

# STANDARD SPECIFICATIONS

JULY 1992



# **STANDARD SPECIFICATIONS**

## **CITY OF SAN JOSE DEPARTMENT OF PUBLIC WORKS**

**JULY 1992**

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Mayor**

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## **FOREWORD TO GENERAL PROVISIONS**

This 1992 edition of the City of San Jose Standard Specifications for Public Works Construction, issued by the Department of Public Works, is a complete revision of and supersedes the publication of the same title dated 1975.

General Provisions, Sections 1 through 9 of these City Standard Specifications are complete as included herein. These provisions are patterned after the Caltrans Standard Specifications; however, they have been modified to make them consonant with City of San Jose requirements. In addition, the subsections within Sections 1 through 9 of the City Standard Specifications bear identical numbers and cover the same subject matter of the Caltrans Standard Specifications. Additional subsections have been added to the Caltrans Standard Specifications as necessary to complete these Standard Specifications.





**SECTION 1  
DEFINITION AND TERMS**

<b>1-1.01</b>	<b>General</b>
<b>1-1.02</b>	<b>Abbreviations</b>
<b>1-1.03</b>	<b>Definitions and Terms</b>
<b>thru</b>	
<b>1-1.49</b>	



**CITY OF SAN JOSE  
STANDARD SPECIFICATIONS  
FOR  
PUBLIC WORKS CONSTRUCTION**

**SECTION 1 - DEFINITION AND TERMS**

**1-1.01 General.** - 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 1.

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

**1-1.02 Abbreviations.**

AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APHA	American Public Health Association
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHVE	American Society of Heating and Ventilating Engineers
ASLA	American Society of Landscape Architects
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gage
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
EEL	Electrical Engineers Institute
EIA	Electronic Industries Association
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineers Society
IMSA	International Municipal Signal Association
NEC	National Electrical Code
NEMA	National Electric Manufacturers Association
PUC	Public Utilities Commission
REA	Rural Electrification Administration
SS	State Specifications

UBC	Uniform Building Code
UL	Underwriters' Laboratories Inc.
CF	Cubic Foot
CSJ	City of San Jose
CY	Cubic Yard
EA	Each
GAL	Gallon
LB	Pound
LF	Linear Foot
LS	Lump Sum
MFBM	Thousand Foot Board Measure
MI	Mile
MSYD	Thousand Station Yard
SQFT	Square Foot
SQYD	Square Yard
STA	Station
TAB	Tablet

**1-1.03 Acceptance.** - The formal written acceptance by the Engineer of an entire contract which has been completed in all respects in accordance with the plans and specifications and any modifications thereof previously approved.

**1-1.032 Addendum.** - A written modification of the contract documents provided to holders of the contract documents prior to the opening of proposals issued by the Engineer.

**1-1.034 Admitted Surety, Insurer or Carrier.** - A surety or insurance carrier admitted to transact insurance in the State of California, as evidenced by the surety's or insurer's possession of a valid Certificate of Authority issued by the California Department of Insurance, as defined by the California Insurance Code.

**1-1.036 Award.** - The acceptance by the approval authority of a proposal.

**1-1.04 (Blank)**

**1-1.05 Base.** - A layer of specified material of planned thickness placed immediately below the pavement or surfacing.

**1-1.06 Basement Material.** - The material in excavation or embankments underlying the lowest layer of subbase, base, pavement, surfacing or other specified layer which is to be placed.

**1-1.07 Bidder.** - Any individual, firm, partnership, corporation, or combination thereof, submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.

**1-1.075 Bidder's Bond.** - Form of proposal guaranty accompanying the proposal submitted by the bidder.

**1-1.08 Bridge.** - Any structure which carries a utility facility, or railroad, highway, street, or road, pedestrian, or other traffic, over a water course or over or under or around any obstruction.

**1-1.081 Calendar Day.** - A calendar day shall be any day including all legal holidays, Saturdays and Sundays.

**1-1.082 Caltrans.** - The Department of Transportation of the State of California organized to administer the affairs relating to State highways.

**1-1.083 Caltrans Specifications.** - The standard specifications of the State of California, Department of Transportation.

**1-1.084 City Clerk.** - City Clerk of the City of San Jose, and Ex-officio Clerk of the City Council.

**1-1.085 City Council.** - City Council of the City of San Jose.

**1-1.086 City of San Jose.** - A chartered municipal corporation of the State of California, as created by law; also referred to as the "City" or "Owner."

**1-1.087 City Manager.** - Chief Administrative Officer of the City.

**1-1.088 Conduit.** - A pipe or tube in which smaller pipes, tubes, or electrical conductors are inserted or are to be inserted.

**1-1.09 Contract.** - The written agreement covering the performance of the work and the furnishing of labor, materials, tools, and equipment in the construction of the work. The contract shall include the notice to contractors, proposal, plans, specifications, special provisions, written addenda and contract bonds; the required insurance and any Resolution of Intention of the City Council to order the work done or improvement made which is the subject of the plans and specifications; also any and all supplemental agreements amending or extending the work contemplated and which may be required to complete the work in a substantial and acceptable manner; also referred to as "Contract Documents." Supplemental agreements are written agreements covering alterations, amendments or extensions to the contract and include but are not limited to contract change orders.

**1-1.092 Contract Change Order.** - A written order to the Contractor, covering changes to the contract found by the City to be necessary for the proper completion or construction for the whole work contemplated by the contract, and establishing the basis of payment and/or time adjustments for the work affected by the changes, also sometimes referred to as a "Change Order."

**1-1.094 Contract Item (Pay Item).** - A specific unit of work for which a price is provided in the contract.

**1-1.096 Contract Time.** - The number of working or calendar days allowed for completion of the contract. If a calendar date of completion is shown in the proposal in lieu of a number of working or calendar days, the contract shall be completed by that date.

**1-1.10 Contractor.** - The person or persons, firm, partnership, corporation, or combination thereof private or municipal, who have entered into a contract with the City or the City's legal representatives.

**1-1.102 County Agencies.** - Whenever, in these specifications, reference is made to any County agency or officer, such reference shall be deemed made to any agency or officer succeeding in accordance with law to the powers, duties, jurisdiction and authority of the agency or officer mentioned.

**1-1.104 County Engineer.** - The County Engineer of the county in which the work is to be performed, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties properly delegated to them.

**1-1.11 Culvert.** - Any structure, other than a bridge, which provides an opening under a roadway for drainage or other purposes.

**1-1.115 Date of Acceptance.** - The date which the Notice of Completion and Acceptance is filed at the office of the County Clerk in the county in which the work is performed.

**1-1.12 Days.** - Unless expressly otherwise designated, days as used in the specifications will be understood to mean calendar days.

**1-1.13 Department of Public Works.** - The Department of Public Works of the City of San Jose as created by law, also referred to herein as the "Department."

**1-1.14 Detour.** - A temporary route for traffic around a closed portion of a road.

**1-1.15 Director of Public Works.** - The executive officer of the Department of Public Works, as created by law also referred to as the "Director"; also the ex-officio Superintendent of City Streets, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties properly delegated to them; also referred to herein as the "Engineer."

**1-1.16 Divided Highway.** - A highway with separated traveled ways for traffic, generally in opposite directions.

**1-1.17 (Blank)**

**1-1.18 Engineer.** - The City Engineer of the City of San Jose, being also the Director of the Department of Public Works of the City of San Jose, and ex-officio Superintendent of City Streets of San Jose, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties properly delegated to them.

**1-1.19 Engineer's Estimate.** - The list of estimated quantities of work to be performed as contained in the Proposal.

**1-1.20 Federal, State or Local Agencies.** - Whenever, in the specifications, reference is made to any Federal, State or Local agency or officer, including but not limited to the City, such reference shall be deemed made to any agency or officer succeeding in accordance with law to the powers, duties, jurisdiction, and authority of the agency or officer mentioned.

**1-1.21 Fixed Costs.** - Any necessary labor, material and equipment costs directly expended on the item or items under consideration which remain constant regardless of the quantity of the work done.

**1-1.22 Frontage Road.** - A local street or road auxiliary to and located generally on the side of an arterial highway for service to abutting property and adjacent areas and for control of access.

**1-1.225 Full Compensation.** - Total and complete payment including overhead and profit for furnishing all supervision, labor, materials, tools, equipment, and doing all work involved in providing the item complete and in place in accordance with the requirements of the contract.

**1-1.23 Grading Plane.** - The surface of the basement material upon which the lowest layer of subbase, base, pavement, surfacing, or other specified layer, is placed.

**1-1.24 Highway.** - The whole right of way or area which is reserved for and secured for use in constructing the roadway and its appurtenances also referred to herein as "street" or "road."

**1-1.242 Improvement District.** - The district to be benefitted by the work and assessed to pay the cost and expenses thereof.

**1-1.245 Inspector.** - An authorized representative of the Engineer, acting exclusively for the benefit of City, properly assigned to make all necessary inspections of the work performed or being performed, or of the materials furnished or being furnished by the Contractor for conformance to the contract documents.

**1-1.25 Laboratory.** - The established laboratory of the Department or other laboratories authorized by the Department to test materials and work involved in the contract.

**1-1.255 Legal Holidays.** - Those days designated as holidays in the City of San Jose Municipal Code.

**1-1.257 Limit of Work.** - The area described or outlined on the project plans. This area shall constitute the extent of the contractor's operation related to the project.

**1-1.26 Liquidated Damages.** - The amount prescribed in the specifications to be paid to the City or to be deducted from any payments due or to become due the Contractor for each day's delay in completing the whole or any specified portion of the work beyond the time allowed in the specifications.



**1-1.265 Manual of Traffic Controls.** - The Department of Transportation (Caltrans) publication entitled "MANUAL OF TRAFFIC CONTROLS for Construction and Maintenance Work Zones."

**1-1.267 Material Storage Area** - An area, if any, described or outlined on the project plans to be used by the Contractor for material and equipment storage related to the project.

**1-1.27 Median.** - That portion of a divided highway separating the traveled ways for traffic in opposite directions including inside shoulders.

**1-1.272 Notice of Award of Contract.** - The notice by the City Clerk setting forth particulars and the name of the lowest responsive and responsible bidder awarded the contract for the work.

**1-1.274 Notice to Contractors.** - The advertisement for proposals for all work on which bids are required. Such advertisement will indicate, among other things, the location of the work to be done, bonding requirements, licensing requirements, and the time and place of opening of bids.

**1-1.276 Notice to Proceed.** - The notice issued by the Engineer authorizing the Contractor to proceed with the work, among other particulars.

**1-1.277 Notice of Termination.** - The written notice issued by the Engineer specifying that the contract is terminated.

**1-1.28 Pavement.** - The uppermost layer of material placed on the traveled way or shoulders. This term is used interchangeably with surfacing.

**1-1.29 Plans.** - The official project plans, and Standard Plan Details, profiles, typical cross sections, working drawings and supplemental drawings, or reproductions thereof, approved by the Engineer, which show the location, character, dimensions and details of the work to be performed. All such documents are to be considered as a part of the plans whether or not reproduced in the special provisions.

In the above definition, the following terms are defined as follows:

- (a) **Standard Plan Details** - The Standard Plan Details of the Department, approved by City Council, also referred to herein as Standard Details.
- (b) **Project Plans.** - The project plans are specific details and dimensions peculiar to the work and are supplemented by the Standard Plans insofar as the same apply.

**1-1.295 Private Improvement Contract.** - Any improvement contract financed by a private party other than the City, to be constructed in public or private streets, and easements.

**1-1.30 Processing.** - Any operation or operations of whatever nature and extent required to produce a specified material.

**1-1.31 Proposal.** - The offer of the bidder for the work when made out and submitted on the prescribed proposal form, properly signed and guaranteed, sometimes also referred to herein as a bid.

**1-1.32 Proposal Form.** - The approved form upon which the City requires formal bids be prepared and submitted for the work.

**1-1.33 Proposal Guaranty.** - The cash, cashier's check, certified check, or bidder's bond accompanying the proposal submitted by the bidder, as a guaranty that the bidder will enter into a contract with the City for the performance of the work, if it is awarded to the bidder, and will provide the contract bonds and insurance required of the bidder.

**1-1.334 Right of Way.** - The whole right-of-way or area which is reserved for and secured for use in constructing the improvement and its appurtenances.

**1-1.34 Roadbed.** - The roadbed is that area between the intersection of the upper surface of the roadway and the side slopes or curb lines. The roadbed rises in elevation as each increment or layer of subbase, base, surfacing or pavement is placed. Where the medians are so wide as to include areas of undisturbed land, a divided roadway is considered as including 2 separate roadbeds.

**1-1.35 Roadway.** - That portion of the right of way included between the outside lines of sidewalks, or curbs, slopes, ditches, channels, waterways, and including all the appertaining structures, and other features necessary to proper drainage and protection.

**1-1.36 Shoulders.** - The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

**1-1.37 Special Provisions.** - Specific clauses setting forth conditions or requirements peculiar to the work and supplementary to these Standard Specifications. The State of California Department of Transportation (Caltrans) publications entitled "Labor Surcharge And Equipment Rental Rates" and "General Prevailing Wage Rates" are to be considered as a part of the special provisions.

**1-1.38 Specifications.** - The directions, provisions and requirements contained in these Standard Specifications as supplemented by the special provisions.

**1-1.39 State.** - The State of California.

**1-1.40 (Blank)**

**1-1.41 Subbase.** - A layer of specified material of planned thickness between a base and the basement material.

**1-1.42 Subgrade.** - That portion of the roadbed on which pavement, surfacing, base, subbase, or a layer of any other material is placed.

**1-1.425 Substantial Completion.** - When the work, or designated portion thereof, is sufficiently complete in accordance with the contract documents so that the City can occupy or utilize the work, or designated portion thereof, for the use for which it was intended, as evidenced by the Engineer's Certificate of Substantial Completion. The Certificate of Substantial Completion shall set forth the date on which substantial completion is deemed by City in its sole discretion to have occurred, subject to the provisions of Section 7-1.166 "Substantial Completion."

**1-1.43 Substructure.** - All that part of the bridge below the bridge seats, tops of piers, haunches of rigid frames, or below the spring lines of arches. Backwalls and parapets of abutments and wing walls of bridges shall be considered as parts of the substructure.

**1-1.435 Superintendent of Streets.** - The Superintendent of City Streets of San Jose, also referred to as the "Engineer," "Director of Public Works," or "Director," acting directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

**1-1.44 Superstructure.** - All that part of the bridge except the bridge substructure.

**1-1.45 Surfacing.** - The uppermost layer of material placed on the traveled way, or shoulders. This term is used interchangeably with pavement.

**1-1.46 Traffic Lane.** - That portion of a traveled way for the movement of a single line of vehicles.

**1-1.47 Traveled Way.** - That portion of the roadway for the movement of vehicles, exclusive of shoulders.

**1-1.48 Work.** - All the work specified, indicated, shown or contemplated in the contract to construct the improvement, including, but not limited to, all alterations, amendments or extensions thereto made by contract change order or other written orders of the Engineer.

**1-1.49 Working Day.** - 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 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; or
- (c) Days on which the Contractor is prevented, by reason of requirements in the "Maintaining Traffic" section of 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.

END OF SECTION



**SECTION 2**  
**PROPOSAL REQUIREMENTS AND CONDITIONS**

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## SECTION 2

## PROPOSAL REQUIREMENTS AND CONDITIONS

**2-1.01 Contents of Proposal Forms.** - Prospective bidders will be furnished with proposal forms which will state the location and description of the contemplated construction and may show the approximate estimate of the various quantities and kinds of work to be performed or materials to be furnished, with a schedule of items for which bid prices are asked. All special provisions will be grouped together and attached to the proposal form.

**2-1.02 Approximate Estimate.** - The quantities when given in the proposal and contract are approximate only, being given as a basis for the comparison of bids. The City does not, expressly or by implication, represent or agree that the actual amount of work will correspond therewith, and reserves the right to increase or decrease the amount of any class or portion of the work, or to omit portions of the work, as may be deemed necessary or advisable by the Engineer. The bidder shall verify the actual quantities necessary for the work.

Where the City has prepared an engineer's estimate for the cost of the work, such estimate is made only for the purpose of comparison, study and design by City. Such estimate is not a part of the contract and is provided solely for the convenience of the bidder or contractor to use or not as the bidder or Contractor shall deem appropriate. It is expressly understood and agreed that the City assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the estimate thus made, the records thereof, or of the interpretations set forth therein or made by the City in its use thereof and there is no warranty or guaranty, either express or implied, that the estimate or records thereof are accurate representations of the actual cost of construction.

**2-1.03 Examination of Plans, Specifications, Contract, and Site of Work.** - The bidder shall examine carefully the site of the work contemplated, the plans and specifications, and the proposal and contract forms therefor. The submission of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and scope of work to be performed, the quantities of materials to be furnished, and as to the requirements of the proposal, plans, specifications, and the contract.

Where the City has made investigations of site conditions including subsurface conditions in areas where work is to be performed under the contract, or in other areas, some of which may constitute possible local material sources, such investigations are made only for the purpose of study and design. Where such investigations have been made, bidders or Contractors may, upon written request, inspect the records of the City as to such investigations subject to and upon the conditions hereinafter set forth. Such inspection of records may be made at the office of the Department.

The records of such investigations are not a part of the contract and are shown solely for the convenience of the bidder or contractor. It is expressly understood and agreed that the City assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the investigations thus made, the records thereof, or of the interpretations set forth therein or made by the City in its use thereof and there is no warranty or guaranty either express or implied, that the conditions indicated by such investigations or records thereof are representative of those



existing throughout such areas, or any part thereof, or that unlooked-for developments may not occur, or that materials other than, or in proportions different from those indicated, may not be encountered.

When a log of test borings or other record of geotechnical data obtained by the City's investigation of subsurface conditions is included with the contract plans, it is expressly understood and agreed that said record does not constitute a part of the contract, represents only the opinion of the City as to the character of the materials or the conditions encountered by it in its investigations at the precise place indicated and the time of year such investigation(s) was made, and is included in the plans only for the convenience of bidders and its use is subject to all of the conditions and limitations set forth in this Section 2-1.03.

In some instances, the information from such site investigations considered by the Department to be of possible interest to bidders or contractors has been compiled as "Materials Information." Said "Materials Information" is not a part of the contract and is furnished solely for the convenience of bidders or contractors. It is understood and agreed that the fact that the Department has compiled the information from such investigations as "Materials Information" and has exhibited or furnished to the bidders or contractors such "Materials Information" shall not be construed as a warranty or guaranty, express or implied, as to the completeness or accuracy of such compilations and the use of such "Materials Information" shall be subject to any of the conditions and limitations set forth in this Section 2-1.03 and Section 6-2, "Local Materials."

When contour maps were used in the design of the project, the bidders may inspect such maps, and if available, they may obtain copies for their use.

The availability or use of information described in this Section 2-1.03 is not to be construed in any way as a waiver of the provisions of the first paragraph in this Section 2-1.03 and a bidder or contractor is cautioned to make such independent investigation and examination as they deem necessary to satisfy themselves as to conditions to be encountered in the performance of the work and, with respect to possible local material sources, the quality and quantity of material available from such property and the type and extent of processing that may be required in order to produce material conforming to the requirements of the specifications.

No information derived from such inspection of records of investigations or compilation thereof will in any way relieve the bidder or contractor from any risk or from properly fulfilling the terms of the contract.

**2-1.04 Mass Diagram.** - If a mass diagram has been prepared for a project, it will be available to the bidders upon the following conditions:

The swell or shrinkage of excavated material and the direction and quantities of haul or overhaul as shown on said mass diagram are for the purpose of design only, and in like manner as provided in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," concerning furnishing information resulting from subsurface investigations, the City assumes no responsibility whatever in the interpretation or exactness of any of the information shown on said mass diagram, and does not, either expressly or impliedly, make any guaranty of the same.

**2-1.05 Proposal Forms.** - The City will furnish to each bidder a standard proposal form, which, when filled out and executed shall be submitted as their bid. Bids not presented on forms so furnished may, in the City's sole discretion, be deemed nonresponsive and rejected on that basis.

On all bid items for which bids are to be received on a unit price basis, the unit price for all items bid shall be shown, as well as the extended price (unit price multiplied by the number of units shown on the proposal form) for each bid item bid. In the case of any discrepancy between the extended price for any bid item bid, the unit price multiplied by the number of units shall prevail. In the event of any discrepancy between the total contract amount and the sum of the extended prices of all items, the sum of the extended prices of all items shall prevail.

The proposal form is bound in a book together with the Notice to Contractors, special provisions, and contract. The proposal shall set forth the item prices and totals, in clearly legible figures, in the respective spaces provided and shall be signed by the bidder, who shall fill out all blanks in the proposal form as therein required.

The bidder shall also fill out all blanks in the proposal forms for any alternative to the project proposed by the City; failure to do so may, in the City's sole discretion, result in the proposal being considered nonresponsive and rejected on that basis.

All proposal forms may also be obtained from the Engineer's office in San Jose, California, unless otherwise noted in the Notice to Contractors. No proposals submitted by facsimile (FAX) or any other electronic means will be accepted.

The proposal shall be submitted as directed in the "Notice to Contractors" under sealed cover plainly marked as a proposal, and identifying the project to which the proposal relates and the date of the bid opening therefor. Proposals which are not properly marked may be disregarded at the sole discretion of City.

**2-1.06 Rejection of Proposals.** - The City, in its sole discretion, may reject any or all bids or proposals presented. Proposals may be rejected if (among other things) they show any alteration of form, additions not called for, conditional bids, incomplete bids, erasures, or irregularities of any kind, or a disproportionate amount of payment being made on any item of work during any phase of the project, or fail to provide a price on all bid items, including all alternates or proposals submitted which are not in strict compliance with the directions in the Notice to Contractors. The City may, in its sole discretion, waive any informalities or minor irregularities in the bid or proposal.

Proposals not submitted in strict compliance with the directions in the Notice to Contractors may, in City's sole discretion, be deemed non-responsive and rejected on that basis.

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 co-partnership, a "Power of Attorney" must be on file with the City Clerk prior to opening bids or shall be submitted with the proposal; otherwise, the proposal may be rejected at the City's sole discretion as irregular and unauthorized.

Proof of the authority of the person or persons signing on behalf of the bidder shall be provided to City upon request after the bid opening.

**2-1.07 Proposal Guaranty.** - All bids shall be presented under sealed cover and accompanied by one of the following forms of bidder's security:

## SECTION 2

## PROPOSAL REQUIREMENTS AND CONDITIONS

Cash, a cashier's check or a certified check made payable to City, or a bidder's bond executed by an admitted surety insurer naming the City as beneficiary.

The security shall be in an amount equal to at least 10 percent of the total amount bid including all alternates. A bid will not be considered unless one of the specified forms of bidder's security is enclosed with it.

A bidder's bond shall conform to the bond form included in the book entitled "Special Provisions, Notice to Contractors, Proposal, and Contract" for the project and shall be properly filled out and executed. The form of bidder's bond included in the said book must be used. Upon request "Bidder's Bond" forms may be obtained from the City.

**2-1.08 Withdrawal of Proposals.** - Any proposal may be withdrawn at any time prior to the time fixed in the Notice to Contractors for the opening of bids only by written request for the withdrawal of the bid filed with the City Clerk. The request shall be executed by the bidder or the bidder's duly authorized representative. The withdrawal of a bid does not prejudice the right of the bidder to file a new bid. Whether or not bids are opened exactly at the time fixed in the Notice to Contractors, a bid will not be received after that time, nor may any bid be withdrawn after the time fixed in the Notice to Contractors for the opening of bids.

**2-1.09 Public Opening of Proposals.** - Proposals will be opened and read publicly at the time and place indicated in the "Notice to Contractors." Bidders or their authorized agents are invited to be present.

**2-1.095 Relief of Bidders.** - After the time set for the opening of bids, a bidder shall not be relieved of their bid unless by consent of the City nor shall any change be made in the bid because of mistake. However, if no relief is granted and the bid guarantee declared forfeit, the bidder may bring an action against the City in a court of competent jurisdiction in Santa Clara County for the recovery of the amount forfeited, without interest or costs.

The complaint shall be filed, and summons served on the Director of Public Works of the City of San Jose, within 90 days after the opening of the bid; otherwise, the action shall be dismissed.

To be relieved of its bid without forfeiture of its bid security the bidder shall establish to the satisfaction of the City, determined in its sole and absolute discretion, that:

- (1) A mistake was made.
- (2) The Contractor gave the City written notice within five working days after the opening of the bids of the mistake, specifying in detail in the notice how the mistake occurred.
- (3) The mistake made the bid materially different than the Contractor intended it to be.
- (4) The mistake was made in filling out the bid and not due to an error in judgment or to carelessness by the Contractor in inspecting the site of the work, or in reading the plans or specifications.

Other than the above described notice to the City, no claim is required to be filed by the bidder before bringing a legal action against the City under this Section to recover a forfeited bid guarantee.

A bidder who claims a mistake and who forfeits its bid guarantee shall be prohibited from participating in further bidding on the project on which the mistake was claimed and security forfeited. However, a bidder who is relieved of its bid without forfeiture of its bid guarantee may bid again on the project if it is put out for rebid.

**2-1.10 Disqualification of Bidders.** - Any one or more of the following causes may, at City's sole discretion, be considered as sufficient for the disqualification of bidder and the rejection of their bid or bids:

1. The bidder has been barred from bidding on City projects under the provisions of the San Jose Municipal Code, Section 14.4.600 et seq.
2. More than one proposal from an individual, firm, partnership, corporation, or combination thereof under the same or different names is received, all such proposals will not be considered.
3. Evidence of collusion among bidders.
4. Lack of competency as revealed by any financial statement, as may be required by the special provisions, or by experience or plant and equipment statements submitted.
5. Lack of responsibility as shown by past work on any Public Works project for any public entity judged from the standpoint of workmanship and progress.
6. Incomplete work on any Public Works project for any public entity which, in the judgment of the City, might hinder or prevent the prompt completion of additional work if awarded.
7. Being in arrears on any existing Public Works contract for any public entity, in litigation with the City, or having defaulted on a previous contract with any public entity.
8. Failure of the bidder to have a valid Contractor's license in the class specified in the Notice to Contractors at the time of bid opening, except as provided for projects where federal funds are involved as specified in Section 7-1.01.
9. Failure of the bidder to provide prices for all items in the proposal, including alternatives, or submitting an incomplete or otherwise non-responsive proposal.
10. Any other ground which the Engineer determines, in the Engineer's sole discretion, significantly impairs the ability of the Contractor to perform on a City project.

**2-1.108 Compliance with Orders of the National Labor Relations Board.** - Pursuant to Public Contract Code Section 10232, the contractor shall swear by a statement, under penalty of perjury, that no more than one final,

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## PROPOSAL REQUIREMENTS AND CONDITIONS

unappealable finding on contempt of court by a federal court has been issued against the contractor within the immediately preceding 2-year period because of the contractor's failure to comply with an order of a federal court which orders the contractor to comply with an order of the National Labor Relations Board. For purpose of said Section 10232, a finding of contempt does not include any finding which has been vacated, dismissed, or otherwise removed by the court because the Contractor has complied with the order which was the basis for the finding. The City may rescind any contract in which the contractor falsely swears to the truth of the statement required by said Section 10232.

The statement required by said Section 10232 is on the page preceding the signature page of the proposal.

**2-1.11 Debarment of Bidders.** - All bidders are hereby advised that the City has an ordinance in place which precludes certain contractors, subcontractors and suppliers from performing work or providing material or services on City projects. Within 5 days of the date set for the opening of bids, each bidder is responsible for contacting the City to determine which contractors, subcontractors and suppliers have been barred from City projects. A bidder may not submit a bid on any City project which contemplates the use of such contractors, subcontractors or suppliers. The listing of such contractors, subcontractors or suppliers on the bid proposal by any bidder will, at the City's sole option, be grounds for rejecting the bid as nonresponsive.

If after commencement of the work of improvement the City becomes aware that the Contractor to whom the contract has been awarded is using a contractor, subcontractor or supplier who was barred from performing work or providing materials or services on City projects at the time of bid, the City may, in its sole discretion, terminate the contract for cause as provided for elsewhere in these Specifications.

**2-1.12 Material Guaranty.** - The successful bidder may be required to furnish a written guaranty covering certain items of work for varying periods of time from the date of acceptance of the contract. The work to be guaranteed, the form, and the time limit of the guaranty will be specified in the special provisions or as specified in Section 7-1.23, "Final Guarantee". Said guaranty shall be signed and delivered to the Engineer before acceptance of the contract. Upon completion of the contract the amounts of the 2 contract bonds required in Section 3-1.02, "Contract Bonds," may be reduced to conform to the total amount of the contract bid prices for the items of work to be guaranteed, and this amount shall continue in full force and effect for the duration of the guaranty period. The payment bond shall not be reduced until the expiration of the time required by Section 3249 of the Civil Code.

**2-1.13 Qualification of Bidders.** - Each bidder may be required to furnish the City with satisfactory evidence of their competency to perform the work contemplated. The City reserves the right to reject a bidder as not responsible, if the bidder has not submitted a statement of their qualifications, or experience on or before the date of the opening of the proposals.

Each bidder may be required to furnish a statement covering experience on similar work, a list of machinery, plant, other equipment available for the proposed work on or before the date of the opening of the proposals. Bidder shall provide the City with all documents reasonably necessary to perform such

investigation within a reasonable time after a request by the City that the bidders do so. The City reserves the right to make an investigation of information submitted.

The bidder shall also submit a statement relating to their experience in performing construction work similar to that for which the proposal is offered. The bidder shall also file with the City a statement relating to the amount and condition of the equipment as often as may be required by the City. Both the experience and equipment statements referred to shall be submitted in a manner acceptable to the City.

It is the intention of the City to award a contract only to a bidder who furnishes satisfactory evidence that the bidder has the requisite experience and ability and that the bidder has sufficient capital, facilities and plant to enable them to prosecute the work successfully and promptly, and to complete the work within the time specified in the plans and contract.

To determine the degree of responsibility to be credited to a bidder, the City will weigh any evidence that the bidder or personnel guaranteed to be employed by the bidder in responsible charge of the work has or has not performed satisfactorily on other contracts of like nature and magnitude or comparable difficulty at similar rates of progress.

**2-1.14 Addenda and Interpretations.** - Written addenda by way of clarifications, amendments, changes or additions to the Contract Documents including a change to the proposed opening time, date or place may be issued by the City before the opening of proposals. Addenda will be mailed by certified mail with return receipt requested or telephone facsimile (FAX) transmitted to all prospective bidders prior to the opening of bids. Failure of any bidder to receive any addenda shall not relieve the bidder from any obligations imposed by the addenda. All addenda issued shall become part of the contract and the price therefore, set forth in the proposal. The bidder's failure to sign and submit any or all addenda with the bid shall be a cause for rejection of the bid.

Every request for interpretation should be in writing addressed to the Director of Public Works at 801 North First Street, San Jose, CA 95110, and to be given consideration, must be received at least 5 days prior to the date fixed for the opening of bids. Any and all interpretations will be in the form of writing which, if issued, will be mailed by certified mail with return receipt requested or transmitted by telephone facsimile (FAX) to all prospective bidders prior to the opening of bids. Failure of any bidder to receive any interpretation shall not relieve the bidder from any obligation under their bid as submitted and the bidder shall be required to perform the work as modified by the interpretation. All interpretations issued, shall become part of the contract.

No oral interpretation of the meaning of the plans, specifications or other documents will be made. If any such oral interpretation is made, it shall not be considered by the bidder in preparing its proposal.

**2-1.15 Subcontracting Requirements.** - Subcontracting requirements are as follows, and as may be contained in the Special Provisions:

**2-1.15A Designation of Subcontractors.** - Each bidder shall in their proposal set forth:

1. The name and the location of the place of business 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, or a subcontractor licensed by the State of California who, under subcontract to the Contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of 1/2 of one percent of the Contractor's total bid or, in the case of bids or offers for the construction of streets or highways, including bridges, in excess of 1/2 of one percent of the Contractor's total bid or \$10,000, whichever is greater.
2. The portion of the work which will be done by each subcontractor.
3. The Contractor shall list only one subcontractor for each portion of the work as defined by the Contractor in their proposal.
4. If the Contractor fails to specify a subcontractor or if the Contractor specifies more than one subcontractor for the same portion of work to be performed under the contract in excess of 1/2 of one percent of the Contractor's total proposal, the Contractor agrees that it is fully qualified to perform that portion itself, and that the Contractor shall perform that portion of the work.
5. If after award of the contract, the Contractor subcontracts, without obtaining the consent of the City as provided herein, any such portion of the work, the Contractor shall be subject to the penalties set forth in Section 2.1.15G below.

Circumvention by a Contractor of the requirements of this Section by the device of listing a subcontractor who will in turn sublet portions constituting the majority of the work covered by the contract, shall be considered a violation of this Section and shall subject that Contractor to the penalties set forth in Section 2.1.15G below.

**2-1.15B Substitution of Subcontractors.** - No contractor whose bid is accepted shall:

1. Substitute any person as subcontractor in place of the subcontractor listed in the original bid, except where the City, or its duly authorized officer, may, except as otherwise provided, have consented to the substitution of another person as a subcontractor in any of the following situations:
  - (a) When the subcontractor listed in the bid after having had a reasonable opportunity to do so fails or refuses to execute a written contract, when that written contract, based upon the

- general terms, conditions, plans and specifications for the project involved or the terms of that subcontractor's written bid, is presented to the subcontractor by the Contractor.
- (b) When the listed subcontractor becomes bankrupt or insolvent.
  - (c) When the listed subcontractor fails or refuses to perform its subcontract.
  - (d) When the listed subcontractor fails or refuses to meet the bond requirements of the Contractor as set forth in Section 2-1.15D, below.
  - (e) When the Contractor demonstrates to the City, subject to the further provisions set forth in Section 2-1.15C, below, that the name of the subcontractor was listed as the result of an inadvertent clerical error.
  - (f) When the listed subcontractor is not licensed at the time of bid pursuant to the Contractors License Law on non-federally funded projects or at the time of award on federally funded projects.
  - (g) When the City determines that the work performed by the listed subcontractor is substantially unsatisfactory and not in substantial accordance with the plans and specifications, or that the subcontractor is substantially delaying or disrupting the progress of the work.

Prior to approval of the Contractor's request for a substitution of subcontractor, the City shall give notice in writing to the listed subcontractor of the Contractor's request to substitute and of the reasons for the request. The notice shall be served by certified or registered mail to the last known address of the subcontractor. The listed subcontractor who has been so notified shall have 5 working days within which to submit written objections to the substitution to the City. Failure to file these written objections shall constitute the listed subcontractor's consent to the substitution.

If written objections are filed, the City shall give notice in writing of at least 5 working days to the listed subcontractor of a hearing by the City on the Contractor's request for substitution.

2. Permit any subcontract to be voluntarily assigned or transferred or allow it to be performed by anyone other than the subcontractor listed in the original bid, without the consent of the City.



3. Other than in the performance of change orders causing changes or deviations from the original contract, sublet or subcontract any portion of the work in excess of 1/2 of one percent of the prime contractor's total bid as to which the Contractor's original bid did not designate a subcontractor.

**2-1.15C Claims of Inadvertent Clerical Error in Listing of Subcontractor.** - The Contractor as a condition to asserting a claim of inadvertent clerical error in the listing of a subcontractor shall within 2 working days after the time of the bid opening by the City give written notice to the City and copies of that notice to both the subcontractor the Contractor claims to have listed in error and the intended subcontractor who had bid to the Contractor prior to bid opening.

Any listed subcontractor who has been notified by the Contractor in accordance with this section as to an inadvertent clerical error shall be allowed 6 working days from the time of the bid opening within which to submit to the City and to the Contractor written objections to the Contractor's claim of inadvertent clerical error. Failure of the listed subcontractor to file the written notice within the 6 working days shall be primary evidence of the listed subcontractor's agreement that an inadvertent clerical error was made.

The City shall, after a hearing and in the absence of compelling reason to the contrary, consent to the substitution of the intended subcontractor if:

1. The Contractor, the subcontractor listed in error, and the intended subcontractor each submit a declaration or affidavit to the City, along with such additional evidence as the parties may wish to submit, that an inadvertent clerical error was in fact made, provided that the declarations or affidavits from each of the 3 parties are filed within 8 working days from the time of the bid opening, or
2. The declarations or affidavits are filed by both the Contractor and the intended subcontractor within the specified time but the subcontractor whom the Contractor claims to have listed in error does not submit within 6 working days, to the City and to the Contractor, written objections to the Contractor's claim of inadvertent clerical error as provided for in this section, or
3. The declarations or affidavits are filed by both the Contractor and the intended subcontractor but the listed subcontractor has, within 6 working days from the time of the bid opening, submitted to the City and to the Contractor written objections to the Contractor's claim of inadvertent clerical error, the City shall investigate the claims of the parties and shall hold a hearing to determine the validity of those claims.

**2-1.15D Subcontractors Bonding Requirements.** - It shall be the responsibility of each subcontractor submitting bids to a Contractor to be prepared

to submit a faithful performance and payment bond or bonds if so requested by the Contractor.

Prior to bid opening, in the event any subcontractor submitting a bid to the Contractor does not, upon the request of the Contractor and, except as provided below, at the expense of the Contractor at the established charge or premium therefor, furnish to the Contractor a bond or bonds issued by an admitted surety wherein the Contractor shall be named the obligee, guaranteeing prompt and faithful performance of the subcontract and the payment of all claims for labor and materials furnished or used in and about the work to be done and performed under the subcontract, the Contractor may reject the bid and make a substitution of another subcontractor.

The bond or bonds may be required at the expense of the subcontractor only if the Contractor in its written or published request for subbids (1) specified that the expense for the bond or bonds shall be borne by the subcontractor and (2) clearly specifies the amount and requirements of the bond or bonds.

**2-1.15E Subcontracting Where No Subcontractor Listed.** - Subletting or subcontracting of any portion of the work in excess of 1/2 of one percent of the Contractor's total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity demonstrated by the Contractor to the satisfaction of the City or upon a finding by the City that it is in the best interest of the City to allow such substitution. The burden shall be upon the Contractor to prove by compelling evidence the benefit to be derived by the City by allowing such a substitution.

#### **2-1.15F (Blank)**

**2-1.15G Violations of Subcontractor Requirements.** - A contractor violating any of the provisions set forth in Sections 2-1.15A through 2-1.15F is in breach of its contract and the City may exercise the option, in its sole and absolute direction, of (1) canceling the contract or (2) assessing the Contractor a penalty in an amount of not more than 10 percent of the amount of the subcontract involved, and this penalty shall be deposited in the fund out of which the contract was awarded. In any proceedings under this section the Contractor shall be entitled to a public hearing and to 5 days notice of the time and place thereof.

The failure on the part of a Contractor to comply with any provision of Sections 2-1.15A through 2-1.15F shall not constitute a defense to the Contractor in any action brought against the Contractor by a subcontractor.

Nothing in this Section shall limit or diminish any rights or remedies, either legal or equitable, which:

1. An original or substituted subcontractor may have against the Contractor, its successors or assigns.
2. The state or any county, city, body politic, or public agency may have against the Contractor, its successors or assigns, including the right to take over and complete the contract.

**2-1.15H Definitions.** - As used in Sections 2-1.15A through 2-1.15G, inclusive, the word "subcontractor" shall mean a contractor, within the meaning of the provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the

## SECTION 2

## PROPOSAL REQUIREMENTS AND CONDITIONS

California Business and Professions Code, who contracts directly with the Contractor.

"Contractor" shall mean the Contractor who contracts directly with the City.

**2-1.16 Filing of Proposals.** - All proposals must be filed with the Clerk and Ex-officio Clerk of the City Council, in his or her office in City Hall, on or before the time specified in the Notice to Contractors for opening the proposals.

END OF SECTION

**SECTION 3**  
**AWARD AND EXECUTION OF CONTRACT**

3-1.01	Award of Contract
3-1.02	Contract Bonds
3-1.02A	Faithful Performance Bond
3-1.02B	Contractor's Payment Bond
3-1.03	Execution of Contract
3-1.04	Failure to Execute Contract
3-1.05	Return of Proposal Guaranties
3-1.06	Notification of Surety and Insurance Companies
3-1.07	Damages for Collusion



## SECTION 3

## AWARD AND EXECUTION OF CONTRACT

**3-1.01 Award of Contract.** - The City, in its sole discretion, reserves the right to reject any and all proposals.

The award of the contract, if it is awarded, will be to the lowest responsive and responsible bidder whose proposal complies with all the requirements prescribed. If 2 or more bids are the same and lowest, the City may accept either bid it chooses in its sole discretion. Such award, if made, will be made within 90 days after the opening of the proposals. If the lowest responsible bidder refuses or fails to execute the contract, the City may award the contract to the second lowest responsive and responsible bidder. Such award, if made, will be made within 105 days after the opening of the proposals. If the second lowest responsible bidder refuses or fails to execute the contract, the City may award the contract to the third lowest responsive and responsible bidder. Such award, if made, will be made within 120 days after the opening of the proposals. The Department of Public Works may proceed in like manner until the Director either finds a responsible and responsive bidder willing to be awarded the contract or determines that it is not in the best interest of the City to proceed further. The periods of time specified above within which the award of contract may be made shall be subject to extension for such further period as may be agreed upon in writing between the Director and the bidder concerned.

All bids will be compared on the basis of the Engineer's Estimate of the quantities of work to be done.

**3-1.02 Contract Bonds.** - Except as provided by Section 14.04.440 and Section 14.04.460 of the San Jose municipal code, the successful bidder shall, at the time of executing the contract, file the following bonds with the City. Bonds shall be in the same form as those bound with the special provisions.

**3-1.02A Faithful Performance Bond.** - The faithful performance bond shall be a bond in the penal sum of at least 100 percent of the contract price, secured by 2 or more sufficient sureties approved by the Director of Finance or by an admitted surety company, conditioned upon the Contractor's faithful performance of the contract terms within the contract time. In addition, if the Contractor fails to complete the contract within the time fixed in the contract, or such extension thereof as may be allowed by the City, the contract may, by that fact, be terminated for cause and the City shall not thereafter pay or allow the Contractor any further compensation for any work done by the Contractor under said contract, and the Contractor or their sureties shall be liable to the City for all loss or damage which City may suffer by reason of the Contractor's failure to complete their contract within such time. The time limit in the contract for the completion of the work may be extended by the City in accordance with the provisions of Section 8-1.07 "Liquidated Damages."

**3-1.02B Contractor's Payment Bond.** - The payment bond shall be a good and sufficient bond approved by the City in an amount not less than 100 percent of the contract price. To be approved, bond must provide that if the Contractor or their subcontractor fails to pay any of the persons named in Section 3181 of the California Civil Code, or amounts due under the Unemployment

Insurance Code with respect to the work or labor contracted to be done and performed by any claimant, then the surety or sureties will pay for same, in an amount not exceeding the amount of the bond, and also, in case suit is brought upon the bond, a reasonable attorney's fee to be fixed by the court. To be approved, the bond must be issued by an admitted surety and shall, by its term, inure to the benefit of any of the persons named in Section 3181 of the California Civil Code, to give a right of action to such persons or their assigns in any suit brought upon the bond, including the right of action to recover on the bond, in any suit brought to foreclose the liens provided for in Title 15, Part 4, Division 3 of the California Civil Code or in a separate suit brought on this bond. The Bond shall otherwise comply with all of the provisions of Title 15, Part 4, Division 3 of the California Civil Code.

Unless a Contractor's Payment Bond is filed and approved as herein provided, no claim in favor of the Contractor arising under the contract shall be audited, allowed or paid by the City. Any persons named in Section 3181 of the Civil Code of the State of California, shall receive payment of their respective claims in the manner provided by Chapter 4, Part 4, Division 3, Title 15 of the Civil Code of the State of California upon having complied with the conditions of Section 3183 of the Civil Code.

**3-1.03 Execution of Contract.** - The contract shall be signed by the successful bidder and returned, together with the contract bonds and insurance, within 8 days, not including Saturdays, Sundays and legal holidays, after the bidder has received notice that the contract has been awarded.

**3-1.04 Failure to Execute Contract.** - Failure of a responsive and responsible bidder to execute the contract and file acceptable bonds and insurance as provided herein within 8 days, not including Saturdays, Sundays and legal holidays, after such bidder has received notice that the contract has been awarded to them shall be just cause in the City's sole discretion for voiding the award and the forfeiture of the proposal guaranty. The successful bidder may file with the City a written notice, signed by the bidder or their authorized representative, specifying that the bidder will refuse to execute the contract if presented to the bidder. The filing of such notice shall have the same force and effect as the failure of the bidder to execute the contract and furnish acceptable bonds within the time hereinbefore prescribed.

**3-1.05 Return of Proposal Guaranties.** - Until the award and execution by the Contractor of the contract, the Engineer shall hold the proposal guarantees of the three lowest bidders. Any other bid proposal guarantees may be released by the Engineer when the Engineer determines in the Engineer's sole discretion that the best interest of the City would not be served by retaining such proposal guarantees.

**3-1.06 Notification of Surety and Insurance Companies.** - The surety companies and other signers of any of the above mentioned bonds, and all insurance companies, shall familiarize themselves with all of the conditions and provisions of this contract, and they waive the right of special notification of any change or modification of this contract or of extension of time, or of decreased or increased work, or of the cancellation of the contract, or of any other act or acts by the City or its authorized agents, under the terms of this contract, and failure to notify the

sureties or insurance companies of changes shall not relieve the sureties or insurance companies of their obligation under this contract.

**3-1.07 Damages for Collusion.** - If at any time it is found that the person, firm, or corporation to whom the contract has been awarded, in presenting any bid or bids, colluded with any other party or parties, then the contract awarded may be declared by the City to be null and void, and the Contractor and their sureties shall be liable to the City for all loss or damage which the City may have suffered as a result of such collusion, and the City may re-advertise anew for bids for said work.

END OF SECTION





## **SECTION 4 SCOPE OF WORK**

4-1.01	Intent of Plans and Specifications
4-1.02	Final Cleaning Up
4-1.03	Changes
4-1.03A	Procedure and Protest
4-1.03B	Increased or Decreased Quantities
4-1.03B(1)	Increases of More than 25 Percent
4-1.03B(2)	Decreases of More than 25 Percent
4-1.03B(3)	Eliminated Items
4-1.03C	Changes in Character of Work
4-1.03D	Extra Work
4-1.03E	Revocable Contract Items
4-1.04	Detours
4-1.05	Use of Materials Found on the Work
4-1.07	Differing Site Conditions



## SECTION 4

## SCOPE OF WORK

**4-1.01 Intent of Plans and Specifications.** - The intent of the plans and specifications is to prescribe the details for the construction and completion of the work which the Contractor undertakes to perform in accordance with the terms of the contract. Where the plans or specifications describe portions of the work in general terms, but not in complete detail, it is understood that only the best general practice is to prevail and that only materials and workmanship of the first quality are to be used. 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 workmanlike manner.

**4-1.02 Final Cleaning Up.** - Before final inspection of the work, the Contractor shall clean the job site, highway, material sites, and all ground occupied by the Contractor in connection with the work of all rubbish, excess materials, falsework, temporary structures, and equipment. All parts of the work shall be left in a neat and presentable condition. Full compensation for final cleaning up 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 Director.

**4-1.03 Changes.** - The City reserves the right to make such alterations, deviations, additions to or deletions from the plans and specifications, including the right to increase or decrease the quantity of any item or portion of the work or to delete any item or portion of the work, as may be deemed by the City to be necessary for the proper completion or construction of the whole work contemplated.

Any such changes will be set forth in a contract change order which 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 full compensation for such work. A contract change order will not become effective until approved by the City.

Upon receipt of an approved contract change order, the Contractor shall proceed with the ordered work. If ordered in writing by the City, by letter of intent to perform extra work, executed by the Director or the Director's properly authorized agent, 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 will, as soon as practicable, issue an approved contract change order for such work and the provisions in Section 4-1.03A, "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 4-1.03, the Contractor shall, upon request, furnish the 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 4-1.03B (1) or 4-1.03B (2), such cost data shall be submitted with their request.

If City proposes to Contractor that Contractor perform work by way of change order, and the City and Contractor cannot agree upon a price for performing such change order work, City has the right to issue to Contractor a "Directed Change Order" requiring Contractor to perform work at the price and on the terms

which City, in its sole discretion, shall deem reasonable. Contractor will thereafter perform work for the price and on the terms set forth in such change order. The Contractor shall not have the right to terminate the contract based upon the issuance of a "Directed Change Order." Contractor may then make a claim as provided for in this contract for any additional compensation, or time extension, or both which the Contractor believes is due and owing to them for performing such work.

The compensation provided for in each and every change order shall include all costs and taxes applicable thereto, and the City shall not be liable for any increase in taxes during the term of change order work.

The overhead and profit markup on each and every change order shall include full compensation for all costs incurred by the Contractor for any additional time required to complete the change order.

**4-1.03A Procedure and Protest.** - A contract change order approved by the City 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 the Contractor has not executed, the Contractor shall submit a written protest to the City, 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 and 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 Sections 4-1.03B to 4-1.03D, 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 4-1.03B to 4-1.03D, inclusive. The Contractor shall keep full and complete records of the cost of such work and shall permit the City to have such access thereto as may be necessary to assist the City in making 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 8-1.07, "Liquidated Damages."

Proposed contract change orders may be presented to the Contractor for consideration prior to approval by the City. If the Contractor signifies acceptance of the terms and conditions of such proposed contract change order by executing such document and if such change order is approved by the City 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 is an executed contract change order as that term is used in Sections 4-1.03B to 4-1.03D, inclusive. An approved contract change order shall supersede a proposed, but unapproved, contract change order covering the same work.

The City may provide for an adjustment of compensation as to a contract item of work included in a contract change order determined as provided in Sections 4-1.03B to 4-1.03D, inclusive, if such item of work is eligible for an adjustment of compensation thereunder.

**4-1.03B 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 4-1.03C, "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 4-1.03B(1), 4-1.03B(2), or 4-1.03B(3), as the case may be, except as provided in Section 4-1.03E.

**4-1.03B(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 sole option of the City, payment for the work involved in such excess will be made on the basis of force account as provided in Section 9-1.03, "Force Account Payment."

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 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 in the same manner as if the work were to be paid for on a force account basis as provided in Section 9-1.03, or such adjustment will be as agreed to by the Contractor and the City.

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 Engineer reserves the right to make no adjustment in said price if the Engineer so elects, except that an adjustment will be made if requested in writing by the Contractor within 10 working days from the date the Contractor became aware, or should have reasonably become aware, of the increase.

**4-1.03B(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 within 10 working days from the date when the Contractor became aware, or should have reasonably become aware, of the decrease. 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, or at the option of the City payment for the quantity of the work of such item performed will be made on the basis of

force account as provided in Section 9-1.03, 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 in the same manner as if the work were to be paid for on a force account basis as provided in Section 9-1.03, or such adjustment will be as agreed to by the Contractor and the City.

The payment for the total pay quantity of 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.

**4-1.03B(3) Eliminated Items.** - Should any contract item of the work be eliminated in its entirety for any reason, including but not limited to the convenience of the City, 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 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, 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. If the material is returnable to the vendor and if the 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. The actual cost of handling returned material will be paid.

The actual costs or charges to be paid by the City to the Contractor as provided in this Section 4-1.03B (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 9-1.03, "Force Account Payment."

**4-1.03C Changes in Character of Work.** - If an ordered change in the plans or specifications materially changes the character of the work of a contract item from that on which the Contractor based their 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.

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 in the same manner as if the work were to be paid for on a force account basis as provided in Section 9-1.03, or such adjustment will be as agreed to by the Contractor and the City. 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, the work of said item or portion of item

which is changed in character will be paid for by force account as provided in Section 9-1.03.

If the compensation for an item of work is adjusted under this Section 4-1.03C, 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 4-1.03B, "Increased or Decreased Quantities."

Failure of the City 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 their duty and responsibility of filing a written protest within the 15 day limit as provided in Section 4-1.03A, "Procedure and Protest."

**4-1.03D Extra Work.** - New and unforeseen work will be classed as extra work when determined by the City 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 to be covered by some of the various items for which there is a bid price or combinations of such items, the remaining portion of such work will be classed as extra work. Extra work also includes work specifically designated as extra work in the plans or 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, and in the absence of such approved contract change order or other written order of the City 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 4-1.03D, in the absence of an executed contract change order, will be made by force account as provided in Section 9-1.03, or as agreed to by the Contractor and the City.

**4-1.03E Revocable Contract Items.** - Items noted as "Revocable" in the Proposal may be deleted entirely or in part at the sole discretion of the City. The provisions of Section 4-1.03B "Increased or Decreased Quantities" shall not apply to entire or partial deletion of Revocable items.

**4-1.04 Detours.** - The Contractor shall construct and remove detours and detour bridges for the use of public traffic as provided in the special provisions, or as shown on the plans, or as directed by the Engineer. Payment for such work will be made as set forth in the special provisions or at the contract prices for the items of work involved if the work being performed is covered by contract items of work and no other method of payment therefor is provided in the special provisions, otherwise the work will be paid for as extra work as provided in Section 4-1.03D

When public traffic is routed through the work, provision for a passageway through construction operations will not be considered as detour construction or detour maintenance and such work shall conform to and be paid for as provided in Section 7-1.08, "Public Convenience," unless otherwise specified in the special provisions.

Detours used exclusively by the Contractor for hauling materials and equipment shall be constructed and maintained by the Contractor at their expense. The failure or refusal of the Contractor to construct and maintain detours at the proper time shall be sufficient cause for closing down the work until such detours are in satisfactory condition for use by public traffic. Contractor shall not be



allowed additional compensation or an extension of time to complete the work due to such as suspension of work order.

Where the Contractor's hauling is causing such damage to the detour that its maintenance in a condition satisfactory for public traffic is made difficult and unusually expensive, the Engineer shall have authority to regulate the Contractor's hauling over the detour.

**4-1.05 Use of Materials Found on the Work.** - Unless designated as selected material as provided in Section 19-2.07, "Selected Material," the Contractor, with the approval of the Engineer, may use in the proposed construction such stone, gravel, sand or other material suitable in the opinion of the Engineer as may be found in excavation. The Contractor will be paid for the excavation of such materials at the contract price for such excavation, but the Contractor shall replace at their expense with other suitable material all of that portion of the material so removed and used which was contemplated for use in the work, except that the Contractor need not replace, at their expense, any material obtained from structure excavation used as structure backfill. No charge for materials so used will be made against the Contractor. The Contractor shall not excavate or remove any material from within the highway location that is not within the excavation, as indicated by the slope and grade lines, without written authorization from the Engineer.

**4-1.07 Differing Site Conditions.** - For all excavations extending deeper than four feet below the surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the City, in writing, of any:

1. Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the California Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.
2. Subsurface or latent physical conditions at the site differing from those indicated in the contract documents.
3. Unknown physical conditions at the site of any unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

The City 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 costs of, or the time required for, performance of any part of the work, City shall issue a change order under the procedures described in the contract documents.

In the event a dispute arises between the City and the Contractor as to whether or not 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 the contract documents or by law which pertain to the resolution of disputes and protests between the contracting parties.

**END OF SECTION**



## **SECTION 5 CONTROL OF WORK**

5-1.01	Authority of Engineer
5-1.02	Plans and Working Drawings
5-1.02A	Trench Excavation Safety Plans
5-1.03	Conformity With Contract Documents and Allowable Deviations
5-1.04	Coordination and Interpretation of Plans, Standard Specification, and Special Provisions
5-1.04A	Record Drawings
5-1.04B	Arrangement
5-1.05	Order of Work
5-1.06	Superintendence
5-1.065	Status of Contractor
5-1.07	Lines and Grades
5-1.08	Inspection
5-1.08A	Inspection for Sole Benefit of the City
5-1.09	Removal of Rejected and Unauthorized Work
5-1.09A	Acceptance of Defective or Nonconforming Work
5-1.09B	Modification to Contractor's Work
5-1.10	Equipment and Plants
5-1.11	Alternative Equipment
5-1.115	Alternative Methods of Construction
5-1.12	Character of Workers
5-1.13	Final Inspection
5-1.14	Cost Reduction Incentive
5-1.15	Project Appearance
5-1.16	Conferences



## SECTION 5

## CONTROL OF WORK

**5-1.01 Authority of Engineer.** - It will be the Engineer's duty to inspect materials and workmanship for all deviations from the drawings, specifications and other contract provision which may come to the Engineer's notice. Such inspection is for the sole benefit of the City and shall not act as a waiver of defects in the work. The Engineer shall decide all questions which may arise as to the quality or acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of the work; all questions which may arise as to the interpretation of the plans and specifications; all questions as to the acceptable fulfillment of the contract on the part of the Contractor, and all questions as to compensation. The Engineer's decision shall be final and the Engineer shall have authority to enforce and make effective such decisions and orders which the Contractor fails to carry out promptly. The engineer shall have the right to order the work stopped, if in the Engineer's opinion such action becomes necessary, until the Engineer has determined and ordered that the work may proceed in due fulfillment of all contract requirements.

**5-1.02 Plans and Working 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 contract plans shall be supplemented by such working drawings prepared by the Contractor as are necessary to adequately control the work. No change shall be made by the Contractor in any working drawing after it has been reviewed by the Engineer without the further written approval.

Working drawings for any part of the permanent work shall include, but not be limited to: stress sheets, anchor bolt layouts, shop details, erection plans, equipment lists and any other information specifically required elsewhere in the specifications.

Working drawings for cribs, cofferdams, falsework, temporary support systems, haul bridges, centering and form work and for other temporary work and methods of construction the Contractor proposes to use, shall be submitted when required by the specifications or ordered by the Engineer. Such working drawings shall be subject to review by the Engineer insofar as the details affect the character of the finished work and for compliance with design requirements applicable to the construction when specified or called for, but details of design will be left to the Contractor who shall be responsible for the successful construction of the work.

Working drawings shall be reviewed by the Engineer before any work involving such drawings is performed. It is expressly understood that review of the Contractor's working drawings shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications. Such review shall not operate to waive any of the requirements of the plans and specifications or relieve the Contractor of any obligation thereunder, and defective work, materials and equipment may be rejected notwithstanding such review.

Working drawings for any structure shall consist of such detailed plans as may be required for the prosecution of the work and are not included in the plans

furnished by the Engineer. They shall include shop details, erection plans, masonry layout diagrams, and bending diagrams for reinforcing steel, which shall be approved by the Engineer before any work involving these plans is performed. Plans for cribs, cofferdams, falsework, centering and form work shall be required and shall be subject to approval unless approval be waived by the Engineer. These plans will be subject to approval insofar as the details affect the character of the finished work, but other details of design will be left to the contractor, who shall be responsible for the successful construction of the work.

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

Full compensation for furnishing all working 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.

The Engineer's review of working drawings, and other submittals submitted for the Engineer's review by the Contractor shall not act as a waiver of defects subsequently discovered in such documents or in work performed by the Contractor in reliance on those documents.

Working drawings and schedules shall be submitted in such number as required by the Engineer, accompanied by letter of transmittal which shall give a list of the numbers and dates of the drawings submitted. Working drawings shall be complete in every respect and bound in sets. Unless otherwise requested, six copies of working drawings and schedules shall be submitted for approval.

The Contractor shall submit all working drawings and schedules sufficiently in advance of construction requirements to allow ample time for checking, corrections, resubmitting and rechecking.

The Engineer's review of the Contractor's plans shall in no way be construed to impose tort liability on the City or any of its officers or employees by reason of any damage to property or person, including death resulting from or arising out of the use of such plan, and the Contractor shall indemnify and hold harmless the City, its officers and employees from any loss or liability resulting from the use of such plans.

The Contractor shall keep on the work a copy of the plans and specifications including all authorized change orders, and shall at all times give the Engineer and the Engineer's representatives access thereto.

Plans and specifications and copies thereof furnished by the Engineer shall not be used on other projects without the Engineer's consent.

**5-1.02A Trench Excavation Safety Plans.** - Attention is directed to Section 7-1.01E, "Trench Safety." The Contractor shall, before beginning any excavation or trench work, 5 feet or more in depth, secure a permit "to perform Excavation or Trenchwork," from the State of California, Division of Industrial Safety. Excavation for any trench 5 feet or more in depth shall not begin until completion of review by the 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 5 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 Occupational Safety and Health and if such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California.

The acceptance of the copy of the permit "to perform Excavation or Trench work," or review by the Engineer of the Contractor's detailed plan for worker protection from the hazards of caving ground during the excavation of trenches, shall in no way be construed to impose tort liability on the City or any of its officers or employees by reason of any damage to person, including death or property resulting from or arising out of the use of such plan, and the Contractor shall be fully responsible for any such damage, and the Contractor shall indemnify and hold harmless the City, its officers and employees from any loss or liability resulting from the use of such plan.

The permit together with a copy of approved plan for trench safety shall be maintained on the job site at all times.

**5-1.03 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 as to such conformity, the Engineer shall be the sole judge as to whether the work or materials deviate from the plans and specifications, and the Engineer's decision as to any allowable deviations therefrom shall be final.

**5-1.04 Coordination and Interpretation of Plans, Standard Specifications, and Special Provisions.** - These Standard Specifications, the Standard Plan Details, 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.

In case of conflict between the Standard Specifications and Standard Plan Details, the project plans and the special provisions, the order of precedence shall be as follows:

1. Special Provisions
2. Project Plans
3. Standard Plan Details
4. Standard Specifications

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 Engineer for such further explanations as may be necessary and shall conform to them 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 Engineer, whose decision thereon shall be final.

If the Contractor, in the course of the work, discovers any discrepancies between the plans and the conditions actually encountered at the Project site, or any errors or omissions in the plans or in the layout given by stakes, points or



instructions, it shall be the Contractor's duty to inform the Engineer immediately in writing; and the Engineer shall promptly investigate the same. Any work done after such discovery, until authorized will be done at the Contractor's risk.

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.

The headings and titles printed on the plans and in these general conditions, in the specifications and elsewhere in the contract documents, are inserted for the convenience of reference only, and shall not be taken or considered as having any bearing on the interpretation thereof.

**5-1.04A Record Drawings.** - The Contractor shall keep and maintain, on the job site, one record set of Drawings. On these, the Contractor shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Documents, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated in the Contract Documents. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the work as actually constructed. These master record drawings of the contractor's representation of as built conditions, including all revisions made necessary by addenda, change orders, and the like shall be maintained up to date during the progress of the work.

In the case of those drawings which depict the detailed requirements for equipment to be assembled and wired in the factory, such as motor control centers and the like, the record drawing shall be updated by indicating those portions which are superseded by change order drawings or final shop drawings, and by including appropriate reference information describing the change orders by number and the shop drawings by manufacturer, drawing, and revision numbers.

Record drawings shall be accessible to the Engineer at all times during the construction period and shall be delivered to the Engineer upon completion of the Work.

Final payment will not be approved until the Contractor prepared record drawings have been delivered to the Engineer. Said up to date record drawings may be in the form of a set of prints with carefully plotted information as approved by the Engineer.

Upon substantial completion of the Work and prior to final acceptance, the Contractor shall complete and deliver a complete set of record drawings to the Engineer for transmittal to the City, conforming to the construction records of the Contractor. This set of drawings shall consist of corrected plans showing the reported location of the Work. The information submitted by the Contractor and incorporated by the Engineer into the Record Drawings will be assumed to be reliable, and the Engineer will not be responsible for the accuracy of such information, nor for any errors or omissions which may appear on the Record Drawings as a result.

**5-1.04B Arrangement.** - The specifications and drawings herein referred to are arranged and numbered for convenience. Such arrangement and numbering shall not limit the work required by any separate trade. The terms and conditions

of limitation are between Contractor and their sub-contractors. The General Conditions apply to all work including authorized extras.

**5-1.05 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.

**5-1.06 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.

When the Contractor is comprised of 2 or more persons, firms, partnerships, or corporations functioning on a joint venture basis, said Contractor shall designate in writing before starting work, the name of one authorized representative who shall have the authority to represent and act for the Contractor.

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 Engineer shall be made for any emergency work which may be required.

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

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

The Engineer shall be supplied at all times with the names and telephone numbers of at least 2 persons in charge of or responsible for the work who can be reached for emergency work 24 hours a day, 7 days a week.

**5-1.065 Status of Contractor.** - The City's right of supervision hereunder shall not make the Contractor an agent of the City, and the liability of the Contractor for all damages to persons or to public or private property arising from the Contractor's execution of the work, shall not be lessened because of such supervision.

**5-1.07 Lines and Grades.** - Such stakes or marks will be set by the Engineer as the Engineer determines to be necessary to establish the lines and grades required for the completion of the work specified in these specifications, on the plans and in the special provisions.

When the Contractor requires such stakes or marks, the Contractor shall notify the Engineer of the Contractor's requirements 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 2 working days be considered a reasonable length of time.

Stakes and marks set by the Engineer shall be carefully preserved by the Contractor. In case such stakes and marks are destroyed or damaged, they will be replaced at the 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 Engineer were carelessly or willfully destroyed or damaged by the Contractor's operations. This charge will be deducted from any moneys due or to become due the Contractor.

The Contractor shall not disturb any monuments found within the area of the work or improvements unless they have first procured written permission from the Engineer. The Contractor shall bear the expense of resetting any monuments which may be disturbed or damaged or removed without such permission.

**5-1.08 Inspection.** - The Engineer shall, at all times, have safe 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 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 and unsuitable work or materials may be rejected, notwithstanding that such work or materials have been previously inspected by the Engineer or that payment therefor has been included in a progress estimate.

Projects financed in whole or in part with Federal, State, County or Regional agency funds or otherwise subject to the jurisdiction or control by another public entity, shall be subject to inspection at all times by the appropriate Federal, State, County, or Regional agency or other public entity involved.

The Contractor shall notify the Engineer at least 24 hours in advance of the time required for the services of the Inspector. Should the Contractor fail to notify the Engineer and proceeds with work requiring inspection, all said work shall be rejected by the Engineer. The work so rejected may be subsequently accepted by the Engineer only after receipt of the certification described below and only if the Engineer approves such certification. Should the Contractor request acceptance of such rejected work the Contractor shall, at the Contractor's sole expense, secure the services of: private material testing laboratories, consulting engineers or licensed land surveyors, as previously approved by the City, who shall certify that said work does, in fact, conform to the requirements of the plans and these specifications.

Neither the inspection by the project engineer nor by an inspector, nor any order, measurement, approved notification, certificate, or payment of money, or acceptance of any part or whole of the work, nor any extension of time, nor any possession by the City or its agents, shall operate as a waiver of any provision of this Contract or of any power reserved therein to the City or its agents, shall operate as a waiver of any provision of this contract or of any power reserved therein to the City, or any right to damage thereunder; nor shall any waiver by the City of any breach of this Contract be held to be a waiver of any subsequent breach of the same provision or any other provision of the contract. All remedies shall be taken and construed as cumulative.

**5-1.08A Inspection for Sole Benefit of the City.** - The Contractor is hereby advised that inspection of the Contractor's work during the contract is for the sole and exclusive benefit of the City. Such inspection shall not relieve the Contractor from any obligation to perform the work pursuant to the plans and

specifications, even if defects or deficiencies in such work were noted or observed at the time of such inspection and not communicated to the Contractor.

**5-1.09 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 and no compensation will be allowed to the Contractor for such removal, replacement, or remedial work. Any work done beyond the lines and grades shown on the plans or established by the Engineer, or any extra work done without written authority from the City will be considered as unauthorized work and will not be paid for. Upon order of the 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 Engineer made under this Section 5-1.09, the Engineer may cause rejected or unauthorized work to be remedied, removed, or replaced, and to deduct the costs from any moneys due or to become due the Contractor.

**5-1.09A Acceptance of Defective or Nonconforming Work.** - If the City prefers to accept defective or nonconforming work, the City may do so in its sole discretion and without the consent of the Contractor instead of requiring its removal and correction, in which case a written Change Order will be issued to reflect a reduction in the contract amount. Such adjustment shall be effected whether or not final payment has been made. Acceptance of defective or nonconforming work may occur only upon issuance by the City of a written Change Order or as set forth above.

**5-1.09B Modification to Contractor's Work.** - The City may modify the Contractor's work, either before or after acceptance of the project, without commencing or voiding any of the warranties or accepting, in part or in whole, the Contractor's work. Notification of the City's intent to modify the Contractor's work will be made in writing 48 hours prior to commencement of the modification. Whenever the City makes a claim against the Contractor for defective workmanship or materials, it shall be the sole obligation of the Contractor to establish that the defect being complained of was due solely to a modification, if any, made by the City.

**5-1.10 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.

Plants shall be designed and constructed in accordance with general practice for such equipment and shall be of sufficient capacity to insure the production of sufficient material to carry the work to completion within the time limit.

The Contractor shall provide adequate and suitable equipment and plants to meet the above requirements, and when ordered by the Engineer, shall remove unsuitable equipment from the work and discontinue the operation of unsatisfactory plants.

The Contractor shall identify each piece of their equipment, other than hand tools, by means of an identifying number plainly stenciled or stamped on the equipment at a conspicuous location, and shall furnish to the Engineer a list giving the description of each piece of equipment and its identifying number. In addition, the make, model number and empty gross weight of each unit of compacting

equipment shall be plainly stamped or stenciled in a conspicuous place on the unit. The gross weight shall be either the manufacturer's rated weight or the scale weight.

The make, model, serial number and manufacturer's rated capacity for each scale shall be clearly stamped or stenciled on the load receiving element and its indicator or indicators. All meters shall be similarly identified, rated and marked. Upon request of the Engineer, the Contractor shall furnish a statement by the manufacturer, designating sectional and weighbridge capacities of portable vehicle scales.

Each machine or unit of equipment shall be operated by an experienced operator skilled in handling the particular make of machine or unit of equipment in use, at a speed or rate of production not to exceed that recommended by the manufacturer.

All vehicles used to haul materials over existing traveled ways shall be equipped with pneumatic tires and operated within legal wheel load limits.

**5-1.11 Alternative Equipment.** - While certain of these specifications may provide that equipment of a particular size and type is to be used to perform portions of the work, it is to be understood that the development and use of new or improved equipment is to be encouraged.

The Contractor may request, in writing, permission from the Engineer to use equipment of a different size or type in place of the equipment specified.

The Engineer, before considering or granting such request, may require the Contractor to furnish, at the Contractor's expense, evidence satisfactory to the Engineer that the equipment proposed for use by the Contractor is capable of producing work equal to, or better than, that which can be produced by the equipment specified.

If such permission is granted by the Engineer, it shall be understood that such permission is granted for the purpose of testing the quality of work actually produced by such equipment and is subject to continuous attainment of results which, in the opinion of the Engineer, are equal to, or better than, that which can be obtained with the equipment specified. The Engineer shall have the right to withdraw such permission at any time that the Engineer determines that the alternative equipment is not producing work that is equal, in all respects, to that which can be produced by the equipment specified. Upon withdrawal of such permission by the Engineer, the Contractor will be required to use the equipment originally specified and shall, in accordance with the directions of the Engineer, remove and dispose of or otherwise remedy, at the Contractor's expense, any defective or unsatisfactory work produced with the alternative equipment.

Neither the City nor the Contractor shall have any claim against the other for either the withholding or the granting of permission to use alternative equipment, or for the withdrawal of such permission.

Permission to use alternative equipment in place of equipment specified will only be granted where such equipment is new or improved and its use is deemed by the Engineer to be in furtherance of the purposes of this Section 5-1.11. The approval for use of particular equipment on any project shall in no way be considered as an approval of the use of such equipment on any other project.

Nothing in this Section 5-1.11 shall relieve the Contractor of responsibility for furnishing materials or producing finished work of the quality specified in these specifications or in the special provisions.

**5-1.115 Alternative Methods of Construction.** - Whenever the plans or specifications provide that more than one specified method of construction or more than one specified type of material or construction equipment may be used to perform portions of the work and leave the selection of the method of construction or the type of material or equipment to be used up to the Contractor, it is understood that the City does not guarantee that every such method of construction or type of material or equipment can be used successfully throughout all or any part of any project. It shall be the Contractor's responsibility to select and use the alternative or alternatives which will satisfactorily perform the work under the conditions encountered. In the event some of the alternatives are not feasible or it is necessary to use more than one of the alternatives on any project, full compensation for any additional cost involved shall be considered as included in the contract price paid for the item of work involved and no additional compensation will be allowed therefor.

**5-1.12 Character of Workers.** - If any subcontractor or person employed by the Contractor shall appear to the Engineer to be incompetent or to act in a disorderly or improper manner, they shall be discharged from the work immediately on the request of the Engineer without cost to the City, and such person shall not again be employed on the work.

**5-1.13 Final Inspection.** - When the work has been completed, the Engineer will make the final inspection.

**5-1.14 Cost Reduction Incentive.** - The Contractor may submit to the Engineer, in writing, proposals for modifying the plans, specifications or other requirements of the contract for the sole purpose of reducing the total cost of construction. The cost reduction proposal shall not impair, in any manner, the essential functions or characteristics of the project, including but not limited to service life, economy of operation, ease of maintenance, desired appearance, or design and safety standards.

Cost reduction proposals shall contain the following information:

1. A description of both the existing contract requirements for performing the work and the proposed changes.
2. An itemization of the contract requirements that must be changed if the proposal is adopted.
3. A detailed estimate of the cost of performing the work under the existing contract and under the proposed change. The estimates of cost shall be determined in the same manner as if the work were to be paid for on a force account basis as provided in Section 9-1.03, "Force Account Payment."
4. A statement of the time within which the Engineer must make a decision thereon.
5. The contract items of work affected by the proposed changes, including any quantity variation attributable thereto.

The provisions of this Section 5-1.14 shall not be construed to require the Engineer to consider any cost reduction proposal which may be submitted

hereunder; proposed changes in basic design of a bridge or of a pavement type will not be considered as an acceptable cost reduction proposal; the City will not be liable to the Contractor for failure to accept or act upon any cost reduction proposal submitted pursuant to this section nor for any delays to the work attributable to any such proposal. If a cost reduction proposal is similar to a change in the plans or specifications, under consideration by the City for the project, at the time said proposal is submitted or if such a proposal is based upon or similar to Standard Specifications, standard special provisions or Standard Plans adopted by the City after the advertisement for the contract, the Engineer will not accept such proposal and the City reserves the right to make such changes without compensation to the Contractor under the provisions of this section.

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

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

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

If the Contractor's cost reduction proposal is accepted in whole or in part, such acceptance will be by a contract change order, which shall specifically state that it is executed pursuant to this Section 5-1.14. Such change order shall incorporate the changes in the plans and specifications which are necessary to permit the cost reduction proposal or such part of it as has been accepted to be put into effect, and shall include any conditions upon which the City's approval thereof is based if the approval of the City is conditional. The change order shall also set forth the estimated net savings in construction costs attributable to the cost reduction proposal effectuated by the change order, and shall further provide that the Contractor be paid 50 percent of said estimated net savings amount. The Contractor's cost of preparing the cost reduction incentive proposal and the City's cost of investigating a cost reduction incentive proposal, including any portion thereof paid by the Contractor, shall be excluded from consideration in determining the estimated net savings in construction costs.

Acceptance of the cost reduction proposal and performance of the work thereunder shall not extend the time of completion of the contract unless specifically provided for in the contract change order authorizing the use of the cost reduction proposal.

The amount specified to be paid to the Contractor in the change order which effectuates a cost reduction proposal shall constitute full compensation to the

Contractor for the cost reduction proposal and the performance of the work thereof pursuant to the said change order.

The City expressly reserves the right to adopt a cost reduction proposal for general use on contracts administered by the City when it determines that said proposal is suitable for application to other contracts. When an accepted cost reduction proposal is adopted for general use, only the Contractor who first submitted such proposal will be eligible for compensation pursuant to this section, and in that case, only as to those contracts awarded to the Contractor prior to submission of the accepted cost reduction proposal and as to which such cost reduction proposal is also submitted and accepted. Cost reduction proposals identical or similar to previously submitted proposals will be eligible for consideration and compensation under the provisions of this Section 5-1.14 if the identical or similar previously submitted proposals were not adopted for general application to other contracts administered by the City. Subject to the provisions contained herein, the City or any other public agency shall have the right to use all or any part of any submitted cost reduction proposal without obligation or compensation of any kind to the Contractor.

This Section 5-1.14 of the specifications shall apply only to contracts awarded to the lowest bidder pursuant to competitive bidding.

**5-1.15 Project Appearance.** - The Contractor shall maintain a neat appearance to the work. In any area visible to the public, the following shall apply:

When practicable, broken concrete and debris developed during clearing and grubbing shall be disposed of concurrently with its removal. If stockpiling is necessary, the material shall be removed or disposed of daily unless otherwise specified in the special provisions or as directed by the Engineer.

The Contractor shall furnish trash bins for all construction debris. All debris shall be placed in trash bins daily. Forms or falsework that are to be re-used shall be stacked neatly concurrently with their removal. Forms and falsework that are not to be re-used shall be disposed of concurrently with their removal.

The Contractor shall not sweep construction and other debris into the storm drainage system and shall prevent such materials from entering the storm drains.

The Contractor is advised that disposal of dirt and other debris into the public storm drain system is prohibited under the San Jose Municipal Code and under California State Fish & Game Code. Any fines or penalties levied against the Contractor for violation of the above and related regulations are the sole responsibility of the Contractor.

Except as otherwise provided as a separate pay item, full compensation for conforming to the provisions in this Section shall be considered as included in prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

**5-1.16 Conferences.** - At any time during progress of the work, the Engineer shall have authority to require the Contractor and any subcontractors and/or suppliers at any tier to attend a job-site conference. Any notice of such



**SECTION 5**

**CONTROL OF WORK**

conference shall be duly observed and complied with by the Contractor and Subcontractors and suppliers.

**END OF SECTION**

## **SECTION 6 CONTROL OF MATERIALS**

- 6-1.01 Source of Supply and Quality of Materials
- 6-1.02 City Furnished Materials
- 6-1.03 Storage of Materials
- 6-1.04 Defective Materials
- 6-1.05 Trade Names and Alternatives
- 6-1.05A No Warranty for Listed Material Supplier or Equipment  
Manufacturer
- 6-1.06 Plant Inspection
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- 6-1.11 Samples
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- 6-3.03 Statistical Testing
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## SECTION 6

## CONTROL OF MATERIALS

## 6-1 GENERAL

**6-1.01 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 specifications to be furnished by the City and materials furnished by the City in accordance with Section 9-1.03, "Force Account Payment."

Only materials conforming to the requirements of the specifications shall be incorporated in the work.

The materials furnished and used shall be new, except as may be provided elsewhere in these specifications, on the plans or in the special provisions. The materials shall be manufactured, handled, and used in a workmanlike manner to insure completed work in accordance with the plans and specifications.

Materials to be used in the work will be subject to inspection and tests by the Engineer or the Engineer's designated representative. The Contractor shall furnish without charge such samples as may be required. The Contractor shall furnish the Engineer a list of sources of materials and the locations at which such materials will be available for inspection. The list shall be submitted on a City furnished form and shall be furnished to the Engineer in sufficient time to permit inspecting and testing of materials to be furnished from such listed sources in advance of their use. After testing, if it is found that the proposed sources of supply do not furnish a uniform product, or if the product from any such sources proves unacceptable at any time, the Contractor shall furnish approved material from other sources subject to prior approval of City. No material which, even after approval, has in any way become unfit for use shall be used in the work. The 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 Engineer is assured by the Contractor of the cooperation and assistance of both the Contractor and the supplier of the material. The Contractor shall assure that the Engineer or the Engineer's authorized representative has free access at all times to the material to be inspected, sampled or tested. It is understood that such inspections and tests 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, and that inspection and testing performed by the City shall not relieve the Contractor or the Contractor's suppliers of responsibility for quality control.

Manufacturers' warranties, guaranties, instruction sheets and parts lists, which are furnished with certain articles or materials incorporated in the work, shall be delivered to the Engineer before acceptance of the contract.

Reports and records of inspections made and tests performed, when available at the site of the work, may be examined by the Contractor.

**6-1.02 City Furnished Materials.** - Materials which are listed as City furnished materials in the special provisions will be available to the Contractor free of charge, unless otherwise specified.

The Contractor shall submit a written request to the Engineer for the delivery of City furnished material at least 15 days in advance of the date of its intended use, except that the written request for the delivery of City furnished sign

panels for roadside signs and overhead sign structures shall be submitted at least 30 days in advance of their intended installation. The request shall state the quantity and the type of each material.

The locations at which City furnished materials will be available to the Contractor free of charge will be designated in the special provisions. In such cases said materials shall be hauled to the site of the work by the Contractor at the Contractor's expense, including any necessary loading and unloading that may be involved. If the locations are not designated in the special provisions, the City furnished materials will be furnished to the Contractor free of charge at the site of the project. In either case, all costs of handling and placing City furnished material shall be considered as included in the price paid for the contract item involving such City furnished material.

The Contractor shall be responsible for all materials furnished to the Contractor and shall pay all demurrage and storage charges. City furnished materials lost or damaged from any cause whatsoever shall be replaced by the Contractor at the Contractor's expense. The Contractor shall be liable to the City for the cost of replacing City furnished material and such costs may be deducted from any monies due or to become due the Contractor.

All City furnished material that is not used on the work shall remain the property of the City and shall be delivered to the Engineer.

The Engineer may increase the number of sign panels in any shipment to provide economical use of the City's transportation facilities.

The quantity of each type of City furnished paint required shall be determined by the Contractor subject to verification by the Engineer.

**6-1.03 Storage of Materials.** - Articles or materials to be incorporated in the work shall be stored in such a manner as to insure the preservation of their quality and fitness for the work, and to facilitate inspection.

**6-1.04 Defective Materials.** - All materials which the 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 Engineer. No rejected material, the defects of which have been subsequently corrected, shall be used in the work, unless approval in writing has been given by the Engineer. Upon failure of the Contractor to comply promptly with any order of the Engineer made under the provisions in this Section 6-1.04, the Engineer shall have authority to cause the removal and replacement of rejected material and to deduct the cost thereof from any moneys due or to become due the Contractor.

**6-1.05 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 may be designated under a trade name or the name of a manufacturer and catalog information and followed by the words "or equal." 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 and the Contractor shall furnish all information necessary as required by the Engineer. The Engineer shall be the sole judge as to the quality

and suitability of alternative articles or materials and the Engineer's decision shall be final.

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 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, but need not be made in less than 35 days after award of the contract.

Wherever in the contract documents the name or the name and address of a manufacturer or supplier is given for a material, product, or equipment, or if any other source of a material, product, or equipment is indicated therefor, such information is given for the convenience of the Contractor only, and no limit, restriction, or direction is indicated or intended thereby, nor is the accuracy or reliability of such information guaranteed. It shall be the responsibility of the Contractor to determine the accurate identity and location of any such manufacturer, supplier, or other source of any material, product, or equipment called for in the contract documents.

Approval by the Engineer of substitute item proposed by the Contractor shall not relieve Contractor of the responsibility for full compliance with the contract documents and for adequacy of the substituted item. The Contractor shall also be responsible for resultant changes and all additional costs which the substitution requires in its work, the work of subcontractors and of other contractors and shall effect such changes without cost to the City.

**6-1.05A No Warranty for Listed Material Supplier or Equipment Manufacturer.** - The City does not warrant nor guarantee the ability of any material supplier or equipment manufacturer listed in the specifications to perform their work in a timely manner or in a manner acceptable to City. Furthermore, the City does not warrant that such materials or equipment installed and in place will be acceptable to the City.

**6-1.06 Plant Inspection.** - The 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 Engineer is assured of the cooperation and assistance of both the Contractor and the material producer. The Engineer or the Engineer's authorized representative shall have free entry at all times to such parts of the plant as concerns 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.

**6-1.07 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 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 Engineer.

**6-1.08 Foreign Materials.** - Materials which are manufactured, produced or fabricated outside of the United States shall be delivered to a distribution point in the San Francisco Bay Area, unless otherwise required in these specifications or the special provisions, where they shall be retained for a sufficient period of time to permit inspection, sampling, and testing. Attention is directed to the provisions in Section 8-1.07, "Liquidated Damages." The Contractor shall not be entitled to an extension of time for acts or events occurring outside of the United States and it shall be the Contractor's responsibility to deliver materials obtained from outside of the United States to the point of entry into the continental United States in sufficient time to permit timely delivery to the job site.

The Contractor, at no cost to the City, shall supply the facilities and arrange for any testing required in California which the City is not equipped to perform. All testing by the Contractor shall be subject to witnessing by the Engineer.

The manufacturer, producer or fabricator of foreign material shall furnish to the Engineer a Certificate of Compliance in accordance with the provisions in Section 6-1.07, "Certificates of Compliance." In addition, certified mill test reports clearly identifiable to the lot of material shall be furnished where required in these specifications or otherwise requested by the Engineer.

If the welding of steel for structural steel members or the casting and prestressing of precast prestressed concrete members is to be performed outside of the United States, the following requirements shall apply:

1. Such fabrication shall be performed only within the plants and by fabricators who have previously established, to the satisfaction of the Engineer, that they have the experience, knowledge, trained manpower, quality controls, equipment and other facilities required to produce the quality and quantity of work required. At the option of the Engineer, prequalification of the plant and fabricator will be established either by the submission of detailed written proof thereof or through in-plant inspection by the Engineer or the Engineer's representative, or both.
2. The Contractor shall make written application to the Engineer for approval for such foreign fabrication at the earliest possible time and, in no case, later than 50 days in advance of the planned start of fabrication. The

application shall list the specific units or portion of a work which will be fabricated outside of the United States.

3. The Contractor shall advise the Engineer, in writing, at least 20 days in advance of the actual start of any such foreign fabrication.
4. All documents pertaining to the contract, including but not limited to, correspondence, bid documents, working drawings and data shall be written in the English language and all numerical data shall use the foot-pound-second system of units of measurement.

The use of steel manufactured outside of the United States as unidentified stock material, as provided in Caltrans Section 55-2.07, "Unidentified Stock Material," will not be allowed.

**6-1.09 State Specification Numbers.** - The State Specification number of material furnished on the contract shall conform to the number specified in these specifications or the special provisions for the material involved, except that material conforming to a later specification issue will be acceptable.

**6-1.10 Commencement of Warranty.** - Unless expressly agreed to in writing by the City, all warranties required under the contract documents shall commence upon acceptance by the City of the entire project. Use or occupancy by the City of a portion of the project either before or after completion of that portion of the work shall not commence the running of any warranty required under the contract documents.

**6-1.11 Samples.** - All materials must be of specified quality and fully equal to samples previously submitted. The Contractor shall furnish to the Engineer for testing, free of charge, samples of all materials proposed to be used in the work, and also samples of completed Portland cement concrete or asphaltic concrete work. When so required by the Engineer, the Contractor shall submit for approval samples of the various materials, together with the finish thereon, as specified for that intended to be used in the work. All materials and workmanship shall be equal in every respect to that of the samples so submitted and approved. These samples shall be sent to such place as the Engineer may direct. In all cases, freight must be prepaid by the Contractor. These samples will be returned to the Contractor, if requested, freight collect.

Where samples are called for, 2 or more samples of materials to be used in fulfilling the requirements of the specifications shall be deposited with the Engineer as soon as possible prior to their use in the work.

No materials or equipment of which samples are required to be submitted for approval shall be used on the work until such approval has been given by the Engineer, save only at the Contractor's risk and expense.

## 6-2 LOCAL MATERIALS

**6-2.01 General.** - Local material is rock, sand, gravel, earth, or other mineral material, other than local borrow or selected material, obtained or produced



from sources in the vicinity of the work specifically for use on the project. Local material does not include materials obtained from established commercial sources.

Local materials shall be furnished by the Contractor from any source the Contractor may elect, except that when mandatory local material sources of certain materials are designated in the special provisions, the Contractor shall furnish material from such designated mandatory sources.

The Contractor shall be responsible for making all arrangements necessary to obtain materials from any local material source other than a mandatory local material source. If the Contractor elects to obtain materials from a possible local material source, subject to the provisions of Section 6.02, "Possible Local Material Sources," the Contractor shall comply with the requirements of said section. If the Contractor elects to obtain material from any other non-mandatory source, the Contractor shall furnish the Engineer with satisfactory evidence that the Contractor has entered into an agreement with the property owner for obtaining material from such source and with copies of any necessary permits, licenses and environmental clearances before removing any material from such sources.

The furnishing of local materials from any source is subject to the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," and in Section 6-2, "Local Materials."

Unless described in the special provisions as a mandatory local material source, or approved in writing by the Engineer, material sources shall not be excavated at locations where the resulting scars will present an unsightly appearance from any highway. No payment will be made for material obtained in violation of this provision.

The Contractor shall, at the Contractor's expense, make any arrangements necessary for hauling over local public and private roads from any source.

When requested by the Contractor in writing, the City will test materials from any local material source, which has not been previously tested. If satisfactory material from such local source is used in the work, the Contractor will not be charged for the costs of the tests.

In all other cases, the cost of such testing requested by the Contractor shall be at the Contractor's expense and deductions will be made from any moneys due or to become due the Contractor, sufficient to cover the costs of such tests.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in conforming to the provisions in this Section 6-2.01, for furnishing and producing materials from any source shall be considered as included in the price paid for the contract item of work involving such material and no additional compensation will be allowed therefor.

**6-2.02 Possible Local Material Sources.** - Where the City has made arrangements with owners of land in the vicinity of a project for the obtaining of material from an owner's property, such arrangements are made solely for the purpose of providing all bidders an equal opportunity to obtain material from such property. Bidders or Contractors may, upon written request, inspect the documents evidencing such arrangements between property owners and the City. The Contractor may, if so elect, exercise any rights that have been obtained, which may be exercised by a Contractor under such arrangements, subject to and upon the conditions hereinafter set forth.

Such arrangements are not a part of the contract, and it is expressly understood and agreed that the City assumes no responsibility to the bidder or Contractor whatsoever in respect to the arrangements made with the property owner

to obtain materials therefrom and that the Contractor shall assume all risks in connection with the use of such property, the terms upon which such use shall be made, and there is no warranty or guaranty, either express or implied, as to the quality or quantity of materials that can be obtained or produced from such property or the type or extent of processing that may be required in order to produce material conforming to the requirements of the specifications.

In those instances in which the City has compiled "Materials Information" as referred to in Section 2-1.03, "Examination of Plans, Specifications Contract, and Site of Work," said compilation may include the documents setting forth the arrangement made with some of the property owners for the obtaining of material from such owners' properties. The inclusion of such documents therein shall not in any respect operate as a waiver of any of the provisions in this Section 6-2.02 concerning said documents. All necessary permits, licenses and environmental clearances needed to enable the Contractor to use a possible local material source for which the "Materials Information" compilation for the project does not include said permits, licenses and environmental clearances issued to the Department (whether or not the arrangement made by the City with the owner of the property is included in the compilation) shall be obtained by the Contractor and copies thereof shall be furnished the Engineer before any material is removed from such source. The Bidder or Contractor is cautioned to make such independent investigation and examination as the bidder or Contractor deems necessary for their satisfaction as to the quality and quantity of materials available from such property, the type and extent of processing that may be required in order to produce material conforming to the requirements of the specifications and the rights, duties and obligations acquired or undertaken under such arrangement with the property owner. Notwithstanding that the Contractor may elect to obtain materials from any such property owner's property, no material may be obtained from such property unless the Contractor has first either:

- (1) Executed a document that will guarantee to hold such owner harmless from all claims for injury to persons or damage to property resulting from the Contractor's operations on the property owner's premises and also agree to conform to all other provisions set forth in the arrangement made between the City and the property owner. Said document will be prepared by the Engineer for execution by the Contractor, or
- (2) Entered into an agreement with the owner of the material source on any terms mutually agreeable to the owner and the Contractor; provided that the Contractor shall furnish to the Engineer a release, in a form satisfactory to the Engineer, executed by the owner, relieving the City of any and all obligations under the City's arrangement with the owner.

If the Contractor elects to obtain material under (1), the use of such site shall be subject to the terms, conditions and limitations of the arrangement made between the property owner and the City, and the Contractor shall pay such charges as are provided for in the arrangement made by the City with the property owner, and deductions will be made from any moneys due or that may become due the

Contractor under the contract sufficient to cover the charges for such material removed.

If the Contractor elects to obtain material under (2), the Contractor shall pay such charges as are provided for in the agreement between the owner and the Contractor and deductions will not be made from any moneys due or that may become due the Contractor under the contract to cover such charges.

Before acceptance of the contract, the Engineer may require the Contractor to submit written evidence that the owner of the material source is satisfied that the Contractor has satisfactorily complied with the provisions of either (1), the arrangement between the City and the owner, or (2), the agreement between the owner and the Contractor, as the case may be.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and producing specified materials from possible local material sources, including the construction of any access roads or fences and any clearing, grubbing and stripping of material sources, and all processing of whatever nature and extent required, shall be considered as included in the price paid for the contract item of work involving such material and no additional compensation will be allowed therefor.

**6-2.03 Mandatory Local Material Sources.** - The Contractor shall perform all work required to obtain and produce acceptable materials from the mandatory local material sources designated in the special provisions and the Contractor shall have no right to obtain such materials from any other source or sources. As part of such work in producing acceptable materials from the mandatory sources, it will be necessary for the Contractor to perform certain processing of the material as set forth in the special provisions. Any processing of the material required in addition to that specified in the special provisions which, in the opinion of the Engineer, is necessary to produce acceptable material from the mandatory sources will be paid for as extra work as provided in Section 4-1.03D.

If the Engineer determines that the designated mandatory local material source or sources are no longer to be used because they are exhausted or for other reasons, the Engineer will designate an alternative mandatory local material source or sources from which the Contractor shall obtain the balance of the material required.

In such case the City will pay the Contractor for the cost of moving the Contractor's plant to such new mandatory source and erecting it as extra work as provided in Section 4-1.03D. Construction of access roads, fences, clearing and grubbing or stripping of such new mandatory source, ordered by the Engineer to be performed, will be paid for as extra work as provided in Section 4-1.03D. The Department will also allow or deduct, as the case may be, the increase or decrease in haul cost due to an increase or decrease in the length of haul involved. Increased haul costs will be paid for as extra work as provided in Section 4-1.03D and deductions for decreased haul will be determined in the same manner. No allowance or additional compensation will be made for lost time or for delay in completing the work due to moving the Contractor's plant from the designated mandatory source to the alternative mandatory source, other than an extension of time pursuant to the provisions in Section 8-1.07, "Liquidated Damages." Any processing of the material required in addition to that specified in the special provisions for the originally designated mandatory source which, in the opinion of the Engineer, is necessary to produce acceptable material from the alternative mandatory source will be paid for as extra work as provided in Section 4-1.03D.

The Contractor will be charged the same royalty as provided in the special provisions for the original designated mandatory local material source.

The Contractor shall, prior to entering a mandatory local material source or an alternative mandatory local material source, execute a document that will guarantee to hold the owner of such property harmless from all claims for injury to persons or damage to property resulting from the Contractor's operations on the property owner's premises. Said document will be prepared by the Engineer for execution by the Contractor.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in obtaining and producing specified materials from mandatory sources, including the construction of any access roads or fences and any clearing, grubbing, and stripping of mandatory local material sources, except as otherwise provided for in this Section 6-2.03, shall be considered as included in the price paid for the contract item of work involving such material and no additional compensation will be allowed therefor.

6-3 TESTING

6-3.01 General. - Unless otherwise specified, all tests shall be performed in accordance with the methods used by the Department of Public Works, and shall be made by the Engineer or the Engineer's designated representative.

The City uses Caltrans and American Society for Testing and Material (ASTM) 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 and ASTM Tests. Copies of individual California Tests are available at the City's Material Testing Laboratory.

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

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

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 2 or more tests, the 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 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 Engineer may, at the Engineer's discretion, select random samples from the lot for testing. Test specimens from the random samples, including those required for retest, shall be prepared in accordance with the referenced specification and furnished by the Contractor at the Contractor's expense. The number of such samples and test specimens shall be entirely at the discretion of the Engineer. Unidentified metal products such as sheet, plate, hardware, etc. shall be subject to the requirements of Caltrans Section 55-2.07, "Unidentified Stock Material."

When requested by the Engineer, the Contractor shall furnish, without charge, samples of all materials entering into the work, and no material shall be used prior to approval by the Engineer, except as provided in Section 6-1.07, "Certificates of Compliance." Samples of material from local sources shall be taken by or in the presence of the Engineer, otherwise the samples will not be considered for testing.

### **6-3.02 Blank**

**6-3.03 Statistical Testing.** - Whenever both individual test results and operating range requirements are specified in these specifications or the Special Provisions, materials shall meet both requirements. Materials used in the work to replace materials which did not comply with requirements and were removed shall conform to the limits specified for the operating range.

Individual samples tested prior to the first use of aggregates from each source, or prior to the first use of aggregates after appreciable changes have been made in aggregate processing procedures, shall conform to the limits specified for the operating range.

If individual test results on materials used in the work do not fall within specified limits, but the operating range utilizing such test results is within the specified operating range limits, the individual test results may be waived at the discretion of the Engineer. No test result for material used in the work shall be omitted from the operating range determination.

Operating ranges shall be computed as follows:

Operating ranges shall be rounded to the same number of significant figures as are reported for individual test results. When the figure to be dropped is less than 5, round down; if greater than 5, round up, and if it is 5, round up or down to the even number.

Operating ranges shall be continuous for the entire project. In determining an operating range for a material property, all of the individual test results that represent material actually used in the work, except individual test results for portions of such material for which requirements have been revised by an executed contract change order, shall be used in the calculation. The test results shall enter the calculation sequence in the chronological order that the work is performed. The first individual test results shall start an operating range and shall meet the operating range requirements. Until more than 4 test results are available, the operating range shall be the numerical average of the individual test results. When

more than 4 test results are available, the operating range shall be determined by adding the last 4 individual test results, adding the new individual test results to this product and then dividing this sum by 5.

Where more than one source is used for a single material and the sources are not similar in all respects, a separate operating range shall be calculated for each source.

Where a single source provides material to more than one project, a separate operating range shall be calculated for each project. A single test result representing material delivered to different projects shall be used in each operating range for which it is appropriate and separate tests will not be required.

If individual test results on materials used in the work do not fall within specified limits, but the operating range utilizing such test results is within the specified operating range limits, the individual test results may be waived at the discretion of the Engineer. No individual test result for material used in the work shall be omitted from the operating range determination.

**6-3.04 Field Tests, or Adjustments and Operations.** - The Contractor shall arrange for the presence of a manufacturer's representative or other qualified persons who shall instruct City operating personal in the operation and care of all the various pieces of equipment and parts of the installation as determined by the Engineer. The Contractor shall superintend the operations of the equipment during the 30-day period and shall be responsible for the proper operation thereof, and shall make no claim against the City for any damage to the equipment during such operation, or for the services of the above-mentioned representatives or other qualified persons. The Contractor shall make changes, adjustments, or replacements of equipment as may be required to make the equipment comply with the specifications, or to replace any defective parts or material.

END OF SECTION



**SECTION 7**  
**LEGAL RELATIONS AND RESPONSIBILITY**

7-1.01	Laws to be Observed
7-1.01A	Labor Code Requirements
7-1.01A(1)	Hours of Labor
7-1.01A(2)	Prevailing Wage
7-1.01A(2)(a)	Travel and Subsistence Payments
7-1.01A(3)	Payroll Records
7-1.01A(4)	Labor Nondiscrimination
7-1.01A(5)	Apprentices
7-1.01A(6)	Worker's Compensation
7-1.01A(7)	Suits to Recover Penalties and Forfeitures
7-1.01B	Blank
7-1.01C	Contractor's Licensing Laws
7-1.01D	Vehicle Code
7-1.01E	Trench Safety
7-1.01F	Air Pollution Control
7-1.01G	Water Pollution
7-1.01H	Use of Pesticides
7-1.01I	Sound Control Requirements
7-1.01J	Assignment of Antitrust Actions
7-1.01K	Time for Giving of Notice
7-1.01L	Compliance with the Underground Notification Systems
7-1.01M	Prohibition of Gifts
7-1.02	Weight Limitations
7-1.03	Payment of Taxes
7-1.04	Permits and Licenses
7-1.05	Patents
7-1.06	Safety and Health Provisions
7-1.07	Blank
7-1.08	Public Convenience
7-1.09	Public Safety
7-1.10	Use of Explosives
7-1.11	Preservation of Property
7-1.12	Responsibility for Damage
7-1.121	Protection of Contractor's Work and Property
7-1.122	Insurance Requirements
7-1.122A	Insurance During Termination and/or Suspension
7-1.125	Legal Actions Against the City
7-1.13	Disposal of Material Outside the Project Limits
7-1.14	Cooperation
7-1.145	Mutual Responsibility of Contractors
7-1.15	Relief from Maintenance and Responsibility
7-1.16	Contractor's Responsibility for the Work and Materials
7-1.165	Damage by Storm, Flood, Tidal Wave or Earthquake
7-1.166	Substantial Completion
7-1.17	Acceptance of Contract



## **SECTION 7**

## **LEGAL RELATIONS AND RESPONSIBILITY**

7-1.18	Property Rights in Materials
7-1.19	Rights in Land and Improvements
7-1.20	Repair of Equipment
7-1.21	Material Plants
7-1.22	Provisions of Law and Venue
7-1.23	Final Guarantee
7-1.24	Legal Address of Contractor
7-1.25	Material Storage
7-1.26	Waiver by the City
7-1.27	Archeological and Paleontological Rights
7-1.28	Emergencies
7-1.29	Integration Clause

## SECTION 7

## LEGAL RELATIONS AND RESPONSIBILITY

**7-1.01 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 of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. The Contractor shall at all times observe and comply with, and shall cause all the Contractor's agents and employees to observe and comply with all such existing and future laws, ordinances, regulations, orders and decrees of bodies or tribunals having any jurisdiction or authority over the work; and shall to the fullest extent allowed by law protect, defend and indemnify the City of San Jose, and all officers, employees, and agents thereof connected with the work, including but not limited to the Engineer, against any claim or liability arising from any work performed under the contract or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or their employees, subcontractors or suppliers at any tier unless such claim or liability arises due to the sole negligence or willful misconduct of the City, its officers, employees or agents. 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 Engineer in writing.

**7-1.01A Labor Code Requirements.** - Attention is directed to the following requirements of the Labor Code:

**7-1.01A(1) Hours of Labor.** - Eight hours labor constitutes a legal day's work. The Contractor shall forfeit, as a penalty to the State, \$50 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 and 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, except that work performed by employees of 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.

**7-1.01A(2) Prevailing Wage.** - The Contractor shall comply with Labor Code Sections 1774 and 1775. Pursuant to said Section 1775 the Contractor shall forfeit to the State a penalty of not more than fifty dollars (\$50) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the Director of Industrial Relations for the work or craft in which the worker is employed for any public work done under the contract by him or her or by any subcontractor under him or her in violation of the provisions of the Labor Code and in particular, Labor Code Sections 1770 to 1780, inclusive. The amount of this forfeiture shall be determined by the Labor Commissioner and shall be based on consideration of the Contractor's mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages, or the previous record of the Contractor in meeting his or her prevailing wage obligations, or a Contractor's willful failure

to pay the correct rates of prevailing wages. A mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages is not excusable if the Contractor had knowledge of his or her obligations under the Labor Code. 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 1773.8 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 be applicable to all holidays recognized in the collective bargaining agreement of the particular craft, classification or type of workers 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.

The wage rates determined by the Director of Industrial Relations and published in the Department of Transportation publication entitled General Prevailing Wage Rates refer to expiration dates. If the published wage rate does not refer to a predetermined wage rate to be paid after the expiration date, said published rate of wage shall be in effect for the life of the contract. If the published wage rate refers to a predetermined wage rate to become effective upon expiration of the published wage rate and the predetermined wage rate is on file with the Department of Industrial Relations, such predetermined wage rate shall become effective on the date following the expiration date and shall apply to the contract in the same manner as if it had been published in said publication. If the predetermined wage rate refers to one or more additional expiration dates with additional predetermined wage rates, which expiration dates occur during the life of the contract, each successive predetermined wage rate shall apply to the contract on the date following the expiration date of the previous wage rate. If the last of such predetermined wage rates expires during the life of the contract, such wage rate shall apply to the balance 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.

All questions regarding prevailing wages shall be directed to the City's Office of Affirmative Action/Contract Compliance.

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 their bid, and will not under any circumstances be considered as the basis of a claim against the City on the contract.

**7-1.01A(2) (a) Travel and Subsistence Payments.** - Attention is directed to the requirements of Section 1773.8 of the Labor Code. The Contractor shall make travel and subsistence payments to each worker, needed to execute the work, in accordance with the requirements in said Section 1773.8.

**7-1.01A(3) Payroll Records.** - The Contractor's attention is directed to the provisions of Labor Code Section 1776, a portion of which is quoted below. Regulations implementing said Section 1776 are located in Sections 16016 through 16019 and Sections 16207.10 through 16207.19 of Title 8, California Administrative Code. The Contractor shall be responsible for compliance by subcontractors.

- "(a) Each contractor and subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work.
- "(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the contractor on the following basis:
  - (1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.
  - (2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.
  - (3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the contractor.
- "(c) Each contractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that

- requested the records within 10 days after receipt of a written request.
- "(d) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address and social security number. The name and address of the contractor awarded the contract or performing the contract shall not be marked or obliterated.
- "(e) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within 5 working days, provide a notice of a change of location and address.
- "(f) In the event of noncompliance with the requirements of this section, the contractor shall have 10 days in which to comply subsequent to receipt of written notice specifying in what respects the contractor must comply with this section. Should noncompliance still be evident after the 10-day period, the contractor shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit 25 dollars (\$25) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due."

The penalties specified in subdivision (f) of Labor Code Section 1776 for noncompliance with the provisions of said Section 1776 may be deducted from any moneys due or which may become due to the Contractor.

A copy of all payrolls shall be submitted weekly to the Engineer. Payrolls shall contain the full name, address and social security number of each employee, the employee's correct classification, rate of pay, daily and weekly number of hours worked, itemized deductions made 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 their 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 forms furnished by the City or on any form with identical wording. The Contractor shall be responsible for the submission of copies of payrolls of all subcontractors. If by the 15th of the month, the Contractor has not submitted satisfactory payrolls for all work performed during the monthly period ending on or before the 1st of that month, the City will retain an amount equal to 10 percent of the estimated value of the work performed (exclusive of Mobilization) during the month from the next

monthly estimate, except that such retention shall not exceed \$10,000 nor be less than \$1,000. Retention for failure to submit satisfactory payrolls shall be additional to all other retention provided for in the contract. The retention for failure to submit payrolls for any monthly period will be released for payment on the monthly estimate for partial payments next following the date that all the satisfactory payrolls for which the retention was made are submitted.

The Contractor and each subcontractor shall preserve their payroll records for a period of 4 years from the date of completion of the contract.

**7-1.01A(4) Labor Nondiscrimination.** - Attention is directed to Section 1735 of the Labor Code, which reads as follows:

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

Attention is hereby directed to those provisions of Title II, Chapter 13, Parts 1, 2, and 3 of the San Jose Municipal Code (relating to equal employment opportunity, nondiscrimination in employment, and requirements for affirmative action to insure equal employment opportunity, including requirements for submittal of written affirmative action programs and pre-award approvals of such programs in certain contracts), and to the Affirmative Action Guidelines adopted by resolution of the City Council. Contractor agrees to comply with all of such provisions and guidelines applicable to this contract. The provisions of said Chapter 13 of Title II of the San Jose Municipal Code, said resolutions and said Affirmative Action Guidelines are set forth in full in the special provisions of the specifications.

**7-1.01A(5) Apprentices.** - Attention is directed to Sections 1777.5, 1777.6, and 1777.7 of the California Labor Code and Title 8, California Administrative Code Section 200 et seq. To insure compliance and complete understanding of the law regarding apprentices, and specifically the required ratio thereunder, each contractor or subcontractor should, where some question exists, contact the Division of Apprenticeship Standards, State of California prior to commencement of work on the public works contract. Responsibility for compliance with this section lies with the Contractor.

It is City policy to encourage the employment and training of apprentices on public works contracts as may be permitted under local apprenticeship standards.

**7-1.01A(6) 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 the Contractor's 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 Engineer a certification in the following form:

"I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against

liability for workers; compensation or to undertake self-insurance in accordance with the provisions of that 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 3-1.03, "Execution of Contract," shall constitute signing and filing of the said certificate.

Before beginning the work, the Contractor shall furnish to the City satisfactory proof that he has taken out, for the period covered by the work under this contract, full compensation insurance for all persons whom the Contractor may employ directly or through subcontractors, in carrying out the work contemplated under this contract, in accordance with the "Workers' Compensation and Insurance Act," Division IV of the Labor Code of the State of California and any acts amendatory thereof. Such insurance shall be maintained in full force and effect during the period covered by this contract.

If the Contractor or subcontractor fail to maintain such insurance, the City may take out compensation insurance which the City might be liable to pay under the provisions of the Act by reason of any employee of the Contractor or subcontractors being injured or killed, and deduct and retain the amount of the premium for such insurance from any sums due to the Contractor.

If any injury occurs to any employee of the Contractor for which the employees, or his dependents in the event of this death, is entitled to compensation from the City under the provisions of said Act, or for which compensation is claimed from the City, the City may retain from the sums due the Contractor under this contract an amount sufficient to cover such compensation, as fixed by said Act, until such compensation is paid, or until it is determined that no compensation is due, and if the City is compelled to pay such compensation, it will deduct and retain from such sums the amount so paid.

**7-1.01A(7) Suits to Recover Penalties and Forfeitures.** - Attention is directed to Sections 1730 to 1733, inclusive, of the Labor Code concerning suits to recover amounts withheld from payment for failure to comply with requirements of the Labor Code or contract provisions based on such laws.

Said sections provide that a suit on the contract for alleged breach thereof in not making the payment is the exclusive remedy of the Contractor or the Contractor's assignees with reference to amounts withheld for such penalties or forfeitures, and that such suit must be commenced and actual notice thereof received by the awarding authority prior to 90 days after completion of the contract and the formal acceptance of the job.

Submission of a claim under Section 9-1.07B, "Final Payment and Claims," for the amounts withheld from payment for such penalties and forfeitures is not a prerequisite for such suits and such claims will not be considered.

**7-1.01B (Blank)**

**7-1.01C 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 at the time of bid in the classification set forth in these contract

documents and any bidder or contractor not so licensed is subject to the penalties imposed by such laws and rejection of their bid.

In all City projects where federal funds are involved, no bid submitted shall be invalidated by the failure of the bidder to be licensed at the time of bid in accordance with the laws of this state. At the time a federally funded contract is awarded, the Contractor shall be properly licensed in accordance with the laws of the State of California.

The first payment for work or material under any contract shall not be made by the City unless and until the Registrar of Contractors certifies to the City that the records of the Contractors State License Board indicate that the Contractor was properly licensed at the time the contract was awarded. Any bidder or contractor not so licensed shall be subject to all legal penalties imposed by law, including, but not limited to, any appropriate disciplinary action by the Contractors State License Board. Failure of the bidder to timely obtain proper and adequate licensing for an award of a contract shall constitute a failure to execute the contract as provided in Section 3-1.04 "Failure to Execute Contract" and shall result in the forfeiture of the security of the bidder.

**7-1.01D Vehicle Code.** - Pursuant to the authority contained in Vehicle Code Section 591, the City has determined that within such areas as are within the limits of the project and are open to public traffic, the following requirements of the Vehicle Code will apply. The lighting requirements in Section 25803; the brake requirements in Chapter 3, Division 12; the splash apron requirements in Section 27600, and, when operated on completed or existing treated base, surfacing, pavement or structures, except as otherwise provided in Section 7-1.02 "Weight Limitations," the weight limitation requirements contained in Division 15.

Attention is directed to the statement in said Section 591 that this section shall not relieve the Contractor or any person from the duty of exercising due care. The Contractor shall take all necessary precautions for safe operation of their equipment and the protection of the public from injury and damage from such equipment.

Any other requirements set forth in Divisions 11, 12, 13, 14 and 15 of the Vehicle Code which the City, pursuant to the authority contained in Vehicle Code Section 591, will require compliance with, will be set forth in the special provisions.

**7-1.01E Trench Safety.** - Attention is directed to the provisions of Section 6705 of the Labor Code concerning trench excavation safety plans.

**7-1.01F Air Pollution Control.** - The Contractor shall comply with all air pollution control rules, regulations, ordinances and statutes which apply to any work performed pursuant to the contract, including any air pollution control rules, regulations, ordinances and statutes.

Unless otherwise provided in the special provisions, material to be disposed of shall not be burned, either inside or outside the project right of way.

**7-1.01G Water Pollution.** - The Contractor shall exercise every reasonable precaution to protect streams, lakes, reservoirs, bays, and coastal waters from pollution with fuels, oils, bitumens, calcium chloride and other harmful materials and shall conduct and schedule their operations so as to avoid or minimize muddying and silting of said streams, lakes, reservoirs, bays and coastal waters.



## SECTION 7

## LEGAL RELATIONS AND RESPONSIBILITY

Care shall be exercised to preserve roadside vegetation beyond the limits of construction.

Water pollution control work is intended to provide prevention, control, and abatement of water pollution to streams, waterways, and other bodies of water, and shall consist of constructing those facilities which may be shown on the plans, specified herein or in the special provisions, or directed by the Engineer.

In order to provide effective and continuous control of water pollution, it may be necessary for the Contractor to perform the contract work in small or multiple units, on an out of phase schedule, and with modified construction procedures. The Contractor shall provide temporary water pollution control measures, including but not limited to, dikes, basins, ditches, and applying straw and seed, which become necessary as a result of their operations. The Contractor shall, coordinate water pollution control work with all other work done on the contract.

Before starting any work on the project, the Contractor shall submit, for acceptance by the Engineer, a program to control water pollution effectively during construction of the project. Such program shall show the schedule for the erosion control work included in the contract and for all water pollution control measures which the Contractor proposes to take in connection with construction of the project to minimize the effects of their operations upon adjacent streams and other bodies of water. The Contractor shall not perform any clearing and grubbing or earthwork on the project, other than that specifically authorized in writing by the Engineer, until such program has been accepted.

If the measures being taken by the Contractor are inadequate to control water pollution effectively, the Engineer may direct the Contractor to revise their operations and their water pollution control program. Such directions will be in writing and will specify the items of work for which the Contractor's water pollution control measures are inadequate. No further work shall be performed on said items until the water pollution control measures are adequate and, if also required, a revised water pollution control program has been accepted.

The Engineer will notify the Contractor of the acceptance or rejection of any submitted or revised water pollution control program in not more than 5 working days.

The City will not be liable to the Contractor for failure to accept all or any portion of an originally submitted or revised water pollution control program, nor for any delays to the work due to the Contractor's failure to submit an acceptable water pollution control program.

The Contractor may request the Engineer to waive the requirement for submission of a written program for control of water pollution when the nature of the Contractor's operation is such that erosion is not likely to occur. Waiver of this requirement will not relieve the Contractor from responsibility for compliance with the other provisions of this section. Waiver of the requirement for a written program for control of water pollution will not preclude requiring submittal of a written program at a later time if the Engineer deems it necessary because of the effect of the Contractor's operations.

Unless otherwise approved by the Engineer in writing, the Contractor shall not expose a total area of erodible earth material, which may cause water pollution, exceeding 750,000 square feet for each separate location, operation, or spread of equipment before either temporary or permanent erosion control measures are accomplished.

Where erosion which will cause water pollution is probable due to the nature of the material or the season of the year, the Contractor's operations shall be so scheduled that permanent erosion control features will be installed concurrently with or immediately following grading operations.

Nothing in the terms of the contract nor in the provisions in this Section 7-1.01G shall relieve the Contractor of the responsibility for compliance with Sections 5650 and 12015 of the Fish and Game Code, or other applicable statutes relating to prevention or abatement of water pollution.

When borrow material is obtained from other than commercially operated sources, erosion of the borrow site during and after completion of the work shall not result in water pollution. The material source shall be finished, where practicable, so that water will not collect or stand therein.

The requirements of this section shall apply to all work performed under the contract and to all non-commercially operated borrow or disposal sites used for the project.

The Contractor shall also conform to the following provisions:

1. Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams, and during construction of such barriers, muddying of streams shall be held to a minimum.
2. Removal of material from beneath a flowing stream shall not be commenced until adequate means, such as a bypass channel, are provided to carry the stream free from mud or silt around the removal operations.
3. Should the Contractor's operations require transportation of materials across live streams, such operations shall be conducted without muddying the stream. Mechanized equipment shall not be operated in the stream channels of such live streams except as may be necessary to construct crossings or barriers and fills at channel changes.
4. Water containing mud or silt from aggregate washing or other operations shall be treated by filtration, or retention in a settling pond, or ponds, adequate to prevent muddy water from entering live streams.
5. Oily or greasy substances originating from the Contractor's operations shall not be allowed to enter or be placed where they will later enter a live stream.
6. Portland cement or fresh Portland cement concrete shall not be allowed to enter flowing water of streams.
7. When operations are completed, the flow of streams shall be returned as nearly as possible to a meandering thread without creating possible future bank erosion, and settling pond sites shall be graded so they will drain and will blend in with the surrounding terrain.
8. Material derived from roadway work shall not be deposited in a live stream channel where it could be washed away by high stream flows.

9. Where there is possible migration of anadromous fish in streams affected by construction on the project, the Contractor shall conduct their operations so as to allow free passage of such migratory fish.

Compliance with the requirements of this section shall in no way relieve the Contractor from their responsibility to comply with the other provisions of the contract, in particular the Contractor's responsibility for damage and for preservation of property.

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

**7-1.01H Use of Pesticides.** - The Contractor shall comply with all rules and regulations of the State of California, Department of Food and Agriculture, the State of California, Department of Health, the State of California, Department of Industrial Relations and all other agencies which govern the use of pesticides required in the performance of the work on the contract.

Pesticides shall include but shall not be limited to herbicides, insecticides, fungicides, rodenticides, germicides, nematocides, bactericides, inhibitors, fumigants, defoliants, desiccants, soil sterilants, and repellents.

Any substance or mixture of substances intended for preventing repelling, mitigating, or destroying weeds, insects, diseases, rodents, or nematodes and any substance or mixture of substances intended for use as plant regulator, defoliant or desiccant shall be considered a pesticide.

**7-1.01I Sound Control Requirements.** - The Contractor shall minimize noise and 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.

**7-1.01J Assignment of Antitrust Actions.** - The Contractor's attention is directed to the following provisions of Government Code Sections 4551, 4553, and 4554 which shall be applicable to the Contractor and subcontractors:

"In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the contractor, without further acknowledgement by the parties.

If an awarding body or public purchasing body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action."

**7-1.01K Time for Giving of Notice.** - The terms of Code of Civil Procedure Section 1013 shall not apply to any notices given by City under this contract.

**7-1.01L Compliance with the Underground Notification System.** - To the extent they apply to the Contractor's work, the Contractor shall comply with the requirements of Government Code Sections 4216 through 4216.9, inclusive.

**7-1.01M Prohibition of Gifts.** - Pursuant to Chapter 10.36, Part 5, "Prohibition of Gifts and Certain Contributions" of the City Municipal Code, the Contractor shall be familiar with the City's prohibition against acceptance of any gift by a City officer or designated employee. Said prohibition is found in Chapter 10.36 of the San Jose Municipal Code.

The Contractor agrees not to offer any City officer or designated employee any gift prohibited by said Chapter.

The offer or giving of any gift prohibited by Chapter 10.36 shall constitute a material breach of this contract by Contractor. In addition to any other remedies City may have in law or equity, City may terminate for cause this contract for such breach as provided elsewhere in these General Conditions.

**7-1.02 Weight Limitations.** - Unless expressly permitted in the special provisions, construction equipment or vehicles of any kind which, laden or unladen, exceed the maximum weight limitations set forth in Division 15 of the Vehicle Code, shall not be operated over completed or existing treated bases, surfacing, pavement or structures in any areas within the limits of the project, whether or not such area is subject to weight limitations under Section 7-1.01D, "Vehicle Code," except as hereinafter provided in this Section 7-1.02.

After application of the curing seal, no traffic or Contractor's equipment will be permitted on cement treated base or lean concrete base for a period of 72 hours. After 72 hours, traffic and equipment operated on the base shall be limited to that used in paving operations and placing additional layers of cement treated base. No traffic or Contractor's equipment will be permitted on treated permeable base except for that equipment required to place the permeable base and the subsequent layer of pavement. Trucks used to haul treated base, Portland cement

concrete, or asphalt concrete shall enter onto the base to dump at the nearest practical entry point ahead of spreading equipment. Empty haul trucks shall exit from the base at the nearest practical exit point. Entry and exit points shall not be more than 1,000 feet ahead of spreading equipment except in locations where specifications prohibit operation of trucks outside the area occupied by the base or where steep slopes or other conditions preclude safe operation of hauling equipment. In such locations, entry and exit points shall be established at the nearest point ahead of spreading equipment permitted by specifications and allowing safe operation of hauling equipment. Damage to curing seal or base shall be repaired promptly by the Contractor at the Contractor's expense, as directed by the Engineer.

Within the limits of the project and subject to the control of the Engineer, and provided that the Contractor at the Contractor's expense shall provide such protective measures as are deemed necessary by the Engineer and shall repair any damage caused by such operations, the Contractor will be permitted to:

- (1) Make transverse crossings of such portions of an existing public road or street as are within the highway right of way, with construction equipment which exceeds the size or weight limitations set forth in Division 15 of the Vehicle Code.
- (2) Make transverse crossings of treated bases, surfacing, or pavement which are under construction or which have been completed, with construction equipment which exceeds the size or weight limitations set forth in Division 15 of the Vehicle Code.
- (3) Cross bridge structures that are not open to public traffic and which are designed for HS20-44 Live Loading (culverts and pipes excluded), with construction equipment which exceeds the size or weight limitations set forth in Division 15 of the Vehicle Code, but not exceeding the weight limitations hereinafter specified, provided that the Contractor furnishes to the Engineer the dimensions and maximum axle loadings of equipment proposed for use on bridge structures:
  - (a) The maximum loading on bridge structures due to pneumatic-tired truck and trailer combinations shall not exceed (1) 28,000 pounds for single axles, (2) 48,000 pounds for tandem axles, nor (3) 60,000 pounds total gross load for single vehicles or 110,000 pounds total gross load for truck and trailer or semi-trailer combinations.
  - (b) The loading on bridge structures due to 2 and 3 axle pneumatic-tired earth movers shall not exceed that shown in the following table.

**ALLOWABLE CONSTRUCTION LOADING ON BRIDGES  
FOR 2 AND 3 AXLE EARTH MOVERS**

Spacing of Bridge Girders (center to center in feet)	Maximum Axle Loading (in pounds)
4	28,000
5	29,000
6	30,000
7	32,000
8	34,000
9	37,000
10 and over	40,000

Minimum axle spacing:

For 3-axle earth movers

Axles 1 to 2 = 8 feet

Axles 2 to 3 = 20 feet

For 2-axle earth movers

Axles 1 to 2 = 20 feet

- (4) Move equipment within the limits of the project over completed or existing base, surfacing, pavement, and structures, whether or not open to the public, in accordance with the limitations and conditions established by the Engineer.

Within the limits of the project and subject to the condition that the Contractor shall repair, at the Contractor's expense, any damage caused thereby, the Contractor will be permitted to cross culverts and pipes with construction equipment which exceeds the size or weight limitations set forth in Division 15 of the Vehicle Code in accordance with the conditions set forth on the plans. If such conditions are not set forth on the plans, the provisions in the first paragraph in this Section 7-1.02 will apply.

Should the Contractor desire to increase the load carrying capacity of a structure or structures which are to be constructed as a part of the contract, in order to facilitate their own operations, the Contractor may request the Engineer to consider redesigning the structure or structures. Proposals by the Contractor to increase the load carrying capacity of structures above 130,000 pounds per single axle or pair of axles less than 8 feet apart, or above 330,000 pounds total gross vehicle weight, will not be approved. The request shall include a description of the structure or structures involved and a detailed description of the overloads to be carried, the date the revised plans would be required, and a statement that the Contractor agrees to pay all costs involved in the strengthening of the structure or structures, including the cost of revised plans, and further that the Contractor agrees that no extension of time will be allowed by reason of any delay to the work which may be due to the alteration of the structure or structures. If the Engineer determines that strengthening the structure or structures will be permitted, the Engineer will inform the Contractor of the estimated cost of the alterations, including engineering, and the date that revised plans could be furnished. If the cost

and date are satisfactory to the Contractor, the Engineer will prepare a change order providing for the agreed upon alterations and payment to the City.

**7-1.03 Payment of Taxes.** - The contract prices paid for the work shall include full compensation for all taxes which the Contractor is required to pay, whether imposed by Federal, State or local government, including, without being limited to, Federal excise tax. No tax exemption certificate nor any document designed to exempt the Contractor from payment of any tax will be furnished to the Contractor by the City, as to any tax on labor, services, materials, transportation, or any other items furnished pursuant to the contract.

**7-1.04 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 in sufficient time to prevent delays to the work.

The Environmental Quality Act (Public Resources Code, Sections 21000 to 21176, inclusive) may be applicable to permits, licenses and other authorizations which the Contractor must obtain from local agencies in connection with performing the work of the contract. The Contractor shall comply with the provisions of said statutes in obtaining such permits, licenses and other authorizations and they shall be obtained in sufficient time to prevent delays to the work.

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.

**7-1.05 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 hold harmless the City, its employees, duly authorized agents and 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.

**7-1.06 Safety and Health Provisions.** - The Contractor shall conform to all applicable occupational safety and health standards, rules, regulations and orders established by the Federal Government, State of California, County of Santa Clara and the City of San Jose or any other government agency of competent Jurisdiction.

All working areas utilized by the Contractor to perform work during the hours of darkness, shall be lighted to conform to the minimum illumination intensities established by California Division of Occupational Safety and Health Construction Safety Orders.

All lighting fixtures shall be mounted and directed in a manner precluding glare to approaching traffic.

Full compensation for conforming to the requirements of this section shall be considered as included in the contract prices paid for the various items of work involved and no separate payment will be made therefor.

**7-1.07 (Blank)**

**7-1.08 Public Convenience.** - This Section 7-1.08 defines the Contractor's responsibility with regard to convenience of the public and public traffic in connection with the Contractor's operations.

Attention is directed to Section 4-1.04, "Detours," for provisions relating to the passage of traffic around the work over detours.

Attention is directed to Section 7-1.09, "Public Safety," for provisions relating to the Contractor's responsibility for the safety of the public. The requirements in said Section 7-1.09 are in addition to the requirements of this Section 7-1.08 and the Contractor will not be relieved of any responsibilities as set forth in said Section 7-1.09 by reason of conformance with any of the provisions in this Section 7-1.08.

Attention is directed to Section 12, "Construction Area Traffic Control Devices," for requirements concerning flagging and traffic-handling equipment and devices used in carrying out the provisions of this Section 7-1.08 and said Section 7-1.09.

In the event of a suspension of the work, attention is directed to Section 8-1.05, "Temporary Suspension of Work."

The Contractor shall so conduct operations as to offer the least possible obstruction and inconvenience to the public and shall have under construction no greater length or amount of work than can be prosecuted properly with due regard to the rights of the public.

Unless otherwise provided in the 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 signals and highway lighting shall be kept in operation for the benefit of the traveling public during progress of the work, and other forces will continue routine maintenance of existing systems.

Construction operations shall be conducted in such a manner as to cause as little inconvenience as possible to abutting property owners.

Convenient access to driveways, houses, and buildings along the line of the work shall be maintained and temporary approaches to crossings or intersecting highways shall be provided and kept in good condition. When the abutting property owner's access across the right of way line is to be eliminated, or to be replaced under the contract by other access facilities, the existing access shall not be closed until the replacement access facilities are usable.

The Contractor may be required to cover certain signs which regulate or direct public traffic to roadways that are not open to traffic. The Engineer will determine which signs shall be covered. Except as otherwise provided for construction area signs in Section 12, "Construction Area Traffic Control Devices," furnishing, installing and removing covers will be paid for as extra work as provided in Section 4-1.03D.

Excavation and the construction of embankments shall be conducted in such manner as to provide a reasonably smooth and even surface satisfactory for use by public traffic at all times; sufficient fill at culverts and bridges to permit traffic to cross shall be placed in advance of other grading operations, and if ordered by the Engineer roadway cuts shall be excavated in lifts and embankments constructed part width at a time, construction being alternated from one side to the



other and traffic routed over the side opposite the one under construction. Culvert installation or culvert construction shall be conducted on but one-half the width of the traveled way at a time and that portion of the traveled way being used by public traffic shall be kept open and unobstructed until the opposite side of the traveled way is ready for use by traffic.

Upon completion of rough grading at the grading plane, or placing any subsequent layer thereon, the surface of the roadbed shall be brought to a smooth, even condition free of humps and depressions, satisfactory for the use of public traffic.

After the surface of the roadbed has been brought to a smooth and even condition for the passage of public traffic as above provided, any work ordered by the Engineer for the accommodation of public traffic prior to commencing subgrade operations will be paid for as extra work as provided in Section 4-1.03D. After subgrade preparation for a specified layer of material has been completed, the Contractor shall, at the Contractor's expense, repair any damage to the roadbed or completed subgrade, including damage caused by the Contractor's operations or use by public traffic.

While subgrade and paving operations are underway, public traffic shall be permitted to use the shoulders and, if half-width paving methods are used, shall also be permitted to use the side of the roadbed opposite the one under construction. When sufficient width is available, a passageway wide enough to accommodate at least 2 lanes of traffic shall be kept open at locations where subgrade and paving operations are in active progress.

Any shaping of shoulders or reshaping of subgrade necessary for the accommodation of public traffic thereon during subgrade preparation and paving operations will be paid for as extra work as provided in Section 4-1.03D.

When ordered by the Engineer, the Contractor shall furnish a pilot car and driver and flaggers for the purpose of expediting the passage of public traffic through the work under one-way controls, and the cost thereof will be paid for as extra work as provided in Section 4-1.03D, except that the cost of flaggers furnished for this purpose will be paid for as provided in Section 12-2.02, "Flagging Costs." At locations where traffic is being routed through construction under one-way controls and when ordered by the Engineer, the movement of the Contractor's equipment from one portion of the work to another shall be governed in accordance with such one-way controls.

Water or dust palliative shall be applied if ordered by the Engineer for the alleviation or prevention of dust nuisance as provided in Section 10, "Dust Control."

In order to expedite the passage of public traffic through or around the work and where ordered by the Engineer, the Contractor shall install signs, lights, flares, temporary railing (Type K), barricades, and other facilities for the sole convenience and direction of public traffic. Also where directed by the Engineer, the Contractor shall furnish competent flaggers whose sole duties shall consist of directing the movement of public traffic through or around the work. The cost of furnishing and installing such signs, lights, flares, temporary railing (Type K), barricades, and other facilities, not to be paid for as separate contract items, will be paid for as extra work as provided in Section 4-1.03D.

The cost of furnishing flaggers for the sole convenience and direction of public traffic will be paid for as provided in Section 12-2.02, "Flagging Costs."

The Contractor will be required to pay the cost of replacing or repairing all facilities installed under extra work for the convenience or direction or warning of public traffic that are lost while in the Contractor's custody, or are damaged by

reason of the Contractor's operations to such an extent as to require replacement or repair, and deductions from any moneys due or to become due the Contractor will be made to cover such cost.

Whenever a section of surfacing, pavement, or the deck of a structure has been completed, the Contractor shall open it to use by public traffic if the Engineer so orders or may open it to use by public traffic if the Engineer so consents. In either case, the Contractor will not be allowed any compensation due to any delay, hindrance, or inconvenience to the Contractor's operations caused by such public traffic, but will thereupon be relieved of responsibility for damage to completed permanent facilities caused by public traffic, within the limits of such use. The Contractor will not be relieved of any other responsibility under the contract nor will the Contractor be relieved of cleanup and finishing operations.

Except as otherwise provided in this Section 7-1.08 or in the special provisions, full compensation for conforming to the requirements in this Section 7-1.08 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.

**7-1.09 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 7-1.12, "Responsibility for Damage."

Attention is directed to Section 7-1.08, "Public Convenience," for provisions relating to the Contractor's responsibility for providing for the convenience of the public in connection with the Contractor's operations.

Attention is directed to Section 12, "Construction Area Traffic Control Devices," for requirements concerning flagging and traffic-handling equipment and devices used in carrying out the provisions of said Section 7-1.08 and this Section 7-1.09.

Whenever the Contractor's operations create a condition hazardous to traffic or to the public, the Contractor shall, at the Contractor's expense and without cost to the City, 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.

Such fences, temporary railing (Type K), barricades, lights, signs, and other devices furnished, erected and maintained by the Contractor, at the Contractor's expense, are in addition to any construction area traffic control devices for which payment is provided for elsewhere in the specifications.

The Contractor shall also furnish such flaggers as are necessary to give adequate warning to traffic or to the public of any dangerous conditions to be encountered and payment therefor will be made as provided in Section 12-2.02, "Flagging Costs."

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

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

Construction equipment shall enter and leave the highway via existing ramps and crossovers and shall move in the direction of public traffic. All movements of workers and construction equipment on or across lanes open to public traffic shall be performed in a manner that will not endanger public traffic.

The Contractor's trucks or other mobile equipment which leave a freeway lane, that is open to public traffic, to enter the construction area, shall slow down gradually in advance of the location of the turnoff to give following public traffic an opportunity to slow down.

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

Lanes, ramps, and shoulders shall be closed in accordance with the details shown on the plans, the provisions of Section 12, "Construction Area Traffic Control Devices," and as provided in the special provisions.

Pedestrian openings through falsework shall be paved or provided with full width continuous wood walks and shall be kept clear. Pedestrians shall be protected from falling objects and curing water for concrete. Overhead protection for pedestrians shall extend not less than 4 feet beyond the edge of the bridge deck. All pedestrian openings through falsework shall be illuminated in accordance with the provisions in Caltrans Section 86-6.11, "Falsework Lighting."

The Contractor shall notify the Engineer not less than 15 days before the anticipated start of each falsework and girder erection operation whenever such falsework or girders will reduce clearances available to public traffic.

Where the height of vehicular openings through falsework is less than 15 feet, a W34B "Vertical Clearance" sign shall be provided above each opening facing approaching traffic. The signs shall have black letters and numbers on an orange reflectorized background and shall be illuminated so that said signs are clearly visible. The minimum height of the letters and numbers shall be 6 inches and 10 inches, respectively.

No material or equipment shall be stored where it will interfere with the free and safe passage of public traffic, and at the end of each day's work and at other times when construction operations are suspended for any reason, the Contractor shall remove all equipment and other obstructions from that portion of the roadway open for use by public traffic.

Temporary facilities which the Contractor uses to perform the work shall not be installed or placed where they will interfere with the free and safe passage of public traffic.

Temporary facilities which could be a hazard to public safety if improperly designed shall comply with design requirements specified in the contract for such facilities or, if none are specified, with standard design criteria or codes appropriate for the facility involved. Working drawings and design calculations for such temporary facilities shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California and shall be submitted to the Engineer for review pursuant to Section 5-1.02, "Plans and Working Drawings." Such submittal shall designate thereon the standard design criteria or codes used. Installation of such temporary facilities shall not start until the Engineer has reviewed the drawings.

Provision for the payment for signs, lights, flares, temporary railing (Type K), barricades, and other facilities by extra work as provided in Section 7-1.08, "Public Convenience," or by contract item as provided in Section 12, "Construction Area Traffic Control Devices," shall in nowise relieve the Contractor from any responsibility as provided in this Section 7-1.09.

Except as otherwise provided in this Section 7-1.09 or in the special provisions, full compensation for conforming to all of the provisions in this Section 7-1.09 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.

Should the Contractor be negligent or fail to furnish and/or maintaining warning and protective facilities as required herein, the City may furnish and/or maintain such facilities and charge Contractor therefor by deducting the cost thereof from periodic progress payments due the Contractor as such costs are incurred by City.

In the event the Contractor does not provide such flaggers and guards as are required by this section, the Director may request that the San Jose Police Department provide for public safety and that the costs related thereto shall be deducted from any periodic progress payments due the Contractor.

No material or equipment shall be stored where it will interfere with the free and safe passage of public traffic, and at the end of each day's work and at other times when construction operations are suspended for any reason, the Contractor shall remove all equipment and other obstructions from that portion of the right-of-way open for use by public traffic.

**7-1.10 Use of Explosives.** - The use of explosives is expressly prohibited unless specifically provided for in the special provisions.

**7-1.11 Preservation of Property.** - Attention is directed to Section 7-1.12, "Responsibility for Damage," and to Section 8-1.10, "Utility and Non-Highway Facilities." 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.

Roadside 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 highway facilities, and any other improvements or facilities within or adjacent to the highway shall be protected from injury or damage, and if ordered by the Engineer, the Contractor shall provide and install suitable safeguards, approved by the 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 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 moneys due or to become due to the Contractor under the contract.

The fact that any underground facility is not shown upon the plans shall not relieve the Contractor of any responsibility under Section 8-1.10, "Utility and Non-Highway Facilities." It shall be the Contractor's responsibility, pursuant thereto, to ascertain the location of such underground improvements or facilities which may be subject to damage by reason of the Contractor's operations.

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 7-1.11, shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefor.

**7-1.12 Responsibility for Damage.** - The City and all agents, officers and employees thereof including but not limited to the Engineer, shall not be answerable or accountable in any manner: for any loss or damage that may happen to the work or any part thereof; for any loss or damage to any of the materials or other things used or employed in performing the work; for injury to or death of any person, either workers or the public, or for damage to property from any cause which might have been prevented by the Contractor, or the workers, or anyone employed by the Contractor.

The Contractor shall be responsible for any liability imposed by law and for injuries to or death of any person including but not limited to workers and the public, or damage to property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before its completion and final acceptance.

The Contractor shall protect, indemnify, defend and hold harmless the City and all agents, officers and employees thereof including but not limited to the Engineer, from all claims, suits or actions of every name, kind and description including attorney's fees, brought forth, or on account of, injuries to or death of any person including but not limited to workers and the public, or damage to property resulting from the performance of a contract, except as otherwise provided by statute the State of California. The duty of the Contractor to indemnify and save harmless includes the duties to defend as set forth in Section 2778 of the Civil Code.

With respect to third party claims against the Contractor, the Contractor waives any and all rights to any type of express or implied indemnity against the City, its agents, officers or employees.

It is the intent of the parties that the Contractor will indemnify and hold harmless the City, its agents, officers and employees from any and all claims, suits or actions as set forth above regardless of the existence or degree of fault or negligence on the part of the City, the Contractor, the subcontractor or subcontractor at any tier or employee of any of these, other than the sole negligence or willful conduct of the City, its agents, officers and employees.

In addition to any remedy authorized by law, so much of the money due the Contractor under and by virtue of the contract as shall be considered necessary by the City may be retained by the City until disposition has been made of such suits or claims for damages as aforesaid

The retention of money due the Contractor shall be subject to the following:

1. The City will give the Contractor 30 days notice of its intention to retain funds from any partial payment which

- may become due to the Contractor prior to acceptance of the contract. Retention of funds from any payment made after acceptance of the contract may be made without such prior notice to the Contractor.
2. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 9-1.06, "Partial Payments."
  3. If the City has retained funds and it is subsequently determined that the City is not entitled to be indemnified and hold harmless by the Contractor in connection with the matter for which such retention was made, the City shall pay interest on the amount retained at the same rate as that received by the City on such funds for the period of such retention.

The Contractor shall be responsible for any liability imposed by law and for injuries to or death of any person including but not limited to workers and the public, or damage to property. Contractor shall indemnify and hold harmless any county, city or district, their officers and employees connected with the work, within the limits of which county, city or district the work is being performed hereunder, all in the same manner and to the same extent as provided above for the protection of the City and all officers and employees thereof connected with the work.

Nothing in this contract is intended to make the public or any member thereof a third party beneficiary hereunder, nor is any term and condition or other provision of the contract intended to establish a standard of care owed to the public or any member thereof.

**7-1.121 Protection of Contractor's Work and Property.** - The Contractor shall protect their work, supplies and materials from damage due to the nature of the work, the action of the elements, trespassers, or any cause whatsoever which is under the Contractor's control, until the completion and acceptance of the work. Neither the City nor any of its agents assumes any responsibility for collecting indemnity from any person or persons causing damage to the work of the Contractor.

**7-1.122 Insurance Requirements.** - Contractor shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damage to property as set forth in the Special Provisions which may arise from or in connection with the performance of the work hereunder by the Contractor, the Contractor's agents, representatives, employees or subcontractors, including work performed pursuant to Section 8-1.05, "Temporary Suspension of Work." The cost of such insurance shall be included in the Contractor's bid.

**7-1.122A Insurance During Termination and/or Suspension.** - If the City elects to suspend the contract work as provided for in these Specifications, it shall be the Contractor's obligation to keep all insurance policies required under the contract documents in place and effective during the period of such suspension.

If the City should elect to terminate the contract, it shall be the Contractor's obligation to keep all insurance required under the contract documents in place and in effect until the acceptance of the project by the Engineer.

**7-1.125 Legal Actions Against the City.** - In the event litigation is brought against the City concerning compliance by the City with State, Federal, regional, or local laws, ordinances, rules or regulations applicable to the work, the provisions of this Section 7-1.125 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 right of way delay within the meaning of Section 8-1.09, "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 4-1.03, "Changes," or terminate the contract.
- (C) If the final judgment in an 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 4-1.03, "Changes," or terminate the contract.
- (D) If the contract is to be terminated, the termination and the determination of the total compensation payable to the Contractor shall be governed by the provisions of Section 8-1.11, "Termination of Contract."
- (E) If any legal action is filed involving the project, the City may, in its sole discretion, elect to terminate the contract for convenience or suspend the contract, as provided elsewhere in these Specifications. This right to terminate and/or suspend the contract work shall include but not be limited to an action brought under the California Environmental Quality Act (CEQA).

**7-1.13 Disposal of Material Outside the Project Limits.** - If the Contractor elects to dispose of materials at locations other than those where arrangements have been made by the City, or, if material is to be disposed of and the City has not made arrangements for disposal of such material, the Contractor shall make arrangements for disposing of materials outside the project limits and the Contractor shall pay all costs involved. Arrangements shall include, but not be limited to, entering into agreements with property owners and obtaining necessary permits, licenses and environmental clearances. Before disposing of any material outside the project limits, the Contractor shall furnish to the Engineer satisfactory evidence that the Contractor has entered into agreements with the property owners of the site involved and has obtained said permits, licenses and clearances.

When any material is to be disposed of outside the project right of way, and the City has not made arrangements for disposal of such material, the

Contractor shall first obtain written authorization from the property owner on whose property the disposal is to be made and the Contractor shall file with the Engineer said authorization or a certified copy thereof together with a written release from the property owner absolving the City from any and all responsibility in connection with the disposal of material on said property, and before any material is disposed of on said property, the Contractor shall obtain written permission from the Engineer to dispose of the material at the location designated in said authorization.

When material is disposed of as above provided and the disposal location is visible from a highway, the Contractor shall dispose of the material in a neat and uniform manner to the satisfaction of the Engineer.

Where the City has made arrangements with owners of land in the vicinity of a project for the disposal of materials on an owner's property, such arrangements are made solely for the purpose of providing all bidders an equal opportunity to dispose of said materials on such property. Bidders or Contractors may, upon written request, inspect the documents evidencing such arrangements between property owners and the City. If the Contractor so elects, exercise any rights that have been obtained, which may be exercised by a Contractor under such arrangements, subject to and upon the conditions hereinafter set forth.

Such arrangements are not a part of the contract and it is expressly understood and agreed that the City assumes no responsibility to the bidder or Contractor whatsoever in respect to the arrangements made with the property owner to dispose of materials thereon and that the Contractor shall assume all risks in connection with the use of such property, the terms upon which such use shall be made, and there is no warranty or guaranty, either express or implied, as to the quantity or types of materials that can be disposed of on such property.

In those instances in which the Department has compiled "Materials Information" as referred to in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," said compilation will include the documents setting forth the arrangement made with some of the property owners for the disposal of material on such owners' properties. The inclusion of such documents therein shall not in any respect operate as a waiver of any of the provisions in this Section 7-1.13 concerning said documents.

The bidder or Contractor is cautioned to make such independent investigation and examination as they deem necessary to satisfy themselves as to the quantity and types of materials which may be disposed of on such property and the rights, duties and obligations acquired or undertaken under such arrangement with the property owner.

Notwithstanding that the Contractor may elect to dispose of materials on any such property owner's property, no material may be disposed of on such property unless the Contractor has first either:

- (1) Executed a document that will guarantee to hold such owner harmless from all claims for injury to persons or damage to property resulting from the Contractor's operations on the property owner's premises and also agree to conform to all other provisions set forth in the arrangement made between the City and the property owner. Said document will be prepared by the Engineer for execution by the Contractor, or
- (2) Entered into an agreement with the owner of the disposal site on any terms mutually agreeable to the



owner and the Contractor; provided that the Contractor shall furnish to the Engineer a release, in a form satisfactory to the Engineer, executed by the owner, relieving the City of any and all obligations under the City's arrangement with the owner.

If the Contractor elects to dispose of material under (1), the use of such site shall be subject to the terms, conditions and limitations of the arrangement made between the property owner and the City and the Contractor shall pay such charges as are provided for in the arrangement made by the City with the property owner, and deductions will be made from any moneys due or that may become due the Contractor under the contract sufficient to cover the charges for such material disposed of.

If the Contractor elects to dispose of material under (2), the Contractor shall pay such charges as are provided for in the agreement between the owner and the Contractor and deductions will not be made from any moneys due or that may become due the Contractor under the contract to cover such charges.

Before acceptance of the contract, the Engineer may require the Contractor to submit written evidence that the owner of the disposal site is satisfied that the Contractor has satisfactorily complied with the provisions of either - (1), the arrangement between the City and the owner, or (2), the agreement between the owner and the Contractor, as the case may be.

Full compensation for all costs involved in disposing of materials as specified in this Section 7-1.13, 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.

**7-1.14 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.

When 2 or more contractors are employed on related or adjacent work, or obtain materials from the same material source, as provided in Section 6-2.02, "Possible Local Material Sources," or Section 6-2.03 "Mandatory Local Material Sources," each contractor shall conduct their operations in such a manner as not to cause any unnecessary delay or hindrance to the other.

Each contractor shall be responsible to the other for all damage to work, to persons or property caused to the other by his/her operations, and for loss caused the other due to his/her unnecessary delays or failure to finish the work within the time specified for completion. The Contractor shall conduct, adjust, correct and coordinate their work with the work of others so that no discrepancies shall result in the whole work and shall defend, indemnify and hold the City harmless against any claims arising therefrom. The Contractor, including sub-contractors at any tier, shall keep informed of the progress and the detail work of other contractors and shall notify the Engineer immediately of lack of progress or defective workmanship on the part of other contractors, where such delay or such defective workmanship will interfere with the Contractor's own operations. Failure of a Contractor to keep informed of the work progressing on the site and failure to give notice of lack of

progress or defective workmanship by others shall be construed as acceptance by the Contractor of the status of the work as being satisfactory for proper coordination with the Contractor's work. If the work of the Contractor is delayed because of any acts or omissions of any other contractor, the Contractor shall on that account have no claim against the City other than for an extension of time.

**7-1.145 Mutual Responsibility of Contractors.** - If the Contractor or any of their subcontractors or employees cause loss or damage to any other contractor, and if such other contractor makes a claim against the City, its employees or agents, on account of any loss so sustained, the City shall notify the Contractor, who shall defend, indemnify and save harmless the City, its employees and agents against any such claim, expense or judgement arising therefrom.

**7-1.15 Relief From Maintenance and Responsibility.** - Upon the request of the Contractor, the Engineer may relieve the Contractor of the duty of maintaining and protecting certain portions of the work as described below, which have been completed in all respects in accordance with the requirements of the contract and to the satisfaction of the Engineer and of which City has taken occupancy or use, and thereafter except with the Engineer's consent, the Contractor will not be required to do further work thereon. In addition, such action by the 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 from the Contractor's negligence. Portions of the work for which the Contractor may be relieved of the duty of maintenance and protection as provided in the above paragraph include but are not limited to the following:

- (1) The completion of one-quarter mile of roadway or one-quarter mile of one roadway of a divided highway or a frontage road including the traveled way, shoulders, drainage control facilities, planned roadway protection work, lighting and any required traffic control and access facilities.
- (2) A bridge or other structure of major importance.
- (3) A complete unit of a traffic control signal system or of lighting system.
- (4) Facilities constructed for other agencies.
- (5) Storm or sanitary sewer facilities as designated by the Engineer.

However, nothing in this Section 7-1.15 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 or after the formal written acceptance of the entire contract by the Engineer.

If the Contractor is relieved of maintenance and responsibility of a portion of the work performed under this contract and the City takes occupancy or use of that portion of the work, the Contractor hereby agrees to provide reasonable access to the City's maintenance forces to properly maintain those areas occupied by the City.

**7-1.16 Contractor's Responsibility for the Work and 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 the Contractor has received partial payment as provided in Section 9-1.06, "Partial Payments," 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 7-1.08, "Public Convenience," and 7-1.15, "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, except as otherwise expressly provided in Section 7-1.165, "Damage by Storm, Flood, Tidal Wave or Earthquake," and in Caltrans Section 19-2.04, "Slides and Slipouts," and except for such injuries, losses, or damages as are directly and proximately caused by acts of the Federal, State, regional, or local Government or the public enemy. Where necessary to protect the work or materials from damage, the Contractor shall, at the Contractor's expense, provide suitable drainage of the work area and erect such temporary structures as are necessary to protect the work or materials from damage. The suspension of the work from any cause whatever shall not relieve the Contractor of any responsibility for the work and materials as herein specified. If ordered by the Engineer, the Contractor shall, at the Contractor's expense, properly store materials which have been furnished by the City. Such storage by the Contractor shall be on behalf of the City and the City shall at all times be entitled to the possession of such materials, and the Contractor shall promptly return the same to the site of the work when requested. The Contractor shall not dispose of any of the materials so stored except on written authorization from the Engineer.

The City reserves the right to use or occupy any portion or all of the work prior to completion. Upon occupying or commencing use of any such portion or all of the work prior to completion, the Contractor shall not be relieved of any duty for maintaining and protecting said work and the Contractor shall be required thereafter to complete said work. The Contractor shall be fully responsible for coordinating with the City for the completion of such work such that said work will cause the least interference with the City's use and/or occupancy.

**7-1.165 Damage by Storm, Flood, Tidal Wave or Earthquake.** - Attention is directed to Section 7-1.16, "Contractor's Responsibility for the Work and Materials." In the event damage to the work is caused by a storm, flood, tidal wave or earthquake which constitutes an "Occurrence," as hereinafter defined, the provisions of this Section 7-1.165 shall be applicable and the Contractor may apply in writing to the Engineer for the City to pay or participate in the cost of repairing damage to the work from such cause or, in lieu thereof, and at the sole discretion of the City, terminate the contract and relieve the Contractor of further obligation to perform the work, subject to the following:

- A. Occurrence. "Occurrence" shall include tidal waves, earthquakes in excess of a magnitude of 3.5 on the Richter Scale, and storms and floods as to which the Governor has proclaimed a state of emergency when the damaged work is located within the territorial limits to which such proclamation is applicable or, which were,

in the opinion of the Engineer, of a magnitude at the site of the work sufficient to have caused such a proclamation had they occurred in a populated area or in an area in which such a proclamation was not already in effect.

- B. Application by Contractor. The Contractor's written request for the City to pay or to participate in the cost of rebuilding, repairing, restoring or otherwise remedying the damage to the work caused by the Occurrence shall be submitted to the Engineer before performing any work other than emergency work, including emergency work necessary to provide for passage of public traffic.
- C. Protecting the Work from Damage. Nothing in this section shall be construed to relieve the Contractor of any responsibility to protect the work from damage. The Contractor shall bear the entire cost of repairing damage to the work caused by the Occurrence which the Engineer determines was due to the failure of the Contractor to comply with the requirements of the Plans and Specifications, take reasonable and adequate measures to protect the work or exercise sound engineering and construction practices in the conduct of the work, and such repair costs shall be excluded from consideration under the provisions of this section.
- D. Repair Work. Repair of damaged work under the provisions of this section shall be pursuant to a contract change order issued hereunder and specifying the repair work to be performed on the damaged facility. Such repair work shall consist of restoring the in-place construction (for the purposes of this section erected falsework and formwork shall be considered in-place construction) to the same state of completion to which such work had advanced prior to the Occurrence. Emergency work which the Engineer determines would have been part of the repair work if it had not previously been performed, will be considered to be part of said repair work.

The City reserves the right to make changes in the plans and specifications applicable to the portions of the work to be repaired, and if such changes will increase the cost of repairing the damage over the Engineer's estimate of the cost of repair without the changes, the Contractor will be paid for such increased costs in accordance with Subsection E and the increased cost amount shall not be considered in determining the cost of repair to be borne by the Contractor under Subsection F.

Nothing in this section shall be construed to relieve the Contractor of full responsibility for the risk of injury, loss or damage to materials not yet incorporated in the work and to materials, tools and

equipment (except erected falsework and formwork) used to perform the work, or to relieve the Contractor of any responsibility under Section 7-1.12, "Responsibility for Damage." The provisions of this section shall not be applicable to the repair of damage caused by an Occurrence to any portion of the work as to which the Contractor has been granted relief from maintenance and responsibility pursuant to Section 7-1.15, "Relief From Maintenance and Responsibility," or to the removal of slides and slipouts or the repair and restoration of damage to the work resulting from slides and slipouts pursuant to Caltrans Section 19-2.04, "Slides and Slipouts."

- E. **Determination of Costs.** Unless otherwise agreed between the Engineer and the Contractor, the cost of the work performed pursuant to this Section 7-1.165 will be determined in accordance with the provisions in Section 9-1.03, "Force Account Payment," except there shall be no markup allowance pursuant to Section 9-1.03A, "Work Performed by Contractor," unless the Occurrence that caused the damage was a tidal wave or earthquake. The cost of emergency work, which the Engineer determines would have been part of the repair work if it had not previously been performed, will be determined in the same manner as the authorized repair work. The cost of repairing damaged work which was not in compliance with the requirements of the plans and specifications shall be borne solely by the Contractor, and such costs shall not be considered in determining the cost of repair under this Subsection E.
- F. **Payment for Repair Work.** When the Occurrence that caused the damage was a tidal wave or earthquake, the City will pay the cost of repair determined as provided in Subsection E, that exceeds 5 percent of the amount of the Contractor's bid for bid comparison purposes.

When the Occurrence that caused the damage was a storm or flood, the City will participate in the cost of the repair determined as provided in Subsection E in accordance with the following:

1. On projects for which the amount of the Contractor's bid for bid comparison purposes is \$2,000,000 or less, the City will pay 90 percent of the cost of repair that exceeds 5 percent of the amount of the Contractor's bid for bid comparison purposes.
2. On projects for which the Contractor's bid for bid comparison purposes is greater than \$2,000,000, the City will pay 90 percent of the cost of repair that exceeds \$100,000.

- G. **Termination of Contract.** If the City elects to terminate the contract, the termination and the determination of the total compensation payable to the Contractor shall be governed by the provisions of Section 8-1.11, "Termination of Contract."

**7-1.166 Substantial Completion.** - When the Contractor considers the work or a designated portion thereof substantially complete as defined in Section 1-1.425, "Substantial Completion," the Engineer shall prepare for the Contractor a list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all work in accordance with the contract documents. When the Engineer determines that the work or designated portion thereof is substantially complete, the Engineer will then prepare a Certificate of Substantial Completion which shall state the responsibilities of the City and the Contractor for security, maintenance, heat, utilities, damage to the work and insurance. The Certificate of Substantial Completion of the work shall be submitted to the City and the Contractor for their written acceptance of the responsibilities assigned to them in such Certificate. The Contractor shall obtain and submit to the City, prior to the date of Substantial Completion, all necessary permits for occupancy or the date of Substantial Completion shall be deemed postponed until the City receives these permits. If desired by the City, portions of the work, as completed, may be placed in service. The Contractor shall give proper access to the work for this purpose. Such use and operation shall not constitute an acceptance of the work or that portion placed in service. Contractor shall be liable for defects due to faulty construction.

Upon issuance of the Certificate of Substantial Completion of the work or designated portion thereof, and upon application by the Contractor, and certification by the Engineer, the City shall make payment, reflecting adjustment in retainage, if any, for such work or portion thereof as provided in the contract.

Liquidated damages shall continue to accrue until the filing of the Notice of Acceptance, unless otherwise stated in the Certificate of Substantial Completion. Warranties shall begin to run upon filing of the Notice of Acceptance unless otherwise stated in the Certificate of Substantial Completion.

**7-1.17 Acceptance of Contract.** - When the Engineer has made the final inspection as provided in Section 5-1.13, "Final Inspection," and determines that the contract work has been completed in all respects and in its entirety in accordance with the plans and specifications, the Engineer will formally accept the contract, and immediately upon and after such acceptance by the Engineer, and recordation of the Notice of Completion and Acceptance by the County Recorder's Office, the Contractor will be relieved of the duty of maintaining and protecting the work as a whole, and except for warranty and punch list work, the Contractor will not be required to perform any further work thereon, and the Contractor shall be relieved of responsibility for injury to persons or property or damage to the work which occurs after the formal acceptance by the Engineer.

**7-1.18 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 installed for their intended use. All such materials shall become the property of the City upon being so attached or affixed.

**7-1.19 Rights in Land and Improvements.** - Nothing in these specifications shall be construed as allowing the Contractor to make any arrangements with any person to permit occupancy or use of any land, structure, or building within the limits of the contract for any purpose whatsoever, either with or without compensation, in conflict with any agreement between the City and any owner, former owner, or tenant of such land, structure, or building.

The Contractor shall not occupy City-owned property outside the right of way as shown on the plans or outside the expressly designated areas in the contract documents unless the Contractor enters into a rental agreement with the City. The agreement will be based on the fair rental values.

**7-1.20 Repair of Equipment.** - The work of installing, assembling, repairing or reconditioning, or other work of any nature on machinery, equipment, or tools used in or upon the work shall be considered a part of the work to be performed under the contract and any laborers, workers, or mechanics working on such machinery, equipment, or tools, unless employed by bona fide commercial repair shops, garages, blacksmith shops, or machine shops, which have been established and operating on a commercial basis for a period of at least 2 months prior to the award of the contract, shall be subject to all the requirements relating to labor set forth in these specifications and in the special provisions.

**7-1.21 Material Plants.** - The construction, erection, and operation of material production, proportioning, or mixing plants from which material is used wholly on the contract or on contracts under the supervision of the City shall be considered a part of the work to be performed under the contract and any laborers, workers, or mechanics working on such plants shall be subject to all of the requirements relating to labor set forth in these specifications and in the special provisions.

**7-1.22 Provisions of Law and Venue.** - It is specifically provided that this contract is to be interpreted pursuant to California Law and subject to all the provisions of law regulating and controlling the performance of work for the City, and that the rules of law shall prevail over any provision contained in any of the contract documents which may be in conflict or inconsistent therewith.

Each and every provision of law and clause required by law to be inserted in these contract documents shall be deemed to be inserted herein and the contract documents shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provisions is not inserted, or is not correctly inserted, then upon application of either party, the contract documents shall forthwith be physically amended to make such insertion or correction at no additional cost to City.

The parties to this Contract hereby expressly agree that any contrary provisions of this contract notwithstanding, any action to interpret the terms of the Contract or resolve any dispute arising under this Contract by the Contractor, subcontractors at any tier, and material suppliers at any tier, shall be filed exclusively in the State Court of Santa Clara County or where otherwise appropriate in the Federal District Court for the Northern District of California located in San Jose, California, having proper jurisdiction. There is no express or implied agreement between the parties to mediate and/or arbitrate in any forum any matter arising under this Contract.

The Contractor is hereby advised that these contract documents, including the Contractor's Proposal, are subject to the California State Public Records Act and become documents available to the general public.

In the event that a particular City public work contract is funded or required to be approved in whole or in part by the state or federal government and any provision contained herein is inconsistent with any applicable state or federal statutes, rules or regulations, orders or controlling policies pertaining to such funding or approval, such provisions to the extent that it is inconsistent shall not apply to said City public works contract.

**7-1.23 Final Guarantee.** - Unless otherwise specified, all work shall be guaranteed by the Contractor against defects resulting from the use of inferior materials, equipment, or workmanship for one year from the date of final acceptance of the contract.

If, within any guarantee period, repairs or changes are required in connection with guaranteed work, which, in the opinion of the Engineer, is rendered necessary as the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the contract, the Contractor shall, promptly upon receipt of notice from the Engineer, and without expense to the City, (1) place in satisfactory condition in every particular all of such guaranteed work, correcting all defects therein; (2) make good all damage to the structure, site or work, or equipment or contents thereof, which, in the opinion of the Engineer, is the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the contract; and (3) make good any work or material, or the equipment and contents of said structures, site or work disturbed in fulfilling any such guarantee. If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the City may have the defects corrected and the Contractor and the Contractor's surety shall be liable for all expense incurred.

**7-1.24 Legal Address of Contractor.** -Both the address given in the proposal and the Contractor's office in the vicinity of the work are hereby designated as places to either of which drawings, samples, notices, letters or other articles or communications to the Contractor may be mailed or delivered. The delivery at either of these places of any such thing from the City or its agents to the Contractor shall be deemed sufficient service thereof upon the Contractor, and the date of such service shall be the date of such delivery. The address set forth in the proposal may be changed at any time by notice in writing from the Contractor to the City. Nothing herein contained shall be deemed to preclude or render inoperative the service of any drawings, sample, notice, letter or other article or communication to or upon the Contractor personally.

**7-1.25 Material Storage.** - The Contractor shall store materials only within the work limit and Material Storage Areas designated in the plans. Should these areas prove inadequate, the Contractor shall make arrangements for and pay all fees in connection with the use of property other than the site for storage of materials or other purpose.

**7-1.26 Waiver by the City.** - The Contractor hereby agrees that waiver by the City of any breach or violation or any term or condition of this contract agreement shall not be deemed to be a waiver or any other term or condition



## SECTION 7

## LEGAL RELATIONS AND RESPONSIBILITY

contained herein or a waiver of any subsequent breach or violation of the same term or condition of the contract. Payment for or acceptance by City of any work or services by Contractor performed under this contract shall not be deemed to be a waiver of any term or condition of this contract even if at the time of such payment or acceptance the City was aware of the Contractor's failure to comply with any term or condition of the contract.

**7-1.27 Archeological and Paleontological Rights.** - Notwithstanding any other provisions of this contract, in the event any archeological or paleontological objects within the project are discovered during the course of the work, the Contractor shall halt the work within the area affected, and the City shall have and retain all right, title and interest to such objects and shall have the further right, during the course of the contract, to examine or cause to have examined, the site of the work for any such objects and to perform or have performed archeological or paleontological excavations and all other related work to explore for, discover, recover and remove such objects from the site of the work.

In the event the work of archeological or paleontological examination and related work delays the Contractor's work, the Contractor shall be entitled to an extension of time to complete the work equal to the number of days thus delayed. Any such delays will be considered right-of-way delays within the meaning of Section 8-1.09, "Right of Way Delays", and compensation for such delay will be determined in accordance with said Section 8-1.09. The Contractor shall be entitled to no other compensation for any Archeological and Paleontological delays.

**7-1.28 Emergencies.** - In an emergency affecting the safety of persons or property the Contractor shall act reasonably to prevent threatened damage, injury or loss. The Contractor shall immediately notify the City in writing of such actions. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in Section 4-1.03, "Changes."

**7-1.29 Integration Clause.** - The contract, including these general and any special or technical specifications as defined herein, constitutes the entire agreement between the parties. There are no prior or contemporaneous oral agreements between the parties not set forth in the contract. Any modification to the contract or these specifications must be in writing in order to be effective and binding on the parties to the contract.

END OF SECTION



**SECTION 8  
PROSECUTION AND PROGRESS**

8-1.01	Subcontracting
8-1.02	Assignment
8-1.03	Beginning of Work
8-1.04	Progress Schedule
8-1.05	Temporary Suspension of Work
8-1.06	Time of Completion
8-1.06A	Sunday, Holiday and Night Work
8-1.07	Liquidated Damages
8-1.07A	No Pay For Delay
8-1.08	Blank
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8-1.11	Termination of Contract
8-1.11A	Continuation of Contract
8-1.12	Concurrent Delays
8-1.13	City's Right to Carry Out the Work



## SECTION 8

## PROSECUTION AND PROGRESS

**8-1.01 Subcontracting.** - The Contractor shall give personal attention to the fulfillment of the contract and shall keep the work under the Contractor's control.

No subcontractor will be recognized by City as such and purpose of City, and all persons engaged in the work of construction will be considered by City as employees of the Contractor and the Contractor will be held responsible for their work, which shall be subject to the provisions of the contract and specifications.

The Contractor shall perform with the Contractor's own organization 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 and 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 with 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 an item is subcontracted, the value of work subcontracted will be based on the estimated percentage of the contract item bid price, determined from information submitted by the Contractor, subject to approval by the Engineer.

Before work is started on a subcontract, the Contractor shall file with the Engineer a written statement showing the work to be subcontracted, the names of the subcontractors and the description of each portion of the work to be 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 or any designated employee of the subcontractor shall be removed immediately on the request of the Engineer and shall not again be employed on the work.

The roadside production of materials produced by other than the Contractor's forces shall be considered as subcontracted. Roadside production of materials shall be construed to be production of aggregates of all kinds with portable, semiportable or temporary crushing or screening, proportioning, and mixing plants established or reopened for the purpose of supplying aggregate or material for a particular project or projects. The erection, establishment, or reopening of such plants and the operation thereof in the production of said materials for use on the work shall conform to the requirements relating to labor set forth in these specifications and in the special provisions.

Nothing contained in the specifications or plans shall be construed as creating any contractual relationship between any subcontractor and the City. The divisions or sections of the specifications are not intended to control the Contractor in dividing the work among subcontractors or to limit the work performed by any trade.

The Contractor shall be fully responsible to the City for the acts and omissions of subcontractors, and of persons employed by the Contractor.

The Contractor shall be responsible for the coordination of trades, subcontractors, and suppliers engaged upon this work.

Any and all subcontractors or material suppliers at any tier shall be bound by the provisions of these specifications.

**8-1.02 Assignment.** - The performance of the contract may not be assigned, except upon the written consent of the City. Consent will not be given to any proposed assignment which would relieve the original Contractor or the original Contractor's surety of their responsibilities under the contract nor will the City consent to any assignment of a part of the work under the contract.

The Contractor may assign moneys 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 moneys shall be subject to all proper set-offs in favor of the City and to all deductions provided for in the contract and particularly 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.

**8-1.03 Beginning of Work.** - The Contractor shall begin work within 10 days after receiving the Notice to Proceed from the Engineer, and shall diligently prosecute the same to completion within the time limit provided in the special provisions. The first working day charged shall be the 11th calendar day following the date of the "Notice to Proceed". Should the 11th day fall on a Saturday, Sunday or Holiday, the following working day shall be the first working day charged.

The Contractor shall notify the Engineer, in writing, of the Contractor's intent to begin work at least 72 hours before work is begun. The notice shall be delivered to the Office of the Engineer and shall specify the date the Contractor intends to start. Under no circumstances shall the Contractor enter the site of the work until receipt of the Notice to Proceed.

Should the Contractor begin work in advance of receiving Notice to Proceed, any work performed in advance of the said date of Notice to Proceed shall be considered as having been done by the Contractor's own risk and expense and as a volunteer unless a Notice to Proceed is subsequently issued. Should any work be performed prior to Notice to Proceed, such work shall be subject to inspection and acceptance by City as provided for elsewhere in these Contract documents.

**8-1.04 Progress Schedule.** - When required by the special provisions, the Contractor shall submit to the Engineer a progress schedule within 20 working days of the Notice to Proceed, or within 10 working days of the Engineer's written request at any other time prior to the Notice to Proceed.

The Contractor must furnish the schedule in the form specified in the special provisions.

The schedule shall show the order in which the Contractor proposes to carry out the work, the dates on which the Contractor will start the several salient features of the work (including procurement of materials, plant, and equipment), and the contemplated dates for completing the said salient features.

The progress schedules submitted shall be consistent in all respects with the time and order of work requirements of the contract.

Subsequent to the time that submittal of a progress schedule is required in accordance with these specifications, no progress payments will be made for any work until a satisfactory schedule has been submitted to the Engineer.

The City retains the right to reject any and all construction schedules submitted by the Contractor, in the City's sole discretion, or when City determines that the Contractor has too many items on the Critical Path or the logic of the schedule is in error.

Subject to the above provisions, nothing herein shall preclude the Contractor from early completion of the contract.

**8-1.05 Temporary Suspension of Work.** - The Engineer shall have the authority to suspend the work wholly or in part, for such period as the Engineer may deem 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 the Engineer may deem 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 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 Engineer.

In the event that a suspension of work is ordered as provided above, and should such suspension be ordered by reason of the failure of the Contractor to carry out orders or to perform any provision of the contract; or by reason of weather conditions being unsuitable for performing any item or items of work, which work, in the sole opinion of the Engineer, could have been performed prior to the occurrence of such unsuitable weather conditions had the Contractor diligently prosecuted the work when weather conditions were suitable; the Contractor, at the Contractor's expense, shall do all the work necessary to provide a safe, smooth, and unobstructed passageway through construction for use by public traffic; and provide for proper and efficient operations of sewer, drainage, and other facilities within the site of the work during the period of such suspension as provided in Sections 7-1.08, "Public Convenience," and 7-1.09, "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 moneys due or to become due the Contractor.

In the event that a suspension of work is ordered by the Engineer due to unsuitable weather conditions, and in the sole opinion of the Engineer, the Contractor has prosecuted the work with energy and diligence prior to the time that operations were suspended, the cost of providing a smooth and unobstructed passageway through the work will be paid for as extra work as provided in Section 4-1.03D or, at the option of the Engineer, such work will be performed by the City at no cost to the Contractor.

If the Engineer orders a suspension of all of the work or a portion of the work which is the current controlling operation or operations, due to unsuitable weather or to such other conditions as are considered unfavorable to the suitable prosecution of the work, the days on which the suspension is in effect shall not be considered working days as defined in Section 8-1.06, "Time of Completion." If a portion of work at the time of such suspension is not a current controlling operation or operations, but subsequently does become the current controlling operation or operations, the determination of working days will be made on the basis of the then current controlling operation or operations.

If a suspension of work is ordered by the Engineer, due to the failure on the part of the Contractor to carry out orders given or to perform any provision of the contract, the days on which the suspension order is in effect shall be considered

working days if such days are working days within the meaning of the definition set forth in Section 8-1.06, "Time of Completion."

In the event of a suspension of work under any of the conditions set forth under this Section, such suspension of work shall not relieve the Contractor of the Contractor's responsibilities as set forth in the specifications including but not limited to the Contractor's maintenance of the Project site in a safe condition.

**8-1.06 Time of Completion.** - Time is of the essence in the performance of the Contractor's obligations under this contract.

The Contractor shall complete all or any designated portion of the work called for under the contract in all parts and requirements within the time set forth in the special provisions.

Should the Contractor prepare to begin work at the regular starting time of any day on which increment 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 is to be construed to include any feature of the work (e.g., an operation or activity, or a settlement or curing period) considered at the time by the Engineer and the Contractor, which, if delayed or prolonged, will delay the time of completion of the contract.

Determination that a day is a non-working day by reason of inclement weather or conditions resulting immediately therefrom, shall be made by the Engineer. The Contractor will be allowed 15 days from the issuance of the weekly statement of working days in which to file a written protest setting forth in what respects the Contractor differs from the Engineer, otherwise the decision of the Engineer shall be deemed to have been accepted by the Contractor as correct. The Engineer will furnish the Contractor a weekly statement showing the number of working days charged to the contract for the preceding week, the number of working days of time extensions being considered or approved, the number of working days originally specified for the completion of the contract and the number of working days remaining to complete the contract and the extended date for completion thereof, except when working days are not being charged in accordance with the provisions in Section 8-1.05, "Temporary Suspension of Work."

**8-1.06A Sunday, Holiday and Night Work.** - Unless otherwise provided in the Special Provisions, work shall not be done between the hours of 6:00 P.M. and 7:00 A.M. nor on Sundays or legal holidays except such work as is necessary for the proper care and protection of work already performed, or except in case of an emergency, and in any case, only with the prior written permission of the Engineer.

It is understood, however, that night work may be established as a regular procedure by the Contractor if they first obtains the written permission of the Engineer, and that such permission may be revoked at any time by the Engineer if the Contractor fails to maintain at night, adequate force and equipment for reasonable prosecution and to justify inspection of the work.



**8-1.07 Liquidated Damages.** - It is agreed by the parties to the contract that in case all the work called for under the contract in all parts and requirements is not finished or completed within the number of working days as set forth in the special provisions, damage will be sustained by the City, and 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; and it is therefore agreed that the Contractor will pay to the City, the sum set forth in the special provisions per day for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed; and the Contractor agrees to pay said liquidated damages herein provided for, and further agrees that the City may deduct the amount thereof from any moneys due or that may become due the Contractor under the contract.

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 Engineer shall have the right to increase the number of working days or not, as the Engineer may deem best to serve the interest of the City, and if the Engineer decides to increase the said number of working days, the Engineer shall further have the right to charge to the Contractor, the Contractor's heirs, assigns or sureties and to deduct from the final payment for the work all or any part, as the Engineer may deem proper, of the actual cost of engineering, inspection, superintendence, and other overhead expenses which are directly chargeable to the contract, and which accrue during the period of such extension, except that cost of final surveys and preparation of 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 Engineer in writing of the causes of delay within 15 days from the beginning of any such delay. The Engineer shall ascertain the facts and the extent of the delay, and the Engineer's 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 Engineer documentary proof that the Contractor has made every effort 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 8-1.04, "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 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 these provisions as a cause for extension of time. Delays in obtaining materials due to priority in filling orders will not constitute a shortage of materials.

If the Contractor is delayed in completion of the work by reason of changes made under Section 4-1.03, "Changes," or by failure of the City to acquire or clear right of way, or by moving the Contractor's plant pursuant to Section 6-2.03, "Mandatory Local Material Sources," or by any act of the Engineer or of the City, not contemplated by the contract, an extension of time commensurate with the delay in completion of the work thus caused will be granted and the Contractor shall be relieved from any claim for liquidated damages, or engineering and inspection charges or other penalties for the period covered by such extension of time; provided that the Contractor shall notify the Engineer in writing of the causes of delay within 15 days from the beginning of any such delay. The Engineer shall ascertain the facts and the extent of the delay, and the Engineer's findings thereon shall be final and conclusive.

It is the intention of the above provisions that the Contractor shall not be relieved of liability for liquidated damages or engineering and inspection charges for any period of delay in completion of the work in excess of that expressly provided for in this Section 8-1.07.

**8-1.07A No Pay for Delay.**- Except as provided in Section 7-1.28 "Archeological and Paleontological Rights", Section 8-1.10 "Utility and Non-Highway Facilities", Section 8-1.09 "Right of Way Delays" and except as provided in Section 7102 of the Public Contract Code, the Contractor shall receive no additional compensation for any delay to the Contractor's work. Such delays are expressly contemplated by the parties hereto. The Contractor's sole remedy for such delay will be an appropriate extension of time to the contract completion of the project.

If the City causes a substantial delay to the project and the Contractor sustains losses which could not have been avoided by the judicious handling of forces, equipment and plant, the City, in its sole discretion, may elect to pay the Contractor an amount the City finds fair and reasonable for the Contractor's actual loss, as in the opinion of the City, was unavoidable. The total amount of any payment made pursuant to this Section, including overhead, profit and administration, shall be as determined in Section 8-1.09 "Right of Way Delays."

#### **8-1.08 (Blank)**

**8-1.09 Right of Way Delays.** - If, through the failure of the City to acquire or clear right of way, the Contractor sustains loss which could not have been avoided by the judicious handling of forces, equipment and plant, there shall be paid to the Contractor such amount as the Engineer may find to be a fair and reasonable compensation for such part of the Contractor's actual loss, as, in the opinion of the Engineer, was unavoidable, determined as follows:

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, as provided in Section 9-1.03A(3), "Equipment Rental," with the following exceptions:

- (1) The right of way delay factor for each classification of equipment shown in the Caltrans publication entitled Labor Surcharge And Equipment Rental Rates, which is a part of the contract, will be applied to such equipment rental rate.

- (2) The time for which such compensation will be paid will be the actual normal working time during which such delay condition exists, but in no case will exceed 8 hours in any one day.
- (3) The days for which compensation will be paid will be the calendar days, excluding Saturdays, Sundays and legal holidays, during the existence of such delay, except that when rental of equipment is paid for under the provisions in Section 9-1.03A (3b), "Equipment not on the Work." no payment will be made for right of way delays in accordance with the provisions in this Section 8-1.09.

Actual loss shall be understood to include no items of expense other than idle time of equipment and necessary payments for idle time of men, cost of extra moving of equipment, and cost of longer hauls. Compensation for idle time of equipment will be determined as provided in this Section 8-1.09 and compensation for idle time of men will be determined as provided in Section 9-1.03A(1), "Labor," and no markup will be added in either case for overhead and profit. The cost of extra moving of equipment and the cost of longer hauls will be paid for as extra work as provided in Section 4-1.03D.

If performance of the Contractor's work is delayed as the result of the failure of the City to acquire or clear right of way, an extension of time determined pursuant to the provisions in Section 8-1.07, "Liquidated Damages," will be granted.

**8-1.10 Utility and Non-Highway Facilities.** - Attention is directed to Section 7-1.11, "Preservation of Property," and Section 7-1.12, "Responsibility for Damage." The Contractor shall protect from damage utility and other non-highway facilities that are to remain in place, be installed, relocated or otherwise rearranged.

It is anticipated that some or all of the utility and other non-highway facilities, both above ground and below ground, that are required to be rearranged (as used herein, rearrangement includes installation, relocation, alteration, or removal) as a part of the highway improvement will be rearranged in advance of construction operations. Where it is not anticipated that such rearrangement will be performed prior to construction, or where the rearrangement must be coordinated with the Contractor's construction operations, the existing facilities that are to be rearranged will be indicated on the plans or in the special provisions.

Where a rearrangement is indicated on the plans or in the special provisions, the Contractor will have no liability for the costs of performing the work involved in such rearrangement.

The right is reserved to the City and the owners of facilities, or their authorized agents, to enter upon the highway right-of-way for the purpose of making such changes as are necessary for the rearrangement of their facilities or for making necessary connections or repairs to their properties. The Contractor shall cooperate with forces engaged in such work and shall conduct operations in such a manner as to avoid any unnecessary delay or hindrance to the work being performed by such other forces. Wherever necessary, the work of the Contractor shall be coordinated with the rearrangement of utility or other non-highway facilities, and the Contractor shall make arrangements with the owner of such facilities for the coordination of the work.

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, the location of their service laterals or other appurtenances, and of existing service lateral or appurtenances of any other underground facilities which can be inferred from the presence of visible facilities such as buildings, meters and junction boxes prior to doing work that may damage any of such facilities or interfere with their service.

If the Contractor cannot locate an underground facility whose presence is indicated on the plans or in the special provisions, the Contractor shall so notify the Engineer in writing. If the facility for which such notice is given is in a substantially different location from that indicated on the plans or in the special provisions, the additional cost of locating the facility will be paid for as extra work as provided in Section 4-1.03D.

If the Contractor discovers underground main or trunk lines not indicated on the plans or in the special provisions, the Contractor shall immediately give the Engineer and the Utility Company written notification of the existence of such facilities. Such main or trunk lines shall be located and protected from damage as directed by the Engineer and the cost of such work will be paid for as extra work as provided in Section 4-1.03D. The Contractor shall, if directed by the Engineer, repair any damage which may occur to such main or trunk lines. The cost of such repair work, not due to the failure of the Contractor to exercise reasonable care, will be paid for as extra work as provided in Section 4-1.03D. Damage due to the Contractor's failure to exercise reasonable care shall be repaired at the Contractor's cost and expense.

Where it is determined by the Engineer that the rearrangement of an underground facility is essential in order to accommodate the highway improvement and the plans and specifications do not provide that such facility is to be rearranged, the Engineer will provide for the rearrangement of such facility by other forces or such rearrangement shall be performed by the Contractor and will be paid for as extra work as provided in Section 4-1.03D.

When ordered by the Engineer in writing, the Contractor shall rearrange any utility or other non-highway facility necessary to be rearranged as a part of the highway improvement, and such work will be paid for as extra work as provided in Section 4-1.03D.

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

The Contractor shall immediately notify the Engineer of any delays to operations as 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, or as a direct result of utility or other non-highway facilities not being rearranged as herein provided (other than delays in connection with rearrangements made to facilitate construction operations or delays due to a strike or labor dispute). Any

such delays will be considered right of way delays within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for such delay will be determined in accordance with said Section 8-1.09. The Contractor shall be entitled to no other compensation for any such delay.

Any delays to the Contractor's operations as a direct result of utility or other non-highway facilities not being rearranged as provided in this Section 8-1.10, due to a strike or labor dispute, will entitle the Contractor to an extension of time as provided in Section 8-1.07, "Liquidated Damages." The Contractor shall be entitled to no other compensation for any such delay.

Notwithstanding any other provisions of the contract, plans, specifications or Special Provisions, the City shall, as between the City and Contractor, assume the responsibility and the cost therefor for the location, repair of damage not due to the Contractor's failure to exercise reasonable care, removal, or relocation of existing main and trunkline utility facilities located on the site of the work, if such facilities are not identified in the plans or specifications made a part of the Notice to Contractors inviting bids for the work, and for equipment on the project necessarily idled during such location, repair, removal or relocation. If the Contractor, while performing the contract, discovers utility facilities not identified by the City in the plans or specifications, the Contractor shall immediately notify the Engineer and the utility in writing. The public utility, where it is the owner of an affected utility, shall have the sole discretion to perform repairs, removal or relocation work or permit the Contractor to do such repairs, removal or relocation work on the affected utility at a reasonable price.

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 City to provide for removal or relocation of such utility facilities.

Nothing herein shall be deemed to require the City to indicate the presence of existing service laterals or appurtenances whenever 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 of the construction. However, nothing herein shall relieve the City from identifying main or trunklines in the plans and specifications.

Nothing herein shall preclude the City from pursuing any appropriate remedy against the utility for delays which are the responsibility of the utility.

Nothing herein shall be construed to relieve the utility from any obligation as required either by law or by contract to pay the cost of removal or relocation of existing utility facilities.

**8-1.11 Termination of Contract.** - The contract may be terminated by the Engineer when termination is authorized by Section 7-1.125, "Legal Actions Against the City," Section 7-1.165, "Damage by Storm, Flood, Tidal Wave or Earthquake," 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 Engineer in the Engineer's sole discretion that termination of the contract is in the best interest of the City. If the City elects to terminate the contract for convenience, the termination of the contract and the total compensation payable to the Contractor shall be governed by the following:

- (A) The City will issue the Contractor a written notice signed by the Engineer, specifying that the contract is 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 7-1.16, "Contractor's Responsibility for the Work and Materials," and, except as otherwise directed in writing by the Engineer, the Contractor shall:

- (1) Stop all work under the contract except that specifically directed to be completed prior to acceptance.
- (2) Perform work the Engineer deems necessary to secure the project for termination.
- (3) Remove equipment and plant from the site of the work.
- (4) Take such action as is necessary to protect materials from damage.
- (5) 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 Engineer.
- (6) Provide the 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 Engineer may request.
- (7) Dispose of materials not yet used in the work as directed by the 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 9-1.06, "Partial Payments," and with bills of sale or other documents of title for such materials.
- (8) Subject to the prior written approval of the Engineer, settle all outstanding liabilities and all claims arising out of subcontracts or orders for materials terminated hereunder. To the extent directed by the 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.
- (9) Furnish the Engineer with the documentation required to be furnished by the Contractor under the provisions of the contract including, on projects as to which Federal and State funds are involved, all documentation required under the Federal and State requirements included in the contract.

- (10) Take such other actions as the Engineer may direct.
- (B) 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:
- (1) The Contractor's responsibility for damage to materials for which partial payment has been made as provided in Section 9-1.06, "Partial Payments," and for materials furnished by the City for use in the work and unused shall terminate when the Engineer certifies that such materials have been stored in the manner and at the locations the Engineer has directed.
  - (2) 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.
  - (3) When the Engineer determines that the Contractor has completed the work under the contract directed to be completed prior to termination and such other work as may have been ordered to secure the project for termination, the Contractor will recommend that the Engineer formally accept the contract to the extent performed, and immediately upon and after such acceptance by the Engineer, the Contractor will not be required to perform any further work thereon and shall be relieved of the Contractor's contractual responsibilities for injury to persons or property which occurs after the formal acceptance of the project by the Engineer.
- (C) Termination of the contract shall not relieve the surety of its obligation for any just claims arising out of the work performed.
- (D) The total compensation to be paid to the Contractor shall be determined by the Engineer on the basis of the following:
- (1) The reasonable cost to the Contractor, without profit, for all work performed under the contract, including mobilization, demobilization and work done 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. Deductions will also be made, when the contract is terminated under the authority of Section 7-1.165, "Damage by Storm, Flood, Tidal Wave or Earthquake," for the cost of materials damaged by the "occurrence." When, in the opinion of the 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 and the excessive actual cost shall be disallowed.
- (2) A reasonable allowance for profit on the cost of the work performed as determined under Subsection (1), provided the Contractor establishes to the satisfaction of the Engineer that it is reasonably probable that the Contractor would have made a profit had the contract been completed and provided further, that the profit allowed shall in no event exceed 4 percent of said cost.
  - (3) The reasonable cost to the Contractor of handling material returned to the vendor, delivered to the City or otherwise disposed of as directed by the Engineer.
  - (4) A reasonable allowance for the Contractor's administrative costs in determining the amount payable due to termination of the contract.
  - (5) A reasonable credit to the City for defective or incomplete work not corrected.

All records of the Contractor and subcontractors necessary to determine compensation in accordance with the provisions of this Section 8-1.11 shall be open to inspection or audit by representatives of the City at all times after issuance of the Notice of Termination and for a period of 3 years, thereafter, and such records shall be retained for that period.

After acceptance of the work by the Engineer, the Engineer may make payments on the basis of interim estimates pending issuance of the Final Estimate in accordance with Section 9-1.07B, "Final Payment and Claims," when, in the 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.



If this contract is terminated by the City for cause, and it is later determined that the proper basis for a termination for cause did not exist, the termination shall be deemed to have been a termination for convenience and governed by the terms of this contract dealing with such termination.

If the contract is terminated by the City for cause or convenience, such termination shall neither act as a waiver by the City of its right to require the Contractor to correct defects in the work performed by the Contractor nor void any warranties applicable to the work performed under the contract.

The provisions of this Section 8-1.11 shall be included in all subcontracts.

In the event of conflict between the termination provisions of this Section 8-1.11 and any other provision of the contract, this Section 8-1.11 shall prevail.

**8-1.11A Continuation of Contract.** - If a dispute should arise between the Contractor and the City regarding work performed or to be performed or payment therefor, Contractor hereby agrees that it will continue to perform the work called for under this contract and hereby expressly waives its rights, if any, to terminate or suspend work pending resolution of said dispute.

**8-1.12 Concurrent Delays.** - Where there are concurrent delays to a controlling item of work no extension of time or additional compensation shall be granted to the Contractor where at least one of the delays is due, in part or in whole, to the Contractor's own acts.

**8-1.13 City's Right to Carry Out the Work.** - If the Contractor defaults or neglects to carry out the work in accordance with the contract documents, and fails within seven days after receipt of written notice from the City to commence and continue correction of such default or neglect with diligence and promptness, the City may, after 7 days following receipt by the Contractor of an additional written notice and without prejudice to any other remedy the City may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Engineer's additional services made necessary by such default, neglect or failure. Such action by the City and the amount charged to the Contractor are both subject to the prior approval of the Engineer. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the City.

END OF SECTION



**SECTION 9  
MEASUREMENT AND PAYMENT**

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9-1.08	Blank
9-1.09	Blank
9-1.10	No Arbitration of Disputes



SECTION 9

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**9-1.01 Measurement of Quantities.** - All work to be paid for at a contract price per unit of measurement will be measured by the Engineer in accordance with United States Standard Measures. A ton shall consist of 2,000 pounds avoirdupois.

Unless shipped by rail, material paid for by weight shall be weighed on scales furnished by and at the expense of the Contractor or on other sealed scales regularly inspected by the Division of Measurement Standards or its designated representative.

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 Title 4, Chapter 8 of the California Administrative Code, the provisions of the California Business and Professions Code, Division 5, and these specifications. Devices not Type-approved by the Division of Measurement Standards shall be Type-approved in accordance with California Test 109.

All weighing, measuring or metering devices used to determine the quantity of materials to be paid for will be considered to be "commercial devices," and shall be sealed by the Division of Measurement Standards or its authorized representative as often as the Engineer may deem necessary. The installation of all portable vehicle scales must be approved by the Engineer prior to sealing.

Vehicle scales shall be of sufficient size to permit the entire vehicle or combination of vehicles to rest on the scale deck while being weighed. Combination vehicles may be weighed as separate units provided they are disconnected while being weighed. The maximum concentrated load shall not exceed the manufacturer's designed sectional capacity of the scale.

All weighing, measuring or metering devices required by these specifications for the purpose of proportioning a material or product will be considered to be "non-commercial devices," and shall be tested and approved in accordance with California Test 109. This testing shall be done by one of the following, in the presence of the Engineer, as often as the Engineer deems necessary:

- A County Sealer of Weights and Measures
- A Scale Service Agency
- A Division of Measurement Standards Official

The Contractor shall notify the Engineer at least 24 hours in advance of testing the device.

All undersupports for scale bearing points shall be constructed of Portland cement concrete produced from commercial quality aggregates and cement, which contains not less than 470 pounds of cement per cubic yard. Undersupports shall be constructed in a manner to prevent any shifting or tilting of the support. They shall have a minimum height of 14 inches above ground line. The footings shall have a minimum depth of 6 inches below the ground line. The bearing surface of the footings shall have a minimum width of 30 inches and shall be of such area that the pressure does not exceed 4,000 pounds per square foot. Adequate drainage shall

be provided to prevent saturation of the ground under the scale. Scale bulkheads shall be of adequate material and strength to resist displacement.

If timber bulkheads are used, the minimum cross section shall be 8 inches by 8 inches. Wedges shall not be used to shim the supports. If shimmying is necessary, it shall be done by securely attached metal shims, or by grouting. Shimmying shall not exceed 3 inches. The approach ramps shall be level with the scale deck for a distance of not less than 1/2 the length of the scale deck. The mechanical indicating elements shall be installed level and plumb and shall be rigidly mounted upon a concrete foundation.

The lever system and mechanical indicating elements of hopper scales shall be rigidly attached to non-yielding supports in such a manner as to prevent any loss in weight due to bending and distortion of the supports.

When a multiple beam type scale is used in proportioning materials, an over and under indicator shall be provided which will give positive visible evidence of the amount of any over and under weight. The indicator shall be so designed that it will operate during the addition of the last 200 pounds of any weighing. The over-travel of the indicator shall be at least 1/3 of the loading travel. Indicators shall be enclosed against moisture and dust.

All over and under, dial, and other indicators for weighing and measuring systems used in proportioning materials shall be grouped so that the smallest increment for each indicator can be accurately read from the point at which the proportioning operation is controlled.

The Contractor shall bear the expense of all service fees for testing and approving of "non-commercial devices." The cost of the equipment, labor and materials furnished by the Contractor to assist in the testing of weighing, measuring or metering devices will be considered as included in the contract prices paid for the various contract items requiring said weighing, measuring or metering and no separate payment will be made there.

Whenever pay quantities of material are determined by weighing, the scales shall be operated by a weighmaster licensed in accordance with the provisions of the California Business and Professions Code, Division 5, Chapter 7. The Contractor shall furnish a Public Weighmaster's certificate or certified daily summary weigh sheets. A representative of the Department may, at the discretion of the Engineer, be present to witness the weighing and to check and compile the daily record of such scale weights.

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

If material is shipped by rail, the car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.

Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as the Engineer may direct. Each vehicle shall bear a plainly legible identification mark. Vehicles may from time to time be required by the Engineer to have the weight of the material to be paid for verified by weighing the empty and loaded vehicle on such other scales as the Engineer may designate.

All loads in vehicles hauled over streets and highways shall be legal loads and no payment will be made for the loads in excess of the legal load limits.

All materials which are specified for measurement by the cubic yard "measured in the vehicle" shall be hauled in vehicles of such type and size that the actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. All vehicles shall be loaded to at least their water level capacity and all loads shall be leveled when the vehicles arrive at the point of delivery. Loads hauled in vehicles not meeting the above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.

When material is to be measured and paid for on a volume basis and it is impractical to determine the volume by the specified method of measurement, or when requested by the Contractor in writing and approved by the Engineer in writing, the material will be weighed in accordance with the requirements specified for weight measurement and such weights will be converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Engineer and shall be agreed to by the Contractor before such method of measurement of pay quantities will be adopted.

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 the 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 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.

The weight of all aggregate or other roadway material which is to be paid for on a weight basis, except imported borrow, imported topsoil, straw, fiber, aggregate subbases, aggregate bases or aggregate for cement treated bases, will be determined by deducting from the weight of material, the weight of water in the material at the time of weighing in excess of 3 percent of the dry weight of the material. When imported borrow, imported topsoil, or aggregate subbase is being paid for on weight basis, the weight to be paid for will be determined by deducting from the weight of the material, the weight of water in the material at the time of weighing in excess of 6 percent of the dry weight of the material. When straw is being paid for on weight basis, the weight to be paid for will be determined by deducting from the weight of straw, the weight of water in the straw at the time of weighing in excess of 15 percent of the dry weight of the straw. When fiber is being paid for on a weight basis, the weight of water in the fiber at the time of weighing shall not exceed 15 percent of the dry weight of the fiber. No deduction will be made for the weight of water in fiber. The percentage of water in the material shall be determined by California Test 226. The weight of aggregate base and aggregate for cement treated bases which are to be paid for on a weight basis, will be determined as provided in Section 26, "Aggregate Bases," and Section 27, "Cement Treated Bases," respectively.

The weight of water deducted as provided in this Section 9-1.01 will not be paid for.

Full compensation for all expense involved in conforming to the requirements specified in this Section 9-1.01 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.

**9-1.015 Final Pay Quantities.** - When the estimated quantities for a specific portion of the work are designated in the contract as final pay quantities, said estimated quantities shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the Engineer. If such dimensions are revised, and such revisions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the changes in the dimensions. The estimated quantities for such specific portion of the work shall be considered as approximate only and no guarantee is made that the quantities which can be determined by computations, based on the details and dimensions shown on the plans, will equal the estimated quantities. No allowance will be made in the event that the quantities based on computations do not equal the estimated quantities.

When portions of an item have been designated in the contract as final pay quantities, portions not so designated will be measured and paid for in accordance with the applicable provisions of these specifications and the special provisions.

In case of a discrepancy between the quantities designated in the contract as final pay quantities and the quantity of the same item shown in the Engineer's Estimate, payment will be based on the final pay quantities shown on the plans.

**9-1.02 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 the acceptance by the City and for all risks of every description connected with the prosecution of the work, also 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.

Any payment to the Contractor for work performed under this contract, whether a partial progress payment or final payment, shall not waive City's right to demand that the Contractor correct defects in the Contractor's work, whether or not defects were known to the Engineer, the City, its agents or employees at the time such payment was made.

Whenever it is specified or indicated in the contract documents, that the Contractor is to do work, or furnish materials for which no price is fixed in the contract, it is understood and agreed, that there is included in each lump sum or unit price bid, the entire cost of all work, incidental to the completion of that part of the work covered by each lump sum or unit price bid, or if not directly incidental to any specific bid items, the cost thereof has been distributed among those bid items deemed most appropriate by the Contractor.

**9-1.03 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 Engineer and compensation will be determined as follows:

**9-1.03A 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 9-1.03A (1), "Labor," 9-1.03A (2), "Materials," and 9-1.03A (3), "Equipment Rental," except where agreement has been reached to pay in accordance with Section 9-1.03B, "Work Performed by Special Forces or Other Special Services."

To the total of the direct costs computed as provided in Sections 9-1.03A (1), "Labor," 9-1.03A (2), "Materials," and 9-1.03A (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.

The above markups shall constitute full compensation for all direct and indirect overhead costs and profit which shall be deemed to include all items of expense not specifically designated as cost or equipment rental in Sections 9-1.03A (1), "Labor," 9-1.03A (2), "Materials," and 9-1.03A (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 to be paid for on a force account basis is performed by a subcontractor, approved in accordance with the provisions in Section 8-1.01, "Subcontracting," an additional markup of 5 percent will be added to the total cost of said extra work including all markups specified in this Section 9-1.03A. Said additional 5 percent markup shall reimburse the Contractor for additional overhead, job site, home office and administrative costs, and no other additional payment will be made by reason of performance of the extra work by a subcontractor.

**9-1.03A (1) Labor.** - The Contractor will be paid the cost of labor for the workers (including foremen when authorized by the 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 the sum of the following:

**9-1.03A (1a) 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.

**9-1.03A (1b) Labor Surcharge.** - To the actual wages, as defined in Section 9-1.03A(1a), will be added a labor surcharge set forth in the State of California, Department of Transportation publication entitled 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. Said 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 9-1.03A (1a) and subsistence and travel allowance as specified in Section 9-1.03A (1c).

**9-1.03A (1c) Subsistence and Travel Allowance.** - The actual subsistence and travel allowance paid to such workers.

**9-1.03A (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 as the following are applicable:

**9-1.03A(2a)** - 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.

**9-1.03A (2b)** - 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 Engineer plus the actual costs, if any, incurred in the handling of such materials.

**9-1.03A (2c)** - If the materials are obtained from a 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.

**9-1.03A (2d)** - If the cost of such materials is, in the opinion of the Engineer, excessive, then the cost of such material shall be deemed to be the lowest current wholesale price at which such materials were available in the quantities concerned delivered to the job site, less any discounts as provided in Section 9-1.03A(2a).

**9-1.03A (2e)** - If the Contractor does not furnish satisfactory evidence of the cost of such materials from the actual supplier thereof within 60 days after the date of delivery of the material or within 15 days after acceptance 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 such materials were available in the quantities concerned delivered to the location of the work, less any discounts as provided in Section 9-1.03A (2a).

**9-1.03A(3) Equipment Rental.** - The Contractor will be paid for the use of equipment at the rental rates listed for such equipment in the Department of Transportation publication entitled 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 rental or other agreement, if such may exist, for use of such equipment entered into by the Contractor, except that for those pieces of equipment with a rental rate of \$10.00 per hour or less as listed in the Labor Surcharge And Equipment Rental Rates publication and which are rented from a local equipment agency, other than Contractor owned, the Contractor will be paid at the hourly rate shown on the rental agency invoice or agreement for the time used on force account work as provided in Section 9-1.03A (3a), "Equipment on the Work." If a minimum equipment rental amount is required by the local equipment rental agency, the actual amount charged will be paid to the Contractor.

If it is deemed necessary by the Engineer to use equipment not listed in said publication, a suitable rental rate for such equipment will be established by the Engineer. The Contractor may furnish any cost data which might assist the Engineer in the establishment of such rental rate. If the rental rate established by the Engineer is \$10.00 per hour or less, the provisions above concerning rental of equipment from a local equipment agency shall apply.

The rental rates 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 9-1.03A(1), "Labor."

All equipment shall, in the opinion of the 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 ratings recommended by the manufacturer.

Individual pieces of equipment or tools not listed in said publication and having a replacement value of \$500 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefor.

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

**9-1.03A (3a) Equipment on the Work.** - 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, and in addition, shall include the time required to move the equipment to the location of the extra work and return it to the original location or to another location requiring no more time than that required to return it to its original location, except that moving time will not be paid for if the equipment is used at the site of the extra work on other than such extra work. Loading and transporting costs will be allowed, in lieu of moving time, when the equipment is moved by means other than its own power, except that no payment will be made if the equipment is used at the site of the extra work on other than such extra work.

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 4 hours of operation shall be considered to be 1/2 day of operation.

**9-1.03A (3b) Equipment not on the Work.** - 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 the rental rates listed in the State of California Department of Transportation publication entitled 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, or determined as provided in Section 9-1.03A (3) and for the cost of transporting the equipment to the location

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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 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) The rental period shall begin at the time the equipment is unloaded at the site of the extra work, shall include each day that the equipment is at the site of the extra work, excluding Saturdays, Sundays, and legal holidays unless the equipment is used to perform the extra work on such days, and shall terminate at the end of the day on which the Engineer directs the Contractor to discontinue the use of such equipment. The rental time to be paid per day will be in accordance with the following:

<i>Hours Equipment is in Operation</i>	<i>Hours to be paid</i>
0	4
0.5	4.25
1	4.5
1.5	4.75
2	5
2.5	5.25
3	5.5
3.5	5.75
4	6
4.5	6.25
5	6.5
5.5	6.75
6	7
6.5	7.25
7	7.5
7.5	7.75
8	8
Over 8	hours in operation

The hours to be paid for equipment which is operated less than 8 hours due to breakdowns, shall not exceed 8 less the number of hours the equipment is inoperative due to breakdowns.

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

When daily rates are listed, payment for 1/2 day will be made if the equipment is not used. If the equipment is used, payment will be made for one day. The minimum rental time to be paid for the entire rental period on an hourly basis shall not be less than 8 hours or, if on a daily basis, shall not be less than one day.

- (6) 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.
- (7) 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.

When extra work, other than work specifically designated as extra work in the plans and specifications, is to be paid for on a force account basis and the Engineer determines that such extra work requires the Contractor to move on to the work equipment which could not reasonably have been expected to be needed in the performance of the contract, the Engineer may authorize payment for the use of such equipment at equipment rental rates in excess of those listed as applicable for the use of such equipment subject to the following additional conditions:

- (1) The Engineer shall specifically approve the necessity for the use of particular equipment on such work,
- (2) The Contractor shall establish to the satisfaction of the Engineer that such equipment cannot be obtained from a normal equipment source or sources and those of the subcontractors,
- (3) The Contractor shall establish to the satisfaction of the Engineer that the proposed equipment rental rate for such equipment from the proposed source is reasonable and appropriate for the expected period of use.
- (4) The Engineer shall approve the equipment source and the equipment rental rate to be paid by the City before the Contractor begins work involving the use of said equipment.

**9-1.03A(3c) Owner-Operated Equipment.** - When owner-operated equipment is used to perform extra work to be paid for on a force account basis, the Contractor will be paid for the equipment and operator, as follows:

Payment for the equipment will be made in accordance with the provisions in Section 9-1.03A(3), "Equipment Rental."

Payment for the cost of labor and subsistence or travel allowance will be made at the rates paid by the Contractor to other workers operating similar

equipment already on the project or, in the absence of such other workers, at the rates for such labor established by collective bargaining agreements for the type of worker and location of the work, whether or not the owner operator is actually covered by such an agreement. A labor surcharge will be added to the cost of labor described herein, in accordance with the provisions in Section 9-1.03A(1b), "Labor Surcharge."

To the direct cost of equipment rental and labor, computed as provided herein, will be added the markups for equipment rental and labor as provided in Section 9-1.03A, "Work Performed by Contractor."

**9-1.03B Work Performed by Special Forces or Other Special Services.**

-When the Engineer and the Contractor, by agreement, determine that a special service or an item of extra work cannot be performed by the forces of the Contractor or those of any of the subcontractors, such service or extra work item may be performed by a specialist. Invoices for such service or item of extra work on the basis of the current market price thereof may be accepted without complete itemization of labor, material, and equipment rental costs when it is impracticable and not in accordance with the established practice of the special service industry to provide such complete itemization.

In those instances wherein a Contractor is required to perform extra work necessitating a fabrication or machining process in a fabrication or machine shop facility away from the job site, the charges for that portion of the extra work performed in such facility may, by agreement, be accepted as a specialist billing.

To the specialist invoice price, less a credit to the City for any cash or trade discount offered or available, whether or not such discount may have been taken, will be added 15 percent in lieu of the percentages provided in Section 9-1.03A, "Work Performed by Contractor."

**9-1.03C Records.** - The Contractor shall maintain all 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 Engineer completed daily extra work reports, on forms furnished by the City, 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, except for charges described in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services." The daily extra work reports shall provide names or identifications and classifications of workers, the hourly rate of pay and hours worked, and also 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 the acceptance 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 were available in the quantities concerned delivered to the location of work less any discounts as provided in Section 9-1.03A (2a).

Said daily extra work reports shall be signed by the Contractor or the Contractor's authorized representative.

The Engineer will compare his/her 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 10 day notice of the time when such audit is to begin.

**9-1.03D Payment.** - Payment as provided in Sections 9-1.03A, "Work Performed by Contractor," and 9-1.03B, "Work Performed by Special Forces or Other Special Services," 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.

**9-1.04 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 Engineer, including failure or refusal to issue a change order, or for the happening of any event, thing, occurrence, or other cause, unless the Contractor shall have given the Engineer due written notice of potential claim as hereinafter specified, provided, however, the written request by this Section 9-1.04 shall not be a prerequisite to claims subject to the protest provisions set forth in Section 4-1.03, "Changes," or Section 8-1.06, "Time of Completion," or the notice provisions in Section 8-1.07, "Liquidated Damages," or Section 8-1.10, "Utility and Non-Highway Facilities," 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 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 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. City may request additional information from Contractor regarding the Contractor's claim which shall be provided to City within 10 days of the request.

It is the intention of this Section 9-1.04 that differences between the parties arising under and by virtue of the contract be brought to the attention of the 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 agrees that they shall have no right to additional compensation for any claim that may be

## SECTION 9

## MEASUREMENT AND PAYMENT

based on any such act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was filed.

**9-1.05 Stop Notices.** - The City may at its option and at any time retain out of any amounts due the Contractor, sums sufficient to cover claims filed pursuant to Section 3179 et seq of the Civil Code. Stop notice information may be obtained from the Department of Public Works of the City of San Jose.

**9-1.06 Partial Payments.** - The City, once in each month, shall cause an estimate in writing to be made by the Engineer. The estimate shall include the total amount of work done to the time of such estimate, and the value thereof. The estimate shall also include any amounts payable for mobilization.

The City shall retain 10 percent of such estimated value of the work done, except that at any time after 50 percent of the work has been completed, if the Engineer finds that satisfactory progress is being made, the City may reduce the total amount being retained from payment pursuant to the above requirements to 5 percent of the total estimated value of said work and may so reduce the amount retained from any of the remaining partial payments to 5 percent of the estimated value of such work. In addition, on any partial payment made after 95 percent of the work has been completed, the City may reduce the amount withheld from payment pursuant to the requirements of this Section 9-1.06, to such lesser amount as the Engineer determines is adequate security for the fulfillment of the balance of the work and other requirements of the contract (but in no event will said amount be reduced to less than 125 percent of the estimated value of the work yet to be completed as determined by the Engineer). Such reduction will only be made upon the written request of the Contractor and shall be approved in writing by the surety on the Performance Bond and by the surety on the Payment Bond. The approval of the surety shall be submitted to the City; the signature of the person executing the approval for the surety shall be properly acknowledged and the power of attorney authorizing him/her to give such consent must either accompany the document or be on file with the City.

The Engineer may at any time and in the Engineer's sole discretion reinstate the retention at the full 10 percent of the value of the work performed upon notice to the Contractor. The Contractor shall immediately repay to the City all amounts paid to the Contractor in excess of the 10 percent retention. If the Contractor fails to repay the amount due within a reasonable time, the City may, in addition to all of the other remedies available to it, withhold such amount from future partial payments made to the Contractor.

The City shall pay monthly to the Contractor, while carrying on the work, the balance not retained, as aforesaid, after deducting therefrom all previous payments and all sums to be kept or retained under the provisions of the contract. No such estimate or payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the contract, or the total value of the work done since the last estimate amounts to less than \$5,000.

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 Public Contract Code Section 10164, the provisions of which are set forth in Section 7-1.01C, "Contractor's Licensing Laws."



The estimates of the Engineer shall be final and conclusive evidence of the amount of work performed by the Contractor under this contract, and shall be taken as full measure of compensation to be received by the Contractor.

Before any partial payment or the final payment is made, the Contractor may be required to submit satisfactory evidence that the Contractor is not delinquent in payments to employees or creditors for labor and materials incorporated into the work.

The Contractor shall maintain and provide to the City, with each partial payment request, certified payrolls for all of its employees and those employees of Contractor's subcontractors.

**9-1.065 Payment of Withheld Funds.** - The Contractor may substitute securities for any moneys withheld by the City to ensure performance under this contract, provided that substitution of securities shall not be allowed in contracts in which there will be financing provided by the Farmers Home Administration of the United States Department of Agriculture pursuant to the Consolidated Farm and Rural Development Act (7 U.S.C. Sec. 1921 et seq.), and where federal statutes, regulations or policies, or both, do not allow the substitution of securities. At the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the City, or with a state or federally chartered bank as the escrow agent, the City shall then pay such withheld moneys to the Contractor. Upon satisfactory completion of the contract, the securities shall be returned to the Contractor.

Securities eligible for investment under this Section shall include those listed in Section 16430 of the California Government Code, bank or savings and loans 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.

The escrow agreement used to implement this Section shall be null, void, and unenforceable unless it is substantially similar to the following form:

ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between City of San Jose whose address is \_\_\_\_\_, hereinafter called "Owner,"

\_\_\_\_\_ whose address is \_\_\_\_\_

\_\_\_\_\_ hereinafter called "Contractor" and

\_\_\_\_\_ whose address is \_\_\_\_\_

\_\_\_\_\_ hereinafter called "Escrow Agent"

For the consideration hereinafter set forth, the Owner, Contractor, and Escrow Agent agree as follows:

- (1) Pursuant to Section 22200 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by Owner pursuant to the Construction Contract entered into between the Owner and Contractor for \_\_\_\_\_ in the amount of \_\_\_\_\_ dated \_\_\_\_\_ (hereinafter referred to as the "Contract"). Alternatively, on written request of the contractor, the owner shall make payments of the retention earnings directly to the escrow agent. When Contractor deposits the securities as a substitute for Contract earnings, the Escrow Agent shall notify the Owner within 10 days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between the Owner and Contractor. Securities shall be held in the name of \_\_\_\_\_, and shall designate the Contractor as the beneficial owner.
(2) The Owner shall make progress payments to the Contractor for such funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above.
(3) When the Owner makes payment of retentions earned directly to the escrow agent, the escrow agent shall hold them for the benefit of the contractor until such time as the escrow created under this contract is terminated. The Contractor may direct the investment of the payments into securities. All Terms and conditions of this agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the owner pays the escrow agent directly.

- (4) Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of the Owner. These expenses and payment terms shall be determined by the Owner, Contractor and Escrow Agent.
- (5) The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to the Owner.
- (6) Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account accompanied by written authorization from Owner to the Escrow Agent that Owner consents to the withdrawal of the amount sought to be withdrawn by Contractor.
- (7) The Owner shall have a right to draw upon the securities in the event of default by the Contractor. Upon seven days written notice to the Escrow Agent from the Owner of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by the Owner.
- (8) Upon receipt of written notification from the Owner certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payments of fees and charges.
- (9) Escrow Agent shall rely on the written notifications from the Owner and the Contractor pursuant to Sections (4) and (6), inclusive, of this Agreement and the Owner and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest set forth above.
- (10) The names of the persons who are authorized to give written notice or to receive written notice on behalf of the Owner and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

**SECTION 9**

**MEASUREMENT AND PAYMENT**

On behalf of Owner

On behalf of Contractor

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
Address

On behalf of Escrow Agent

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

At the time the Escrow Account is opened, the Owner and Contractor shall deliver to the Escrow Agent a fully executed counterpart of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

Owner

Contractor

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

**9-1.07 Payment After Acceptance.** - After the work has been accepted by the Engineer, as provided in Section 7-1.17, "Acceptance of Contract," payments will be made to the Contractor subject to the provisions in this Section 9-1.07.

**9-1.07A Payment Prior to Proposed Final Estimate.** - After acceptance of the work by the Engineer, the Engineer will make an estimate of the total amount of work done under the contract and the City will make a final monthly payment pending issuance of the proposed final estimate. The City will pay the balance thereon found to be due after deduction of all previous payments, all amounts to be kept or retained under the provisions of the contract, and such further amounts as the Engineer determines to be necessary pending issuance of said proposed final estimate and payment thereon.

**9-1.07B Final Payment and Claims.** - If the work is deemed acceptable to the Engineer in the Engineer's sole discretion, after acceptance by the Engineer, the Engineer will make a proposed final estimate in writing of the total amount payable to the Contractor, including therein an itemization of said amount, segregated as to contract item quantities, extra work and any other basis for payment, and shall also 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. Within 30 days after said proposed final estimate has been submitted to the Contractor, the Contractor shall submit to the Engineer written approval of said proposed final estimate or a written statement of all claims the Contractor has 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 as to which a notice or protest is required under the provisions in Sections 4-1.03, "Changes," 8-1.06, "Time of Completion," 8-1.07, "Liquidated Damages," 8-1.10, "Utility and Non-Highway Facilities," and 9-1.04, "Notice of Potential Claim," unless the Contractor has complied with the notice or protest requirements in said sections.

On the Contractor's approval, or if the Contractor files no claim within said period of 30 days, the Engineer will issue a final estimate in writing in accordance with the proposed final estimate submitted to the Contractor 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 Section 9-1.03C, "Records."

If the Contractor within said period of 30 days files claims, the Engineer will issue a semifinal estimate in accordance with the Proposed final estimate submitted to the Contractor and within 30 days thereafter the City will pay the sum so found to be due. Such semifinal 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 insofar as affected by the claims filed within the time and in the manner required hereunder and except as otherwise provided in Section 9-1.03C, "Records."

The claims filed by the Contractor shall be in sufficient detail to enable the Engineer to ascertain the basis and amount of said claims. The Engineer will consider and determine the Contractor's claims and it will be the responsibility of the Contractor to furnish within a reasonable time such further information and

## **SECTION 9**

## **MEASUREMENT AND PAYMENT**

details as may be required by the Engineer to determine the facts or contentions involved in the Contractor's claims. Failure to submit such information and details will be sufficient cause for denying the claims and shall constitute a waiver of such claims.

The Engineer will make the final determination of any claims which remain in dispute after completion of claim review. The Engineer will review such claims and make a written recommendation thereon. The Contractor may meet with the review board or person to make a presentation in support of such claims.

Upon final determination of the claims, the Engineer shall then make and issue the Engineer's final estimate in writing and 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 Section 9-1.03C, "Records."

Before the final payment can be made, the Contractor shall also submit to the Engineer all record drawings, catalog data, warranties and guarantees, operation and maintenance instruction sheets, and other items as required by the contract documents.

**9-1.08 (Blank)**

**9-1.09 (Blank)**

**9-1.10 No Arbitration of Disputes.** - All disputes shall be resolved by litigation as provided for herein.

**END OF SECTION**

## **FOREWORD TO TECHNICAL PROVISIONS**

Sections 10 through 1501 of these Standard Specifications (Technical Provisions) incorporate by reference the following: (1) in Sections 10 through 95 the January 1988 State of California, Department of Transportation (Caltrans) Standard Specifications; and (2) in Sections 1207 through 1501 the 1991 Edition of the APWA Standard Specifications for Public Works Construction (Green Book). The Caltrans Standard Specifications and the Green Book are modified and supplemented as necessary to make them conform to City standards and practices. It is the duty of each bidder to determine for itself the difference between these specifications and the Caltrans Standard Specifications or the Green Book.

The section numbers, titles and general content of these City Standard Specifications beginning with Section 10 through Section 95 follow the Caltrans Standard Specifications with two added series of complete sections covering water systems (Sections 101 through 104) and drainage and sewer systems (Sections 1207 through 1501).

Wherever references are made in Sections 10 through 95 of the Caltrans Standard Specifications to any provisions in Sections 1 through 9 of the Caltrans Standard Specifications, or references made in the Green Book to any provisions in Sections 1 through 9 of the Green Book, such references shall apply to the appropriate corresponding provisions in these City Standard Specifications and not the Caltrans Standard Specifications or the Green Book. Wherever, throughout Sections 10 through 95 of the Caltrans Standard Specifications, and the context so requires, terms such as: "State" shall mean "City"; "Director of Transportation" shall mean "Director of Public Works," and other terms shall be converted to their proper meaning as defined in Section 1 of these City Standard Specifications.





**SECTION 10**

**DUST CONTROL**

Dust control shall conform to Section 10 of the Caltrans Standard Specifications and these City Standard Specifications.

**10-1.01 Description.** - Unless otherwise specified, the Contractor shall use non-potable water for dust control.

Whenever the Contractor is negligent in providing dust control, the Engineer will order the Contractor to provide dust control. If the Contractor does not immediately comply with the order, the Engineer has the authority to suspend all or part of the work for as long as deemed necessary until the Contractor provides dust control to the Engineer's satisfaction. The City may provide dust control and charge the Contractor by deducting the cost from any partial payments to the Contractor as costs incurred by the City.

**10-1.04 Payment.** - Delete the second paragraph of Section 10-1.04 of the Caltrans Standard Specifications.



**SECTION 11**

**MOBILIZATION**

Mobilization shall conform to Section 11 of the Caltrans Standard Specifications.



## SECTION 12

## CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Construction area traffic control devices shall conform to Section 12 of the Caltrans Standard Specifications and these City Standard Specifications.

## 12-1 GENERAL

**12-1.02 Traffic Control Public Convenience.** - After the surface of one-half of the roadbed has been brought to a smooth and even condition for the passage of public traffic as provided above, traffic shall be diverted, and work commenced on the opposite side of the roadbed. After subgrade preparation for a specified layer of material has been completed, the Contractor shall, at his expense, repair any damage to the roadbed or completed subgrade, including damage caused by his operations or use by public traffic.

At locations where traffic is being routed through construction under one-way controls and when ordered by the Engineer, the movement of the Contractor's equipment from one portion of the work to another shall be governed in accordance with such one-way controls.

Whenever a section of surfacing, pavement, or the deck of a structure has been completed, the Contractor shall open it to use by public traffic if the Engineer so orders or may open it to use by public traffic if the Engineer so consents. In either case, the Contractor will not be allowed any compensation due to any delay, hindrance, or inconvenience to his 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 any other responsibility under the contract nor will he be relieved of cleanup and finishing operations.

Water or dust palliative shall be applied for the alleviation or prevention of dust nuisance as provided in Section 10, "Dust Control."

Except as otherwise provided in the special provisions, full compensation for conforming to the requirements in this section shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be made.

The Contractor may install "Tow-Away" or "No Parking, No Stopping" signs in critical areas to provide traffic lanes or project work areas. Prohibition of stopping/parking or the installation of tow-away signs will require the approval of the Engineer and the issuance of a permit from the Streets and Traffic Dept. The Contractor shall notify the Engineer 48 hours in advance of the work for approval. After approval of the stopping/parking restriction or tow-away signs, the Contractor shall furnish and place approved "NO STOPPING" or "NO PARKING" signs where directed. So that the stopping, parking or tow-away zone prohibition will be effective and enforceable, the messages on the signs shall include the dates and times of the required prohibition. Article 22652 of the California State Vehicle Codes requires a sign to be in place 24 hours before it becomes legally enforceable.

Vehicular travel over backfilled but unpaved trenches and other excavation will not be allowed unless a temporary wearing surface of at least 2 inches of plant mix asphalt over 6 inches of aggregate base is provided or traffic plates of sufficient width are set upon the trench and AC cutback shall be placed around the edges of the steel plate. In sidewalk areas, 1-1/8 inch plywood may be substituted.

## SECTION 12 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

When pavement is broken prior to trench excavation in a lane to be left open to traffic, the broken pavement fragments must be removed and replaced with a temporary wearing surface.

The Contractor shall leave the project site in a safe, neat, clean, and presentable state at the close of every work day.

No equipment shall be allowed to be parked within any traffic lanes or medians after work hours.

The Contractor shall notify City of San Jose Communications 48 hours in advance of any detours and street closures, (408) 277-4311.

If construction will obstruct a bus stop, the Contractor shall notify Santa Clara County Transit 48 hours in advance at (408) 299-4384.

On streets with one traffic lane in each direction, the Contractor shall maintain one 14-foot lane for two-way operation. Two flaggers shall be required. On streets with two or more traffic lanes in each direction, the Contractor shall reduce traffic by one lane only in each direction. On one-way streets, the Contractor shall reduce traffic by one lane only.

The Contractor shall provide electric arrow board(s) for lane reductions. All traffic lane diversions and separations shall be delineated with Type I barricades, 28-inch traffic cones, or 37-inch delineators with two white reflective bands spaced 25 feet on center. The tapered transition length shall be 125 feet minimum. Post "KEEP RIGHT" or "KEEP LEFT" signs or Type II barricades at the beginning of each diversion or separation.

The Contractor shall be responsible for informing the public of traffic conditions existing within the construction area at all times by placement of warning and advisory signs.

The Contractor shall not work within two adjacent intersections at the same time.

The Contractor shall not close two adjacent streets at the same time.

**12-1.03 Traffic Control Public Safety.** - Whenever work is being performed adjacent to a lane carrying traffic, the edge of lane or pavement shall be delineated by placing temporary portable delineators adjacent thereto in accordance with the provisions in Section 12-3.04, "Portable Delineators."

The Contractor shall not block the movement of pedestrian traffic. Where necessary, the Contractor shall provide for movement by phasing his operations, by providing 4-foot wide temporary bridges across trenches or establishing 4-foot wide passageways in the parkway or street area as applicable. Each bridge or passageway shall be bordered with safe railings or barricades, which shall be lighted at night and with non-slip walking surface, and which shall remain in place until all work at the particular location has been completed and the sidewalk, walk or crosswalk has been opened to the safe transit of pedestrian traffic. On barricades which direct pedestrians around the work site or to crosswalks not closed, the Contractor shall post, where directed by the Engineer, informational signs directing pedestrians. Railings or barricades which border passageways located in roadway areas shall be reflectorized on the side facing oncoming traffic.

Traffic signals shall not be shut down or put into a flashing mode unless approved by the City. When traffic signal shut down is permitted by City, Contractor shall notify the Engineer and San Jose Communication Center at least 5 working days prior to shut down.

The operation of any existing traffic signal shall not be disturbed before 9:00 a.m. and shall be returned to normal operation before 4:00 p.m. of the same day.

The Contractor shall restrict traffic lanes from 8:15 a.m. to 4:15 p.m. only. Whenever a lane closure is made, the Contractor shall close the lane by placing fluorescent traffic cones, portable delineators, or other devices approved by the Engineer, along a taper and along the edge of the closed lane adjacent to public traffic. An arrowboard should be placed adjacent to the first cone of the taper, as shown on the State Typical Plans T-10 and T-11. Advanced warning signs should be placed prior to the taper (this distance should be in relationship to the speed of traffic and conditions of the road).

Fluorescent traffic cones shall be of good commercial quality, flexible material suitable for the purpose intended. The outer section of the portion above the base of the cone shall be a highly pigmented fluorescent orange polyvinyl compound. The overall height of the cone shall be at least 28 inches. The base shall be of sufficient weight and size or shall be anchored in a manner such that the traffic cone will remain in an upright position.

If the traffic cones or portable delineators are damaged, displaced or are not in an upright position, from any cause, cones or portable delineators shall immediately be replaced or restored to their original location, in an upright position, by the Contractor.

Telescoping flag trees shall be of good commercial quality material, suitable for the purpose intended and shall be capable of maintaining an upright position at all times while in use.

The fluorescent traffic cones or portable delineators shall be placed at intervals as directed by the Engineer, or as shown in the "Manual of Traffic Controls for Construction and Maintenance of Work Zones."

If the work requires that fluorescent traffic cones or portable delineators be placed in the lane open to public traffic, cones or portable delineators shall be placed on a 1-1/2 foot width of the lane open to traffic along the side adjacent to the lane to be closed.

Traffic cones or portable delineators, telescoping flag trees with flags, arrowboards and signs shall be placed before beginning work each day and shall be removed from the work site at the end of each working day.

Upon completion of all work requiring lane closure, traffic cones and telescoping flag trees and construction signs shall be removed from the work site.

If material from the trench excavation spills onto the roadway, the roadway area shall be swept and washed with water to provide a safe and dust free surface before the lane is reopened.

Full compensation for furnishing, placing, maintaining and removing the traffic cones and telescoping flag trees with flags required for lane closure, and for moving and placing signs shall be considered as included in the contract prices paid for the items of work requiring the lane closure and no separate payment will be made therefor.

The provisions for lane closure in this Section will in no way relieve the Contractor from his responsibility to provide devices or measures necessary to comply with Section 7-1.09, "Public Safety."

On projects such as rechannelization and street widening work where changes in traffic patterns require either relocation, removal or installation of permanent regulatory traffic control and other signs, the Contractor shall relocate,

## SECTION 12 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

remove or install signs and standards where and as specifically shown on the plans, or where directed by the Engineer.

For all existing permanent traffic controls signs which are to be removed and not relocated, the Contractor shall remove the signs, all hardware and the standards. The Contractor shall deliver the above items to a designated City Corporation Yard. Any signs, standards or hardware damaged by the Contractor through negligence shall be replaced by the Contractor.

The temporary relocation of each "STOP" or other traffic regulatory sign shall be done immediately upon its removal, and to a location as close as possible to the original position of sign or as directed by the Engineer.

Any excavation permitted to be left open shall be barricaded with Type II and Type III barricades with flashers. "OPEN TRENCH" signs shall be posted at 30 feet off center. A minimum of 15 Type III barricades shall be available for diverting traffic and barricading trenches. See Caltrans Standard Details "Securing Open Trench "A" or "B" for K-railing and Chain Link Fencing."

All open excavated areas shall be barricaded with at least 2 Type III barricades at the end of the excavation that faces oncoming traffic. The longitudinal edge of pavement excavation shall be delineated with Type II barricades spaced 25 feet on center. Attach "OPEN TRENCH" signs to barricades 200 feet on center.

**12-1.04 Traffic Control Responsibility.** - The Contractor shall provide and maintain all traffic control and safety items. The Contractor assumes sole and complete responsibility for the job and site conditions during the course of construction, including safety of all persons and property. This requirement shall apply continuously 24 hours/day and shall not be limited to normal work hours.

All personnel occupying the roadway or median shall be required to wear approved safety vests with protective coloration.

### 12-2 FLAGGING

**12-2.01 Flaggers.** - Flag personnel shall be used where necessary to control the flow of traffic through the construction site and shall be used in all cases where traffic is being routed through the construction under one-way control, and when ordered by the Engineer.

**12-2.02 Flagging Costs.** - Delete the first paragraph of Section 12-2.02 of the Caltrans Standard Specifications.

The cost of furnishing all flaggers, including transporting flaggers to provide for passage of public traffic through the work in accordance with the provisions of Section 7-1.08, "Public Convenience" and 7-1.09, "Public Safety" shall be borne by the Contractor.

### 12-3 TRAFFIC - HANDLING EQUIPMENT AND DEVICES

**12-3.02 Barricades.** - Delete the first paragraph of Section 12-3.02 of the Caltrans Standard Specifications.

**12-3.02A Types.** - Barricades are designated by type according to function and physical characteristics. Type I, II and III barricades are portable construction barricades and the Type IV barricade is intended for permanent installation. Type



I, II and III barricades shall conform to the provisions, details and dimensions as specified in Caltrans, "Manual of Traffic Controls for Construction and Maintenance of Work Zones." Type IV barricades shall conform to the plan dimensions and the provisions as specified herein.

### 12-3.02B Materials

**12-3.02B(1)** - Materials for Type I, II and III barricades shall conform to provisions of the Caltrans manual referenced above.

**12-3.02B(2)** - Type IV barricades shall be constructed of materials as specified herein.

Posts shall be 4 inch by 4 inch, nominal size, highway post grade redwood or No. 2 heart structural grade redwood (1000f).

Rails shall be 2 inch by 6 inch, nominal size light framing construction grade Douglas fir, free of heart center.

Object markers for mounting on each post between the rails shall be red reflectorized sheeting, tape or plates, (3 inch by 5 inch minimum size). Where called for on the plans, object markers shall be Type M markers (9-spot) conforming to the provisions of the Caltrans "Traffic Manual."

Paint for posts and rails shall consist of a minimum of one coat of wood primer and 2 coats of white exterior enamel, conforming to the provisions of Section 91, "Paint."

**12-3.02B(3)** - Barricade warning lights shall conform to the provisions as specified in the Manual as referenced above. Unless otherwise specified in the special provisions, Type A Barricade Warning Lights (flashers) shall be used.

**12-3.02B(4)** - The Contractor shall establish the necessary quality control to assure compliance with these specifications. No Certificate of Compliance, as such, will be required for Type IV barricades. Certificate of Compliance may be required for Type I, II and III barricades for warning lights to assure compliance with these specifications.

### 12-3.02C Installation

**12-3.02C(1) Construction Barricades.** - Construction barricades of the type specified in the special provisions shall be furnished and set at locations as the Engineer may direct. The barricades shall be maintained for as long as necessary and shall be checked for their position location at the close of each day's activity and more often as necessary.

The batteries of warning lights shall be maintained at a high rate of charge at all times.

**12-3.02C(2) Permanent Barricades.** - The posts of the barricade shall be placed in holes excavated to the required depth as shown on the plans. The space around the posts shall be backfilled with selected earth free of deleterious material, and tamped solid. Wood wedges may be used to plumb posts prior to backfilling voids. Wood posts of barricades shall not be embedded in concrete.

Rails shall be attached to posts with 16d galvanized nails, before or after setting posts in the ground.

## SECTION 12 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

All exposed wood surfaces shall be given one application of wood primer and 2 coats of white exterior enamel paint. After painting, the object markers shall be attached to each post as shown on the plan details.

**12-3.04 Portable Delineators.** - If the portable delineators are damaged, from any cause, delineators shall immediately be replaced in an upright position by the Contractor.

When work is in progress in a trench or other excavation adjacent to the traveled way, the portable delineators shall be placed on the edge of pavement. At other times, the portable delineators shall be placed off of and adjacent to the edge of pavement.

The portable delineators shall be spaced as necessary for proper delineation.

When no longer required for delineation, the portable delineators shall be removed from the work site.

### 12-4 MEASUREMENT AND PAYMENT

**12-4.01 Measurement and Payment.** - When the Engineer's Estimate includes a contract item for Type I, II, III, and IV barricades, the barricades will be measured as units of actual count of the number of barricades ordered by the Engineer. After initial placement of Type I, II, and III barricades, and if ordered by the Engineer, the barricades shall be moved from location to location and the cost thereof will be paid for as extra work as provided in Section 4-1.03D. The contract unit price paid for Type I, II, and III barricade shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the furnishing, placing, maintaining, repairing, replacing and removing the barricades, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

## SECTION 15

## EXISTING FACILITIES

Existing facilities shall conform to Section 15 of the Caltrans Standard Specifications and these City Standard Specifications.

**15-1.01 Description.** - Facilities subject to the provisions of this section shall include any existing facilities which interfere with planned construction as identified in the project plans or special provisions. The removal of existing utilities required to permit orderly progress of work shall be accomplished by the utility company concerned, unless otherwise shown on the plans.

**15-2 MISCELLANEOUS HIGHWAY FACILITIES**

**15-2.02A Obliterating Roads and Detours.** - Traffic control devices, such as, but not restricted to, guidance, regulatory and warning signs and barricades used for the purpose of detouring traffic, shall be removed as directed by the Engineer.

**15-2.02B Traffic Stripes and Pavement Markings.** - Painting out traffic lines and markings with black traffic line paint will only be allowed, in rare instances, where the existing pavement will be resurfaced with asphalt concrete.

Temporary detour traffic stripes and pavement markings installed on permanent pavement surfaces outside the limits of the construction site shall be removed by sandblasting as directed by the Engineer.

**15-2.02E Drainage and Sewer Facilities.** - Existing manholes, catch basins, and other sewerage or drainage structures shown on the plans to be removed shall be removed completely, including foundation.

Existing sanitary or storm sewers, manholes, catch basins and other sewerage or drainage structures which have been or are to be abandoned, and which lie within a trench or other structure excavation, shall be removed from within the limits of required excavation necessary for the work.

Sanitary sewers, storm sewers, sewer laterals and other culverts to be abandoned, but not required to be removed, shall be thoroughly sealed at all open ends, and at the structures in which they terminate as applicable. The open ends shall be sealed with brick or concrete rubble, and mortar.

In addition to sealing open ends as specified above, and when specifically required, all sewer mains, upon abandonment shall be filled with a slurry sand/cement grout or blown sand. Facilities to be filled shall be sealed at the downstream end, filled with the approved mixture, and sealed at the upstream end.

The bottom of abandoned structures shall be perforated or broken to prevent the entrapment of water.

**15-2.02F Fences and Gates.** - All fence material and gates to be salvaged or relocated shall be removed with care to prevent any damage to the material. All adhering concrete footings shall be removed from fence posts and braces which are to be salvaged or relocated.

**15-2.02G Concrete Pavement.** - Asphalt or Portland cement concrete

pavements shall be removed to clean straight lines. If, in the opinion of the Engineer, the edges are ragged, raised or otherwise unsatisfactory, saw cutting will be required. Where concrete pavement adjoins a trench, the edges adjacent to the trench shall be trimmed to neat straight lines before resurfacing of the trench.

**15-2.05A Frames, Covers, Grates, and Manholes.** - Delete the 5th, 6th, 7th and 8th paragraph of Section 15-2.05A of the Caltrans Standard Specifications. Throat grade rings may be used to raise manhole frame castings to a maximum of 18 inches from top of cone to bottom of castings. If height is greater than 18 inches, for raising castings, then the cone shall be removed and manhole rebuilt accordingly.

When frames, covers, grates of existing manholes, inlets or other facilities are removed, a traffic rated plate shall be placed over the opening. The traffic plate shall be of a design that the possibility of dislodgement is non-existent. The required use of a traffic plate will be waived if the work of raising frames, covers or grates is accomplished the same day.

The Contractor shall exercise care in removing manhole covers and frames and install cover plates for manhole to preclude the possibility of any rubble or debris from entering the sewer pipe. Should any rubble or debris fall into the manhole, the manhole shall be immediately cleaned of any and all rubble and debris. At the discretion of the Engineer, the sewer main shall be flushed and cleaned downstream from the point of entry of any rubble and debris, in accordance with the provisions of Section 1308. The cost of flushing and cleaning of sewer mains as a result of rubble and debris entering into the mains shall be the sole responsibility of the Contractor and no additional compensation will be provided. Should the Contractor fail to flush and clean the sewer main, the Engineer shall order the work done by others and deduct the cost from any monies due the Contractor.

If the manhole cover is unstable under traffic, the manhole ring and cover shall be removed and replaced with a stable ring and cover.

**15-2.05F Sanitary Sewer Laterals.** - Sanitary sewer laterals encountered in the work that obstructs or otherwise interferes with other planned improvements shall be adjusted or relocated in accordance with appropriate provisions of these specifications.

**15-2.07 Payment.** - The cost of removal of detour traffic control devices shall be considered as included in the prices paid for the various contract items of work and no separate payment will be made therefor.

### 15-3 REMOVING CONCRETE

**15-3.02 Removal Methods.** - Concrete facilities shall be removed to neatly sawed edges with saw cuts made to a minimum depth of 1-1/2 inches. Concrete sidewalk or driveway aprons to be removed shall be neatly sawed in straight lines either parallel to the curb or at right angles to the alignment of the sidewalk as required. No section of sidewalk or driveway apron to be replaced shall be smaller than score line to score line in either length or width or, as directed by the Engineer. Curb and gutter shall be sawed to a minimum depth of 1-1/2 inches on a neat line at right angles to the curb face. No section of curb and gutter to be replaced shall be smaller than five feet in length. If the saw cut in curb and

gutter falls within five feet of a construction joint or expansion joint, the concrete shall be removed to that joint.

Isolated concrete, where designated, shall be interpreted to mean: concrete facilities to be removed in areas outside the area that would normally be designated to be cleared, or such miscellaneous concrete facilities whose removal is required for those projects where cleaning, grubbing and removal of obstructions are included in other items of work.

The removal of subterranean facilities shall be as specified in Section 15-5.

### 15-5 SUBTERRANEAN FACILITIES

**15-5.01 Description.** - This work shall consist of removing and/or sealing and abandonment of existing subterranean facilities, including basements, septic tanks, cess pools, and wells. The type and general dimensions of such facilities to be removed, sealed, and/or abandoned will be shown on the project plans or described in the special provisions.

**15-5.02A Removal of Basements, Septic Tanks, and Cess Pools.** - When in the course of clearing, grubbing and removing of obstructions to the work, or, if designated on the plans or specified in the special provisions, basements, septic tanks or cess pools of any type, size or depth, are shown or encountered, they shall be removed in their entirety, with the following exception: cess pools 8 feet or greater in depth may be backfilled with approved materials and thoroughly jetted with water containing an approved wetting agent. The top of the cess pool shall be removed 2 feet below the grading plane or 3 feet below existing finished grade.

Floors of basements of any description shall be removed entirely to native soil. All rubble from basement removal shall be disposed of off the project.

All abandoned sewer laterals encountered shall be removed as described below:

- 1) Sewer laterals 2 feet or more below grading plane shall be sealed in accordance with the provisions of Section 15-2.02E, "Drainage and Sewer Facilities."
- 2) Sewer laterals in or above the grading plane shall be removed completely to a point where lateral is a minimum of 2 feet below grading plane and the ends of the lateral to remain shall be sealed as described above.

All area depressions resulting from removal of basements, septic tanks and cess pools shall be backfilled with approved native material and compacted to a relative density of not less than 90 percent.

Payment for basement, septic tank or cess pool removal and/or backfill shall be included in the price paid for clearing and grubbing, if such basement, septic tank or cess pool are shown on the plans or specified in the special provisions. If not shown on the plans or specified in the special provisions and encountered in the work, payment for basement, septic tank or cess pool removal and/or backfill will be paid for as extra work according to the provisions of Section 4-1.03D, "Extra Work."

**15-5.02B Sealing and Abandonment of Wells.** - The work of sealing and abandoning wells shall be in accordance with the "Standards for the Sealing of

Abandoned Wells Santa Clara County," adopted by Santa Clara Valley Water District, such provisions will be specified in the special provisions. Payment for sealing and abandoning of wells will be made per each well so sealed and abandoned as shown on the plans or specified in the special provisions. If not shown on the plans or specified in the special provisions and encountered in the work, payment for sealing and abandoning wells will be paid for as extra work according to the provisions of Section 4-1.03D, "Extra Work."

**15-5.03 Payment.** - Removal of subterranean facilities will be paid for at a lump sum price. The pay item will include removal of all such facilities encountered within the project boundaries in accordance with the provisions of these specifications except where otherwise specified. Where the Engineer's Estimate designates that payment will be made for the removal or abandonment of specific items on a unit basis, measurement will be made by the unit so designated.

Sealing and abandonment of wells will be paid for at the contract unit price per each.

The above prices paid shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved for the item or items as shown on the plans and as specified in these specifications, and as directed by the Engineer, including the disposal of all resulting material removed or encountered.

When the contract does not include a separate pay item for removal of subterranean facilities as specified above, and unless otherwise provided for in the special provisions, full compensation for any necessary removal of such facilities required to perform the construction operations specified shall be considered as included in the price bid for other items of work and no additional compensation will be allowed therefor.

## SECTION 16

## CLEARING AND GRUBBING

Clearing and grubbing shall conform to Section 16 of the Caltrans Standard Specifications and these City Standard Specifications.

**16-1.01 Description.** - Areas subject to the provisions of this section shall include any portions of the project site identified in the project plans or special provisions to be cleared and grubbed. This work shall include, but not be restricted to, removal of structures, trees, stumps, logs, brush, other vegetation, debris and rubbish of any nature. This work shall also consist of protecting and maintaining existing trees not to be removed from the project site.

**16-1.03 Construction.** - Within the limits of clearing, all objectional material including masonry and concrete rubble shall be removed 3 feet below the existing ground surface or 6 feet below finished grade, whichever is deeper.

Tree branches extending over the roadway within 13.5 feet of the finished grade shall be cut off close to the trunk by a reputable arborist or tree surgeon.

**16-1.04 Removal and Disposal of Materials.** - All materials removed shall be disposed of at locations outside the project site unless otherwise shown on the plans or specified in the special provisions. The Contractor shall make his own arrangements for disposal and shall pay all costs involved.

Combustible material, including chips, shall be disposed of as directed by the Engineer.

**16-1.06 Payment.** - The price paid for clearing and grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals required for maintenance and protection of existing trees as specified in this section.





## SECTION 17

## WATERING

Watering shall conform to Section 17 of the Caltrans Standard Specifications and these City Standard Specifications.

**17-1.01 Description.** - This work shall also consist of: (1) application and payment of fees for drawing water through meters from fire hydrants and (2) constructing or installing portable tank reservoirs and installing pumping plants and pipeline systems.

Any system chosen by the Contractor shall be adequate for the supply of water for periods of maximum demand and shall be in operation for the life of the project.

Water used for whatever purpose in construction shall be considered as included in the prices paid for the various items of work involved and no additional compensation will be allowed therefor.

**17-1.02A Application.** - The application of water shall be under the control of the Engineer at all times.

At the option of the Contractor, excavation areas and borrow sources may be watered prior to excavating the material.

**17-1.03 Materials.** - Water, wetting agents, and chemical additives shall conform to the following:

- (a) **Water.** - Water used for whatever purpose in construction shall be free from oils, heavy concentrations of salts, minerals, or other deleterious substances.
- (b) **Wetting Agents.** - Type of material shall be as specified in the special provisions or on the project plans. In any case, the chemical additive to be used as a wetting agent shall be capable of readily mixing with water and of distributing moisture evenly in soil, leaving no dry pockets or voids.

The wetting agent shall be a non-ionic, non-organic, non-detergent, non-toxic, non-flammable liquid having a neutral pH which, when applied to soils shall not be harmful to vegetation.

The proportion of wetting agent to water shall be as recommended by manufacturer unless otherwise directed by the Engineer.

The manufacturer shall establish the necessary quality control and inspection practice to assure compliance with these specifications. The Contractor shall furnish a certificate of compliance, in accordance with the requirements of Section 6-1.07, "Certificate of Compliance", that the product furnished complies with the requirements of these specifications.

**17-1.04 Payment.** - Delete Section 17-1.04 of the Caltrans Standard Specifications.

**SECTION 18**

**DUST PALLIATIVE**

Dust palliative shall conform to Section 18 of the Caltrans Standard Specifications.



## SECTION 19

## EARTHWORK

## 19-1 GENERAL

Earthwork shall conform to Section 19 of the Caltrans Standard Specifications and these City Standard Specifications.

**19-1.01 Description.** - Earthwork for drainage and sewer facilities is specified in Section 1301 of these City Standard Specifications. Subgrade preparation shall conform to Section 21 of these City Standard Specifications. Delete all subgrade preparation provisions in Section 19 of the Caltrans Standard Specifications.

Earthwork shall include all excavation, compaction, and other earthwork performed on the project site, as indicated in the plans or special provisions. In general, references to the "roadway prism" or "roadway facilities" or "roadway" or "highway" shall be construed as references to the project or project site, as applicable and except as otherwise indicated in these specifications.

## 19-2 ROADWAY EXCAVATION

**19-2.01 Description.** - This work shall conform to Section 19-2 of the Caltrans Standard Specifications, except that all references to "roadway" shall be construed as references to roadways and other pavement facilities.

Excavation shall be performed as indicated on the plans to the lines, grades, and elevations shown. All deleterious materials encountered within the limits indicated shall be removed and disposed of.

The rough excavation shall be carried to a depth necessary to allow for compacting the basement material to the requirements as specified and to the planned cross section of the grading plane.

The Contractor may use any type of earth-moving equipment or any type of compaction equipment, provided the equipment is in satisfactory condition and is capable of performing the work within the time schedule of the project.

During the process of excavation, the grade shall be maintained so that it will be well drained at all times. When so directed, Contractor shall install temporary drains and drainage ditches to intercept or divert surface water which may affect the work.

**19-2.05 Slopes.** - When completed, slopes and shoulders shall present a neat and uniform appearance.

**19-2.07 Selected Material.** - Topsoil excavated within the limits of the project shall be stockpiled for use in areas to be planted or landscaped, and shall not be used for any other purpose until no further topsoil is required for landscape purposes. Any remaining topsoil may then be used as specified for selected material.

Selected material designated for use as backfill for areas to be landscaped shall conform to Section 20-2.01, "Soil," except the soil need not be surface soil.

## SECTION 19

## EARTHWORK

## 19-1 GENERAL

Earthwork shall conform to Section 19 of the Caltrans Standard Specifications and these City Standard Specifications.

**19-1.01 Description.** - Earthwork for drainage and sewer facilities is specified in Section 1301 of these City Standard Specifications. Subgrade preparation shall conform to Section 21 of these City Standard Specifications. Delete all subgrade preparation provisions in Section 19 of the Caltrans Standard Specifications.

Earthwork shall include all excavation, compaction, and other earthwork performed on the project site, as indicated in the plans or special provisions. In general, references to the "roadway prism" or "roadway facilities" or "roadway" or "highway" shall be construed as references to the project or project site, as applicable and except as otherwise indicated in these specifications.

## 19-2 ROADWAY EXCAVATION

**19-2.01 Description.** - This work shall conform to Section 19-2 of the Caltrans Standard Specifications, except that all references to "roadway" shall be construed as references to roadways and other pavement facilities.

Excavation shall be performed as indicated on the plans to the lines, grades, and elevations shown. All deleterious materials encountered within the limits indicated shall be removed and disposed of.

The rough excavation shall be carried to a depth necessary to allow for compacting the basement material to the requirements as specified and to the planned cross section of the grading plane.

The Contractor may use any type of earth-moving equipment or any type of compaction equipment, provided the equipment is in satisfactory condition and is capable of performing the work within the time schedule of the project.

During the process of excavation, the grade shall be maintained so that it will be well drained at all times. When so directed, Contractor shall install temporary drains and drainage ditches to intercept or divert surface water which may affect the work.

**19-2.05 Slopes.** - When completed, slopes and shoulders shall present a neat and uniform appearance.

**19-2.07 Selected Material.** - Topsoil excavated within the limits of the project shall be stockpiled for use in areas to be planted or landscaped, and shall not be used for any other purpose until no further topsoil is required for landscape purposes. Any remaining topsoil may then be used as specified for selected material.

Selected material designated for use as backfill for areas to be landscaped shall conform to Section 20-2.01, "Soil," except the soil need not be surface soil.

**19-3 STRUCTURE EXCAVATION AND BACKFILL**

**19-3.01 Description.** - Trenches or foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the plans or as staked by the Engineer. Trenches or pits shall be of sufficient size to permit the placing of structures or structure footing of the width and length shown on the plans. Any elevation, as shown on the plans, of the bottoms of footings shall be considered as approximate only and the Engineer may order in writing such changes in dimensions or elevations of footings as may be necessary to secure a satisfactory foundation.

**19-3.03 Cofferdams.** - Cofferdams shall be used whenever water-bearing strata are encountered above the elevation of the bottom of the excavation.

Cross struts or bracing used in cofferdam construction which extend through foundation concrete both above and below low water shall be removed upon completion of footing pouring or when cofferdam is no longer necessary, and the resulting space filled with concrete of the same mix as that specified for the surrounding concrete.

**19-3.04 Water Control and Foundation Treatment.** - All loose and displaced material resulting from the driving of piles shall be removed.

**19-3.06 Structure Backfill.** - Material for structure backfill shall be soil selected from structural excavation insofar as such material is readily compactible and conforms to the requirements of this section.

Structure backfill shall be free from stones and lumps exceeding 3 inches in greatest dimension, vegetable matter, or other unsatisfactory material. If satisfactory material for use as structure backfill cannot be obtained from excavation, suitable imported material, approved by the Engineer, shall be furnished by the Contractor, at his expense.

Material from excavation that is determined by the Engineer to be unsuitable for use as backfill shall be disposed of.

**19-3.065 Pervious Backfill Material.** - Sieve analysis of mineral aggregate to be used as pervious backfill will be tested in accordance with California Test 202.

That portion of pervious backfill material passing the No. 4 sieve shall have a sand equivalent of not less than 60, as determined in accordance with California Test 217.

Filter material for wall drain outlets shall consist of burlap sacks, each containing approximately one cubic foot of specified material. One sack shall be placed behind each wall drain outlet, along with the pervious material backfill.

**19-3.066 Permeable Backfill Material.** - Where shown on the plans, areas to receive permeable material blankets shall be graded to the lines and grades as shown on the plans.

Minimum durability index shall be 40, when tested in accordance with California Test No. 229. Minimum Sand Equivalent of permeable materials shall be 75 when tested in accordance with California Test 217. Original has no test value.

### 19-5 COMPACTION

**19-5.02 General.** - For areas greater than 100 square feet on fill, the provisions of Section 19-6, "Embankment Construction," shall apply. In addition to the density required, the subgrade shall be stable and unyielding.

Any portion of the area which is not accessible to standard compacting equipment shall be compacted to the required density by approved mechanical tamper.

All irregularities or depressions that develop under compacting or rolling equipment shall be corrected by adding, removing, or replacing material until the surface is smooth, uniform and unyielding.

All soft and yielding material and material which will not compact readily when rolled or tamped shall be removed as directed by the Engineer and replaced with suitable material.

**19-5.03 Relative Compaction (95 Percent).** - On areas to be paved, the finished subgrade (basement grade) shall be compacted to a density of not less than 95 percent for a depth of 0.5 foot in accordance with California Test No. 231.

The required relative compaction for paved areas of 95 percent to a minimum depth of 2.5 feet below finished grade applies to embankment fills in excess of 3 feet from the original ground surface. For embankment fills less than 3 feet in height, the relative compaction of not less than 95 percent shall be obtained for the complete depth of the embankment, including 0.5 foot below the original ground surface.

All embankment lifts not otherwise specified in this Section, and composed of noncohesive (granular) soils, shall have a relative compaction of not less than 95 percent.

**19-5.04 Relative Compaction (90 Percent).** - If a portion of an area to be paved is on a local filled area, the material shall be compacted to a density of 90 percent to within 0.5 foot of the subgrade and 95 percent thereafter to finished subgrade.

**19-5.05 Foundation Preparation.** - No payment will be made for suitable materials removed, manipulated, and replaced in order to obtain density. Any removal, manipulation, aeration, replacement, or recompaction of suitable materials necessary to obtain the required density shall be considered as incidental to the excavation.

### 19-6 EMBANKMENT CONSTRUCTION

**19-6.01 Placing.** - Before placing fill material upon any area, clearing and grubbing shall have been accomplished in accordance with the provisions of Section 16, "Clearing and Grubbing." All depressions or holes below the ground surface, whether caused by grubbing or otherwise, shall be backfilled with suitable material and compacted prior to the construction of embankments. Objectionable material shall not be allowed in or under the embankment.

The entire area upon which the embankment is to be placed shall be scarified, plowed, or broken up in such manner that the fill material will blend with the existing surface. Any objectionable material that would cause interference with the compaction of the fill shall be removed and disposed of.



When embankments are to be constructed upon an existing paved surface, the pavement shall be scarified to its full depth and broken up so that no piece larger than 1 foot in greatest dimension shall remain. The broken pieces shall be thoroughly mixed with fill material so that no pockets of broken pavement exist.

The loose thickness of each layer of embankment fill material shall not exceed 0.67 foot for the full width of cross section.

Clods or hard lumps of earth over 0.5 foot in greatest dimension shall be broken up before compacting the embankment material, except as otherwise provided in Section 19-6.01 of the Caltrans Standard Specifications.

When embankment construction requires cutting a minimum 6-foot horizontal bench into existing slopes, as specified in Section 19-6.01 of the Caltrans Standard Specifications, a new bench shall be started where the vertical cut for the next lower bench intersects the existing ground.

**19-6.025 Settlement Period.** - Any embankment for which a settlement period is provided in the special provisions, shall remain in place for the required settlement period before excavating for any designated improvements.

Where an embankment settlement period is specified, the embankment fill shall be constructed to the lines, grades and to the limits shown on the plans or specified in the special provisions.

Settlement platforms and instruments connected therewith shall be protected by the Contractor for the length of the settlement period.

**SECTION 20**

**LANDSCAPING**

**20-1 GENERAL**

This work shall consist of performing roadway planting, park landscaping, and other work necessary for improving the appearance of the roadside and park facilities.

**20-2 SOIL**

**20-2.01 Description.** - Topsoil shall be Sandy loam of an even texture and shall pass through a 1/2-inch screen.

The topsoil shall be free from insects, animal life, or any toxic substances that may be detrimental to the growth of vegetation.

Soil sterilizers or weed killers, if required, shall be of a type which will permit growth of nursery stock planted 3 weeks after application. Compounds containing cyanide or arsenic will not be accepted.

Topsoil shall have a neutral soil reaction and shall have a PH of not less than 6.6 nor greater than 8.0. The topsoil shall have a low saline alkali content-saturation extract and shall have a conductivity of not more than 4 million per centimeter at 25 degrees centigrade and an exchangeable sodium or sodium cation content of not more than 10 percent of the total metallic cation content.

After notification of source of supply by the Contractor, the Engineer shall inspect the topsoil site and have the soil tested for compliance to these specifications.

Sandy loam of low fertility, even though mixed with leaf mold, manure, or other fertilizers, will not be acceptable unless prior approval has been granted by the Engineer. Contractor shall attach soil and plant Lab Report for the Engineer's approval.

**20-2.02 Soil Amendment.** - Organic soil amendment shall be specified by Engineer based on soil and plant laboratory test results. Soil amendment shall be free of weed seed, dust, and other objectionable materials.

In addition to selected organic soil amendment, where specified, commercial grade agricultural gypsum shall be used as soil amendment.

The materials shall be uniformly spread and incorporated with a rotary cultivator to obtain a homogeneously blended soil 6 inches in depth, unless stated otherwise in special provisions.

**20-2.03 Mulch.** - Mulch shall be ground, screened fir bark. Mulch size shall be 3/8-inch to 1/2-inch. Mulch shall be top dressed, where specified, to a minimum depth of 3 inches over soil level.

**20-2.04 Planting Mix.** - Planting mix for backfilling planting holes shall consist of 2 parts of soil excavated from the planting holes (free of rocks over 1/2-inch in diameter) and one part soil amendment. The materials shall be thoroughly mixed until they lose their individual identities.

**20-2.05 Certificate of Compliance.** - The Contractor shall be responsible for the establishment of the necessary quality control and inspection practice as necessary to assure compliance with these specifications. The Contractor shall furnish certificates of compliance for materials so designated in accordance with the requirements of Section 6-1.07, that all of the required tests have been made and the results comply with the requirements of these specifications.

**20-2.06 Topsoil Placement and Treatment.** - Topsoil shall be delivered reasonably dry and in a workable condition. It shall be placed and spread to the line and grade as shown on the plans or as directed by the Engineer. Topsoil shall be compacted to approximately 80 percent relative compaction. Topsoil in tree or shrub pits shall be lightly tamped by hand so as to form a firm setting for the plant, but not hinder growth. Mechanical tamping will not be allowed.

After spreading of the topsoil, any extraneous or unacceptable material not previously removed shall be raked off and removed from the topsoil area. Spreading and compacting shall be completed in such a manner that seeding, sodding or planting, if and as specified on the plans, can proceed after completion of this work without additional grading.

When specified in the special provisions or shown on the plans, the placed topsoil shall be sterilized or treated with an approved weed killer and left 3 or 4 weeks prior to planting.

Immediately before planting, the topsoil shall be cultivated, rolled with a 200-pound roller and raked to provide a uniformly smooth, firm, friable, fine textured finished surface. No grading equipment will be allowed on the topsoil after the area has been treated and prepared for planting.

### 20-3 FERTILIZING

**20-3.01 Fertilizer.** - Planting tablets for planting trees and shrubs shall be tightly compressed, non-burning, long lasting fertilizer of the following guaranteed analysis.

Nitrogen, water soluble	7.00%
Nitrogen, water insoluble	13.00%
Phosphoric Acid, available	10.00%
Potash, soluble	5.00%
Calcium combined	2.60%
Sulfur, combined	1.60%
Iron, expressed as Fe	0.35%

Fertilizer used for planting maintenance shall have a minimum guaranteed chemical analysis of 21 percent nitrogen, 0 percent phosphoric acid, and 0 percent soluble potash.

Fertilizer for tree, turf, and shrub plantings shall be in granular or pelleted form, shall conform to the standards of the Association of Official Agricultural Chemists, and shall provide the minimum percentage of available nutrients as specified in the plans or special provisions. A liquid fertilizer may be used if and when specified.

**20-4 SEEDS**

**20-4.01 Seed.** - Seed shall be furnished separately or in mixtures in standard sealed containers labeled with the seed name, lot number, net weight, percentage of purity, germination and hard seed, and percentage of maximum wildflower/grass seed content.

The Contractor shall furnish the Engineer duplicate signed copies of a certificate of compliance by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within 6 months of date of delivery. The testing shall be in conformance with test procedure standards of the Association of Official Seed Analysts and the provisions of the Agricultural Code of the State of California. The certificate of compliance shall include name and address of laboratory, date of test, lot number for each kind of seed, and results of tests as to name, percentages of purity and of germination, and percentage of wildflower/grass content for each kind of seed furnished and, in case of a mixture, the proportions of each kind of seed.

**20-4.01A Hydroseeding.** - Seeds used for hydroseeding shall conform to the following provisions:

Mulch shall be virgin wood cellulose fiber and shall be of such character that it will disperse uniformly into a slurry when mixed with water. The slurry, when hydraulically applied to the ground, shall form an absorptive mat of mulch uniformly impregnated with seed and other ingredients. No materials which inhibit growth or germination shall be present in the mixture.

Fertilizer shall have a guaranteed analysis of 6 percent nitrogen, 20 percent phosphoric acid, and 20 percent soluble potash and shall be in a form which readily disperse into the slurry.

Seed shall be labeled in accordance with California Department of Agriculture State Seed Law requirement effective on the date of invitation for bids. Seeds that become wet, moldy, or otherwise damaged in transit or in storage will be subject to retest at the discretion of the Landscape Architect. The seed shall be supplied in unopened containers from a commercial seed dealer and may be either mixed or in separate container for each lot. Tags shall be given to inspector or site superintendent. Job will not be considered complete unless all tags are produced and verified.

**20-4.01A Turf Seed.** - Turf seed or mixtures of seed are classified by type according to species or variety of grass. Types of seed or seed mixtures shall be as shown on the plans or specified in the special provisions.

Lawn seed shall be true to species or variety for the type as specified and shall conform to the Agricultural Code of the State of California and the standards of the Association of Official Seed Analysts.

**20-4.01B Wildflower Seed for Hydroseeding.** - Wildflower seed type to be used for hydroseeding shall be as indicated in the plans or special provisions.

Seed shall be labeled in accordance with the California Department of Agriculture, State Seed Law requirements, effective on the date of invitation for bids. Seeds that become wet moldy, or otherwise damaged in transit or in storage will be subject to retest at the discretion of the Landscape Architect. The seed shall be supplied in unopened containers from a commercial seed dealer and may either be mixed or in separate containers for each lot. Tags shall be given to the inspector

or site superintendent. Job will not be considered complete unless all tags are produced and verified.

### 20-5 EROSION CONTROL

**20-5.01 Description.** - This work shall include all erosion control and planting work performed on any portion of the project site (not limited to highways), as indicated in the plans or special provisions. Similarly, all references to "roadway" or "highway" or "right-of-way" shall be construed as references to the project site.

**20-5.02 Liquid Green Dye.** - Liquid green dye used in erosion control work shall be 48-hour colorfast, applied at the rate of 2 quarts per acre.

**20-5.03 Fiber.** - Fiber used for erosion control hydroseeding shall be virgin wood cellulose fiber of such character that it will disperse uniformly into a slurry when mixed with water. The slurry, when hydraulically applied to the ground, shall form an absorptive mat of mulch uniformly impregnated with seed and other ingredients. No materials which inhibit growth or germination shall be present in the mixture.

**20-5.04 Hydroseeding.** - The Contractor shall scarify to a depth of 6 inches and uniformly fine grade so that proper drainage of the entire ground cover is assured. All rocks, soil lumps, and other deleterious materials larger than 1 inch shall be removed and the area raked smooth.

The Contractor shall avoid any compaction of the soils after treatment, and shall not permit vehicular or equipment traffic over such areas. In the event of such compaction, the Contractor shall be required to recultivate any areas thus compacted, at his own expense.

All areas to be treated for weed control shall be treated as indicated in the plans or special provisions.

Equipment for hydroseeding application shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry of fiber, fertilizer, seed and water. The discharge line shall provide even distribution of the slurry on the slopes to be seeded. The slurry tank shall have a minimum capacity of 1,000 gallons.

The slurry preparation should begin by adding water to the tank. When the water level has reached the height of the agitator shaft, the stabilizing agent shall be added. Seed and fertilizer shall then be added, followed by the fiber mulch. The engine throttle shall be opened to full speed when the tank is half-filled with water. All the mulch shall be added by the time the tank is 2/3 to 3/4 full. All material then shall be uniformly blended prior to application. Spraying shall commence within 2 hours after tank is full.

Contractor shall perform hydroseeding when there is no wind. The operator shall spray the slopes with a uniform, visible coat, using the color of the mulch as a guide. The slurry shall be applied in a sweeping motion to allow the fibers to build on each other, until a good coat is achieved and the material is spread at the following rates per acre:

- 1) 1,800 lbs. mulch
- 2) 400 lbs. 6-20-20 fertilizer

- 3) seed mix as specified in the plans or special provisions.
- 4) 2 quarts liquid green dye

Fertilizer used for erosion control work shall be in a form which will readily disperse into the slurry, and shall have a minimum guaranteed chemical analysis of 6 percent nitrogen, 20 percent phosphoric acid, and 20 percent soluble potash.

**20-5.05 Preparing Soil for Planting Areas.** - In areas to be planted, all rocks and other debris greater than one inch in diameter shall be removed and disposed of.

In areas to be planted, the grade shall be one to 2 inches below the planned finish grade prior to conditioning the soil. In all other areas, the grades shall be as indicated at the grading plane for the type of facility to be constructed thereon.

The formation and compaction of embankments shall conform to the provisions as specified in Section 19, "Earthwork," and as modified herein. In areas to be planted, compaction of the fill shall be not more than 85 percent for the upper one foot of such fill.

Cultivation shall be performed with as many passes with the cultivator as necessary, as determined by the Engineer, to produce a friable, uniformly mixed soil, free of pockets of unmixed soil, amendments, or fertilizers if such are specified.

Areas adjacent to walks, structures, or other such facilities that are inaccessible or difficult to reach by mechanical rotary cultivators shall be cultivated by hand.

All rocks or other debris greater than one inch in diameter brought to the surface during cultivation shall be removed and disposed of.

After cultivation, the surface shall be raked, rolled or otherwise smoothed to remove ridges and fill depressions. The finished surface shall be uniform, evenly graded, and reasonably firm. The grades of the finished surface shall be approximately 2 inches below the top of adjacent curbs or pavement unless otherwise shown on the plans and except for those areas designated to receive topsoil, where the grade shall be 6 inches below planned finish grade.

Grading of plants shall conform to the "American Standard for Nursery Stock," ANSI Standard Z60.1, and as may be specified in the special provisions.

## **20-6 PLANTS AND PLANTING PREPARATION**

**20-6.01 Plants.** - Plants shall be vigorous, first class representations of the species and cultivars specified, shall conform to all State and local laws governing the sale and transportation of plant materials. Only plants of the size and type indicated, and only plants with normal plant and root structures, will be acceptable. All plants shall be nursery grown in containers, unless otherwise indicated in the plans or special provisions, shall have been grown in the specified containers for not less than 6 months, and shall be accompanied by certification of same. They shall have straight, single trunks, unless otherwise specified on the plans. No pruning shall be undertaken before planting. Plants specified to be multi-trunk shall have at least 3 main leaders from the base. Any and all plants that have any encircling roots (not rootbound) shall have root balls lightly slashed on a minimum of 3 sides to stop encircling root growth. All plants shall be free from disfiguring

knots and sunscald injuries abrasions, or other objectionable disfigurements. Tree trunks shall be sturdy and well "hardened off."

Any plants delivered to the job site which are found to be not true to name or unsuitable in growth or conditions shall be removed from the site and replaced with acceptable plants. All plants shall be of the species, variety, size, age, and condition a specified herein or as shown on the plans. Under no condition will there be any substitution of plants or sizes for those listed on the accompanying plans, except with the written consent of the Landscape Architect.

One plant of each bundle or lot shall be tagged with the name and size of the plant, in accordance with the standards of practice recommended by the American Association of Nurserymen.

All plant materials shall meet the specifications of Federal, State, and County laws requiring inspection for plant diseases and insect infestations. Inspection certifications required by law shall accompany each shipment, invoice, or order for stock, and when such plants arrive at the site of the work the certificate of inspection shall be filed with the Engineer.

Inspection of all plant material for acceptance shall be made at the project site at time of delivery. All plant material shall be approved by the Landscape Architect prior to installation. Any and all rejected plant material shall be marked as such and removed from the project site immediately.

The Contractor shall notify the Section of Landscape Architecture at least 2 days prior to the delivery of each shipment of plant materials. Plant materials shall be protected and maintained in good condition. Bare root and balled materials shall be watered regularly and placed in a cool area protected from sun and wind.

Plants shall be classified by type as to species, variety and genus and will be specified by scientific name conforming to the publication "Standard Plant Names" as adopted by the American Joint Committee on Horticultural Nomenclature. The plant materials to be planted will be shown on the plans or specified in the special provisions.

**20-6.02 Turf.** - Grass sod shall be will established mown lawn grass turf and shall be free of weeds and any other harmful or deleterious matter.

At least 80 percent of the grass plants in the cut sod shall be composed of the species or varieties specified in the special provisions.

Grass sod shall be grown, inspected, and shipped in accordance with the provisions of the Agricultural Code of the State of California.

Sod shall be machine stripped or cut of a uniform soil thickness of one inch plus or minus 1/4 inch. The measurement for thickness shall exclude top growth and thatch and shall be determined at the time of cutting in the field.

Sod shall be rolled or folded prior to lifting. Handling of sod shall be done in a manner that will prevent tearing, breaking, drying, or any other damage.

Sod shall be transplanted within 24 hours from the time it is stripped, unless circumstances beyond the Contractor's control make storing necessary. In such case, sod shall be stacked, kept moist, and protected from exposure to the air and sun. The stored sod shall be installed in place not more than 48 hours after cutting.

**20-6.03 Trees.** - Trees are classified by type as to genus, species, and variety as well as common name. The tree varieties to be planted shall be as indicated in the plans or special provisions.

Tree species for planting in the City of San Jose are identified by size, either caliper size of trunk or height of tree stock. Table 1 indicates the height relationship to caliper of trunk. The size of tree shall be as indicated on the plans either by caliper or height. If the tree size is specified by caliper of trunk, the height indicated in the table will be considered a minimum; if height is specified on the plans, then caliper of trunk will be considered a minimum. For shade trees of recognized slower growth, as identified by the Engineer, the height shall be not less than 2/3 the height as indicated in Table 1 for specified caliper of trunk.

In size grading of container grown trees, caliper measurement shall take precedence over height measurement, unless otherwise specified in the special provisions.

Caliper measurement shall be taken 4 to 5 inches above soil level. If the tree is budded or grafted to a root system, the measurement shall be taken 2 inches above the bud or graft union.

Trees to be planted as street trees shall be free of branches for approximately the lower half of their height. Trees shall have reasonably straight stems and shall be well branched and symmetrical in accordance with their natural habits of growth. The branch system shall be free from dead or dry wood or broken terminal growth.

Container grown trees shall be capable of standing upright without staking and shall have been grown in the container sufficiently long for the fibrous roots to have developed so that the root mass will retain its shape and hold together when removed from the container. Trees not meeting this requirement will be rejected.

The container shall be sufficiently rigid to protect the root mass during shipping.

At least one tree of each species or variety delivered to the job site shall be identified by scientific name and size on a legible waterproof label securely attached to the tree.

All trees shall be subject to inspection by the Engineer at any time during the duration of the project, at the place of growth, upon delivery, or during planting operations; however, such inspection shall not be construed as final acceptance or even conditional acceptance of such trees until completion of the project.

The Contractor shall establish the necessary quality control and inspection practice to assure compliance with these specifications. The Contractor shall furnish a California Nursery Stock Certificate for each shipment of trees.

**Table 1  
TREE CALIPER-HEIGHT RATIO**

Caliper of Trunk (inches)	Average Height Range (feet)	Container Size (gallons)
3/8 to 1/2	4 to 5	5
1/2 to 5/8	5 to 6	5
5/8 to 3/4	6 to 7	7
3/4 to 1	7 to 8	7
1 to 1 1/4	8 to 9	7
1-1/4 to 1-1/2	9 to 10	15
1-1/2 to 1-3/4	10 to 12	15
1-3/4 to 2	12 to 14	15



**20-6.03A Stakes and Ties.** - Stakes for support of trees shall be lodge-pole pine. Stakes for 15-gallon trees or smaller shall be 2 inches diameter x 10 feet long and 6 feet above ground. Stakes for 24 inch box trees or larger shall be 2 inches diameter x 12 feet long and 8 feet above ground, with 3 one-inch x 4-inch wood cross ties.

The tree ties shall be pieces of corded rubber placed in one place just below the main fork or branches.

**20-6.04 Planting.** - Each tree and shrub location shall be indicated on the plans and shall not be in conflict with any existing utilities, utility boxes, etc. Any and all plants improperly located shall be replanted in their proper location at no additional cost to the City.

After all planting operations have been completed, the Contractor shall remove all trash, empty plant containers, tools, and equipment used in this work, or any other marks in the area caused by this work shall be repaired at the Contractor's expense, and the ground left in a neat and orderly condition throughout the work site.

Planting shall be performed in accordance with the standard plan details and these specifications. Each plant shall be placed in the planting excavation in an upright position in the center of the hole, and the space around it backfilled with planting mix so that amended soil of a thickness equal to at least half the diameter of the root ball is around the sides of the root ball. Do not place organic matter beneath the plant's root ball. The plant shall be set so that the root crown is 1/2 or 3/4-inch higher than average surrounding grade. Dispose of balance of borings around plant in a manner that water is shed away from the crown or trunk of plant.

**20-6.05 Preparation for Ground Covers.** - All areas to be planted with ground cover shall receive fertilizers and soil amendment, uniformly distributed at the following rate per 1,000 square feet and thoroughly rototilled into the top 6 inches of soil. The rate of application for fertilizer and soil amendment shall be as determined by the Engineer.

The Contractor shall fine grade so that proper drainage of the entire ground cover is assured.

The Contractor shall avoid any compaction of the soils after treatment, and shall not permit vehicular or equipment traffic over such areas. In the event of such compaction, the Contractor shall be required to recultivate any areas thus compacted, at his own expense.

All areas to receive a pre-emergent weed control shall be treated prior to planting as indicated in the plans or special provisions.

Ground covers shall be planted in the prepared soil, which shall be moist and friable, never dry or wet and soggy. The moist condition shall extend to the full depth of cultivation.

The spacing of all ground cover plants shall be as indicated on the plans and in the plant list. Plants shall be planted in evenly spaced rows with staggered triangular spacing, around shrubs to within one foot, and around trees to within 18 inches.

**20-6.06 Preparation for Trees and Shrubs.** - Excavate holes by auger unless otherwise specified for particular situations. Before an augered hole is made, the top 6 inches of amended soil shall be removed and stockpiled at one side of hole.

When the backfill around the plant is approximately 2/3 completed, the plant shall be thoroughly watered, after which the backfill shall be completed to the grade of the surrounding area.

Install planting tablets according to the following schedule:

one gal. stock:	2 tablets, 21 gram
2 or 5 gal. stock:	3 tablets, 21 gram
15 gal. stock:	6 tablets, 21 gram
24 inch box stock or larger:	10 tablets, 21 gram

No boxed, balled, or canned trees shall be planted if the ball is broken or cracked, either before or during the process of planting.

All trees shall be provided with 2 lodge pole pine stakes. Tree stakes shall not be driven into the rootball.

Except in turf areas, each plant shall have a soil berm constructed around it to retain water. The soil berm shall be at least 4 inches high and shall have a minimum diameter of 2 feet for shrubs and 3 feet for trees.

Each tree in a turf area shall have the turf removed in a ring around the tree base. For 5-gallon trees, the ring shall be 24 inches in diameter; for 15-gallon and larger trees, the ring shall be 30 inches in diameter.

Pruning shall be limited to a minimum necessary for removal of injured twigs and branches, with cuts over 1/2-inch in diameter painted with a tree wound compound.

"Deep Root" planters, as approved by the Engineer, shall be installed for all trees located in tree wells with tree grates. Deep root planter shall totally encase tree ball. Outside the deep root planter, 3/4 inch to 1-1/2 inches gravel shall be placed to the full depth of the deep root planter. Imported amended topsoil shall be placed a minimum of 12 inches below the bottom of the deep root planter.

**20-6.07 Preparation for Turf.** - All areas to be turfed shall receive fertilizers and soil amendment, uniformly distributed at the following rates per 1,000 square feet and thoroughly rototilled into the top 6 inches of soil unless otherwise stated in the special provisions:

160 lbs. agricultural gypsum
18 lbs. fertilizer
5 cubic yards soil amendment

After application of fertilizer and preparation of soil has been completed as specified, the areas to be seeded in lawn shall be brought to a smooth, uncompacted grade.

The Contractor shall fine grade so that proper drainage of the entire area is assured. All rocks, soil lumps, and other deleterious materials larger than one inch shall be removed and the area raked smooth.

The Contractor shall avoid any compaction of the soils after treatment, and shall not permit vehicular or equipment traffic over such areas. In the event of such compaction, the Contractor shall be required to recultivate any areas thus compacted, at his own expense.

All soil preparation and planting operations shall be conducted under favorable weather conditions only. Soil shall not be worked when excessively dry

or wet and the Engineer reserves the right to stop any work taking place during a period when conditions are considered detrimental to soil structure or plant growth.

The soil on which the turf sod is to be placed shall be moist at the time of planting. The Contractor shall install the turf sod in conformance with all manufacturer's recommendations.

The sod shall be installed to the smooth finish grade with tight edges and no gaps. Sod pieces shall be placed with ends staggered. There shall be no stretching

After the sod has been placed, it shall be rolled with a roller to ensure no air pockets are between the roots and the soil. Sod shall be watered immediately after installation.

Turf to be seeded shall be sown in prepared soil at the rate of 10 pounds per 1,000 square feet, raked in lightly, and rolled.

## 20-7 MAINTENANCE

**20-7.01 Plant Establishment Work.** - Work shall include, but is not limited to, all watering, weeding, fertilizing, cultivation, spraying, cutting, and pruning necessary to keep the plant material in a healthy, growing condition, and to keep the planted areas neat and attractive in appearance throughout the plant establishment period. This work shall also include any additional watering by hand which may be necessary. All plants shall be watered not less than twice a week and in any event shall be such as to provide optimum growth conditions. The Contractor shall provide equipment and means for the proper applications of water to planted areas not provided with an irrigation system.

Trees and shrubs shall be watered, cultivated, and sprayed as required to assure a vigorous, thriving condition from day of planting to end of plant establishment period. Weeds shall be removed during this period. During the plant establishment period, the Contractor shall not water between the hours of 10:00 a.m. and 4:00 p.m.

Should the Contractor fail, be neglectful, or negligent in this work, the City may choose to perform said work. The City shall charge the Contractor the cost for performing the required work by deducting this cost from the partial payments due the Contractor as these costs are incurred by the City.

Turf shall be watered, reseeded, edged, and mowed as required to assure a neat appearance and a healthy and vigorous growth from day of seeding to end of plant establishment period. The first mowing shall not be done until the grass is generally at least 2 inches but less than 3 inches high. For the first mowing and all subsequent mowings, the mower shall be set to cut at a height of 1-1/2 inches. Subsequent mowings, as required, shall be done before the grass is 3 inches high. Grass clippings for all mowings shall not be allowed to lie after mowing. A catcher shall be used on the mower, and grass clippings shall be removed and discarded off site. Immediately following the first mowing of the turf, turf areas shall be fertilized at the rate of 8 lbs. per 1,000 square feet or as specified in the special provisions. Reapplication of fertilizer shall take place as directed by the Engineer during the plant establishment period.

Just prior to the end of plant establishment period, Contractor shall cut all grass, weed all beds, and generally put the whole work in first-class condition.

Prior to and during the plant establishment period, should the appearance of any plant material indicate weakness and probability of dying, in the Engineer's opinion, that plant shall be replaced immediately by the Contractor, at his own

expense. Replacements shall be made in the same manner as specified for the original planting. At the end of the plant establishment period, all plant material shall be in a healthy growing condition. Any plant material replaced within the last 30 days of the plant establishment period must be maintained by the Contractor for 30 days from the date of replacement.

The Contractor shall guarantee a weed free, even stand of the lawn grass, with 95 percent coverage, of the varieties specified. If such stand does not develop as a result of the first seeding, the Contractor shall reseed and care for thin spots until an even stand with 95 percent coverage is produced.

Weed control herbicides, in addition to that which is specifically required elsewhere, may be applied to planted areas at no expense to the City if the Contractor deems it necessary. Type of herbicide to be used and method of application shall be approved by the Engineer.

Following the plant establishment period, the Contractor shall provide a warranty which guarantees all trees for one year from date of final acceptance of the contract. The Contractor shall replace any tree which has died and the tree replacement shall be the same size container as originally designated in the plans.

**20-7.02 Inspection for Start of Plant Establishment Period.** - Upon completion of the turf and planting work and when a stand of turf between 2 and 3 inches has been established and has undergone the first cutting, the Contractor shall notify the Inspector that the project is ready for maintenance. The Inspector shall then schedule a pre-maintenance walk-through inspection for the project and shall notify the Contractor and the Landscape Architect as to the time and date. Upon inspection, if the Inspector and the Landscape Architect find the irrigation, turf, and planting work complete and in compliance with the plans and specifications, the City shall authorize the start of the plant establishment period. Written notice shall be given the Contractor as to the starting date of the maintenance period.

## 20-8 IRRIGATION MATERIALS

**20-8.01 Pipe.** - Water transmission pipe and fittings for service mains, branch mains, and laterals shall be as indicated on the plans and shall conform to the applicable provisions of Section 101, "Pipe and Fittings."

All valves and fittings shall be designed for and shall meet the requirements for service at an operating pressure of 150 pounds per square inch, unless otherwise specified.

All valves and fittings shall have connections compatible with the type of pipe joint selected by the Contractor. If mechanical joints or slip-type joints are used, the Contractor shall furnish and install necessary Portland cement concrete thrust blocks as specified by the Engineer.

**20-8.01A Steel pipe.** - Pipe shall conform to AWWA Standard C200 and ASTM A53.

**20-8.01B Plastic Pipe Supply Line.** - All plastic pipe shall be continuously and permanently marked with the following information: Manufacturer's name, kind of pipe, material, size, NSF approved, and schedule or type.

The manufacturer shall also mark the date of extrusion on pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch numbers, and any other information deemed necessary by the manufacturer.

Guarantee shall cover workmanship of materials from the plastic pipe manufacturer for all plastic pipe and fittings. Main irrigation lines shall be Schedule 40 for lines 1-1/2 inches and smaller and Class 315 PVC for lines 2 inches and larger. Lateral irrigation lines shall be Class 200 PVC. PVC pipe shall conform to CS 256 and ASTM Designation: D 2241.

**20-8.01C Pipe Fittings.** - Pipe fittings shall be of the same material as pipe where applicable and recommended by the pipe manufacturer for the particular type of pipe to which they are to be connected, and shall conform to the following specifications.

Standard galvanized pipe fittings shall conform to the requirements of the AWWA Committee 8620D report, "Collected Standards for Service Line Materials." Galvanized pipe shall be joined by means of couplings. Couplings, elbows, tees, and other fittings shall be galvanized conforming to the above requirements.

Cast iron pipe fittings shall conform to the AWWA Standard C110, "Short Body Cast Iron Fittings, 3 to 12 inches for 250 psi Water Pressure Plus Water Hammer." Cast iron pipe joints shall be the "push-in" type, sealed by means of rubber gaskets. Cast iron fittings shall be used on existing AC mains and shall be approved by Engineer.

All slip-joint PVC fittings shall be Schedule 40. All Schedule 40 PVC couplings 4 inches in diameter or larger shall be a minimum of 7 inches in length.

**20-8.02 Anti-Siphon and Vacuum Breaker Control Valves.** - Anti-siphon and vacuum breaker control valves shall be of brass construction for body and vacuum collar with I.P.S. female pipe connections. The valve body shall be of 2- piece construction with O-ring stem seal.

**20-8.03 Anti-Drainage Valves.** - Anti-drainage valves, for prevention of water drainage of lines through low sprinklers, shall be spring loaded diaphragm devices designed to open valve seat at 16 psi. The body of the valve shall be of brass construction.

**20-8.04 Quick Coupling Valves.** - Quick coupling valves shall be 2-piece brass construction, one inch, angle slot type with locking rubber or vinyl cover, capable of withstanding working pressure of 150 psi without leakage. Quick coupling valves shall be installed on swing joint assembly (same as rotary pop-ups). Valves shall have IPS female pipe connection. Valve key shall be of bronze construction with a replaceable stainless steel lug.

**20-8.05 Automatic Control Valves.** - Automatic control valves shall be electrically operated, normally closed, 24 volts, 60 cycle, 3.5 watt, angled or globe pattern valves. The automatic control valves shall be compatible for operation with the automatic controller.

Automatic control valves shall include housing, cover, and other appurtenances, each of which shall conform to the requirements of the following specifications:

- (1) Automatic valves shall have a cast iron body with bronze seat with globe pattern. Valves shall be completely serviceable from the top without removing the valve body from the system and with a wheel or nut type manual adjustment with packing gland feature to regulate flow from fully open to closed. The adjustment shall remain in set position when the valve is operated manually or automatically. The adjustment feature shall regulate automatic closing time to not less than 4 seconds.
- (2) Included as part of this item will be Christy 3B box or Brooks No. 3 box or approved equal, gravel bed, spicing to control wires and common ground, tee or saddle and all other fittings for connection to main, and all other appurtenances necessary to complete this item as shown on the plans, as well as a one-inch quick coupling valve.

**20-8.06 Valve Boxes.** - Valve boxes and covers shall be constructed of high-density portland cement concrete with a minimum compressive strength at 28 days of 4000 psi.

Reinforcement shall be cold-drawn steel wire conforming to the provisions of ASTM Designation: A#2 or deformed billet-steel bars conforming to the provisions of ASTM Designation: A615.

**20-8.07 Reduced Pressure Backflow Preventers (RPP).** - A backflow prevention assembly shall consist of 2 detector check valves connected in series with 2 non-rising stem gate consist of 2 detector check valves connected in series with 2 non-rising stem gate valves. Backflow prevention assemblies shall be the same size as the pipe main in which they are installed. Standard bronze service stops shall be included with each assembly. The materials for the check and gate valves shall be black iron body, bronze trimmed. The assembly shall be UL listed and approved by the Research Foundation for Cross Connection Control, University of Southern California.

**20-8.08 Gate Valves.** - Gate valves 3 inches and smaller shall be bronze or brass. Gate valves 4 inches and larger shall be cast iron. All valves and sizes shall be as indicated on the plans. Gates valves shall conform to Section 20-2.28 of the Caltrans Standard Specifications and Section 102-2.02, "Resilient Seated Gate Valves" of these City Standard Specifications.

**20-8.09 Wye Strainers.** - Strainers shall be self-cleaning, of the size of service main, with a split wedge gate valve on the strainer end. The gate valve shall be compatible with the size of the assembly. The strainer assembly body shall be black iron.

**20-8.10A Irrigation Controllers.** - Irrigation controllers shall meet one of the following specifications.

**20-8.10A(1) Type I Controllers.** - Automatic irrigation controllers shall be electrically operated, fully automatic, with all solid state electronic components. The controller shall be rated for 117 volt, 60 cycle AC input and 26.5 volt, 2.2 amp output for continuous operation of 24 volt valves, and shall have 12 independent

timing stations unless otherwise shown on the plans, with 14-day programming capability. The controller shall have a 24-hour clock dial with one-hour increment starts. Each station shall have an "Off" switch for zero watering time and individual infinitely variable timing control for 2 to 60 minute station timing as well as an "On-Off-Repeat" switch for eliminating one or more stations from the timing sequence without changing timing dial setting. The 14-day clock shall provide maximum programming versatility and all timer pins shall be of the captive type to prevent loss.

All wiring to and from the controller shall be through color-coded plugs and sockets.

The controller shall be constructed of heavy gauge steel with corrosion resistant enamel finish inside and out.

Automatic irrigation controllers shall conform to NEC Class 2 requirements.

**20-8.10A(2) Type 2 Controllers.** - Automatic irrigation controllers shall be the MIR-5000F Multi-Wire Field Unit by Motorola, Inc., or approved equal. The field unit shall be a computerized irrigation controller capable of fully automatic or manual operation of the irrigation system. The unit shall be a stand-alone controller which is capable of being programmed by a central computer, such as the IBM PC. The unit shall comprise a microprocessor that can handle an input unit (for field sensors), an output unit (to activate irrigation valves), and a keyboard and display. The keyboard shall consist of dedicated functional keys for easy operation. The display shall consist of a liquid crystal display with 2 lines of 40 characters each. The controller shall operate on 115 volts ac, 60Hz, up to 2 amps, and shall be provided with a transformer which will supply a 24 volt current for operating the electric remote control valves. In addition, the controller shall be equipped with or shall be capable of the following:

- a) 60 multi-independent programs
- b) Simple manual operation from keyboard
- c) Program by volume and/or by time
- d) Increments of gallons, hours-minutes, or minute-seconds
- e) Evapotranspiration water budgeting in 1 percent increments, 0-999 percent
- f) Programming up to 8 individual water sources for simultaneous and independent operation
- g) Programming auxiliary operations (in addition to the irrigation programs) for lights, fountains, pumps, gates, etc.
- h) Programming the injection of fertilizer on either a proportional or a direct feed basis  
Programming the automatic flushing of filter(s) based on the elapsed time/quantity of irrigation and/or pressure differential input
- j) Programming in cycles (unlimited per day) to match application rate to the soil's infiltration rate
- k) Programming on the basic unit (18 or 26 stations) which will allow up to 4 water sources, each operating as many as 6 stations at once

- l) Programming on the expanded unit (52 stations) which will allow up to 8 water sources, each operating as many as 6 stations at once
- m) Programming which will allow the selective entry of a stop time to prevent irrigation during "sensitive" times of the day -- this halts the irrigation even if it is not finished and notifies the operator of the incomplete status of that program
- n) Programming by volume which will permit application of water in gallons, measured and regulated by a flow meter
- o) When irrigation is performed on volume basis, monitoring the flow rate of the water for high flow, low flow, no flow, as a means of detecting burst pipes, low pressure, and malfunctioning (closed) valves
- p) When using a flow meter, detection of water flow in the main line and shutoff of the main valve in case of water flow if no command was given (by the operator) to operate the valve.

The controller housing enclosure shall be LeMeur Model "AK" or approved equal and shall be installed according to plans. The controller housing enclosure shall be primed and painted dark brown with industrial grade, rust inhibiting primer and paint by Ameron, Benjamin Moore, or approved equal, as indicated in the plans or special provisions.

**20-8.10B Conductors.** - The wire conductors for automatic control devices shall be of the size and color as shown on the plans and shall be UL rated for direct burial. Conductors shall be able to withstand a crush test of 5000 psi. Common or neutral conductors shall be white. The control wires to the automatic control valves shall be red. The spare wires used, when necessary, shall be black.

**20-8.10C Wire Connectors.** - Wire connectors shall be specifically designed to insure waterproof underground wire connection, and shall be UL listed "Water Resistant Wire Connector Rated 60c, 600v for PVC insulated copper wires." Each connector shall consist of a crimp sleeve, base socket, sealing plug, and inert sealer.

## 20-9 IRRIGATION INSTALLATION

**20-9.01 Conductors, Electrical Conduit and Pull Boxes.** - Conductors may be installed in the same trench as the water pipe. All Clearances between conductors, pipes, and trench walls shall be as specified herein and in the standard details or as indicated in the plans or special provisions.

Sharp bends or kinks in the conductor shall not be permitted. Conductors shall be unreeled in place alongside or in the trench and shall be carefully placed along the bottom of the trench. Under no condition shall the cable be unreeled and pulled into the trench from one end.

Not less than one foot of cable slack shall be left on each side of all splices at all points where cable is connected to field equipment. The slack cable shall be placed in the trench in a series of S curves.



**20-9.02 Installation.** - Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and shall report any variations to the Engineer.

The system shall efficiently and evenly irrigate all areas and shall be complete in every respect, and shall be left ready for operation to the satisfaction of the Engineer.

The Contractor shall install the specified pipe, valves fittings, wiring, switches, controls and appurtenances at the approximate locations indicated on the plans. The Engineer shall indicate specific locations.

The Contractor shall provide all temporary storerooms and shops that he may require at the site for the safe and proper storage of his materials, tools, etc. These rooms shall be constructed only in locations approved by the Engineer as designated on the location map, and must in no way interfere with the work of any other contractor. At such times as these structures interfere with the proper installation and completion of the work, they shall be removed by this Contractor, at his expense, within 3 days after having been notified by the Engineer that such removal is necessary.

**20-9.02B Trenching and Backfilling.** - Trenches for pipe and electrical conductors may be excavated manually or with mechanical trenching equipment. Mechanical trench diggers used on the site shall be essentially vertical so that a minimum of surface is disturbed. Road patrols or graders shall not be used to excavate the trench with their blades. Trenches for pipe shall be excavated to the depths shown on the plans.

The procedure for backfilling shall be the same for all trenches. All lumber, rubbish, and large rocks shall be removed from the trenches. Pipe shall have a firm, uniform bearing for the entire length of each pipe line. Wedging or blocking of pipe will not be permitted.

The procedure for backfilling shall be the same for all trenches. All lumber, rubbish, and large rocks shall be removed from the trenches. Pipe shall have a firm, uniform bearing for the entire length of each pipe line. Wedging or blocking of pipe will not be permitted.

Trenches shall not be excessively wet and shall not contain pools of water during backfilling operations.

Trenches shall be backfilled with sand to a level not less than 8 inches below the finish grade. Sand shall be jetted lightly. The remainder of the backfill shall be topsoil not less than 8 inches deep.

Extreme care shall be exercised by the Contractor while backfilling. Any materials or equipment damaged while backfilling shall be repaired or replaced by the Contractor as directed by the Engineer, at no cost to the City.

**20-9.02C Pipe.** - Contractor shall use only the solvent supplied and recommended by the manufacturer to make plastic pipe joints. The pipe and fittings shall be thoroughly cleaned of dirt, dust, and moisture before applying solvent.

The Contractor shall make solvent weld joints with nonsynthetic bristle brush in the following sequence:

- (1) Apply a liberal, even coat of purple PVC primer to the pipe and fitting immediately before applying the solvent.

- (2) Apply a liberal even coat of solvent to the inside of the fitting and then to the outside of the pipe, making sure that the coated area is equal to the depth of the fitting socket.
- (3) Insert the pipe quickly into the fitting and turn the pipe approximately 1/4 turn to distribute the solvent and remove air bubbles. Hold the joint for approximately 15 seconds so the fitting does not push off the pipe.
- (4) Use a clean rag and wipe off all excess solvent.
- (5) Be sure in going to the next joint that the pipe is not twisted, disturbing the last completed joint.

Allow at least 15 minutes setup time for each welded joint before moving.

On plastic to steel connections, the contractor shall work the steel connections first. For all PVC threaded connections use thread sealing paste with virgin teflon. In no event shall an oil base joint compound be used on a PVC joint.

The Contractor shall exercise care in handling, loading, unloading, and storing plastic pipe and fittings. All plastic pipe and fittings shall be stored under cover before using, and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lie flat so as not to be subject to undue bending or concentrated external load at any point. Any section of pipe that has been dented or damaged will be discarded until said section of pipe is cut out and rejoined with a coupling.

The Contractor shall provide the necessary mason's lines and supports to insure installation of the pipe to line and grade, as staked by the Engineer. The Contractor's facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench will be damaged or disturbed.

All pipes shall be assembled free from dirt, pipe scale, and burrs. The main line supply shall be flushed out and tested for leaks before backfilling and with control valves in place and before lateral pipes are connected to valves. Each section of lateral pipes shall be flushed out before sprinkler heads are attached.

Plastic pipe shall not be laid when there is water in the trench.

The Engineer shall inspect all pipe before it is laid and reject any section that is damaged by handling or is found to be defective to a degree which will materially affect function and service of pipe.

Except as may be noted in other parts of this specification or on the drawings, installation of pipe and connecting fittings shall be as outlined in manuals furnished by the pipe manufacturer, or as set forth by the by the Johns-Manville Co. Manual #7720601 or any later manual. This information shall be deemed part of this specification.

Piping shall be installed a minimum of 36 inches below the top of paved surfaces. Where irrigation mains or laterals are to be installed under paving, a Schedule 40 PVC sleeve shall be installed. The inside diameter of the sleeve shall be a minimum of 2 inches larger than the outside diameter of the pipe.

A separate sleeve shall be installed for irrigation control wires. The minimum diameter shall be 2 inches.

**20-9.02D Valves and Valve Boxes.** - The Contractor shall provide and install all valves as indicated on the drawings and as required for the proper control of the piping systems in which they are incorporated. All main shut-off valves shall be gate valves.

Where a remote control valve is shown at the edge of turf and shrub areas, it shall be placed in the shrub area.

Valves shall be placed in groupings for ease of maintenance.

**20-9.02E Pressure Testing.** - Before testing by either method, all air shall be expelled from the pipe.

All tests on pressure lines shall be completed prior to backfilling; however, sufficient sand shall be placed in trenches between fittings to insure the stability of the line under pressure. In all cases, fittings and couplings must be open to visual inspection for the full period of the test.

No testing shall be done until the last solvent welded joint has had 24 hours to cure.

Where any section of the pipe system is provided with concrete thrust block, the test shall not be made until at least 5 days have passed after the concrete thrust block was installed. If higher early-strength cement is used in the concrete thrust block, the test shall not be made until at least 2 days have elapsed.

**20-9.02F Sprinkler Heads.** - Turf sprinkler heads in open areas shall be installed at least 4 inches above finished grade at the time of installation. Within 5 days of notification by the Engineer, Contractor shall make whatever adjustments of pipe, fittings, valves, or sprinkler heads are necessary to bring the system to the proper level of the permanent grade. At this time, heads shall be made completely firm with sand.

Turf sprinkler heads along walks and driveway, where the finished grade level is established, shall be set flush at the time of installation.

**20-9.02G Disinfection.** Contractor shall disinfect potable water lines according to AWWA standards.

**20-9.02H Records.** - The Contractor shall maintain reasonably clear and detailed records of all underground installations. These records shall be available to the Engineer at all times for verification while the work is in progress. These records shall be delivered to the Engineer in good and acceptable condition prior to final acceptance of the work.

The Contractor shall provide a chart for each controller, which shall be placed on the inside of the controller enclosure door. Record drawings from which the charts are to be made shall be approved by the Landscape Architect prior to preparing the charts.

Each chart shall show the area controlled by the automatic controller and shall be the maximum size which the controller door will allow. The controller chart shall include:

- Connection to existing water lines
- Routing of pressure lines
- Routing of control valves
- Locations of remote control valves, gate valves, and quick valves
- Other items as directed by the Engineer

The chart shall be reduced drawing of the actual as-built system. All symbols shall be readable at the final reduced size.

The chart shall be a black line or blue line print and shall be colored or otherwise coded to indicate the area of coverage for each station.

When completed and approved, the chart shall be hermetically sealed between 2 pieces of 10 mil plastic, minimum.

Each chart shall be completed and approved prior to final inspection of the irrigation system.

**20-9.02I Training.** - After the system has been completed, the Contractor shall instruct the Engineer in the operation and maintenance of the system and shall furnish a complete set of operating instructions prior to final acceptance.

### **20-10 MEASUREMENT AND PAYMENT**

Measurement and payment shall be as specified in the project special provisions.



## SECTION 21

## SUBGRADE PREPARATION

**21-1.01 Description.** - This work consists of preparing subgrades for the placement of subsequent construction such as pavements, bases, subbases, curbs, gutters, sidewalks, driveways, and other structures, which are not specifically provided for under other sections of these specifications.

The preparation of the subgrade may be required at various elevations, depending upon the number of layers of material specified to be placed thereon or type of structure to be constructed and as required in Section 19 "Earthwork".

**21-1.02 Classes.** - Subgrade preparation is classified according to the plane or layer of material placed thereon as follows:

Class A. - Preparation of the native or imported material at the basement grade (grading plane).

Class B. - Preparation of any layer of new material above the basement grade (grading plane), on which a succeeding layer of material is to be placed.

Class C. - Rehabilitation of an existing surface upon which a layer of subbase, base, pavement, surfacing, or other specified material is to be placed.

**21-1.03 Preparation.** - Material shall not be placed upon the prepared subgrade until it has been inspected and approved by the Engineer.

**21-1.03A Class A.** - The preparation of Class A subgrade shall consist of grading and compacting native or imported soil material at the basement grade. Scarifying and cultivating will be required, prior to grading and compacting for dry soils which are impervious to the penetration of water, or for soils which contain excessive amounts of moisture which may result in unstable foundations, or for soils which are non-uniform in character which may result in non-uniform compaction and subsequent differential settlements of finished surfaces, or when a pavement material is to be placed directly on native soil.

After rough grading has been completed, when scarifying and cultivating is required, the basement material shall be loosened to a depth of at least 0.5 foot. The loosened material shall then be worked to a finely divided condition and all rocks larger than 0.25 foot in dimension shall be removed. The moisture content shall be brought to optimum by the addition of water, or by the addition and blending of dry suitable material or by the drying of existing material as the case may be. The material shall then be compacted by approved compacting equipment.

Uniform pervious soils, that allow the immediate penetration of water or uniform impervious soils which allow the penetration of water to a depth of at least 0.5 foot, after the addition of an approved wetting agent to the water, will not require scarifying and cultivating unless a condition previously set forth in this section requires such processing. When scarifying and cultivating are not required, the moisture content of the top 0.5 foot of the material shall be brought to optimum

by addition of water at the surface, and the material shall be compacted by approved equipment.

**21-1.03B Class B.** - The preparation of Class B subgrade shall consist of finishing the surface of any layer of material above the grading plane in accordance with the provisions of the sections for such material, as described below.

<u>Type of Material</u>	<u>Section</u>
Lime Treatment	24
Aggregate subbase	25
Aggregate base	26
Cement treated base	27
Lean Concrete Base	28
Treated Permeable Base	29
Deep Lift Asphalt Base	30
Asphalt Concrete	39
Portland Cement Concrete Pavement	40

Portions of the subbase, base, or other material which have become damaged or destroyed since completion shall be repaired or reconstructed to the specified tolerance requirements for grade and cross section immediately prior to placing any new material thereon, or immediately prior to the application of a curing seal, prime coat or tack coat.

**21-1.03C Class C.** - In advance of spreading any new material on an existing surface to be rehabilitated, surface shall be cleaned of all dirt and loose material.

Broken, failed or otherwise unsatisfactory portions of the existing surface and sections interfering with new construction shall be removed and disposed of. The areas and depths to be removed shall be as shown on the plans and as directed by the Engineer. The basement grade area in the exposed spaces shall be watered and compacted, after which the space shall be filled with subbase, base, or pavement material as shown on the plans or as directed by the Engineer.

Where shown on the plans or specified in the special provisions or directed by the Engineer, the existing surface shall be scarified, watered and rolled in advance of placing any new material thereon.

Where shown on the plans or specified in the special provisions, a leveling course shall be spread upon the existing surface in accordance with the specifications for the type of material being placed, and no compensation other than the contract price or prices being paid for the material will be made for such work, unless otherwise designated.

**21-1.04 Conform Areas.** - Roadway or other areas where "grade only" or "conform" is called for on the plans, shall be graded to meet the tolerances for a base material grade. The finished surface shall be a straight grade from the finished pavement or curb elevations shown on the plans to the elevation of the existing ground at the extremities of the area graded.

**21-1.05 Compaction.** - The finished subgrade immediately prior to placing subsequent layers of material thereon shall have a relative compaction of

not less than 95 percent for a depth of 0.5-foot, or to a depth of 3 ft. below finished grade for engineered fill area. The subgrade for sidewalks, driveways, aprons and similar structures below the aggregate or sand cushion shall be compacted to a relative compaction of 95 percent for a depth of 0.5 foot. After compaction and trimming, the subgrade shall be firm, hard, and unyielding.

Relative compaction will be determined in accordance with California Tests 216, Part II and 231.

The Engineer will perform one initial compaction test and a second compaction retest for failure of the material to meet specification requirements on initial testing. The above 2 tests will be performed in each completed area without charge to the Contractor. In those areas where more than the 2 tests specified above are required for failure of the material to meet the specified compaction requirements, the Contractor will be assessed \$100.00 for each additional test required until the material meets the specified compaction requirements. The Contractor agrees to pay said amounts to the City as liquidated damages, not as a penalty, and further agrees that the City may deduct the amounts from monies due or that may become due the Contractor under the Contract.

**21-1.06 Tolerances.** - The finished subgrade for pavements, sidewalks, curb and gutters, driveways, aprons and other roadway structures shall be uniform and shall not vary more than 0.02-foot from the specified grade and cross section. The finished subgrade for subbase or base material shall not vary more than 0.05-foot from the specified grade and cross section, except as otherwise specified in the appropriate sections of these City Standard Specifications for the material being placed.

**21.107 Measurement.** - Where a separate pay item for Class A subgrade is designated in the Engineer's Estimate, the area of subgrade preparation to be paid for will be measured by the square foot to the dimensions shown on the plans. No allowance will be made for subgrade preparation outside such dimension unless ordered by the Engineer.

**21-1.08 Payment.** - The area of Class A subgrade will be paid for at the contract price per square foot. The above price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work in preparing the subgrade complete, as shown on the plans, as specified in these specifications and as directed by the Engineer.

Where a contract item is not provided for Class A subgrade and for all other subgrade preparation, no separate payment will be made for such work. Full compensation for such subgrade preparation shall be considered as included in the various contract items of work involved.





SECTION 22

FINISHING ROADWAY

Finishing roadway shall conform to Section 22 of the Caltrans Standard Specifications and these City Standard Specifications.

**22-1.01 Description.** - References to "highway" or "right-of-way" shall be construed as references to any project facilities for which grading operations have been performed.

This work shall also include removal and disposal of all weeds and other objectionable growths from areas which were previously cleared and grubbed by the Contractor.

All sewers, drains, culverts, and their appurtenant structures constructed under the contract, as well as existing drainage facilities within the project shall be cleaned out.

Earth conforms for back of sidewalks shall be formed to produce a smooth and uniform slope.

All storage facilities, sheds, yards, equipment, tools, and devices used as temporary installations during construction (e.g., fences, barricades, signs, guard rails, and A. C. berms) shall be removed from the project area and disposed of.



## SECTION 24

## LIME TREATMENT

Lime treatment shall conform to the requirements of Section 24 of the Caltrans Standard Specifications and these City Standard Specifications.

**24-1.04 Mixing.** - Mixing lime shall be added to the material to be treated at the rate of 3 to 7 percent of lime by weight of dry material. Lime slurry shall not be used.

**24-1.05 Spreading and Compacting.** - The finished thickness of the lime treated material shall not vary more than 0.05-foot from the thickness shown on the plans at any point. The finished surface shall not vary from the planned grade more than 0.02-foot for base grade when tested with a 12-foot straight edge applied parallel with and at right angles to the center line or base of the section.

Unless otherwise specified the lime-treated base shall be constructed on a Class 'A' Subgrade. If approved by the Engineer, the Class 'A' Subgrade may be waived, when at the Contractors expense, the thickness of the lime-treated base section is increased a minimum of 3" from the originally specified lime-treated base section.

When California Test Method 216 Part II is used to determine the relative compaction, the sample of lime-treated soil used to determine the maximum wet density will be taken during all initial and final compaction testing with California Test Method 231, or as directed by the Engineer.

The lime-treated soil shall be compacted to a relative compaction of not less than 95%. At the option of the Engineer the relative compaction may be reduced to 93% if the lime content is increased by 0.5%, at the Contractor's expense.

Initial compaction shall begin within 24 hours of final mixing, unless otherwise permitted by the Engineer.

Trimings will not be used to fill low grade locations, or be used for other items of work, unless as permitted by the Engineer. Submittals to the Engineer shall include proposed methods of handling, and tests results conducted by an independent laboratory showing conformance with the project specifications, and all design test requirements.

Delete Paragraph 5 in Section 24-1.05 of the Caltrans Standard Specifications.

**24.1.06 Curing.** - In keeping the lime treated material moist, it shall be sprinkled, not flooded. If washing away of the lime is evident as tested by phenolphthalein, additional lime and remixing of the top 6" of the section will be required to compensate for the washout.

**24-1.07 Measurement.** - Lime treatment will be paid for based on square yardage. Lime quantity for treatment will be included in this bid item, unless otherwise provided.

When separate payment for lime is specified, it will be measured by the ton in accordance with the provisions in Section 24, "Measurement of Quantities," except that if the minimum relative compaction is reduced to 93 percent, the quantity of lime to be paid for will be the weight of lime used multiplied by the

factor  $L/(L+.5)$  where L equals the percent of lime ordered by the Engineer as shown in the schedule of quantities for the project.



## SECTION 25

## AGGREGATE SUBBASES

**25-1.01 Description.** - Aggregate subbases shall conform to the requirements of Section 25 of the Caltrans Standard Specifications and these City Standard Specifications.

**25-1.02 Materials.** - The use of recycled Portland cement concrete or asphalt concrete materials will be permitted, provided that the Contractor submits to the Engineer, laboratory test data that the proposed materials meet all the quality requirements of this section and the Engineer approves its use in writing. Data shall be submitted at least 30 days prior to expected use of the proposed materials in the work. Samples of proposed materials shall be submitted if requested by the Engineer.

**25-1.02A Class 1, Class 2, and Class 3 Aggregate Subbases.** - Delete the last 4 paragraphs of this subsection.

If no class is specified on the plans or in the special provisions, Class 1 shall be used.

**25-1.03 Subgrade.** - Delete this subsection. Subgrade preparation shall be as specified in Section 21 of these City Standard Specifications.

**25-1.05 Compacting.** - Relative compaction shall be determined in accordance with California Tests 216, Part II and 231.

The surface of the finished subbase shall not vary more than 0.08-foot above or below the planned grade at any point and the thickness shall not vary more than 0.08 foot from the thickness shown on the plans at any point. Surfaces will be tested by a 16-foot straight edge applied parallel with and at right angles to the roadway centerline. The Contractor shall furnish the straight edge for the Engineer's use, and it shall be of a type and in a condition approved by the Engineer.

**25-1.06 Measurement.** - Quantities of aggregate subbase to be paid for by the square yard will be calculated on the basis of the dimensions shown on the plans adjusted by the quantity of any change ordered. No allowance will be made for aggregate subbase placed outside such dimensions unless ordered by the Engineer.

**25-1.07 Payment.** - Quantities of aggregate subbase will be paid for at the contract price per appropriate unit of measurement, whichever unit is designated in the contract item, for the class or classes involved.





SECTION 26

AGGREGATE BASES

Aggregate bases shall conform to the requirements of Section 26 of the Caltrans Standard Specifications and these City Standard Specifications.

**26-1.01 Description.** - Aggregate base classes are 1, 2, and 3 as specified in Subsection 26-1.02. The classes of aggregate base to be used in the work will be designated on the plans or in the special provisions.

**26-1.02 Materials.** - The use of recycled asphalt concrete and Portland cement concrete materials will be permitted provided that the Contractor submits to the Engineer certified test data that the proposed material meets all the quality requirements of this section and the Engineer approves its use in writing. Data shall be submitted at least 30 days prior to expected use of the proposed material in the work. Samples of proposed materials shall be submitted if requested by the Engineer.

**26-1.02A Quality Requirements.** - All classes of aggregate base shall be clean and free from vegetable matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base.

Aggregate base shall conform to the quality requirements as specified in Table 1 for classes indicated. All classes of aggregate base shall have a maximum percentage of wear of 50 as determined by California Test 211, and a minimum Durability Index of 25 as determined by California Test 229 (see Note (c)).

**Table 1**  
**Quality Requirements**

Class	R-Value Calif. Test 301		Sand Equivalent Calif. Test 217		Crushed Particles % Calif. Test 205	
	Operating Range	Indiv. Test	Operating Range	Indiv. Test	Operating Range	Indiv. Test
1	-	78	50	45	(a)90	(a)87
2	-	78	30	28(d)	(b)25	(b)23
3	70	68	25	23	-	-

- (a) Percent by weight
- (b) Material retained on the No. 4 USA Standard sieve shall consist of material of which at least 25%, by weight, shall be crushed particles.
- (c) For Class 3 Aggregate Base, the Durability Index requirement of 25 may be waived provided the material is lime treated with not less than 1% high calcium quicklime and has a minimum unconfined compressive strength of 200 psi when tested in accordance with California Test 373 and all other quality requirements met. Method of lime treatment must be approved by the Engineer.

- (d) With the approval of the Engineer, minimum sand equivalent may be reduced to 25 provided, the aggregate base is treated with not less than one half of one percent high calcium quicklime.

**26-1.02B Gradation.** - The percentage composition of aggregate base shall conform to the gradations as shown in Table 2 for the maximum size as specified on the plans or special provisions, when determined by California Test 202. When there is a difference in specific gravity of 0.2 or more, between the coarse and fine portion of the aggregate or blends of different aggregate, California Test 202 will be modified by California Test 905.

Table 2

USA Std. Sieve Size	Percentage Passing Sieves					
	1-1/2" Max.		1" Max.		3/4" Max.	
	Operating Range	Indiv. Test	Operating Range	Indiv. Test	Operating Range	Indiv. Test
2"	100	100	----	----	----	----
1-1/2"	90-100	88-100	100	----	----	----
1"	----	----	85-100	88-100	100	100
3/4"	50- 85	48- 88	60- 90	58- 93	90-100	88-100
No. 4	25- 45	23- 47	30- 50	28- 53	35- 55	33- 57
No. 30	10- 25	8- 28	10- 28	8- 30	10- 30	8- 32
No. 200	2- 9	1- 10	2- 9	1- 10	3- 9	1- 10

**26-1.03 Subgrade.** - Delete this subsection. Subgrade preparation shall be as specified in Section 21 of these City Standard Specifications.

**26-1.05 Compacting.** - Relative compaction shall be determined in accordance with California Tests 216, Part II and 231.

The finished grade of aggregate base, where not controlled by adjacent structures or features, shall not exceed 0.05 foot above or below the planned grade, provided it is uniform and free from sharp breaks. The cross-section of the finished base shall be free from ridges or valleys and be within 0.05 foot above or below the theoretical section shown on the plans at any point on the cross-section. Surfaces will be tested by a 16-foot straight edge applied parallel with and at right angles to the roadway center line. The Contractor shall furnish the straight edge for the Engineer's use, and it shall be of a type and in a condition approved by the Engineer.

Segmented or sheepfoot compactors will not be allowed.

**26-1.06 Measurement.** - Quantities of aggregate base to be paid for by the square yard will be calculated on the basis of the dimensions shown on the plans adjusted by the quantity of any change ordered. No allowance will be made for aggregate base placed outside such dimensions unless ordered by the Engineer.

**26-1.07 Payment.** - Quantities of aggregate base will be paid for at the contract price per appropriate unit of measurement, whichever unit is designated in the contract item, for the class or classes involved.

**SECTION 27**

**CEMENT TREATED BASES**

Cement treated bases shall conform to the requirements of Section 27 of the Caltrans Standard Specifications. Cement treated bases shall be produced by the plant-mixed method, unless otherwise specified.



**SECTION 28**

**LEAN CONCRETE BASE**

**28-1.01 Description.** - Lean concrete base shall conform to Section 28 of the Caltrans Standard Specifications and these City Standard Specifications.

**28-1.06 Spreading, Compacting and Shaping.** - Finished surfaces will be tested by a 16-foot straight edge applied parallel with and at right angles to the roadway centerline. The Contractor shall furnish the straight edge for the Engineer's use, and it shall be of a type and in a condition approved by the Engineer.



## SECTION 29

## TREATED PERMEABLE BASES

**29-1.01 Description.** - Treated permeable bases shall conform to Section 29 of the Caltrans Standard Specifications and these City Standard Specifications.

**29-1.05 Spreading and Compacting Asphalt Treated Permeable Base.** - Finished surfaces will be tested by a 16-foot straight edge applied parallel with and at right angles to the roadway centerline. The Contractor shall furnish the straight edge for the Engineer's use, and it shall be of a type and in a condition approved by the Engineer.

**29-1.06 Placing, Spreading, Compacting, and Shaping Cement Treated Permeable Base.** - Finished surfaces will be tested by a 16-foot straight edge applied parallel with and at right angles to the roadway centerline. The Contractor shall furnish the straight edge for the Engineer's use, and it shall be of a type and in a condition approved by the Engineer.





## SECTION 30

## DEEP LIFT ASPHALT BASE

**30-1.01 Description.** - This work shall consist of constructing an asphalt concrete base specified as "deep lift asphalt base" to the lines, grades, and dimensions shown on the plans and in accordance with these City standard specifications.

Deep lift asphalt base is classified by grade as follows:

Grade A - High quality asphalt concrete produced in a batch or drier-drum mixing plant.

Grade B - Asphaltic base mixture as specified in the special provisions.

**30-1.02 Materials.** -

**30-1.02A Grade A.** - Grade A deep lift asphalt base shall be Type B 3/4" maximum, medium grading asphalt concrete produced by batch mixing or drier-drum mixing conforming to the provisions of Section 39, "Asphalt Concrete" of these standard specifications.

**30-1.02B Grade B.** - Grade B deep lift asphalt base shall be of a composition specified in the special provisions, and produced in a mixing plant conforming to the provisions of Section 39, "Asphalt Concrete" of these standard specifications or mixed in place on the roadbed as specified in the special provisions. Grade B may contain Recycled Asphalt Pavement (RAP) that meets the requirements of the special provisions.

**30-1.03 Equipment.** - Proportioning, mixing, spreading, and compacting equipment shall conform to the provisions of Section 39, "Asphalt Concrete" of these standard specifications and as specified herein.

On contracts where the total amount of asphalt base is 350 tons or less, towed-type pavers may be used with the approval of the Engineer.

All equipment used for spreading and placing base material shall be equipped with a 12-foot straightedge.

**30-1.04 Placing.** - Deep lift asphalt base shall not be placed when the atmospheric temperature is 50°F or below or when the weather is foggy or rainy unless otherwise allowed by the Engineer. Deep lift asphalt base shall be placed only when the surface is dry and in satisfactory condition. In case of sudden rain, the Engineer may permit the placement of base then in transit from the plant, provided that the subgrade is free from pools of water, and the mixture is laid and compacted at the proper temperature.

Immediately prior to application of prime coat, the subgrade of the area to receive deep lift asphalt base shall conform to the compaction requirements and grade tolerance of Section 21, "Subgrade Preparation," unless otherwise permitted by the Engineer.

Prime coat, tack coat or paint binder shall be applied to the areas to receive deep lift asphalt base in accordance with the provisions of Section 36, "Penetration Treatment" of the standard specifications. Sand cover, where required, shall be

spread over primed areas designated by the Engineer. All loose sand shall be completely removed from the primed grade before placing any additional material thereon.

Deep lift asphalt base shall be spread at a temperature of not less than 260°F nor greater than 310°F and all initial rolling or tamping shall be performed when the sum of the air temperature and the temperature of the mixture is between 300°F and 375°F. Intermediate rolling shall be accomplished while the mix temperature is at or above 180°F. No layer shall be placed over a layer which exceeds 0.25-foot in compacted thickness until the temperature at mid depth, of the layer which exceeds 0.25-foot in compacted thickness, is not more than 160°F.

Deep lift asphalt base course mixtures shall be spread and struck off with approved spreading and placement equipment in accordance with the provisions of Section 39-5 "Spreading and Compacting" of Caltrans Standard Specifications.

Blading equipment, if approved by the Engineer to place deep lift asphalt base course mixtures, shall be operated by only skilled and experienced operators and a qualified grade checker shall accompany each blade.

Towed-type pavers and spreaders, if approved to place deep lift asphalt base course mixtures, shall be towed at a uniform speed for any given setting of the screed or strike-off gate. The hopper shall be kept full of material during paving operation to assure a full, even spread.

In unconfined areas, deep lift asphalt base shall be 0.25 foot minimum and 0.42 foot maximum in compacted thickness. In confined, narrow areas, the thickness may be increased to 0.75 foot, provided the density and surface tolerance of the base is obtained.

**30-1.05 Compacting.** - After spreading, deep lift asphalt base course mixtures shall be compacted in accordance with the provisions of Section 39-6.03, "Compacting" of these standard specifications.

The completed deep lift asphalt base course shall have an average density of at least 98 percent of the laboratory density, based on the Job-Mix Formula for the asphalt mixture when tested in accordance with California Test 304 and ASTM D1188, California Test 308, or California test 375. The laboratory compacted specimens will be composed of the same materials in like proportions as the job-mix formula.

**30-1.06 Surface Tolerance.** - The surface of the completed deep lift asphalt base shall be true to line, grade, and cross section and shall be free of ridges, ruts or depressions. The finished surface shall not deviate at any point more than 0.03-foot from the bottom of a 12-foot straightedge applied parallel with, or at right angles to the centerline or base line. Each lift, except base surface lift, placed by a motor grader shall be true to cross section for that lift with a tolerance of not more than 0.05-foot when tested with a 12-foot straightedge in any direction.

**30-1.07 Measurement.** - Deep lift asphalt base will be measured by the ton of the combined weight of the mixture actually used in the work. The weight of the completed mixture shall be determined as provided for in Section 9-1.01, "Measurement of Quantities" of these standard specifications.

**30-1.08 Payment.** - Deep lift asphalt base course mixtures will be paid for at the contract unit price per ton.

The above contract price and payment shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing deep lift asphalt base complete in place, as shown on the plans, as specified in these specifications and as directed by the Engineer.



SECTION 36

PENETRATION TREATMENT

Penetration treatment shall conform to Section 36 of the Caltrans Standard Specifications and these City standard specifications.



## SECTION 37

## BITUMINOUS SEALS

Bituminous seals shall conform to Section 37 of the Caltrans Standard Specifications and these City Standard Specifications.

## 37-1 SEAL COATS

**37-1.01 Description.** - Delete paragraph 3 of Subsection 37-1.01.

**37-1.02 Materials.** - Fog seal coat is specified in Subsection 37-3 of this section. If not designated in the special provisions: Aggregates shall be Medium type (1/4" x No. 10 screenings), and asphaltic emulsion for either single coat or double coat applications shall be Rapid-Setting type, grade CRS2 in accordance with Section 94, "Asphaltic Emulsions" of these City Standard Specifications

Aggregate screenings shall be damp at time of application. Salvaged screenings shall not be used in the work.

**37-1.05 Applying Asphaltic Emulsion.** - The fifth, sixth, seventh, and eleventh paragraphs of Section 37-1.05 of the Caltrans Standard Specifications shall not apply.

Asphaltic emulsion shall be applied to only one designated traffic lane at a time and the entire width of the lane shall be covered in one operation.

Under no circumstance shall the length of spread of asphaltic emulsion be greater than can be immediately covered by the screenings, nor shall the operations proceed in such a manner that the binder material will be allowed to chill, set up, dry, or otherwise impair retention of the screenings.

Delete 13th paragraph of Subsection 37-1.05.

## 37-2 SLURRY SEAL

**37-2.01 Slurry Seal.** - This work shall consist of mixing asphalt emulsion, aggregate, set control additives, and water and spreading the mixture on a surfacing or pavement where shown on the plans, as specified in these special provisions, and as directed by the Engineer. The requirements in Subsections 37-2.01 through 37-2.06 of Section 37-2, "Slurry Seal," of the Caltrans Standard Specifications shall not apply.

**37-2.02 Materials.** - The materials for slurry seal immediately prior to mixing shall conform to the following requirements.

**37-2.02A Asphaltic Emulsion.** - Asphaltic emulsion shall be quick-setting Type CQS1h grade conforming to the requirements of these special provisions and Section 94, "Asphaltic Emulsions," of these City Standard Specifications.

**37-2.02B Water and Additives.** - Water shall be of such quality that the asphalt will not separate from the emulsion before the slurry seal is in place in the work. If necessary for workability, a set-control agent that will not adversely affect the slurry seal, may be used.

**37-2.02C Aggregate.** - Aggregate shall consist of rock dust and other sands or other sands of similar nature, except that 100 percent of any aggregate or combination of aggregate, larger than the No. 50 sieve size, used in the mix shall be obtained by crushing rock. The material shall be free from vegetable matter and other deleterious substances. All aggregate shall be free of caked lumps and oversized particles.

The aggregate, prior to the addition of emulsion, shall conform to the requirements of this section. Conformance with the grading requirements will be determined by California Test 202, modified by California Test 105 when there is a difference in specific gravity of 0.2 or more between blends of different aggregates.

- (1) Type II Aggregate - The percentage composition by weight of the aggregate shall conform to the following grading:

<u>Sieve Size</u>	<u>Percentage Passing</u>
3/8	100
No. 4	94-100
No. 8	65-90
No. 16	40-70
No. 30	25-50
No. 200	5-15

The aggregate shall conform to the following additional quality requirements:

<u>Test</u>	<u>California Test</u>	<u>Requirement</u>
Sand Equivalent	217	55 minimum
Durability Index	229	55 minimum

- (2) Type III Aggregate - The percentage composition by weight of the aggregate shall conform to the following grading:

<u>Sieve Size</u>	<u>Percentage Passing</u>
3/8"	100
No. 4	70-90
No. 8	45-70
No. 16	28-50
No. 30	19-34
No. 200	5-15

The aggregate shall conform to the following additional quality requirement:



<u>Test</u>	<u>California Test</u>	<u>Requirement</u>
Sand Equivalent	217	60 minimum
Durability Index	229	55 minimum

If the results of the aggregate grading do not meet gradation specified, the slurry seal represented by such test shall be removed. However, if requested in writing by the Contractor and approved by the Engineer, the slurry seal may remain in place and the Contractor shall pay to the City \$1.75 per ton for such aggregate left in place.

If the result of the Sand Equivalent test for aggregate does not meet the requirement specified, the slurry seal represented by such test shall be removed. However, if requested in writing by the Contractor and approved by the Engineer, the slurry seal may remain in place and the Contractor shall pay to the City \$1.75 per ton for such aggregate left in place.

When the results of both the aggregate grading and the Sand Equivalent test do not conform to the requirements specified, both payments to the City shall apply. The Department may deduct these amounts from any monies due, or that may become due, the Contractor under the contract. No single aggregate grading or sand equivalent test shall represent more than 300 tons or one day's production, whichever is smaller.

**37-2.03 Mix Design.** - At least 7 working days before slurry seal placement commences, the Contractor shall submit to the Engineer for approval a laboratory report of tests and proposed mix design covering the specific materials to be used on the project. The percentage of asphaltic emulsion proposed in the mix design shall be within the percentage range specified in "Proportioning" in this section of the special provisions.

The tests and mix design shall be performed by a laboratory capable of performing the applicable International Slurry Seal Association (ISSA) tests. The proposed slurry seal mixture shall conform to the requirements specified when tested in accordance with the following tests:

<u>Test</u>	<u>Designation</u>	<u>Requirement</u>
Cohesion Test	ASTM D3910	20 Kg -cm within 1 hour (b)
Wet Track Abrasion	ASTM D3910 *	75 grams per square foot maximum

\* California Test 355 may be used for Type II Slurry Seal.

- (a) Mixing test must pass at the maximum expected air temperature at the project site during application.

- (b) Using project source aggregate and asphaltic emulsion and set control agents if used.

The original laboratory report shall be signed by the laboratory that performed the tests and mix design and shall show the results of the test on individual materials, comparing their values to those required by the specifications. The report shall clearly show the proportions of aggregate, filler (minimum and maximum), water (minimum and maximum), asphalt solids content based on the dry weight of aggregate and set-control agent usage. Previous laboratory reports covering the same materials may be accepted provided they are made during the same calendar year.

Once the proportions of materials to be used are approved by the Engineer, no substitution of other material will be permitted unless the materials proposed for substitution are first tested and a laboratory report is submitted for the substituted design as specified above. Substituted materials shall not be used until the mix design for those materials is approved by the Engineer.

**37-2.04 Proportioning.** - Aggregate, asphaltic emulsion, water, and additives, including set-control agent if used, shall be proportioned by volume utilizing the mix design approved by the Engineer. If more than one kind of aggregate is used, the correct amount of each kind of aggregate to produce the required grading shall be proportioned separately, prior to adding the other materials of the mixture, in a manner that will result in a uniform and homogeneous blend.

The completed mixture, after addition of water and any set-control agent used, shall be such that the slurry seal mixture has proper workability and (a) will permit a traffic flow, without pilot-car-assisted traffic control, on the slurry seal within 1 hour after placement without the occurrence of bleeding, raveling, separation or other distress, and (b) will prevent development of bleeding, raveling, separation or other distress within 15 days after placing the slurry seal.

Asphaltic emulsion shall be added at a rate of between 10 to 15 percent by weight of the dry aggregate. The quantity of asphaltic emulsion to be used in the slurry seal mixture will be determined from the design asphalt binder content, as approved by the Engineer, and the asphalt solids content of the asphaltic emulsion furnished.

The Contractor shall furnish an aggregate moisture determination for every two hours of operation or maintain the moisture content to within a maximum daily variation of  $\pm 0.5$  percent.

The aggregate shall be proportioned using a belt feeder operated with an adjustable cutoff gate. The height of the gate opening shall be readily determinable. The emulsion shall be proportioned by a positive displacement pump. Any variable rate emulsion pump, if used, shall be equipped with a means to seal the adjusting unit in its calibrated condition. Water shall be introduced into the mixer by a meter registering in gallons delivered.

Uniformity of distribution of asphalt will be determined by extraction test in accordance with California Test 310. The bitumen ratio (pounds of asphalt per 100 pounds of dry aggregates) shall not vary more than 0.5 pounds of asphalt above or 0.5 pound of asphalt below the amount approved by the Engineer. This requirement shall apply to representative samples taken from any location or operation designated by the Engineer.

The delivery rate of aggregate and emulsion per revolution of the aggregate feeder shall be calibrated at the appropriate gate settings for each mixer-spreader

truck used on the project in accordance with California Test 109 and the requirements of these special provisions.

The aggregate belt feeder shall deliver aggregate to the pugmill with such volumetric consistency that the deviation for any individual aggregate delivery rate check-run shall not exceed 2.0 percent of the mathematical average of three runs of at least 3 tons in duration each. The emulsion pump shall deliver emulsion to the pugmill with such volumetric consistency that the deviation for any individual delivery rate check-run shall be within 2.0 percent of the mathematical average of three runs of at least 500 gallons in each duration.

These check-runs shall be performed for each aggregate source using a vehicle scale that has been error tested in accordance with California Test 109.

The emulsion storage located immediately before the emulsion pump shall be equipped with a device which will automatically shut down the power to the emulsion pump and aggregate belt feeder when the emulsion level is lowered sufficiently to expose the pump suction line.

A temperature-indicating device shall be installed in the emulsion storage tank at the pump suction level. The device shall indicate temperature of the emulsion and shall be accurate to  $\pm 5^\circ$  F.

The belt delivering the aggregate to the pugmill shall be equipped with a device to monitor the depth of aggregate being delivered to the pugmill. Said device for monitoring depth of aggregate shall automatically shut down the power to the aggregate belt feeder whenever the depth of aggregate is less than 70 percent of the target depth flow. A second device shall be located where it will monitor movement of the aggregate belt by detecting revolutions of the belt feeder. The device for monitoring no flow or belt movement, as the case may be, shall automatically shut down the power to the aggregate belt when aggregate belt movement is interrupted. This second device will not be required where the aggregate delivery belt is an integral part of its drive chain.

To avoid erroneous shutdown by normal fluctuation, a delay of 3 seconds between sensing less than desirable storage levels of aggregate or emulsion and shutdown of the proportioning operation will be permitted.

**37-2.05 Mixing and Spreading Equipment.** - The slurry seal shall be mixed in continuous pugmill mixers of adequate size and power for the type of slurry seal to be placed. All indicators required in the section entitled "Proportioning" shall be in working order prior to commencing mixing and spreading operations.

Mixers-spreader trucks shall be equipped to proportion emulsion, water, aggregate, and set-control additives by volume. All rotating and reciprocating equipment on mixer-spreader trucks shall be covered with metal guards.

The mixer-spreader truck shall not be operated unless all low-flow and no-flow devices and revolution counters are in good working condition and functioning and all metal guards are in place. All indicators required by these special provisions shall be visible while walking alongside the mixer-spreader truck.

Aggregate feeders shall be connected directly to the drive on the emulsion pump. The drive shaft of the aggregate feeder shall be equipped with a revolution counter reading to the nearest full revolution of the aggregate delivery belt.

At least two operational spreader trucks shall be available at the jobsite during the spreading operation except when continuous placement type mixer-spreader trucks are used.

In addition to the requirements of the fourth paragraph of Section 5-1.10, "Equipment and Plants", the identifying number of mixer-spreader trucks shall be at least 2 inches in height, located on the front and rear of the vehicle.

The slurry mixture shall be spread by means of a controlled spreader box conforming to the following requirements:

The spreader shall be capable of spreading a traffic lane width and shall have strips of flexible rubber belting or similar material on each side of the spreader box and in contact with the pavement to positively prevent loss of slurry from the ends of the box. All spreader boxes over 7-1/2 feet in width shall have baffles, reversible motor driven augers, or other suitable means, to insure uniform application on superelevated sections and shoulder slopes. Spreader box skids shall be maintained in such manner as to prevent chatter (wash boarding) in the finished mat.

Rear flexible strike-off blades shall make close contact with the pavement, and shall be capable of being adjusted to the various crown shapes so as to apply a uniform slurry seal coat.

Flexible drags, to be attached to the rear of the spreader box, shall be provided as directed by the Engineer. All drags and strike-off blades (rubbers) shall be cleaned or changed daily if problems with cleanliness and longitudinal scouring occur.

The spreader box shall be clean, free of all slurry seal and emulsion, at the start of each work shift.

Slurry mixture, to be spread in areas inaccessible to the controlled spreader box, may be spread by other approved methods.

**37-2.06 Placing** - The slurry mixture shall be uniformly spread on the existing surfacing within the rate specified without spotting, rehandling or otherwise shifting of the mixture.

Slurry seal shall not be placed when the existing pavement temperature is below 50° F. or during unsuitable weather.

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.

Slurry seal mixture shall be spread at a rate within 20 to 25 pounds of dry aggregate per square yard. The exact rate will be as determined by the Engineer. The completed spread shall be within 10 percent of the rate determined by the Engineer.

Longitudinal joints shall correspond with the edges of traffic lanes. The Engineer may permit other patterns of longitudinal joints, if such patterns will not adversely affect the quality of the finished product, as determined by the Engineer.

All through driving lanes shall be spread in full lane width pulls only. Longitudinal joints, common to two driving lanes, shall be butt joints with overlaps not to exceed 3 inches. Building paper shall be placed at transverse joints, over previously placed slurry seal, or other suitable methods used to avoid double placement of slurry seal. 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 homogenous after spreading on the surfacing 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 so that the slurry seal will not adhere to and be picked up by the tires of vehicles.

### 37-3 FOG SEAL COAT

**37-3.01 Description.** - This work shall consist of furnishing and applying emulsified asphalt or cationic maltenes emulsion as a fog seal coat as shown on the plans, as specified in these specifications and as directed by the Engineer.

**37-3.02 Materials.** - Fog seal coat shall be grade SS1 asphaltic emulsion or cationic maltenes emulsion, as specified in the special provisions or on the plans, in accordance with Section 94, "Asphaltic Emulsions" of these standard specifications.

**37-3.03 Maintaining Traffic.** - At locations where public traffic is being routed over a surface upon which a fog seal is to be applied, the fog seal shall not be applied to more than one-half the width of the traveled way at a time, and the remaining width shall be kept free of obstructions and open for use by public traffic until the fog seal first applied is ready for use by traffic.

The contractor shall provide for the passage of public traffic in accordance with the provisions in Section 7-1.08, "Public Convenience," and 7-1.09, "Public Safety" and when directed by the Engineer, traffic shall be routed through the work under one-way control.

**37-3.04 Preparation of Surface.** - Immediately before applying the fog seal, the surface to be sealed shall be cleaned of all loose and extraneous material.

**37-3.05 Application.** - Fog seal shall not be applied when weather conditions are unsuitable or when the surface temperature is below 50° F.

Fog seal coat shall be applied in accordance with the provisions of Section 94, "Asphaltic Emulsions," and the provisions of this section.

Grade SS-1 asphalt emulsion shall be diluted with an equal amount of water and sprayed at the rate of 0.05 to 0.2 gallon (of diluted material) per square yard. The exact rate of application will be determined by the Engineer.

Cationic maltenes emulsion shall be diluted with water at the approximate rate of 33 percent of water, by volume of the combined mixture. The diluted mixture of cationic maltenes emulsion shall be spread at the rate of 0.04 to 0.10 gallon per square yard. The exact rate of application will be determined by the Engineer.

Fog seal material shall be applied by means of a pressure distributor in a uniform, continuous spread over the section to be treated and within the temperature range specified for the type of material.

If the cut off of the distributor is not positive, a strip of building paper, at least 3 feet in width and with a length equal to that of the spray bar plus one foot, shall be used at the beginning and end of each spread.

When more than one type of seal coat is to be applied, the fog seal coat shall be applied at least four days in advance of the application of an adjoining seal coat requiring screenings. The seal coats shall be applied in such a manner that the joint between the two types will present a neat and uniform appearance true to the line shown on the typical cross section and as established by the Engineer.

After the application of a fog seal coat, any asphaltic emulsion that becomes tacky shall be sprinkled with water in the amount ordered and as directed by the Engineer, and any cationic maltenes emulsion that fails to penetrate or causes the surface treated to become slippery, shall be blotted with sand in the amount ordered and as directed by the Engineer.

Fog seal shall not be applied to open graded paving courses.

**37-3.06 Measurement.** - Quantities of seal coat to be paid for will be measured by the ton in accordance with the provisions in Section 94, "Asphaltic Emulsions."

**37-3.07 Payment.** - The quantities of fog seal will be paid for at the contract unit price per ton unless included in the price of asphalt concrete. The price shall include preparation for treatment, furnishing, mixing and applying the fog seal.

The above price and payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying fog seal coat, complete in place, as shown on the plans, and as specified in these specifications and as directed by the Engineer.

Water furnished and applied to tacky emulsion and for mixing with asphaltic emulsion fog seal will not be paid for and full compensation therefor will be considered as included in the contract price paid for the asphaltic emulsion fog seal.

Water furnished for mixing with cationic maltenes emulsion fog seal or sand required for blotter material will not be paid for and full compensation therefor will be considered as included in the contract price paid for the cationic maltenes emulsion fog seal.

No adjustment of compensation will be made for any increase or decrease in the quantity of fog seal material required, regardless of the reason for such. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," shall not apply to the item of fog seal coat.

SECTION 39

ASPHALT CONCRETE

Asphalt concrete shall conform to Section 39 of the Caltrans Standard Specifications and these City Standard Specifications.

**39-1.01 Description.** - Asphalt concrete is designated as Type A, Type B, Type C, or Open Graded. Type C asphalt concrete shall be as specified in the special provisions. Asphalt concrete is also designated by gradation, according to percentage of crushed particles and sand equivalent of the aggregate (for dense graded mixtures) or according to intended use (for open graded mixes) and by class, according to texture of the mixture. The use of recycled asphalt pavement (RAP) may be permitted at the discretion of the Engineer in type C mixes at a percentage determined by the Engineer not to exceed 15% of total aggregate weight.

Attention is directed to Sections 7-1.11, "Preservation of Property," 7-1.12, "Responsibility for Damage," and 8-1.10, "Utility and Non-Highway Facilities." The Contractor's operations shall be conducted in a manner that existing facilities or improvements will not be harmed or damaged.

At locations where public traffic is routed over the base grade, the Contractor shall plan the paving operations to minimize the delay of traffic.

The Contractor, when required to provide for the passage of public traffic through the work, shall do so in accordance with the provisions of Section 7-1.08, "Public Convenience," and 7-1.09, "Public Safety." The Contractor shall also conform his operations and comply with the provisions of Section 12, "Construction Area Traffic Control Devices."

**39-2.02 Aggregate.** - Aggregate for asphalt concrete mixtures shall consist of crushed or natural stone, gravel, sand, or other mineral material. The coarse and fine aggregate shall be composed of sound, tough, durable particles.

Approval of sources of supply of aggregate shall be obtained from the Engineer prior to delivery of the material to the plant.

Unless otherwise specified in the special provisions, the aggregate grading of the types of asphalt concrete shall conform to these Standard Specifications.

Type C will conform to 3/4 inch maximum, medium grading.

Unless otherwise shown on the plans or specified in the special provisions, Type B shall be used for the base lift course and for the surface lift course. Should the surface lift course be less than 2 inches in thickness, the type, gradation, and class shall be designated by the Engineer.

In Section 39-2.02 of the Caltrans Standard Specifications, the aggregate grading requirements tables, Types A and B asphalt concrete, for the following gradings, shall be deleted, and replaced with the following tables (all other gradation tables in Section 39 of Caltrans shall remain unchanged):

- 3/4" maximum, coarse
- 3/4" maximum, medium
- 1/2" maximum, coarse
- 1/2" maximum, medium
- 1/2" maximum, fine

Section 39 - Asphalt Concrete only applies to projects approved prior to 08/04/2022 OR for projects that specifically call out this specification section and not Section 39 - Superpave Asphalt Concrete

In the following tables, the symbol "X" is the percentage based on the job mix formula established by the Engineer, based on aggregate materials and submittals from the Contractor and his supplier.

**AGGREGATE GRADING REQUIREMENTS**  
**Type A and B Asphalt Concrete**  
**(Replacement Gradings)**  
**Percentage Passing**

Sieve Sizes	Operating Range	Individual Test
<b>3/4" Maximum, Coarse</b>		
1"	100	100
3/4"	90-100	90-100
3/8"	60-75	55-80
No. 4	40-55	35-60
No. 8	27-40	X ± 5
No. 30	12-22	X ± 5
No. 200	3-6	X ± 3

**3/4" Maximum, Medium**

1"	100	100
3/4"	95-100	90-100
3/8"	65-80	60-85
No. 4	45-60	40-65
No. 8	30-45	X ± 5
No. 30	15-25	X ± 5
No. 200	3-7	X ± 3

**1/2" Maximum, Coarse**

3/4"	100	100
1/2"	95-100	90-100
3/8"	75-90	70-95
No. 4	50-67	X ± 5
No. 8	35-50	X ± 5
No. 30	15-30	X ± 5
No. 200	4-7	X ± 3

**1/2" Maximum, Medium**

3/4"	100	100
1/2"	95-100	90-100
3/8"	80-95	75-100
No. 4	55-72	X ± 5
No. 8	38-55	X ± 5
No. 30	18-33	X ± 5
No. 200	4-8	X ± 3



Sieve Sizes	Operating Range	Individual Test
<b>1/2" Maximum, Medium</b>		
3/4"	100	100
1/2"	95-100	90-100
3/8"	80-95	75-100
No. 4	55-72	X ± 5
No. 8	38-55	X ± 5
No. 30	18-33	X ± 5
No. 200	4-8	X ± 3
<b>1/2" Maximum, Fine</b>		
3/4"	100	100
1/2"	95-100	92-100
3/8"	80-95	77-100
No. 4	58-75	X ± 5
No. 8	43-60	X ± 5
No. 30	20-35	X ± 5
No. 200	6-12	X ± 3

When the combined grading of coarse and fine aggregates is deficient in material passing the No. 200 sieve, a commercial filler shall be added to the mixture as specified by the Engineer. The amount of commercial filler to be added shall be only that amount necessary to make the combined grading of the materials comply with the grading requirements for the completed mixture. In no case shall the amount of commercial filler added exceed 3 percent by weight of the combined aggregate.

The combined aggregate shall conform to the table in Section 39-2.02 of the Caltrans Standard Specifications except that the results of the Los Angeles Rattler test, loss at 500 revolutions, shall be a maximum of 33 percent for individual test or 30 percent for operating range, for Types A and B asphalt concrete.

Delete paragraph 8 (page 39-5, top) of Section 39-2.02 of the Caltrans Standard Specifications. In lieu thereof, if the results of either or both the aggregate grading and Sand Equivalent tests do not meet the requirements specified for individual test, the Engineer shall seek appropriate remedy as specified in Section 5, "Control of Work."

The asphalt concrete mixture shall conform to the quality requirements specified in Section 39-2.02 of the Caltrans Standard Specifications and to the following additional requirements:

Test	California Test	Asphalt Concrete Type*		Open Graded Asphalt Concrete
		A	B	
Percent Voids	304	2-5	2-5	---
Film Stripping %	302	25	25	25
Swell	**	**	**	0.030"

\* Including asphalt concrete base type.

\*\* Covered in Caltrans Standard Specifications.

**39-2.02A Job Mix Formula.** - A job mix formula shall be established by the Engineer for each designation of asphalt concrete, based on samples of conforming aggregate materials supplied for each source or supplier proposed by the Contractor. Where more than one source or supplier is designated to supply asphalt concrete, those mixes will be kept separated. The mixes will not be intermixed in the same lift or section of pavement. The paving contractor will submit paving plans showing, in advance, where the mixes will be used from each source. This paving plan will be subject to approval by the Engineer. The job mix formula for each classification shall be within the limits as shown in the table below and as specified herein for aggregate grading requirements. The job mix formula will establish a single percentage of aggregate passing each required sieve size, a percentage of asphalt binder to be added to the aggregate, and a single temperature at which the mixture is discharged from the pugmill to the haul vehicle. Contractor may submit a job mix formula and mix design for consideration by the Engineer. Designs must be accompanied by current test results that indicate compliance with these Standard Specifications as well as Special Provisions.

The paving asphalt content of the mixtures will be calculated on percentage basis by weight of dry aggregate. The paving asphalt content for each designation of asphalt concrete shall not be less than the minimum limits given below.

#### Minimum Asphalt Content (%)

GRADATION AND CLASS		A	TYPE B	OPEN
3/4"	Coarse	4.5	4.5	
	Medium	4.5	4.5	
1/2"	Coarse	5.0	5.0	
	Medium	5.0	5.0	
	Fine	5.4	5.4	
3/8"	-			5.0
1/4"	-			5.5
No. 4	7.0	7.0		

After the job mix formula is established, all asphalt concrete mixtures shall conform to the production tolerances as indicated below. The tolerances as indicated are plus or minus the figures shown below:

SIEVE SIZE (Percent Pass)	TYPE		Open Total Aggregate
	A Weight	B Percent	
No. 4	7	7	-
No. 8 & 30	5	5	-
No. 200	3	3	-
	Weight	Percent	Total Mixture
Asphalt Content	0.45	0.45	0.45
Temperature of Mixture	10° F	10° F	10° F

Any variation from the job mix formula greater than the percentage shown shall be investigated, and the conditions causing the variation shall be corrected immediately.

**39-2.04 Equipment.** - All equipment furnished for the hauling, spreading, and compacting of asphalt concrete mixtures shall be maintained in prime mechanical condition. Equipment that drips fuel, oil or grease shall be removed from the project site until leakage is corrected. Equipment shall be serviced and lubricated away from the paving site.

**39-3.01 Storage.** - The different aggregate sizes shall be kept separated until they have been delivered to the cold feed elevator feeding the dryer. The storage yard shall be maintained in a neat and orderly fashion and separate stockpiles shall be readily accessible for sampling. Each size of aggregate shall be separately fed by feeders to the cold elevators in proper proportion and at a rate to permit correct and uniform temperature control of the heating and drying operation. The aggregates shall be dried and delivered to the mixer at a temperature between 250°F and 325°F. The temperature between these limits shall be regulated according to the viscosity characteristics of the asphalt, temperature of the atmosphere, and the workability of the mixture. Aggregates in the hot bins shall not contain moisture to an extent to cause the mixture to foam, slump, or segregate during hauling and placing operations.

**39-3.01A Cold Storage.** - Once the job mix formula is established, based on samples of aggregate submitted by the Contractor, the aggregate at the cold feed to the dryer shall be within the tolerances as set forth below. The tolerance figures in the table are plus or minus the percent passing the sieve of the size indicated.

<u>Sieve Size</u>	<u>Percent</u>
No. 4 & Larger	10
No. 8	5
No. 200	3

**39-3.01B Hot Storage.** - The gradings of aggregate hot storage shall be as indicated in the following table.

<b>Total Percent Passing by Weight</b>				
Sieve Sizes	Bin 4 3/4" x 1/2"	Bin 3 1/2" x 3/8"	Bin 2 3/8" x #8	Bin 1 fine
1"	100	--	--	--
3/4"	75 - 100	100	--	--
1/2"	0 - 25	80 - 100	100	--
3/8"	0 - 15	20 - 65	90 - 100	--
No. 4	--	0 - 15	30 - 60	100
No. 8	--	--	0 - 15	85 - 100
No. 30	--	--	--	35 - 60
No. 200	0 - 2	0 - 2	0 - 6	6 - 14



**39-3.03 Proportioning.** - Delete paragraph one of Section 39-3.03 of the Caltrans Standard Specifications. The proportions of aggregate and paving asphalt, within the limits specified in the job mix formula, as specified in Section 39-2.02A, "Job Mix Formula," shall be regulated to produce a satisfactory mixture.

The sequence in which several aggregates shall be drawn or weighed may vary under different conditions. The paving asphalt shall be added in an evenly spread sheet over the length of the mixer box in a batch plant, or shall be spread evenly across the mixer box in a continuous mix plant.

**39-3.04 Mixing.** - The asphalt content of the asphalt mixture may be determined in accordance with ASTM Designation: D 2172 or as specified in Section 39-3.04, "Mixing" of the Caltrans Standard Specifications.

Mixing shall be accomplished in the shortest time that will produce a satisfactory mixture. Mixing time shall be within the following limits:

Batch Plants - 0 to 10 seconds dry mixing followed by 25 to 50 seconds mixing after the addition of the paving asphalt.

Continuous Mix Plants - 25 to 60 seconds based on the formula:

$$\text{Mixing time, s} = \frac{\text{pugmill capacity, lb}}{\text{pugmill output, lb/s}}$$

The Engineer or his authorized representatives shall have access at any time to all parts of the mixing plant to insure the manufacture of asphalt concrete mixtures in strict accordance with these specifications. In order that accurate and sufficiently large samples of aggregate may be obtained from hot storage, easy and safe access shall be provided to the location on the plant where samples may be taken.

**39-4.01 Subgrade.** - Subgrade preparation shall be in accordance with Section 21, "Subgrade Preparation," of these specifications. Delete Sections 39-4.01 and 39-4.02 of the Caltrans Standard Specifications.

**39-5.01 Spreading Equipment.** - Pavers shall be capable of spreading and finishing the asphalt concrete true to line, grade, and crown required.

The pavers shall be equipped with quick and efficient steering devices and shall have reverse as well as forward traveling speeds.

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with distributing screws of the reversing type to place the mixture uniformly in front of the screed.

The screed shall be equipped with a controlled heating device for use when required. The screed shall strike off the mix to the depth and cross section specified without the aid of manual adjustment during operation.

Particular attention shall be directed to the setting, clearance and wear condition of the tamper bar on paver screeds so equipped.

**39-5.03 Hauling Equipment.** - Vehicles used for hauling asphalt concrete mixtures shall have tight, smooth, metal beds, and shall be free from dust, screenings, excessive petroleum oils, volatiles, or other mineral spirits which may affect the mix being hauled. Trucks shall be provided with tarpaulins or cargo covers of sufficient size and weight to protect the entire load. Loads shall be covered whenever precipitation is in the air, when the air temperature is 50°F or

below, if the temperature of any load leaving the plants falls more than 20°F between the time of leaving the plant and placing on the roadbed, and at other times as the Engineer may direct. The Contractor shall provide haul trucks of size, speed, and condition to ensure orderly and continuous operation.

**39-6.01 General Requirements.** - No asphalt concrete paving mixture shall be placed when the weather is foggy or rainy, or the ambient air temperature is 50°F or below.

Asphalt concrete paving mixtures shall be placed only when the surface is dry and in satisfactory condition. In case of sudden rain, the Engineer may permit the placement of mixtures in transit from the plant, provided that the subgrade is free from pools of water and the mixture is laid and compacted at the proper temperature.

**39-6.02 Spreading.** - The speed of the paver shall be regulated to eliminate the pulling and tearing of the mat. The paver shall be related to the production rate of the plant and hauling equipment and to the capability of the compaction equipment. Pavers shall be operated in a manner that will insure continuous and uniform movement. There shall be a minimum of intermittent paver stops and starts.

The table below sets forth approximate paver speeds, for various delivery rates and thicknesses of pavement, necessary to achieve continuous paving operation 12 feet wide.

Thickness (feet)	Delivery Rates			
	100 ton/hr.	150 ton/hr.	200 ton/hr.	250 ton/hr.
0.08	24 ft./min.	36 ft./min.	48 ft./min.	60 ft./min.
0.13	18 ft./min.	27 ft./min.	36 ft./min.	45 ft./min.
0.17	12 ft./min.	18 ft./min.	24 ft./min.	30 ft./min.
0.25	8 ft./min.	12 ft./min.	16 ft./min.	20 ft./min.

In limited areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the asphalt concrete mixture may be spread, raked, and luted by hand tools. The mixture shall be thoroughly compacted by means of pneumatic tampers or other methods as will produce the required degree of compacted thickness.

When hand spreading is permitted, the mixture shall be dumped either on the grade or on dump sheets outside the area upon which it is to be spread, and then distributed into place using hot shovels, and spread with hot rakes in a uniformly loose layer to the full width required, and at a depth that, when the work is completed, it will have the required thickness and will conform to the grade and surface tolerance specified. Fanning or broadcasting of material across the mat will not be permitted.

Whenever hand spreading or backwork is required behind the paving spread, the paving machine shall be stopped until such hand spreading or backwork is completed.

Longitudinal joints and edges shall be constructed to true line markings. Lines for the paver to follow in placing individual lanes shall be parallel to the centerline of the roadway or to a baseline established by the Engineer.

The material being placed in the abutting lanes shall be tightly crowded against the face of the previously placed lane. The paving machine shall be

positioned to overlap the existing mat only to the extent that the material placed against the joint is tightly crowded against the vertical face at the joint and that the conform raking leaves no ridges or depressions. Before compacting or pinching the joint, the coarse aggregate in the overlapped material that has dislodged through raking shall be removed from the pavement surface and discarded.

Transverse construction joints and temporary runoff tapers shall be constructed so that no gradual ramping down of the mat occurs back from the joint.

**39-6.03 Compacting.** - The completed pavement shall have an average density equal to or greater than 98 percent of the laboratory density derived from compacting and testing the mixture in accordance with California Test 304 and 308. The laboratory-compacted specimens will be composed of the same materials, in like proportions, as the job mix formula.

Final compaction of the paving may be tested by nuclear density gauges California Test 375 or by coring and testing cores in accordance with California Test 308, to establish compliance with these specifications. In the event of non-compliance with these specifications, the Engineer may require that the nonconforming segments of paving be replaced, or may assess the Contractor a penalty amount to be deducted from the contract amount for this payment item, for each cubic yard of asphalt concrete not in compliance. For each ton of asphalt concrete not in compliance with these specifications, the Engineer may require that the nonconforming segments of paving be replaced or assess the Contractor a penalty to be deducted from the contract item amount.

**39 SUPERPAVE ASPHALT CONCRETE**

Revision Date: 4/4/2022

**39-1 GENERAL**

**39-1.01 GENERAL**

Section 39 includes specifications for performing asphalt concrete work.

**39-1.02 MATERIALS**

Not used

**39-1.03 CONSTRUCTION**

Not used

**39-1.04 PAYMENT**

Not used

**39-2 HOT MIX ASPHALT**

**39-2.01 GENERAL**

**39-2.01A General**

**39-2.01A(1) Summary**

Section 39-2.01 includes general specifications for producing and placing hot mix asphalt.

HMA includes one or more of the following Types:

1. HMA Type F
2. HMA Type H
3. RHMA-G

If liquid antistripping (LAS) is required for HMA, WMA technology may be used as substitution for LAS at the discretion of the Engineer. WMA technologies must be on the Caltrans Authorized Material List for WMA authorized technologies.

Wherever reference is made to the following test methods, the latest year of publication for these test methods shall be used as shown in the following table:

TEST METHOD	DESCRIPTION
AASHTO M 17	Standard Specification for Mineral Filler for Bituminous Paving Mixtures
AASHTO M 323	Standard Specification for Superpave Volumetric Mix Design
AASHTO R 30	Standard Practice for Mixture Conditioning of HMA
AASHTO R 59	Recovery of Asphalt from Solution by Abson Method
AASHTO T 11	Standard Method of Test for Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing
AASHTO T 27	Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
AASHTO T 30	Standard Method of Test for Mechanical Analysis of Extracted Aggregate
AASHTO T 49	Standard Method of Test for Penetration of Bituminous Materials
AASHTO T 59	Standard Method of Test for Emulsified Asphalts
AASHTO T 96	Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
AASHTO T 164	Standard Method of Test for Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)
AASHTO T 176	Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
AASHTO T 209	Standard Method of Test for Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt (HMA)
AASHTO T 269	Standard Method of Test for Percent Air Voids in Compacted Dense and Open Asphalt Mixtures
AASHTO T 275	Standard Method of Test for Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA) Using Paraffin-Coated Specimens
AASHTO T 283	Standard Method of Test for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage
AASHTO T 304	Standard Method of Test for Uncompacted Void Content of Fine Aggregate
AASHTO T 308	Standard Method of Test for Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method
AASHTO T 312	Standard Method of Test for Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyrotory Compactor
AASHTO T 313	Standard Method of Test for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)
AASHTO T 315	Standard Method of Test for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)
AASHTO T 329	Standard Method of Test for Moisture Content of Asphalt Mixtures by Oven Method
AASHTO T 335	Standard Method of Test for Determining the Percentage of Fracture in Coarse Aggregate
ASTM D36/D36M	Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
ASTM D92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
ASTM D217	Standard Test Method for Cone Penetration of Lubricating Grease
ASTM D297	Standard Test Methods for Rubber Products – Chemical Analysis
ASTM D445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids
ASTM D1856	Standard Test Method for Recovery of Asphalt from Solution by Abson Method
ASTM D2007	Standard Test Method for Characteristic Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method



TEST METHOD	DESCRIPTION
ASTM D2074	Standard Test Methods for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2995	Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D5329	Standard Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphalt Pavements and Portland Cement Concrete Pavements
ASTM D7741/D7741M	Standard Test Method for Measurement of Apparent Viscosity of Asphalt-Rubber or Other Asphalt Binders by Using a Rotational Handheld Viscometer
CT 125	Method of Test for Sampling Highway Materials and Products Used in the Roadway Pavement Structure Sections
CT 306	Method of Test for Reducing Samples of Asphalt Mixtures to Testing Size
CT 389	Method of Test for Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt
Asphalt Institute MS-2	Asphalt Mix Design Methods

**39-2.01A(2) Definitions**

**binder replacement:** Binder from RAP expressed as a percent of the total binder in the mix.

**coarse aggregate:** Aggregate retained on a no. 4 sieve.

**Department:** City of San José

**fine aggregate:** Aggregate passing a no. 4 sieve.

**leveling course:** Thin layer of HMA used to correct minor variations in the longitudinal and transverse profile of the pavement before placement of other pavement layers.

**miscellaneous areas:** Areas outside the traveled way and shoulders such as:

1. Median areas not including inside shoulders
2. Island areas
3. Sidewalks
4. Gutters
5. Ditches
6. Overside drains
7. Aprons at ends of drainage structures

**Reclaimed Asphalt Pavement (RAP):** removed and/or reprocessed pavement materials containing asphalt and aggregates

**Warm Mix Asphalt (WMA):** HMA produced using a warm mix asphalt technology produced at a temperature from 240 to 325 degrees F.

**processed RAP:** RAP that has been fractionated

**supplemental fine aggregate:** Mineral filler consisting of rock dust, slag dust, hydrated lime, hydraulic cement, or any combination of these and complying with AASHTO M 17.

**39-2.01A(3) Submittals****39-2.01A(3)(a) General**

Reserved

**39-2.01A(3)(b) Job Mix Formula****39-2.01A(3)(b)(i) General**

Except for the HMA to be used in miscellaneous areas and dikes, submit your proposed JMF for each type of HMA to be used. The JMF must be submitted on the Caltrans Contractor Job Mix Formula Proposal form (CEM 3511) along with:

1. Mix design documentation on Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512) dated within 24 months of submittal.
2. An approved JMF verification on Caltrans Hot Mix Asphalt Verification form (CEM 3513) or a City of San José Hot Mix Asphalt Verification Form dated within 24 months of submittal.
3. SDS for:
  - 3.1. Asphalt binder
  - 3.2. Supplemental fine aggregate except fines from dust collectors
  - 3.3. Antistrip additives

Caltrans forms can be found here:

<https://dot.ca.gov/programs/construction/forms>

The Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512) must identify the AASHTO re:source accredited lab responsible for the mix design and show documentation on aggregate quality.

Submit a new JMF if you change any of the following:

1. Target asphalt binder percentage greater than  $\pm 0.2$  percent
2. Asphalt binder supplier
3. Combined aggregate gradation
4. Aggregate sources
5. Liquid antistrip producer or dosage
6. Any material in the JMF except lime supplier and source
7. Average binder content in a new processed RAP stockpile by more than  $\pm 2.00$  percent from the average RAP binder content reported on the Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512).
8. Average maximum specific gravity in a new processed RAP stockpile by more than  $\pm 0.060$  from the average maximum specific gravity value reported on your Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512).

Allow the Engineer 10 business days from a complete JMF submittal for document review of the aggregate qualities, mix design, and JMF. The Engineer notifies you if the proposed JMF submittal is accepted.

If your JMF fails verification testing, submit an adjusted JMF based on your testing. The adjusted JMF must include a new Caltrans Contractor Job Mix Formula Proposal form (CEM 3511), Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512), and the results of the failed verification testing.

You may submit an adjusted aggregate gradation TV on a Caltrans Contractor Job Mix Formula Proposal form (CEM 3511) before production start-up testing. Aggregate gradation TV must be within the TV limits specified.

**39-2.01A(3)(b)(ii) Job Mix Formula Renewal**

You may request a JMF renewal by submitting:

1. Proposed JMF on a Caltrans Contractor Job Mix Formula Proposal form (CEM 3511)

2. Previously verified JMF documented on either a Caltrans Hot Mix Asphalt Verification (CEM 3513) form or a City of San José Hot Mix Asphalt Verification Form dated within 24 months
3. Mix design documentation on a Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512) used for the previously verified JMF.

**39-2.01A(3)(b)(iii) Job Mix Formula Modification**

For an authorized JMF, submit a modified JMF if you change any of the following:

1. Asphalt binder supplier
2. Liquid antistrip producer
3. Liquid antistrip dosage

You may change any of the above items only once during the Contract.

Submit your modified JMF request at least 15 business days before production. Each modified JMF submittal must include:

1. Proposed modified JMF on Caltrans Contractor Job Mix Formula Proposal form (CEM 3511), marked **MODIFIED**
2. Mix design records on Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512) for the authorized JMF to be modified
3. JMF verification on either a Caltrans Hot Mix Asphalt Verification form (CEM 3513) or a City of San José Hot Mix Asphalt Verification Form for the authorized JMF to be modified.
4. Test results for the modified JMF in compliance with the mix design specifications. Perform tests at the mix design OBC as shown on the Contractor Asphalt Mix Design Data form (CEM 3512).

With an accepted modified JMF submittal, the Engineer verifies each modified JMF within 10 days of receiving all verification samples.

**39-2.01A(3)(c) Quality Control Plan**

This section applies to HMA Type F and RHMA-G only. A QC plan is not required for HMA Type H.

With your proposed JMF submittal, submit a QC plan for HMA.

The QC plan must describe the organization and procedures for:

1. Controlling HMA quality characteristics
2. Taking samples, including sampling locations
3. Establishing, implementing, and maintaining QC
4. Determining when corrective actions are needed
5. Implementing corrective actions
6. Using methods and materials for backfilling core locations

The QC plan must address the elements affecting HMA quality, including:

1. Aggregates
2. Asphalt binder
3. Additives
4. Production
5. Paving

Allow 10 business days for review of the QC plan.

If you change QC procedures, personnel, or sample testing locations, submit a QC plan supplement before implementing the proposed change. Allow 5 business days for review of the QC plan supplement.

#### **39-2.01A(3)(d) Test Results**

If requested by the Engineer, submit all QC test results, except California Test 389, within 3 business days of a request.

If requested by the Engineer, for tests performed under California Test 389, submit test data and 1 tested sample set within 5 business days of a request.

#### **39-2.01A(3)(e) Reserved**

#### **39-2.01A(3)(f) Liquid Antistrip Treatment**

If liquid antistrip treatment is used, submit the following with your proposed JMF submittal:

1. Certificate of compliance for each liquid antistrip shipment. On each certificate of compliance, include:
  - 1.1. Your signature and printed name
  - 1.2. Shipment number
  - 1.3. Material type
  - 1.4. Material specific gravity
  - 1.5. Manufacturer
  - 1.6. Consignee
  - 1.7. Destination
  - 1.8. Quantity
  - 1.9. Contact or purchase order number
  - 1.10. Shipment date
2. Proposed proportions for the liquid antistrip

At the end of each day's production shift, submit production data in electronic and printed media. Present data on electronic media in a tab delimited format. Use line feed carriage return with 1 separate record per line for each production data set. Allow enough fields for the specified data. Include data titles at least once per report. For each HMA mixing plant type, submit the following information in the order specified:

1. For batch plant mixing:
  - 1.1. Production date
  - 1.2. Time of batch completion
  - 1.3. Mix size and type
  - 1.4. Each ingredient's weight
  - 1.5. Asphalt binder content as a percentage of the total weight of mix
  - 1.6. Liquid antistrip content as a percentage of the asphalt binder weight
2. For continuous mixing plant:
  - 2.1. Production date
  - 2.2. Data capture time
  - 2.3. Mix size and type
  - 2.4. Flow rate of wet aggregate collected directly from the aggregate weigh belt
  - 2.5. Aggregate moisture content as a percentage of the dry aggregate weight
  - 2.6. Flow rate of asphalt binder collected from the asphalt binder meter
  - 2.7. Flow rate of liquid antistrip collected from the liquid antistrip meter
  - 2.8. Asphalt binder content as a percentage of the total weight of mix calculated from:
    - 2.8.1. Aggregate weigh belt output
    - 2.8.2. Aggregate moisture input
    - 2.8.3. Asphalt binder meter output
    - 2.8.4.
  - 2.9. Liquid antistrip content as a percentage of the asphalt binder weight calculated from:
    - 2.9.1. Asphalt binder meter output

## 2.9.2. Liquid antistrip meter output

**39-2.01A(3)(g) Reserved****39-2.01A(3)(h) Warm Mix Asphalt Technology**

If a WMA technology is used, submit the following with your proposed JMF submittal:

1. SDS for the WMA technology
2. For water injection foam technology:
  - 2.1. Name of technology
  - 2.2. Proposed foaming water content
  - 2.3. Proposed HMA production temperature range
  - 2.4. Certification from binder supplier stating no antifoaming agent is used
3. For additive technology:
  - 3.1. Name of technology
  - 3.2. Percent admixture by weight of binder and percent admixture by total weight of HMA as recommended by the manufacturer
  - 3.3. Methodology for inclusion of admixture in laboratory-produced HMA
  - 3.4. Proposed HMA production temperature range

Collect and hold WMA Production data for the duration of the Contract. The snapshot of production data must include the following:

1. Production date
2. Production location
3. Time of day the data is captured
4. HMA mix Type being produced and target binder rate
5. HMA additive Type, brand, and target rate
6. Temperature of the binder and HMA mixture
7. For a continuous mixing plant, the rate of flow of the dry aggregate calculated from the wet aggregate flow rate as determined by the conveyor scale
8. For a continuous mixing plant, the rate of flow of the asphalt meter
9. For a continuous mixing plant, the rate of flow of HMA additive meter
10. For batch plant mixing, actual batch weights of all ingredients
11. Dry aggregate to binder ratio calculated from metered ingredient output
12. Dry aggregate to HMA additive ratio calculated from metered output

At the request of the Engineer, submit electronic and printed media from the HMA plant process controller. Present data on electronic media in comma-separated values or tab-separated values format. The captured data for the ingredients represented by the production snapshot must have allowances for sufficient fields to satisfy the amount of data required by these specifications and include data titles at least once per report.

**39-2.01A(3)(i) Samples**

You shall collect acceptance samples.

Samples shall be taken in the presence of the Engineer or Engineer's authorized representative. Split the Engineer acceptance samples into at least 4 parts. The Engineer retains 3 parts and you keep 1 part.

**39-2.01A(3)(j) – 39-2.01A(3)(o) Reserved****39-2.01A(4) Quality Assurance****39-2.01A(4)(a) General**

Take samples under California Test 125.

**SECTION 39**

Reduce samples of HMA to testing size under California Test 306.

The following modifications to California Test 389 apply:

1. The target air void content in accordance with AASHTO T 269 must equal  $7.0 \pm 0.5$  percent for HMA Type F and HMA Type H specimens (6.5 – 7.5 percent range).
2. Use *Table 1 – Type A HMA Testing Temperature* in California Test 389 for HMA Type F and HMA Type H specimens.

**39-2.01A(4)(b) Job Mix Formula Verification**

The Engineer verifies the JMF from samples taken from HMA produced by the plant to be used. The production set point at the plant must be within  $\pm 0.2$  from the asphalt binder percentage TV shown in your Caltrans Contractor Job Mix Formula Proposal form (CEM 3511). Notify the Engineer at least 2 business days before sampling materials.

Samples may be taken from a different project including a non-Department project if you make arrangements for the Engineer or the Engineer's authorized representative to be present during sampling. Samples may be taken during the production start-up evaluation, however, do not continue production until the mix is verified and approved.

In the Engineer's or Engineer's authorized representative's presence and from the same production run, you take samples of:

1. Aggregates. Coarse, fine, and supplemental fine aggregates must be taken from the combined cold-feed belt or the hot bins. If lime treatment is required, samples must be taken from individual stockpiles before lime treatment. Samples must be at least 120 lb. for each coarse aggregate, 80 lb. for each fine aggregate, and 10 lb. for each Type of supplemental fine aggregate. For hot-bin samples, the Department combines these aggregate samples to verify the TV submitted on a Caltrans Contractor Job Mix Formula Proposal form (CEM 3511).
2. Asphalt binder. Take at least two 1qt samples. If the asphalt binder is modified or rubberized, the asphalt binder must be sampled with the components blended in the proportions to be used.
3. RAP. Samples must be at least 50 lb. from each fractionated stockpile used or 100 lb. from the belt.
4. Plant-produced HMA. The HMA samples must be at least 250 lb.

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers. Submit 3 parts to the Engineer and keep 1 part. The Engineer retains 1 part of the samples to be used in the event of dispute resolution.

After acceptance of the JMF submittal, the Engineer verifies each proposed JMF within 20 days of receiving all verification samples.

For JMF verification, the Engineer tests the following for compliance with the specifications:

1. Aggregate quality
2. Aggregate gradation
3. HMA quality characteristics for Department acceptance

To verify the HMA for air voids, voids in mineral aggregate (VMA), and dust proportion, the Engineer uses an average of 3 briquettes. The Engineer tests plant-produced material.

If the Engineer verifies the JMF, the Engineer furnishes you a City of San José Hot Mix Asphalt Verification Form.

If the Engineer's test results on plant-produced samples do not show compliance with the specifications, the Engineer notifies you. Adjust your JMF based on your testing unless the Engineer authorizes reverification without adjustments. JMF adjustments may include a change in:

1. Asphalt binder content TV up to  $\pm 0.20$  percent from the OBC value submitted on the Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512)
2. Aggregate gradation TV within the TV limits specified in the aggregate gradation table

You may adjust the JMF only once due to a failed verification test.

A verified JMF is valid for 24 months.

#### **39-2.01A(4)(c) Job Mix Formula Authorization**

You may start HMA production if:

1. Engineer's review of the JMF shows compliance with the specifications
2. The Contractor provides a verified JMF
3. The Contractor QC plan has been reviewed and approved, if applicable (HMA Type F and RHMA-G mixes).

#### **39-2.01A(4)(d) Job Mix Formula Renewal**

For a JMF renewal and upon request, in the Engineer's or Engineer's authorized representative's presence and from the same production run, you take samples of:

1. Aggregates. Coarse, fine, and supplemental fine aggregates must be taken from the combined cold-feed belt or the hot bins. If lime treatment is required, samples must be taken from individual stockpiles before lime treatment. Samples must be at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each type of supplemental fines. For hot-bin samples, the Department combines these aggregate samples to verify the TV submitted on a Caltrans Contractor Job Mix Formula Proposal form (CEM 3511).
2. Asphalt binder. Take at least two 1 qt samples. Each sample must be in a cylindrical-shaped can with an open top and friction lid. If the asphalt binder is modified or rubberized, the asphalt binder must be sampled with the components blended in the proportions to be used.
3. RAP. RAP samples must be at least 50 lb from each fractionated stockpile.
4. Plant-produced HMA. The HMA samples must be at least 250 lb.

Notify the Engineer at least 2 business days before sampling materials. For aggregate, RAP, and HMA, split samples into at least 4 parts. Submit 3 parts to the Engineer and use 1 part for your testing. The Engineer retains 1 part of the sample to be used in the event of dispute resolution.

Allow the Engineer 5 business days from a complete JMF reverification submittal for document review of the aggregate qualities, mix design, and JMF.

The most recent aggregate quality test results within the past 24 months may be used for verification of JMF renewal or upon request, the Engineer may perform aggregate quality tests for verification of JMF renewal.

The Engineer verifies the JMF for renewal under section 39-2.01A(4)(b) except:

1. Engineer keeps the samples until you provide test results for your part on a Contractor Job Mix Formula Renewal form (CEM 3514).
2. Engineer may use the most recent aggregate quality test results within the past one year, or the Engineer may perform aggregate quality tests.
3. Engineer may use RAP and binder test results from the project where the renewal samples are taken, or the Engineer may perform RAP and binder tests.
4. Department tests samples of materials obtained from the HMA production unit **after** you submit test results that comply with the mix design specifications.
5. After completion of the JMF verification renewal document review, the Engineer verifies each proposed JMF within 20 days of receiving the verification renewal samples and the complete

Contractor Job Mix Formula Renewal form (CEM 3514).

6. You **may not adjust** the JMF due to a failed verification.
7. For each HMA type and aggregate gradation specified, the Engineer verifies at no cost to you 1 proposed JMF renewal within a 24-month period.

If the Engineer verifies the JMF renewal, the Engineer furnishes you a City of San José Hot Mix Asphalt Verification form. The Hot Mix Asphalt Verification form is valid for 24 months.

**39-2.01A(4)(e) Reserved**

**39-2.01A(4)(f) Certifications**

**39-2.01A(4)(f)(i) General**

Laboratories testing aggregate and HMA qualities used to prepare the mix design and JMF must be accredited through the AASHTO re:source program, and/or Caltrans' Independent Assurance Program, or be approved by the Engineer.

**39-2.01A(4)(f)(ii) Hot Mix Asphalt Plants**

Before production, the HMA plant must have a current qualification under Caltrans' Material Plant Quality Program, or be approved by the Engineer.

**39-2.01A(4)(f)(iii)–39-2.01A(4)(f)(v) Reserved**

**39-2.01A(4)(g) Reserved**

**39-2.01A(4)(h) Quality Control**

**39-2.01A(4)(h)(i) General**

QC test results must comply with the specifications for Department acceptance.

Prepare 3 briquettes for air void content and voids in mineral aggregate determination. Report the average of 3 tests for air void content and voids in mineral aggregate.

Except for smoothness, if 2 consecutive QC test results or any 3 QC test results for 1 day's production do not comply with the materials specifications:

1. Stop HMA production
2. Notify the Engineer
3. Take corrective action
4. Demonstrate compliance with the specifications before resuming production and placement

For QC tests performed under AASHTO T 11 / T 27, results are considered 1 QC test regardless of number of sieves out of compliance.

Do not resume production and placement until the Engineer authorizes your corrective action proposal.

**39-2.01A(4)(h)(ii) Reserved**

**39-2.01A(4)(h)(iii) Aggregates**

**39-2.01A(4)(h)(iii)(A) General**

Reserved

**39-2.01A(4)(h)(iii)(B) Reserved**

**39-2.01A(4)(h)(iv) Liquid Antistrip Treatment**

For continuous mixing or batch-plant mixing, sample asphalt binder before adding liquid antistrip.

**39-2.01A(4)(h)(v) Production Start-up Evaluation**

For projects **greater than or equal to 2,000 tons**, you and the Engineer evaluate HMA production and placement at production start-up.



Within the first 750 tons produced on the 1st day of HMA production, in the Engineer's or Engineer's authorized representative's presence, and from the same production run, you take samples of:

1. Aggregates
2. Asphalt binder
3. RAP
4. HMA
5. Additives

Sample aggregates from the combined cold-feed belt or hot bin. Take RAP samples from the RAP system.

For aggregates, RAP, and HMA, split the samples into at least 4 parts and label their containers. Submit 3 parts to the Engineer and keep 1 part. The Engineer retains 1 part of the samples to be used in the event of dispute resolution.

You and the Engineer must test the samples and report test results, except for California Test 389, if required, within 5 business days of sampling. For California Test 389, report test results within 15 days of sampling. If you proceed before receipt of the test results, the Engineer may consider the HMA placed to be represented by these test results.

California Test 389 is not required if production start-up evaluation is within 45 days of the date the Hot Mix Asphalt Verification form is signed.

If production stops for more than 60 days, perform a production start-up evaluation. If production stops for more than 30 days but less than 60 days, perform a reduced production start-up evaluation. Reduced production start-up evaluation is production start-up evaluation without California Test 389.

If production start-up evaluation fails, do not begin production.

#### **39-2.01A(4)(h)(vi) Hot Mix Asphalt Density**

During HMA placement, determine HMA density using a density gauge. A non-nuclear gauge may be used in accordance with ASTM D7113.

For projects greater than 1,500 tons, on the 1st day of production, develop a correlation factor between cores and density gauges under California Test 375.

Replace California Test 375 Part 2B Paragraph 2 with "Follow the procedure described in Part 3 of this test method to establish a minimum of five random test site locations on the test strip".

Cores may be 4-inch or 6-inch diameter and, if requested, must be taken in the presence of the Engineer or Engineer's authorized representative. Test cores per AASHTO T 275, Method A. In-place core density shall represent final result.

Test for in-place density using a density gauge, which has been correlated as noted in the preceding paragraph. Test at random locations you select and include the test results in your QC production test reports. Lots for density testing must not exceed 250 tons with a minimum of 3 locations per lot.

At the request of the Engineer, provide your QC production test reports for in-place density using a density gauge within 24 hours of a request.

#### **39-2.01A(4)(h)(vii) - 39-2.01A(4)(h)(viii) Reserved**

#### **39-2.01A(4)(h)(ix) Pavement Smoothness**

For HMA pavement within 3 feet from and parallel to the construction joint formed between curbs, gutters, or existing pavement, test pavement smoothness using a 12-foot straightedge.

**39-2.01A(4)(h)(x) Reserved****39-2.01A(4)(i) Engineer Acceptance****39-2.01A(4)(i)(i) General**

You shall collect acceptance samples. Samples shall be taken in the presence of the Engineer or Engineer's authorized representative. Split the Engineer acceptance samples into at least 4 parts. Engineer retains 3 parts and you keep 1 part. The Engineer retains 1 part of the samples to be used in the event of dispute resolution.

HMA samples for California Test 389 shall be taken from any of the following locations:

1. Plant
2. Truck
3. Windrow (plant or jobsite)
4. Mat behind the paver

HMA samples for all other tests shall be taken from any of the following locations:

1. Plant
2. Truck
3. Windrow (plant or jobsite)
4. Mat behind the paver

To obtain workability of the HMA sample for splitting, the Engineer reheats each sample of HMA mixture not more than 2 cycles. Each reheat cycle is performed by placing the loose mixture in a mechanical forced-draft oven for 2 hours or less after the sample reaches 230 degrees F.

The Engineer conditions each at-the-plant sample of HMA mixture when composite aggregate absorption factor is greater than 2.0 percent as indicated by the JMF in compliance with sections 7.1.1, 7.1.2, 7.1.3, and 7.1.4 of AASHTO R 30.

No single test result may represent more than 750 tons or one day's production, whichever is less, except California Test 389.

Except for smoothness, if 2 consecutive Department acceptance test results or any 3 Department acceptance test results for 1 day's production do not comply with the specifications:

1. Stop HMA production
2. Take corrective action
3. Demonstrate compliance with the specifications before resuming production and placement

For Department acceptance tests performed under AASHTO T 11 / 27, results are considered 1 Department acceptance test regardless of the number of sieves out of compliance.

The Engineer accepts HMA based on:

1. JMF compliance, applicable material tolerances,
2. In-Place Core Density (if required),
3. Pavement smoothness
4. Visual inspection

**39-2.01A(4)(i)(ii) In-Place Density**

Except for HMA pavement placed using method compaction, the Engineer tests the density core you take from each 250 tons of HMA. If acceptance by cores, you must take the cores in accordance with

California Test 375, Part 3B and/or approved by the Engineer. The Engineer determines the density of the cores you take in accordance with AASHTO T 275, Method A.

You must provide accurate documentation of the location of each core taken. The document shall be clear to allow the Engineer to easily locate the sample location in the field.

Cores taken for gauge calibration may be used as acceptance cores for density.

If a density core is damaged, replace it with a density core taken within 1 foot longitudinally from the original density core. Relocate any density core located within 1 foot of a rumble strip to 1 foot transversely away from the rumble strip.

The Engineer determines the percent of theoretical maximum density for each density result by taking the density result and dividing by the theoretical maximum density. Test results shall not be rounded to the nearest 1.0%; instead, test results shall be reported to the nearest 0.1%. The theoretical maximum density shall be in accordance with AASHTO T 209 and shall be representative of the subplot in which the cores are taken.

Each lift of HMA is tested independently.

If the percent of theoretical maximum density does not comply with the specifications, the Engineer may accept the HMA and take a payment deduction or remove and replace as shown in Table 1 for HMA Type F & HMA Type H mixtures, and Table 2 for RHMA-G mixtures:

Table 1 - Reduced Payment Factors for HMA Type F &amp; HMA Type H

HMA Percent of Theoretical Maximum Density	HMA Type F & HMA Type H Reduced Payment Factor	HMA Percent of Theoretical Maximum Density	HMA Type F & HMA Type H Reduced Payment Factor
92.0	0.0000	97.0	0.0000
91.9	0.0125	97.1	0.0125
91.8	0.0250	97.2	0.0250
91.7	0.0375	97.3	0.0375
91.6	0.0500	97.4	0.0500
91.5	0.0625	97.5	0.0625
91.4	0.0750	97.6	0.0750
91.3	0.0875	97.7	0.0875
91.2	0.1000	97.8	0.1000
91.1	0.1125	97.9	0.1125
91.0	0.1250	98.0	0.1250
90.9	0.1375	98.1	0.1375
90.8	0.1500	98.2	0.1500
90.7	0.1625	98.3	0.1625
90.6	0.1750	98.4	0.1750
90.5	0.1875	98.5	0.1875
90.4	0.2000	98.6	0.2000
90.3	0.2125	98.7	0.2125
90.2	0.2250	98.8	0.2250
90.1	0.2375	98.9	0.2375
90.0	0.2500	99.0	0.2500
<90.0	Remove & replace	>99.0	Remove & replace

Table 2 - Reduced Payment Factors for RHMA-G

RHMA Percent of Theoretical Maximum Density	RHMA-G Reduced Payment Factor	RHMA Percent of Theoretical Maximum Density	RHMA-G Reduced Payment Factor
91.0	0.0000	97.0	0.0000
90.9	0.0125	97.1	0.0125
90.8	0.0250	97.2	0.0250
90.7	0.0375	97.3	0.0375
90.6	0.0500	97.4	0.0500
90.5	0.0625	97.5	0.0625
90.4	0.0750	97.6	0.0750
90.3	0.0875	97.7	0.0875
90.2	0.1000	97.8	0.1000
90.1	0.1125	97.9	0.1125
90.0	0.1250	98.0	0.1250
89.9	0.1375	98.1	0.1375
89.8	0.1500	98.2	0.1500
89.7	0.1625	98.3	0.1625
89.6	0.1750	98.4	0.1750
89.5	0.1875	98.5	0.1875
89.4	0.2000	98.6	0.2000
89.3	0.2125	98.7	0.2125
89.2	0.2250	98.8	0.2250
89.1	0.2375	98.9	0.2375
89.0	0.2500	99.0	0.2500
<89.0	Remove & replace	>99.0	Remove & replace

**39-2.01A(4)(i)(iii) Pavement Smoothness****39-2.01A(4)(i)(iii)(A) General****39-2.01A(4)(i)(iii)(B) Straightedge**

The HMA pavement top layer must not vary from the lower edge of a 12-foot long straightedge:

1. More than 0.01 foot when the straight edge is laid parallel with the centerline
2. More than 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. More than 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

**39-2.01A(4)(i)(iii)(C) Profilograph**

Under California Test 526, determine the zero (null) blanking band Profile Index (PI0) and must-grinds on the top layer of HMA pavement. Take 2 profiles within each traffic lane, 3 feet from and parallel with the edge of each lane.

A must-grind is a deviation of 0.3 inch or more in a length of 25 feet. You must correct must-grinds.

Profile pavement in the Engineer's or Engineer's authorized representative's presence. Choose the time of profiling.

On tangents and horizontal curves with a centerline radius of curvature 2,000 feet or more, the PI0 must be at most 2.5 inches per 0.1-mile section.

On horizontal curves with a centerline radius of curvature between 1,000 feet and 2,000 feet including pavement within the super-elevation transitions, the PI0 must be at most 5 inches per 0.1-mile section.

Before the Engineer accepts HMA pavement for smoothness, submit written final profilograms.

Submit 1 electronic copy of profile information in Microsoft Excel and 1 electronic copy of longitudinal pavement profiles in ".erd" format or other ProVAL compatible format to the Engineer and to:

The following HMA pavement areas do not require a PI0. You must measure these areas with a 12-foot straightedge and determine must-grinds with a profilograph:

1. New HMA with a total thickness less than 0.25 foot
2. HMA sections of turn lanes and collector lanes that are less than 1,500 feet in length

The following HMA pavement areas do not require a PI0. You must measure these areas with a 12-foot straightedge:

1. Horizontal curves with a centerline radius of curvature less than 1,000 feet including pavement within the super-elevation transitions of those curves
2. Within 12 feet of a transverse joint separating the pavement from:
  - 2.1. Existing pavement not constructed under the same project
  - 2.2. A bridge deck or approach slab
3. Exit ramp termini, truck weigh stations, and weigh-in-motion areas
4. If steep grades and super-elevation rates greater than 6 percent are present on:
  - 4.1. Ramps
  - 4.2. Connectors
5. Turn lanes
6. Areas within 15 feet of manholes or drainage transitions
7. Acceleration and deceleration lanes for at-grade intersections
8. Shoulders and miscellaneous areas
9. HMA pavement within 3 feet from and parallel to the construction joints formed between curbs, gutters, or existing pavement.

#### **39-2.01A(4)(i)(iv) Dispute Resolution**

You and the Engineer must work together to avoid potential conflicts and to resolve disputes regarding test result discrepancies. You and the Engineer may only dispute each other's test results if one party's test results pass and the other party's test results fail.

You must notify the Engineer if you plan to a dispute test results within 3 business days of receiving the Engineer's test results. Submit your test results and copies of paperwork including worksheets used to determine the disputed test result within 3 business days of notifying the Engineer of your plan to dispute test results.

You and the Engineer shall mutually agree on an independent third party (ITP) to perform referee testing. Before the ITP participates in a dispute resolution, it must be qualified under the AASHTO re:source program and the Caltrans Independent Assurance Program. The ITP personnel performing the tests shall be competent and possess the necessary certifications to provide referee testing. The ITP must have no prior direct involvement with this Contract.

If the Engineer's portion of the split acceptance samples is not available, you and the Engineer shall mutually agree on available material representing the disputed test result for the ITP to use.

For a dispute involving core density, the ITP performs referee testing based on cores.

The entire dispute resolution process **shall not exceed 20 business days** from the day you notified your plan to dispute the test results (includes selection of an ITP for referee testing). Reduced payment or remove and replace will be enforced at the discretion of the Engineer for dispute resolutions exceeding 20 business days.

If the ITP determines the Engineer's test results are valid, the Engineer deducts ITP's testing costs from payments. If the ITP determines your test results are valid, the Engineer pays the ITP's testing costs.

### **39-2.01B Materials**

#### **39-2.01B(1) General**

Reserved

#### **39-2.01B(2) Mix Design**

##### **39-2.01B(2)(a) General**

The HMA mix design must comply with the Superpave HMA mix design method as described in the latest edition of *MS-2 Asphalt Mix Design Methods* by the Asphalt Institute.

The Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512) must show documentation on aggregate quality.

##### **39-2.01B(2)(b) Hot Mix Asphalt Treatments**

If the proposed JMF indicates that the HMA is being treated with liquid antistrip, then testing the untreated HMA under California Test 389 is not required.

##### **39-2.01B(2)(c) Warm Mix Asphalt Technology**

For HMA with WMA additive technology, produce HMA mix samples for your mix design using your methodology for inclusion of WMA admixture in laboratory-produced HMA. Cure the samples in a forced-air draft oven at 275 degrees F for 4 hours  $\pm$  10 minutes.

For WMA water injection foam technology, the use of foamed asphalt for mix design is not required.

#### **39-2.01B(3) Asphalt Binder**

Asphalt binder must comply with section 92.

#### **39-2.01B(4) Aggregates**

##### **39-2.01B(4)(a) General**

Aggregates must be clean and free from deleterious substances.

The aggregates for a leveling course must comply with the gradation specifications for HMA in section 39-2.02B.

##### **39-2.01B(4)(b) Aggregate Gradations**

Aggregate gradation must be determined before the addition of asphalt binder and must include supplemental fine aggregates. Test for aggregate gradation under AASHTO T 27. Do not wash the coarse aggregate. Wash the fine aggregate in accordance with AASHTO T11. Use a mechanical sieve shaker. Aggregate shaking time must not exceed 10 minutes for each coarse and fine aggregate portion.

Choose a TV within the TV limits shown in the tables titled "Aggregate Gradations."

Gradations are based on nominal maximum aggregate size.

**39-2.01B(4)(c) Reserved**

**39-2.01B(5) Liquid Antistrip Treatment**

Do not use liquid antistrip as a substitute for asphalt binder.

Total amine value for amine-based liquid antistrip must be a minimum of 325 when tested under ASTM D2074. Dosage from amine-based liquid antistrip must be from 0.25 to 1.00 percent by weight of asphalt binder. Only amine-based liquid antistrip shall be used at this time.

Use only 1 liquid antistrip type or brand at a time. Do not mix liquid antistrip types or brands.

Store and mix liquid antistrip under the manufacturer’s instructions.

Warm mix technology may be used as substitute for liquid antistrip treatment at the approval of the Engineer.

**39-2.01B(6)–39-2.01B(7) Reserved**

**39-2.01B(8) Hot Mix Asphalt Production**

**39-2.01B(8)(a) General**

Do not start HMA production before authorization of JMF.

The HMA plant must have a current qualification under the Caltrans Material Plant Quality Program, or be approved by the Engineer.

Proportion aggregate by hot or cold-feed control.

Aggregate temperature must not be more than 375 degrees F when mixed with the asphalt binder.

Asphalt binder temperature must be from 275 to 375 degrees F when mixed with aggregate.

Mix HMA ingredients into a homogeneous mixture of coated aggregates.

HMA must be produced at the temperatures shown in the following table:

<b>HMA Production Temperatures</b>	
HMA compaction	Temperature (°F)
HMA	
Density based Method	≤ 325 305–325
HMA with WMA technology	
Density based Method	240–325 260–325

If you stop production for more than 30 days but less than 60 days, a production start-up evaluation, without California Test 389, is required.

If you stop production for 60 days or more, a production start-up evaluation is required. The Engineer may require California Test 389.

**39-2.01B(8)(b) Liquid Antistrip**

If 3 consecutive sets of recorded production data show that the actual delivered liquid antistrip weight is more than ±1 percent of the authorized mix design liquid antistrip weight, stop production and take corrective action.

If a set of recorded production data shows that the actual delivered liquid antistrip weight is more than ±2 percent of the authorized mix design liquid antistrip weight, stop production. If the liquid antistrip weight exceeds 1.2 percent of the asphalt binder weight, do not use the HMA represented by that data.



The continuous mixing plant controller proportioning the HMA must produce a production data log. The log must consist of a series of data sets captured at 10-minute intervals throughout daily production. The data must be a production activity register and not a summation. The material represented by the data is the quantity produced 5 minutes before and 5 minutes after the capture time. For the duration of the Contract, the collected data must be stored by the plant controller or a computer memory at the plant.

The Engineer orders proportioning activities stopped for any of the following reasons:

1. You fail to submit data
2. You submit incomplete, untimely, or incorrectly formatted data
3. You fail to take corrective actions
4. You take late or unsuccessful corrective actions
5. You fail to stop production when proportioning tolerances are exceeded
6. You use malfunctioning or failed proportioning devices

If you stop production, notify the Engineer of any corrective actions taken before resuming.

#### **39-2.01B(8)(c) Warm Mix Asphalt Technology**

Proportion all ingredients by weight. The HMA plant process controller must be the sole source of ingredient proportioning control and be fully interfaced with all scales and meters used in the production process. The addition of the HMA additive must be controlled by the plant process controller.

Liquid ingredient additive, including a normally dry ingredient made liquid, must be proportioned with a mass flow meter at continuous mixing plants. Use a mass flow meter or a container scale to proportion liquid additives at batch mixing plants.

Continuous mixing plants using HMA additives must comply with the following:

1. Dry ingredient additives for continuous production must be proportioned with a conveyor scale or a loss-in-weight meter.
2. HMA plant process controller and ingredient measuring systems must be capable of varying all ingredient-feed rates proportionate with the dry aggregate delivery at all production rates and rate changes.
3. Liquid HMA additive must enter the production stream with the binder. Dry HMA additive must enter the production stream at or before the mixing area.
4. If dry HMA additives are used at continuous mixing HMA plants, bag-house dust systems must return all captured material to the mix. This requirement is waived for lime-treated aggregates.
5. HMA additive must be proportioned to within  $\pm 0.3$  percent of the target additive rate.

Batch mixing plants using HMA additives must comply with the following:

1. Metered HMA additive must be placed in an intermediate holding vessel before being added to the stream of asphalt binder as it enters the pugmill.
2. If a container scale is used, weigh additive before combining with asphalt binder. Keep the container scale separate from other ingredient proportioning. The container scale capacity must be no more than twice the volume of the maximum additive batch size. The container scale's graduations must be smaller than the proportioning tolerance or 0.001 times the container scale capacity.
3. Dry HMA additive proportioning devices must be separate from metering devices for the aggregates and asphalt binder. Proportion dry HMA additive directly into the pugmill, or place in an intermediate holding vessel to be added to the pugmill at the appropriate time in the batch cycle. Dry ingredients for batch production must be proportioned with a hopper scale.
4. Zero tolerance for the HMA additive batch scale is  $\pm 0.5$  percent of the target additive weight. The indicated HMA additive batch scale weight may vary from the preselected weight setting by up to  $\pm 1.0$  percent of the target additive weight.

**39-2.01B(9) Geosynthetic Pavement Interlayer**

Geosynthetic pavement interlayer must comply with section 96-1.02 of the specifications for pavement fabric, paving mat, paving grid, paving geocomposite grid, or geocomposite strip membrane as shown.

The asphalt binder for geosynthetic pavement interlayer must be PG 64-10, PG 64-16, or PG 70-10.

**39-2.01B(10) Tack Coat**

Tack coat must comply with the specifications for asphaltic emulsion or asphalt binder. Choose the Type and grade of emulsion or binder.

**39-2.01B(11) Miscellaneous Areas and Dikes**

For miscellaneous areas and dikes:

1. Choose the aggregate gradation from:
  - 1.1. 3/8-inch HMA aggregate gradation
  - 1.2. 1/2-inch HMA aggregate gradation
  - 1.3. dike mix aggregate gradation
2. Choose asphalt binder Grade PG 64-10, PG 64-16 or PG 70-10.
3. Minimum asphalt binder content must be:
  - 3.1. 6.40 percent for 3/8-inch HMA aggregate gradation
  - 3.2. 5.70 percent for 1/2-inch HMA aggregate gradation
  - 3.3. 6.00 percent for dike mix aggregate gradation

If you request and the Engineer authorizes, you may reduce the minimum asphalt binder content.

Aggregate gradation for dike mix must be within the TV limits for the specified sieve size shown in the following table:

**Dike Mix Aggregate Gradation  
(Percentage Passing)**

Sieve size	Target value limit	Allowable tolerance
1/2"	100	--
3/8"	---	95 - 100
No. 4	73-77	TV ± 10
No. 8	58-63	TV ± 10
No. 30	29-34	TV ± 10
No. 200	--	0 - 14

For HMA used in miscellaneous areas and dikes, sections 39-2.01A(3), 39-2.01A(4), 39-2.01B(2), 39-2.01B(4)(c), and 39-2.01B(5)-(10) do not apply.

**39-2.01C Construction****39-2.01C(1) General**

Do not place HMA on wet pavement or frozen surface.

You may deposit HMA in a windrow and load it in the paver if:

1. Paver is equipped with a hopper that automatically feeds the screed
2. Loading equipment can pick up the windrowed material and deposit it in the paver hopper without damaging base material
3. Activities for depositing, pickup, loading, and paving are continuous
4. For method compaction:
  - 4.1. The temperature of the HMA and the HMA produced with WMA water injection

- technology in the windrow does not fall below 260 degrees F
- 4.2. The temperature of the HMA produced using WMA additive technology in the windrow does not fall below 250 degrees F

You may place HMA in 1 or more layers on areas less than 5 feet wide and outside the traveled way, including shoulders. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture.

HMA handled, spread, or windrowed must not stain the finished surface of any improvement, including pavement.

Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, shovels, rakes, or compactors.

HMA must be free of:

1. Segregation
2. Coarse or fine aggregate pockets
3. Hardened lumps
4. Marks
5. Tearing
6. Irregular texture

Complete finish rolling activities before the pavement surface temperature is:

1. Below 150 degrees F for HMA with unmodified binder
2. Below 140 degrees F for HMA with modified binder

### **39-2.01C(2) Spreading and Compacting Equipment**

#### **39-2.01C(2)(a) General**

Paving equipment for spreading must be:

1. Self-propelled
2. Mechanical
3. Equipped with a screed or strike-off assembly that can distribute HMA the full width of a traffic lane
4. Equipped with a full-width compacting device
5. Equipped with automatic screed controls and sensing devices that control the thickness, longitudinal grade, and transverse screed slope.

The screed must be heated and produce a uniform HMA surface texture without tearing, shoving, or gouging.

The paver must not leave marks such as ridges and indentations unless you can eliminate them by rolling.

Rollers must be equipped with a system that prevents HMA from sticking to the wheels. You may use a parting agent that does not damage the HMA or impede the bonding of layers.

In areas inaccessible to spreading and compacting equipment:

1. Spread the HMA by any means to obtain the specified lines, grades, and cross sections
2. Use a pneumatic tamper, plate compactor, or equivalent to achieve thorough compaction

**39-2.01C(2)(b) Material Transfer Vehicle**

If a material transfer vehicle is specified, the material transfer vehicle must have sufficient capacity to prevent stopping the paver and must be capable of:

1. Either receiving HMA directly from trucks or using a windrow pickup head to load it from a windrow deposited on the roadway surface
2. Remixing the HMA with augers before transferring into the paver's receiving hopper or feed system
3. Transferring HMA directly into the paver's receiving hopper or feed system

**39-2.01C(2)(c) Method Compaction Equipment**

For method compaction, each paver spreading HMA must be followed by at least one of each of the following 3 Types of rollers:

1. Breakdown roller must be a vibratory roller specifically designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons.
2. Intermediate roller must be an oscillating-Type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, Type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi.
3. Finishing roller must be a steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons.

Each roller must have a separate operator. Rollers must be self-propelled and reversible. Any deviation from the above requirements must be approved in writing by the Engineer.

Method compaction procedures are described in detail in Section 39-2.01C(15)(b).

**39-2.01C(2)(d)–39-2.01C(2)(f) Reserved****39-2.01C(3) Surface Preparation****39-2.01C(3)(a) General**

Before placing HMA, remove loose paving particles, dirt, and other extraneous material by any means including flushing and sweeping.

**39-2.01C(3)(b) Subgrade**

Prepare subgrade to receive HMA under the sections for the material involved. Subgrade must be free of loose and extraneous material.

**39-2.01C(3)(c) - 39-2.01C(3)(e) Reserved****39-2.01C(3)(f) Tack Coat**

Apply a tack coat:

1. To existing pavement including planed surfaces
2. Between HMA layers
3. To vertical surfaces of:
  - 3.1. Curbs
  - 3.2. Gutters
  - 3.3. Construction joints

Equipment for the application of tack coat must comply with section 37-1.03B.

Before placing HMA, apply a tack coat in 1 application at the minimum residual rate shown in the following table for the condition of the underlying surface:

**Tack Coat Application Rates for HMA**

HMA over:	Minimum residual rates (gal/sq yd)		
	CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h asphaltic emulsion	CRS1/CRS2, RS1/RS2 and QS1/CQS1 asphaltic emulsion	Asphalt binder and PMCRS-2 / PMCRS- 2h asphaltic emulsion
New HMA (between layers)	0.02	0.03	0.02
Concrete pavement and existing asphalt concrete surfacing	0.03	0.04	0.03
Planed pavement	0.05	0.06	0.04

If a stress absorbing membrane interlayer as specified in section 37-2.05 is applied, the tack coat application rates for new HMA apply.

Notify the Engineer if you dilute asphaltic emulsion with water. The weight ratio of added water to asphaltic emulsion must not exceed 1 to 1.

Measure added water either by weight or volume under section 9-1.02 or use water meters from water districts, cities, or counties. If you measure water by volume, apply a conversion factor to determine the correct weight.

With each dilution, submit:

1. Weight ratio of water to bituminous material in the original asphaltic emulsion
2. Weight of asphaltic emulsion before diluting
3. Weight of added water
4. Final dilution weight ratio of water to asphaltic emulsion

Apply a tack coat to vertical surfaces with a residual rate that will thoroughly coat the vertical face without running off.

If authorized, you may change the tack coat application rates.

Immediately in advance of placing HMA, apply additional tack coat to damaged areas or where loose or extraneous material is removed.

Close areas receiving tack coat to traffic. Do not allow the tracking of tack coat onto pavement surfaces beyond the job site.

If you use an asphalt binder for tack coat, the asphalt binder temperature must be from 285 to 350 degrees F when applied.

### **39-2.01C(3)(g) Geosynthetic Pavement Interlayer**

Where shown, place geosynthetic pavement interlayer over a coat of asphalt binder and in compliance with the manufacturer's instructions. Do not place the interlayer on a wet or frozen surface. If the interlayer, in compliance with the manufacturer's instructions, does not require asphalt binder, do not apply asphalt binder before placing the interlayer.

Before placing the interlayer or asphalt binder:

1. Repair cracks 1/4 inch and wider, spalls, and holes in the pavement. This repair is change order work and shall be approved by the Engineer.

2. Clean the pavement of loose and extraneous material.

If the interlayer requires asphalt binder, immediately before placing the interlayer, apply asphalt binder at a rate specified by the interlayer manufacturer; at  $0.25 \pm 0.03$  gal per square yard of interlayer; or at a rate that just saturates the interlayer; whichever is greater. Apply asphalt binder the width of the interlayer plus 3 inches on each side. At an interlayer overlap, apply asphalt binder on the lower interlayer the same overlap distance as the upper interlayer.

If asphalt binder tracked onto the interlayer or brought to the surface by construction equipment causes interlayer displacement, cover it with a small quantity of HMA.

If the interlayer placement does not require asphalt binder, apply tack coat prior to placing HMA at the application rates specified under section 39-2.01C(3)(f) based on the condition of the underlying surface on which the interlayer was placed.

Align and place the interlayer with no overlapping wrinkles, except a wrinkle that overlaps may remain if it is less than 1/2 inch thick. If the overlapping wrinkle is more than 1/2 inch thick, cut the wrinkle out and overlap the interlayer no more than 2 inches.

Overlap the interlayer borders between 2 to 4 inches. In the direction of paving, overlap the following roll with the preceding roll at any break.

You may use rolling equipment to correct distortions or wrinkles in the interlayer.

Before placing HMA on the interlayer, do not expose the interlayer to:

1. Traffic, except for crossings under traffic control and only after you place a small HMA quantity
2. Sharp turns from construction equipment
3. Damaging elements

Pave HMA on the interlayer during the same work shift. The minimum HMA thickness over the interlayer must be 0.12 foot including at conform tapers.

#### **39-2.01C(4) Longitudinal Joints**

##### **39-2.01C(4)(a) General**

Longitudinal joints in the top layer must match lane lines. Alternate the longitudinal joint offsets in the lower layers at least 0.5 foot from each side of the lane line. Other longitudinal joint placement patterns are allowed if authorized.

A vertical longitudinal joint of more than 0.15 foot is not allowed at any time between adjacent lanes open to traffic.

For an HMA thickness of 0.15 foot or less, the distance between the ends of the adjacent surfaced lanes at the end of each day's work must not be greater than can be completed in the following day of normal paving.

For an HMA thickness greater than 0.15 foot, you must place HMA on adjacent traveled way lanes or shoulder such that at the end of each work shift the distance between the ends of HMA layers on adjacent lanes is from 5 to 10 feet. Place additional HMA along the transverse edge at each lane's end and along the exposed longitudinal edges between adjacent lanes. Hand rake and compact the additional HMA to form temporary conforms. You may place kraft paper or other authorized release agent under the conform tapers to facilitate the taper removal when paving activities resume.

If placing HMA against the edge of existing pavement, saw cut or grind the pavement straight and vertical along the joint and remove extraneous material.

**39-2.01C(4)(b) Tapered Notched Wedge**

For divided highways with an HMA lift thickness greater than 0.15 foot, you may construct a 1-foot wide tapered notched wedge joint as a longitudinal joint between adjacent lanes open to traffic. A vertical notch of 0.75 inch maximum must be placed at the top and bottom of the tapered wedge.

The tapered notched wedge must keep its shape while exposed to traffic. Pave the adjacent lane within 1 day.

Construct the tapered portion of the tapered notched wedge with an authorized strike-off device. The strike-off device must provide a uniform slope and must not restrict the main screed of the paver.

You may use a device attached to the screed to construct longitudinal joints that will form a tapered notched wedge in a single pass. The tapered notched wedge must be compacted to a minimum of 91 percent compaction.

**39-2.01C(5) Pavement Edge Treatments**

Construct edge treatment on the HMA pavement as shown.

Where a tapered edge is required, use the same Type of HMA used for the adjacent lane or shoulder.

The edge of roadway where the tapered edge is to be placed must have a solid base, free of debris such as loose material, grass, weeds, or mud. Grade the areas to receive the tapered edge as required.

The tapered edge must be placed monolithic with the adjacent lane or shoulder and must be shaped and compacted with a device attached to the paver.

The device must be capable of shaping and compacting HMA to the required cross section as shown. Compaction must be accomplished by constraining the HMA to reduce the cross sectional area by 10 to 15 percent. The device must produce a uniform surface texture without tearing, shoving, or gouging and must not leave marks such as ridges and indentations. The device must be capable of transitioning to cross roads, driveways, and obstructions.

For the tapered edge, the angle of the slope must not deviate by more than  $\pm 5$  degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

If paving is done in multiple lifts, the tapered edge must be placed with each lift.

Short sections of hand work are allowed to construct tapered edge transitions.

**39-2.01C(6) Widening Existing Pavement**

If widening existing pavement, construct new pavement structure to match the elevation of the existing pavement's edge before placing HMA over the existing pavement.

**39-2.01C(7) Shoulders, Medians, and Other Road Connections**

Until the adjoining through lane's top layer has been paved, do not pave the top layer of:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets

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If the number of lanes changes, pave each through lane's top layer before paving a tapering lane's top layer. Simultaneous to paving a through lane's top layer, you may pave an adjoining area's top layer, including shoulders. Do not operate spreading equipment on any area's top layer until completing final compaction.

If shoulders or median borders are shown, pave shoulders and median borders adjacent to the lane before opening a lane to traffic.

If shoulder conform tapers are shown, place conform tapers concurrently with the adjacent lane's paving.

If a driveway or a road connection is shown, place additional HMA along the pavement's edge to conform to road connections and driveways. Hand rake, if necessary, and compact the additional HMA to form a smooth conform taper.

**39-2.01C(8) Leveling**

Section 39-2.01C(8) applies if a bid item for hot mix asphalt (leveling) is shown on the Bid Item List.

Fill and level irregularities and ruts with HMA before spreading HMA over the base, existing surfaces, or bridge decks. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture. HMA used to change an existing surface's cross slope or profile is not paid for as hot mix asphalt (leveling). Compact using the method process unless otherwise specified in the special provisions.

**39-2.01C(9) Miscellaneous Areas and Dikes**

Prepare the area to receive HMA for miscellaneous areas and dikes, including excavation and backfill as needed.

Spread the HMA in miscellaneous areas in 1 layer and compact to the specified lines and grades.

In median areas adjacent to slotted median drains, each layer of HMA must not exceed 0.20 foot (2.4 inch) maximum compacted thickness.

The finished surface must be:

1. Textured uniformly
2. Compacted firmly
3. Without depressions, humps, and irregularities

**39-2.01C(10)–39-2.01C(14) Reserved**

**39-2.01C(15) Compaction**

**39-2.01C(15)(a) General**

Rolling must leave the completed surface compacted and smooth without tearing, checking, cracking, or shoving.

If a vibratory roller is used as a finish roller, turn the vibrator off.

Do not open new HMA pavement to traffic until its mid depth temperature is below 160 degrees F.

If the surface to be paved is both in sunlight and shade, pavement surface temperatures are taken in the shade.

**39-2.01C(15)(b) Method Compaction**

Use method compaction for any of the following conditions:

1. HMA pavement thickness shown is less than **0.15 foot (1.8 inches)**
2. Replace asphalt concrete surfacing (**digouts**)
3. Leveling courses



4. Areas the Engineer determines conventional compaction and compaction measurement methods are impeded

HMA compaction coverage is the number of passes needed to cover the paving width. A pass is 1 roller's movement parallel to the paving in either direction. Overlapping passes are part of the coverage being made and are not a subsequent coverage. Do not start a coverage until completing the prior coverage.

Method compaction must consist of performing:

1. Breakdown compaction of each layer with 3 coverages using a vibratory roller. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the HMA layer thickness is less than 0.08 foot, turn the vibrator off.
2. Intermediate compaction of each layer of HMA with 3 coverages using a pneumatic-tired roller at a speed not to exceed 5 mph.
3. Finish compaction of HMA with 1 coverage using a steel-tired roller.

Start rolling at the lower edge and progress toward the highest part.

The Engineer may order fewer coverages if the layer thickness of HMA is less than 0.15 foot (1.8 inches).

The compacted lift thickness must not exceed 0.25 foot (3 inches).

Any deviation from the above requirements must be approved in writing by the Engineer.

#### **39-2.01C(15)(c)–39-2.01C(15)(e) Reserved**

#### **39-2.01C(16) Smoothness Corrections**

If the pavement surface does not comply with section 39-2.01A(4)(i)(iii), grind the pavement to within specified tolerances, remove and replace the pavement, or place an overlay of HMA. Do not start corrective work until your method is authorized.

Do not use equipment with carbide cutting teeth to grind the pavement unless authorized. Smoothness corrections must leave at least 75 percent of the specified HMA thickness. If ordered, core the pavement at the locations selected by the Engineer. Remove and replace deficient pavement areas where the overlay thickness is less than 75 percent of the thickness specified.

Corrected HMA pavement areas must be uniform rectangles, half the lane width, with edges:

1. Parallel to and along the nearest HMA pavement edge or lane line
2. Perpendicular to the pavement centerline

Measure the corrected HMA pavement surface as specified in 39-2.01A(4)(i)(iii) Pavement Smoothness and correct the pavement to within specified tolerances.

If a must-grind area or straight edged pavement cannot be corrected to within specified tolerances, remove and replace the pavement. Retest the corrected area with the straightedge.

On ground areas not to be overlaid with OGFC, apply a fog seal under section 37-4.02.

#### **39-2.01C(17) Reserved**

#### **39-2.01D Payment**

The payment quantity for geosynthetic pavement interlayer is the area measured from the actual pavement covered.

Except for tack coat used in minor HMA, payment for tack coat is not included in the payment for hot mix asphalt.

The Department does not adjust the unit price for an increase or decrease in the tack coat quantity.

The payment quantity for HMA of the Type shown on the Bid Item List is measured based on the combined mixture weight. If recorded batch weights are printed automatically, the bid item for HMA is measured by using the printed batch weights, provided:

1. Total aggregate and supplemental fine aggregate weight per batch is printed. If supplemental fine aggregate is weighed cumulatively with the aggregate, the total aggregate batch weight must include the supplemental fine aggregate weight.
2. Total virgin asphalt binder weight per batch is printed.
3. Each truckload's zero tolerance weight is printed before weighing the first batch and after weighing the last batch.
4. Time, date, mix number, load number and truck identification is correlated with a load slip.
5. Copy of the recorded batch weights is certified by a licensed weigh master and submitted.

The payment quantity for place hot mix asphalt dike of the Type shown on the Bid Item List is the length measured from end to end. Payment for the HMA used to construct the dike is not included in the payment for place hot mix asphalt dike.

The payment quantity for place hot mix asphalt (miscellaneous areas) is the area measured for the in-place compacted area. Payment for the HMA used for miscellaneous areas is not included in the payment for place hot mix asphalt (miscellaneous areas).

The Engineer does not adjust the unit price for an increase or decrease in the prepaving grinding day quantity.

### **39-2.02 HOT MIX ASPHALT TYPE F & TYPE H**

#### **39-2.02A General**

##### **39-2.02A(1) Summary**

Section 39-2.02 includes specifications for producing and placing HMA Type F & Type H.

If authorized by the Engineer, you may produce HMA Type F & Type H using authorized Caltrans approved WMA technology.

If liquid antistrip (LAS) is specified for HMA Type F or Type H, WMA technology may be used as substitution for LAS at the approval of the Engineer.

##### **39-2.02A(2) Definitions**

Reserved

##### **39-2.02A(3) Submittals**

###### **39-2.02A(3)(a) General**

Reserved

###### **39-2.02A(3)(b) Job Mix Formula**

The JMF must be based on the Superpave HMA mix design method as described in the latest edition of MS-2 *Asphalt Mix Design Methods* by the Asphalt Institute as modified herein.

**39-2.02A(3)(c) Reclaimed Asphalt Pavement**

Submit QC test results for RAP gradation with the combined aggregate gradation within 2 business days of taking RAP samples during HMA production.

**39-2.02A(3)(d)–39-2.02A(3)(f) Reserved****39-2.02A(4) Quality Assurance****39-2.02A(4)(a) General**

Reserved

**39-2.02A(4)(b) Quality Control****39-2.02A(4)(b)(i) General**

Reserved

**39-2.02A(4)(b)(ii) Aggregates**

Test the quality characteristics of aggregates under the test methods and frequencies shown in the following table:

**Minimum Contractor Quality Control Aggregate Testing**

Quality characteristic	Test method	Minimum testing frequency
Gradation <sup>a</sup>	AASHTO T 11 / T 27	1 per 750 tons and any remaining part
Sand equivalent <sup>b, c</sup>	AASHTO T 176	
Moisture content <sup>d</sup>	AASHTO T 255	
Crushed particles	AASHTO T 335	1 per 10,000 tons or 2 per project whichever is greater
Los Angeles Rattler	AASHTO T 96	
Flat and elongated particles	ASTM D4791	

<sup>a</sup> Test for aggregate gradation under AASHTO T 27. Do not wash the coarse aggregate. Wash the fine aggregate in accordance with AASHTO T11. If RAP is used, test the combined aggregate gradation under California Test 384.

<sup>b</sup> Reported value must be the average of 3 tests from a single sample.

<sup>c</sup> Use of a sand reading indicator is required as shown in AASHTO T176, Figure 1. Section 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde.

<sup>d</sup> Test at continuous mixing plants only. If RAP is used, test the RAP moisture content at continuous mixing plant and batch mixing plant.

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during HMA production.

**39-2.02A(4)(b)(iii) Reclaimed Asphalt Pavement**

Sample and test mix design RAP stockpile under California Test 384.

Report the average AASHTO T 308 uncorrected binder content on page 4 of your Contractor Hot Mix Asphalt Design Data form.

When the mix design RAP stockpile is augmented, sample RAP used to augment the stockpile at a minimum frequency of 1 sample per 1,000 tons under California Test 384 before augmenting the stockpile. Test each sample to determine the uncorrected binder content under AASHTO T 308. Average the results of the 3 tests.

When tested under AASHTO T308, the uncorrected binder content of each augmented RAP sample must be within  $\pm 2.00$  percent of the average uncorrected asphalt binder content reported on page 4 of your Contractor Hot Mix Asphalt Design Data form (CEM 3512).

The augmented RAP sample when tested under AASHTO T209 must be within  $\pm 0.06$  of the average maximum specific gravity reported on page 4 of your Contractor Hot Mix Asphalt Design Data form (CEM 3512).

During HMA Type F and Type H production, sample RAP twice daily and perform QC testing for:

1. Aggregate gradation at least once a day under California Test 384
2. Moisture content at least once a day

**39-2.02A(4)(b)(iv)–39-2.02A(4)(b)(viii) Reserved**

**39-2.02A(4)(b)(ix) Hot Mix Asphalt Production**

Test the quality characteristics of HMA under the test methods and frequencies shown in the following table:

**Minimum Contractor Quality Control HMA Testing**

Quality characteristic	Test method	Minimum testing frequency (HMA Type F & Type H)
Asphalt binder content	AASHTO T 308 Method A	1 per 750 tons and any remaining part
HMA moisture content	AASHTO T 329	1 per 2,500 tons but not less than 1 per paving day
Air void content	AASHTO T 269	1 per 4,000 tons or 2 every 5 paving days, whichever is greater
Voids in mineral aggregate	MS-2 Asphalt Mixture Volumetrics	1 per 10,000 tons or 2 per project whichever is greater
Dust proportion	MS-2 Asphalt Mixture Volumetrics	
Density of core	California Test 375	2 per paving day
Nuclear gauge density	California Test 375	3 per 250 tons or 3 per paving day, whichever is greater
Hamburg Wheel Track	California Test 389	1 per 10,000 tons or 1 per project, whichever is greater

**39-2.02A(4)(c)–39-2.02A(4)(d) Reserved**

**39-2.02A(4)(e) Engineer Acceptance**

The Engineer accepts HMA based on compliance with:

1. Aggregate quality requirements shown in the following table:

**Aggregate Quality Requirements**

Quality characteristic	Test method	Requirement	
		Type F	Type H
Aggregate gradation <sup>a</sup>	AASHTO T 11 / 27	JMF TV ± Tolerance	
Percent of crushed particles	AASHTO T 335		
Coarse aggregate (min, %)			
One-fractured face		95	50
Two-fractured faces	90	50	
Fine aggregate (min, %)			
(Passing No. 4 sieve			
and retained on No. 8 sieve.)			
One fractured face		70	20
Los Angeles Rattler (max, %)	AASHTO T 96		
Loss at 100 Rev.		12	12
Loss at 500 Rev.		40	45
Sand equivalent (min.) <sup>b, c</sup>	AASHTO T 176	47	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	10	10
Non-manufactured sand, (max, %) <sup>d</sup>	-	10	10

<sup>a</sup> Test for aggregate gradation under AASHTO T 27. Do not wash the coarse aggregate. Wash the fine aggregate in accordance with AASHTO T11. The Engineer determines combined aggregate gradations containing RAP under California Test 384. The Engineer uses the correlation factor from the Contractor Hot Mix Asphalt Design Data form (CEM 3512) and mathematically combines the virgin and corrected RAP aggregate gradations at the correct proportions to obtain the combined gradation.

<sup>b</sup> Reported value must be the average of 3 tests from a single sample.

<sup>c</sup> Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde

<sup>d</sup> Manufactured sand is fine aggregate produced by crushing rock or gravel

2. If RAP is used, RAP quality requirements shown in the following table:

**Reclaimed Asphalt Pavement Quality**

Quality characteristic	Test method	Requirement
Uncorrected binder content (% within the average value reported <sup>a</sup> )	AASHTO T 308	±2.00
Specific gravity (within the average value reported <sup>b</sup> )	AASHTO T 209	±0.06

<sup>a</sup>Average uncorrected binder content of three ignition oven tests performed at JMF verification. Engineer must use the same ignition oven used to determine the average uncorrected binder content at JMF verification.

<sup>b</sup>Average maximum specific gravity reported on page 4 of Contractor Hot Mix Asphalt Design form (CEM 3512).

3. In-place HMA quality requirements shown in the following table:

**HMA Acceptance In-Place**

Quality characteristic	Test method	Type F	Type H
Asphalt binder content (%)	AASHTOT 308 Method A	JMF ± 0.50	JMF ± 0.50
HMA moisture content (max, %)	AASHTOT 329	1.0	1.0
Air voids content at N <sub>design</sub> (%) <sup>a, b</sup>	AASHTOT 269	4.0 ± 1.5	4.0 ± 1.5
Voids in mineral aggregate on plant-produced HMA (min, %) <sup>a</sup> Gradation: No. 4 3/8-inch 1/2-inch 3/4-inch	MS-2 Asphalt Mixture Volumetrics <sup>c</sup>	15.5–18.5 14.5–17.5 13.5–16.5 12.5–15.5	15.0–18.0 14.0–17.0 13.0–16.0 12.0–15.0
Dust proportion	MS-2 Asphalt Mixture Volumetrics	0.6-1.3	0.5-1.4
Density of core (% of max theoretical density) <sup>e, f</sup>	California Test 375	92.0–97.0	92.0-97.0
Hamburg wheel track (min number of passes at 0.5-inch rut depth) <sup>g</sup> Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	California Test 389	10,000 15,000 20,000 25,000	7,500 12,500 17,500 20,000

<sup>a</sup> Prepare 3 briquettes. Report the average of 3 tests.

<sup>b</sup> The Engineer determines the bulk specific gravity of each lab-compacted briquette under AASHTO T 275, Method A, and theoretical maximum specific gravity under AASHTO T 209, Method A.

<sup>c</sup> Determine bulk specific gravity under AASHTO T 275, Method A.

<sup>e</sup> The Engineer determines percent of theoretical maximum density under California Test 375 except the Engineer uses:

1. AASHTO T 275, Method A, to determine in-place density of each density core instead of using the nuclear gauge
2. AASHTO T 209, Method A to determine theoretical maximum density instead of calculating test maximum density

<sup>f</sup> The Engineer determines theoretical maximum density under AASHTO T 209, Method A.

<sup>g</sup> The Engineer waives the Hamburg wheel track specification for HMA Type H if the HMA contains 10% or less of non-manufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

### 39-2.02B Materials

#### 39-2.02B(1) General

Reserved

#### 39-2.02B(2) Hot Mix Asphalt Mix Design

The mix design for HMA must comply with the requirements shown in the following table:

**HMA Mix Design Requirements**

Quality characteristic	Test method	Type F	Type H
Air voids content (%)	AASHTO T 269 <sup>a, b</sup>	N <sub>initial</sub> > 8.0 N <sub>design</sub> = 4.0 N <sub>max</sub> > 2.0	N <sub>initial</sub> > 8.0 N <sub>design</sub> = 4.0 N <sub>max</sub> > 2.0
Gyrations compaction (no. of gyrations)	AASHTO T 312	N <sub>initial</sub> = 8 N <sub>design</sub> = 85.0 N <sub>max</sub> = 130	N <sub>initial</sub> = 7 N <sub>design</sub> = 65.0 N <sub>max</sub> = 115
Voids in mineral aggregate (min, %) <sup>b</sup> Gradation: No. 4 3/8-inch 1/2-inch 3/4-inch	MS-2 Asphalt Mixture Volumetrics	16.5–19.5 15.5–18.5 14.5–17.5 13.5–16.5	16.0–19.0 15.0–18.0 14.0–17.0 13.0–16.0
Dust proportion	MS-2 Asphalt Mixture Volumetrics	0.6–1.3	0.5–1.4
Hamburg wheel track <sup>d</sup> (min number of passes at 0.5-inch rut depth) Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	California Test 389 <sup>c</sup>	10,000 15,000 20,000 25,000	7,500 12,500 17,500 20,000

<sup>a</sup> Calculate the air voids content of each specimen using AASHTO T 275, Method A, to determine bulk specific gravity. Use AASHTO T 209, Method A to determine theoretical maximum specific gravity. Use a pycnometer and digital manometer when performing AASHTO T 209.

<sup>b</sup> Measure bulk specific gravity using AASHTO T 275, Method A.

<sup>c</sup> Test plant-produced HMA sample

<sup>d</sup> The Engineer waives the Hamburg wheel track specification for HMA Type H if the HMA contains 10% or less of non-manufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

For HMA mixtures using RAP, the maximum allowed binder replacement is 15.0 percent in the upper 0.2 foot (2.4 inches) exclusive of OGFC and 25.0 percent below. The binder replacement is calculated as a percentage of the approved JMF target asphalt binder content.

For HMA with a binder replacement greater than 15.0 percent of your specified OBC and less than or equal to 25.0 percent of OBC, you must use a performance graded asphalt binder grade with upper and lower temperature classifications reduced by 6 degrees C from the specified PG binder grade.

### **39-2.02B(3) Asphalt Binder**

#### **39-2.02B(3)(a) General**

Reserved

### **39-2.02B(4) Aggregates**

#### **39-2.02B(4)(a) General**

Before the addition of asphalt binder and lime treatment, the aggregates must comply with the requirements shown in the following table:

**Aggregate Quality Requirements**

Quality characteristic	Test method	Requirement	
		Type F	Type H
Aggregate gradation <sup>a</sup>	AASHTO T 11 / 27	JMF TV ± Tolerance	
Percent of crushed particles	AASHTO T 335	95	50
Coarse aggregate (min, %)			
One-fractured face			
Two-fractured faces	90	50	
Fine aggregate (min, %)	AASHTO T 335	70	20
(Passing No. 4 sieve			
and retained on No. 8 sieve.)			
One fractured face	70	20	
Los Angeles Rattler (max, %)	AASHTO T 96	12	12
Loss at 100 Rev.			
Loss at 500 Rev.			
Sand equivalent (min.) <sup>b, c</sup>	AASHTO T 176	47	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	10	10
Nonmanufactured sand, (max, %) <sup>d</sup>	-	10	10

<sup>a</sup> Test for aggregate gradation under AASHTO T 27. Do not wash the coarse aggregate. Wash the fine aggregate in accordance with AASHTO T11. The Engineer determines combined aggregate gradations containing RAP under California Test 384.

<sup>b</sup> Reported value must be the average of 3 tests from a single sample.

<sup>c</sup> Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde.

<sup>d</sup> Manufactured sand is fine aggregate produced by crushing rock or gravel.

**39-2.02B(4)(b) Aggregate Size and Gradations**

Unless otherwise indicated in contract documents the ratio of HMA lift thickness to nominal maximum aggregate size must be a minimum of 3:1. If the aggregate gradations for HMA is not specified, aggregate gradations must comply with the requirements shown in the following table:

**Aggregate Gradation Requirements**

HMA pavement thickness shown	Gradation
0.10 foot	3/8 inch
Greater than 0.10 to less than 0.25 foot	1/2 inch or 3/4 inch
0.25 foot or greater	3/4 inch

Aggregate gradation must be within the TV limits for the specified sieve size shown in the following tables:



**Aggregate Gradations for HMA  
(Percentage Passing)****3/4 inch**

Sieve size	Target value limit	Allowable tolerance
1"	100	--
3/4"	90-100	TV±5
1/2"	<90	TV±6
No.8	23-49	TV±5
No.200	2.0-8.0	TV±2.0

**1/2 inch**

Sieve size	Target value limit	Allowable tolerance
3/4"	100	--
1/2"	90-100	TV±5
3/8"	<90	TV±5
No.8	28-58	TV±5
No.200	2.0-10.0	TV±2.0

**3/8 inch**

Sieve size	Target value limit	Allowable tolerance
1/2"	100	--
3/8"	90-100	TV±5
No.4	<90	TV±5
No.8	32-67	TV±5
No.200	2.0-10.0	TV±2.0

**39-2.02B(5) Reclaimed Asphalt Pavement**

Provide enough space at your plant for complying with all RAP handling requirements. Provide a clean, graded base, well drained area for stockpiles.

If RAP is from multiple sources, blend the RAP thoroughly and completely before fractionating.

For RAP substitution greater than 15 percent of the aggregate blend, fractionate RAP stockpiles into 2 sizes, a coarse fraction RAP retained on 3/8-inch sieve and a fine fraction RAP passing 3/8-inch sieve. For RAP substitution of 15 percent of the aggregate blend or less, fractionation is not required.

The RAP fractionation must comply with the requirements shown in the following table:

**RAP Stockpile Fractionation Gradation Requirements**

Size	Test method	Requirement
Coarse (% passing the 1-inch sieve)	California Test 202 <sup>a</sup>	100
Fine (% passing the 3/8-inch sieve)	California Test 202 <sup>a</sup>	98-100

<sup>a</sup> Maximum mechanical shaking time is 10 minutes.

You may use the coarse fractionated stockpile, the fine fractionated stockpile, or a combination of the coarse and fine fractionated stockpiles.

Isolate the processed RAP stockpiles from other materials. Store processed RAP in conical or longitudinal stockpiles. Processed RAP must not be agglomerated or be allowed to congeal in large stockpiles.

**39-2.02B(6)–39-2.02B(10) Reserved**

**39-2.02B(11) Hot Mix Asphalt Production**

If RAP is used, the asphalt plant must automatically adjust the virgin asphalt binder to account for RAP percentage and RAP binder.

During production, you may adjust hot-or cold-feed proportion controls for virgin aggregate and RAP. RAP must be within ±3 of RAP percentage described in your Caltrans Contractor Job Mix Formula Proposal form (CEM 3511) without exceeding 25 percent.

**39-2.02C Construction**

Where the pavement thickness shown is equal to or greater than 0.30 foot, you may place HMA in multiple lifts not less than 0.15 foot each. If placing HMA in multiple lifts:

1. Aggregate gradation must comply with the requirements shown in the following table:

**Aggregate Gradation Requirements**

HMA lift thickness	Gradation
0.15 to less than 0.25 foot	1/2 or 3/4 inch
0.25 foot or greater	3/4 inch

2. Apply a tack coat before placing a subsequent lift
3. The Engineer evaluates each HMA lift individually for compliance

If the ambient air temperature is below 60 degrees F, cover the loads in trucks with tarpaulins. If the time for HMA discharge to truck at the HMA plant until transfer to paver's hopper is 90 minutes or greater and if the ambient air temperature is below 70 degrees F, cover the loads in trucks with tarpaulins, unless the time from discharging to the truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or the pavement surface.

Spread HMA at the ambient air and surface temperatures shown in the following table:

**Minimum Ambient Air and Surface Temperatures**

Lift thickness (feet)	Ambient air (°F)		Surface (°F)	
	Unmodified asphalt binder	Modified asphalt binder	Unmodified asphalt binder	Modified asphalt binder
HMA and HMA produced with WMA water injection technology				
<0.15	55	50	60	55
≥0.15	45	45	50	50
HMA produced with WMA additive technology				
<0.15	45	45	50	45
≥0.15	40	40	40	40

For method compaction, the maximum lift thickness must be 0.25 foot.

For HMA and HMA produced with water-injection technology placed under method compaction, if the asphalt binder is:

1. Unmodified, complete:
  - 1.1. 1st coverage of breakdown compaction before the surface temperature drops below 250 degrees F
  - 1.2. Breakdown and intermediate compaction before the surface temperature drops below

- 190 degrees F
- 1.3. Finish compaction before the surface temperature drops below 150 degrees F
- 2. Modified, complete:
  - 2.1. 1st coverage of breakdown compaction before the surface temperature drops below 240 degrees F
  - 2.2. Breakdown and intermediate compaction before the surface temperature drops below 180 degrees F

Finish compaction before the surface temperature drops below 140 degrees F.

For HMA produced with WMA additive technology placed under method compaction, if the asphalt binder is:

- 1. Unmodified, complete:
  - 1.1 1st coverage of breakdown compaction before the surface temperature drops below 240 degrees F
  - 1.2 Breakdown and intermediate compaction before the surface temperature drops below 190 degrees F
  - 1.3 Finish compaction before the surface temperature drops below 140 degrees F
  - 1.4 You may continue static rolling below 140 degrees F to remove roller marks.
- 2. Modified, complete:
  - 2.1 1st coverage of breakdown compaction before the surface temperature drops below 230 degrees F
  - 2.2 Breakdown and intermediate compaction before the surface temperature drops below 170 degrees F
  - 2.3 Finish compaction before the surface temperature drops below 130 degrees F
  - 2.4 You may continue static rolling below 130 degrees F to remove roller marks.

You may cool HMA with water when rolling activities are complete if authorized.

### **39-2.02D Payment**

Not Used

## **39-2.03 RUBBERIZED HOT MIX ASPHALT–GAP GRADED**

### **39-2.03A General**

#### **39-2.03A(1) Summary**

Section 39-2.03 includes specifications for producing and placing rubberized hot mix asphalt–gap graded (RHMA-G).

If authorized by the Engineer, you may produce RHMA-G using a Caltrans approved WMA technology. If liquid antistripping (LAS) is required for RHMA-G, WMA technology may be used as substitution for LAS at the discretion of the Engineer.

#### **39-2.03A(2) Definitions**

Reserved

**39-2.03A(3) Submittals****39-2.03A(3)(a) General**

At least 5 business days before use, submit the permit issued by the local air district for asphalt rubber binder blending equipment. If an air quality permit is not required by the local air district for producing asphalt rubber binder, submit verification from the local air district that an air quality permit is not required.

At least 10 days before RHMA-G production, submit the name of an authorized laboratory to perform QC testing for asphalt rubber binder. The authorized laboratory must comply with the Caltrans Independent Assurance Program.

**39-2.03A(3)(b) Job Mix Formula**

With your proposed JMF, include the SDS for:

1. Base asphalt binder
2. CRM and asphalt modifier
3. Blended asphalt rubber binder components

The JMF must be based on the Superpave HMA mix design method as described in the most current edition of *MS-2 Asphalt Mix Design Methods* by the Asphalt Institute.

**39-2.03A(3)(c) Asphalt Rubber Binder**

Submit a proposal for asphalt rubber binder design and profile. In the design, include the asphalt binder, asphalt modifier, and CRM and their proportions.

If you change asphalt rubber binder supplier or any component material used in asphalt rubber binder or its percentage, submit a new JMF.

For the asphalt rubber binder used, submit:

1. Log of production daily.
2. Certificate of compliance with test results for CRM and asphalt modifier with each truckload delivered to the HMA plant. The certificate of compliance for asphalt modifier must represent no more than 5,000 lb.
3. Certified weight slips for the CRM and asphalt modifier furnished.
4. QC test results on viscosity within 2 business days after sampling.
5. QC test results on cone penetration, resilience, and softening point within 3 business days after sampling.

Submit a certificate of compliance for the CRM and asphalt modifier. With the certificate of compliance, submit test results for CRM and asphalt modifier with each truckload delivered to the HMA plant.

**39-2.03A(4) Quality Assurance****39-2.03A(4)(a) General**

Reserved

**39-2.03A(4)(b) Job Mix Formula Verification**

If you request, the Engineer verifies RHMA-G quality requirements within 20 days of receiving all verification samples and after the JMF document submittal has been accepted.

**39-2.03A(4)(c) Quality Control****39-2.03A(4)(c)(i) General**

Reserved

**39-2.03A(4)(c)(ii) Asphalt Rubber Binder****39-2.03A(4)(c)(ii)(A) General**

The asphalt rubber binder blending plant must be authorized under the Caltrans' Material Plant Quality Program.

Take asphalt rubber binder samples from the feed line connecting the asphalt rubber binder tank to the HMA plant.

**39-2.03A(4)(c)(ii)(B) Asphalt Modifier**

Test asphalt modifier under the test methods and frequencies shown in the following table:

**Asphalt Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Frequency
Viscosity	ASTM D445	1 per shipment
Flash point	ASTM D92	
Molecular analysis: Asphaltenes Aromatics	ASTM D2007	1 per shipment

**39-2.03A(4)(c)(ii)(C) Crumb Rubber Modifier**

Sample and test scrap tire crumb rubber and high natural crumb rubber separately. Test CRM under the test methods and frequencies shown in the following table:

**Crumb Rubber Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Frequency
Scrap tire crumb rubber gradation	California Test 385	1 per 10,000 lb
High natural crumb rubber gradation	California Test 385	1 per 3,400 lb
Wire in CRM	California Test 385	1 per 10,000 lb
Fabric in CRM	California Test 385	
CRM particle length	--	
CRM specific gravity	California Test 208	
Natural rubber content in high natural crumb rubber	ASTM D297	1 per 3,400 lb

**39-2.03A(4)(c)(ii)(D) Asphalt Rubber Binder**

Test asphalt rubber binder under the test methods and frequencies shown in the following table:

Quality characteristic	Test method	Frequency
Cone penetration	ASTM D217	1 per lot <sup>a</sup>
Resilience	ASTM D5329	
Softening point	ASTM D36/D36M	
Viscosity	ASTM D7741/D7741M	15 minutes before use per lot <sup>a</sup>

<sup>a</sup>The lot is defined in the Caltrans' *MPQP*.

Retain the sample from each lot. Test for cone penetration, resilience, and softening point for the first 3 lots and, if all 3 lots pass, the testing frequency may be reduced to once for every 3 lots.

If QC test results indicate that the asphalt rubber binder does not comply with the specifications, take corrective action and notify the Engineer.

**39-2.03A(4)(c)(iii) Aggregates**

Test the quality characteristics of aggregates under the test methods and frequencies shown in the following table:

**Minimum Contractor Quality Control Aggregate Testing**

Quality characteristic	Test method	Minimum testing frequency
Gradation <sup>a</sup>	AASHTO T 11 / T 27	1 per 750 tons and any remaining part
Sand equivalent <sup>b, c</sup>	AASHTO T 176	
Moisture content <sup>d</sup>	AASHTO T 255	
Crushed particles	AASHTO T 335	1 per 10,000 tons or 2 per project, whichever is greater
Los Angeles Rattler	AASHTO T 96	
Flat and elongated particles	ASTM D4791	

<sup>a</sup> Test for aggregate gradation under AASHTO T 27. Do not wash the coarse aggregate. Wash the fine aggregate in accordance with AASHTO T11.

<sup>b</sup> Reported value must be the average of 3 tests from a single sample.

<sup>c</sup> Use of a sand reading indicator is required as shown in AASHTO T176, Figure 1. Sections 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde.

<sup>d</sup> Test at continuous mixing plants only.

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during RHMA-G production.

**39-2.03A(4)(c)(iv)–39-2.03A(4)(c)(viii) Reserved****39-2.03A(4)(c)(ix) Rubberized Hot Mix Asphalt–Gap Graded Production**

Test the quality characteristics of RHMA-G under the test methods and frequencies shown in the following table:

**Minimum Contractor Quality Control RHMA-G Production Testing**

Quality characteristic	Test method	Minimum testing frequency RHMA-G
Asphalt binder content	AASHTO T 308 Method A	1 per 750 tons and any remaining part
HMA moisture content	AASHTO T 329	1 per 2,500 tons but not less than 1 per paving day
Air void content	AASHTO T 269	1 per 4,000 tons or 2 every 5 paving days, whichever is greater
Voids in mineral aggregate	MS-2 Asphalt Mixture Volumetrics	1 per 10,000 tons or 2 per project whichever is greater
Dust proportion	MS-2 Asphalt Mixture Volumetrics	
Density of core	California Test 375	2 per paving day
Nuclear gauge density	California Test 375	3 per 250 tons or 3 per paving day, whichever is greater
Hamburg Wheel Track	California Test 389	1 per 10,000 tons or 1 per project, whichever is greater

**39-2.03A(4)(d) Reserved****39-2.03A(4)(e) Department Acceptance****39-2.03A(4)(e)(i) General**

The Department accepts RHMA-G based on compliance with:

1. Aggregate quality requirements shown in the following table:

**RHMA-G Aggregate Quality Requirements**

Quality characteristic	Test method	Requirement
Aggregate gradation <sup>a</sup>	AASHTO T 11 / T 27	JMF TV ± Tolerance
Percent of crushed particles	AASHTO T 335	90
Coarse aggregate (min, %)		
One-fractured face		
Two-fractured faces		
Fine aggregate (min, %)	AASHTO T 335	70
(Passing No. 4 sieve and retained on No. 8 sieve.)		
One fractured face		
Los Angeles Rattler (max, %)	AASHTO T 96	12 40
Loss at 100 Rev.		
Loss at 500 Rev.		
Sand equivalent (min.) <sup>b, c</sup>	AASHTO T 176	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	Report only
Nonmanufactured sand, (max, %) <sup>d</sup>	-	10

<sup>a</sup> Test for aggregate gradation under AASHTO T 27. Do not wash the coarse aggregate. Wash the fine aggregate in accordance with AASHTO T11.

<sup>b</sup> Reported value must be the average of 3 tests from a single sample.

<sup>c</sup> Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde

<sup>d</sup> Manufactured sand is fine aggregate produced by crushing rock or gravel.

2. In-place RHMA-G quality requirements shown in the following table:

**RHMA-G Acceptance In Place**

Quality characteristic	Test method	Requirement
Asphalt binder content (%)	AASHTO T 308 Method A	JMF -0.50, +0.50
HMA moisture content (max, %)	AASHTO T 329	1.00
Air voids content @ N <sub>design</sub> (%) <sup>a, b</sup>	AASHTO T 269	4.0 ± 1.5
Voids in mineral aggregate on laboratory-produced HMA <sup>d</sup> (min, %) Gradation: 1/2-inch and 3/4-inch	MS-2 Asphalt Mixture Volumetrics <sup>c</sup>	18.0–23.0
Voids in mineral aggregate on plant-produced HMA (min, %) <sup>a</sup> Gradation: 1/2-inch and 3/4-inch	MS-2 Asphalt Mixture Volumetrics <sup>c</sup>	18.0–23.0
Dust proportion <sup>a</sup>	MS-2 Asphalt Mixture Volumetrics	Report only
Density of core (% of max theoretical density) <sup>e, f</sup>	California Test 375	91.0–97.0
Hamburg wheel track (min number of passes at 0.5-inch rut depth) Base binder grade: PG 64 or lower PG 70	California Test 389	15,000 20,000
Hamburg wheel track (min number of passes at inflection point)	California Test 389	Report Only

<sup>a</sup> Prepare 3 briquettes. Report the average of 3 tests.

<sup>b</sup> The Engineer determines the bulk specific gravity of each lab-compacted briquette under AASHTO T 275, Method A, and theoretical maximum specific gravity under AASHTO T 209, Method A.

<sup>c</sup> Determine bulk specific gravity under AASHTO T 275, Method A.

<sup>d</sup> The Engineer determines the laboratory-prepared RHMA-G value for only mix design verification.

<sup>e</sup> The Engineer determines percent of theoretical maximum density under California Test 375 except the Engineer uses:

1. AASHTO T 275, Method A, to determine in-place density of each density core instead of using the nuclear gauge
2. AASHTO T 209, Method A to determine theoretical maximum density instead of calculating test maximum density

<sup>f</sup> The Engineer determines theoretical maximum density under AASHTO T 209, Method A

**39-2.03A(4)(e)(ii) Asphalt Rubber Binder****39-2.03A(4)(e)(ii)(A) General**

The Department does not use asphalt rubber binder design profile for production acceptance.

**39-2.03A(4)(e)(ii)(B) Asphalt Modifier**

The Department accepts asphalt modifier based on compliance with the requirements shown in the following table:



**Asphalt Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Requirement
Viscosity at 100 °C (m <sup>2</sup> /s x 10 <sup>-6</sup> )	ASTM D445	X ± 3 <sup>a</sup>
Flash point (min, °C)	ASTM D92	207
Molecular analysis: Asphaltenes (max, % by mass) Aromatics (min, % by mass)	ASTM D2007	0.1 55

<sup>a</sup>The symbol X is the asphalt modifier viscosity.

**39-2.03A(4)(e)(ii)(C) Crumb Rubber Modifier**

CRM used must be on the Caltrans Authorized Materials List for Crumb Rubber Modifier.

CRM must be a ground or granulated combination of scrap tire crumb rubber and high natural scrap tire crumb rubber, CRM must be 75.0 ± 2.0 percent scrap tire crumb rubber and 25.0 ± 2.0 percent high natural scrap tire crumb rubber by total weight of CRM. Scrap tire crumb rubber and high natural scrap tire crumb rubber must be derived from waste tires described in Pub Res Code § 42703.

The Department accepts CRM, scrap tire crumb rubber, and high natural crumb rubber based on compliance with the requirements shown in the following table:

**Crumb Rubber Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Requirement
Scrap tire crumb rubber gradation (% passing No. 8 sieve)	California Test 385	100
High natural crumb rubber gradation (% passing No. 10 sieve)	California Test 385	100
Wire in CRM (max, %)	California Test 385	0.01
Fabric in CRM (max, %)	California Test 385	0.05
CRM particle length (max, in)	--	3/16
CRM specific gravity	California Test 208	1.1–1.2
Natural rubber content in high natural crumb rubber (%)	ASTM D297	40.0–48.0

Scrap tire crumb rubber and high natural crumb rubber are sampled and tested separately.

**39-2.03A(4)(e)(ii)(D) Asphalt Rubber Binder**

For Department acceptance testing, take samples of asphalt rubber binder in the Engineer's or Engineer's authorized representative's presence every 5 lots or once a day, whichever is greater. Each sample must be in a 6 qt can with open top and friction lid.

The Department accepts asphalt rubber binder based on compliance with the requirements shown in the following table:

Quality characteristic	Test method	Requirement
Cone penetration at 25 °C (0.10 mm)	ASTM D217	25–70
Resilience at 25 °C (min, % rebound)	ASTM D5329	18
Softening point (°C)	ASTM D36/D36M	52–74
Viscosity at 190 °C (centipoises) <sup>a</sup>	ASTM D7741/D7741M	1,500–4,000

<sup>a</sup>Prepare sample for viscosity test under California Test 388.

**39-2.03A(4)(e)(iii)–39-2.03A(4)(e)(v) Reserved****39-2.03B Materials****39-2.03B(1) General**

Reserved

**39-2.03B(2) Rubberized Hot Mix Asphalt–Gap Graded Mix Design**

For RHMA-G, the mix design must comply with the requirements shown in the following table:

**RHMA-G Mix Design Requirements**

Quality characteristic	Test method	Requirement
Air voids content (%)	AASHTO T 269 <sup>a</sup>	$N_{\text{design}} = 4.0$
Gyrations compaction (no. of gyrations)	AASHTO T 312	$N_{\text{design}} = 50\text{--}150^{\text{b}}$
Voids in mineral aggregate (min, %)	MS-2 Asphalt Mixture Volumetrics <sup>c</sup>	18.0–23.0
Dust proportion	MS-2 Asphalt Mixture Volumetrics	Report only
Hamburg wheel track (min, number of passes at 0.5-inch rut depth) Base binder grade: PG 64 or lower PG 70	California Test 389 <sup>d</sup>	15,000 20,000
Hamburg wheel track (min, number of passes at the inflection point)	California Test 389 <sup>d</sup>	Report Only

<sup>a</sup> Calculate the air voids content of each specimen using AASHTO T 275, Method A, to determine bulk specific gravity and AASHTO T 209, Method A, to determine theoretical maximum specific gravity. Under AASHTO T 209, use a digital manometer and pycnometer when performing AASHTO T 209.

<sup>b</sup> Superpave gyratory compactor ram pressure may be increased to a maximum of 825 kPa, and specimens may be held at a constant height for a minimum of 30 minutes and maximum of 90 minutes.

<sup>c</sup> Measure bulk specific gravity using AASHTO T 275, Method A.

<sup>d</sup> Test plant produced RHMA.

Determine the quantity of asphalt rubber binder to be mixed with the aggregate for RHMA-G as follows:

1. Base the calculations on the average of 3 briquettes produced at each asphalt rubber binder content.
2. Plot asphalt rubber binder content versus average air voids content for each set of 3 specimens and connect adjacent points with a best-fit curve.
3. Calculate voids in mineral aggregate for each specimen, average each set, and plot the average versus asphalt rubber binder content.
4. Calculate the dust proportion and plot versus asphalt rubber binder content.
5. From the curve plotted, select the theoretical asphalt rubber binder content at 4 percent air voids.
6. At the selected asphalt rubber binder content, calculate dust proportion.
7. Record the asphalt rubber binder content in the Caltrans Contractor Hot Mix Asphalt Design Data form (CEM 3512) as the OBC.

The OBC must not fall below 7.5 percent by total weight of the mix.

Laboratory mixing and compaction must comply with Superpave HMA mix design method as described in MS-2 *Asphalt Mix Design Methods* by the Asphalt Institute, except the mixing temperature of the aggregate must be from 300 to 325 degrees F. The mixing temperature of the asphalt rubber binder must be from 375 to 425 degrees F. The compaction temperature of the combined mixture must be from 290 to 320 degrees F.

**39-2.03B(3) Asphalt Rubber Binder****39-2.03B(3)(a) General**

Asphalt rubber binder must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. CRM

The combined asphalt binder and asphalt modifier must be  $80.0 \pm 2.0$  percent by weight of the asphalt rubber binder.

**39-2.03B(3)(b) Asphalt Modifier**

Asphalt modifier must be a resinous, high-flash-point, aromatic hydrocarbon and must comply with the requirements shown in the following table:

**Asphalt Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Requirement
Viscosity at 100 °C ( $m^2/s \times 10^{-6}$ )	ASTM D445	$X \pm 3^a$
Flash point (min, °C)	ASTM D92	207
Molecular analysis:		
Asphaltenes (max, % by mass)	ASTM D2007	0.1
Aromatics (min, % by mass)		55

<sup>a</sup>The symbol X is the proposed asphalt modifier viscosity. X must be between 19 and 36. A change in X requires a new asphalt rubber binder design.

Asphalt modifier must be from 2.0 to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder.

**39-2.03B(3)(c) Crumb Rubber Modifier**

CRM must be a ground or granulated combination of scrap tire crumb rubber and high natural scrap tire crumb rubber. CRM must be  $75.0 \pm 2.0$  percent scrap tire crumb rubber and  $25.0 \pm 2.0$  percent high natural scrap tire crumb rubber by total weight of CRM. Scrap tire crumb rubber and high natural scrap tire crumb rubber must be derived from waste tires described in Pub Res Code § 42703.

The CRM must comply with the requirements shown in the following table:

**Crumb Rubber Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Requirement
Scrap tire crumb rubber gradation (% passing No. 8 sieve)	California Test 385	100
High natural crumb rubber gradation (% passing No. 10 sieve)	California Test 385	100
Wire in CRM (max, %)	California Test 385	0.01
Fabric in CRM (max, %)	California Test 385	0.05
CRM particle length (max, in) <sup>a</sup>	--	3/16
CRM specific gravity	California Test 208	1.1–1.2
Natural rubber content in high natural crumb rubber (%)	ASTM D297	40.0–48.0

<sup>a</sup>Test at mix design and for certificate of compliance.

CRM must be ground or granulated at ambient temperature. If steel and fiber are cryogenically separated, separation must occur before grinding or granulating. Cryogenically produced CRM particles must be ground or granulated and not pass through the grinder or granulator.

CRM must be dry, free-flowing particles that do not stick together. CRM must not cause foaming when combined with the asphalt binder and asphalt modifier. You may add calcium carbonate or talc up to 3 percent by weight of CRM.

### 39-2.03B(3)(d) Design and Profile

Design the asphalt rubber binder from testing you perform for each quality characteristic and for the reaction temperatures expected during production. The profile must include the same component sources for the asphalt rubber binder used. The 24-hour (1,440-minute) interaction period determines the design profile. At a minimum, mix asphalt rubber binder components, take samples, and perform and record the tests shown in the following table:

**Asphalt Rubber Binder Reaction Design Profile**

Quality characteristic	Test method	Minutes of reaction <sup>a</sup>							Limit
		45	60	90	120	240	360	1440	
Cone penetration at 25 °C (0.10 mm)	ASTM D217	X <sup>b</sup>	--	--	--	X	--	X	25–70
Resilience at 25 °C (min, % rebound)	ASTM D5329	X	--	--	--	X	--	X	18
Field softening point (°C)	ASTM D36/D36M	X	--	--	--	X	--	X	52–74
Viscosity (centipoises)	ASTM D7741/D7741M	X	X	X	X	X	X	X	1,500–4,000

<sup>a</sup> Six hours (360 minutes) after CRM addition, reduce the oven temperature to 275 °F for 16 hours. After the 16-hour (960 minutes) cool down after CRM addition, reheat the binder to the reaction temperature expected during production for sampling and testing at 24 hours (1,440 minutes).

<sup>b</sup> X denotes required testing.

### 39-2.03B(3)(e) Asphalt Rubber Binder Production

#### 39-2.03B(3)(e)(i) General

Deliver scrap tire crumb rubber and high natural crumb rubber in separate bags.

#### 39-2.03B(3)(e)(ii) Mixing

Proportion and mix asphalt binder, asphalt modifier, and CRM simultaneously or premix the asphalt binder and asphalt modifier before adding CRM. If you premix asphalt binder and asphalt modifier, mix them for at least 20 minutes. When you add CRM, the temperature of the asphalt binder and asphalt modifier must be from 375 to 440 degrees F.

After interacting for at least 45 minutes, the asphalt rubber binder must comply with the requirements shown in the following table:

Quality characteristic	Test method	Requirement
Cone penetration at 25 °C (0.10 mm)	ASTM D217	25–70
Resilience at 25 °C (min, % rebound)	ASTM D5329	18
Softening point (°C)	ASTM D36/36M	52–74
Viscosity at 190 °C (centipoises) <sup>a</sup>	ASTM D7741/D7741M	1,500–4,000

<sup>a</sup> Prepare sample for viscosity test under California Test 388.

Do not use the asphalt rubber binder during the first 45 minutes of the reaction period. During this period, the asphalt rubber binder mixture must be between 375 degrees F and the lower of 425 or 25 degrees F below the asphalt binder's flash point shown in the SDS.

If any asphalt rubber binder is not used within 4 hours after the reaction period, discontinue heating. If the asphalt rubber binder drops below 375 degrees F, reheat before use. If you add more scrap tire crumb rubber to the reheated asphalt rubber binder, the binder must undergo a 45-minute reaction period. The added scrap tire crumb rubber must not exceed 10 percent of the total asphalt rubber binder weight. Reheated and reacted asphalt rubber binder must comply with the viscosity specifications. Do not reheat asphalt rubber binder more than twice.

### 39-2.03B(4) Aggregates

#### 39-2.03B(4)(a) General

For RHMA-G, before the addition of asphalt binder and lime treatment, the aggregates must comply with the requirements shown in the following table:

**Aggregate Quality**

Quality characteristic	Test method	Requirement
Percent of crushed particles		
Coarse aggregate (min, %)		
One-fractured face		--
Two-fractured faces	AASHTO T 335	90
Fine aggregate (min, %)		
(Passing No. 4 sieve and retained on No. 8 sieve.)		
One-fractured face		70
Los Angeles Rattler (max, %)		
Loss at 100 Rev.	AASHTO T 96	12
Loss at 500 Rev.		40
Sand equivalent (min) <sup>a</sup>	AASHTO T 176	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	Report only
Nonmanufactured sand,(max, %)	--	10

<sup>a</sup> Reported value must be the average of 3 tests from a single sample. The use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde.

#### 39-2.03B(4)(b) Aggregate Gradations

The aggregate gradations for RHMA-G must comply with the requirements shown in the following table:

**Aggregate Gradation Requirements**

RHMA-G pavement thickness shown	Gradation
0.10 foot to less than 0.20 foot	1/2 inch
0.20 foot or greater	3/4 inch

For RHMA-G, the aggregate gradations must be within the TV limits for the specified sieve size shown in the following tables:

**Aggregate Gradations for RHMA-G  
(Percentage Passing)****3/4 inch**

Sieve size	Target value limit	Allowable tolerance
1"	100	--
3/4"	95–98	TV ± 5
1/2"	83–87	TV ± 6
3/8"	65–70	TV ± 5
No. 4	28–42	TV ± 6
No. 8	14–22	TV ± 5
No. 200	0.0–6.0	TV ± 2.0

**1/2 inch**

Sieve size	Target value limit	Allowable tolerance
3/4"	100	--
1/2"	90–98	TV ± 6
3/8"	81–89	TV ± 5
No. 4	24–42	TV ± 6
No. 8	12–22	TV ± 5
No. 200	0.0–6.0	TV ± 2.0

**39-2.03B(5) Rubberized Hot Mix Asphalt–Gap Graded Production**

Asphalt rubber binder must be from 375 to 425 degrees F when mixed with aggregate.

**39-2.03C Construction****Use a material transfer vehicle when placing RHMA-G.**

Do not use a pneumatic tired roller to compact RHMA-G.

Spread and compact RHMA-G and RHMA-G produced with WMA water injection technology at an ambient air temperature of at least 55 degrees F and a surface temperature of at least 60 degrees F.

Spread and compact RHMA-G produced with WMA additive technology at an ambient air temperature of at least 50 degrees F and a surface temperature of at least 50 degrees F.

If the ambient air temperature is below 70 degrees F, cover loads in trucks with tarps. The tarps must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface. Tarps are not required if the time from discharge to truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

For RHMA-G and RHMA-G produced with WMA water injection technology placed under method compaction:

1. Complete the 1st coverage of breakdown compaction before the surface temperature drops below 285 degrees F.
2. Complete breakdown and intermediate compaction before the surface temperature drops below 250 degrees F. Use a static steel-tired roller instead of the pneumatic-tired roller for intermediate compaction.
3. Complete finish compaction before the surface temperature drops below 200 degrees F.

For RHMA-G produced with WMA additive technology placed under method compaction:

1. Complete the 1st coverage of breakdown compaction before the surface temperature drops below 260 degrees F
2. Complete breakdown and intermediate compaction before the surface temperature drops below 230 degrees F
3. Complete finish compaction before the surface temperature drops below 180 degrees F
4. You may continue static rolling below 140 degrees F to remove roller marks

Spread sand at a rate between 1 and 2 lb/sq yd on new RHMA-G pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with section 90-1.02C(3).

Keep traffic off the pavement until spreading of the sand is complete.

**39-2.03D Payment**

Not Used

**39-2.04 RESERVED****39-2.05 RESERVED****39-2.06 HOT MIX ASPHALT ON BRIDGE DECKS****39-2.06A General**

Section 39-2.06 includes specifications for producing and placing hot mix asphalt on bridge decks.

HMA used for bridge decks must comply with the specifications for HMA Type F in section 39-2.02.

**39-2.06B Materials**

Do not use the 1-inch or 3/4-inch aggregate gradation for HMA on bridge decks.

The grade of asphalt binder for HMA must be PG 64-10 or PG 64-16.

**39-2.06C Construction**

Spread and compact HMA on bridge decks using method compaction.

If a concrete expansion dam is to be placed at a bridge deck expansion joint, tape oil-resistant construction paper to the deck over the area to be covered by the dam before placing the tack coat and HMA across the joint.

Apply a tack coat at the minimum residual rate specified in section 39-2.01C(3)(f). For HMA placed on a deck seal, use the minimum residual rate specified for concrete pavement.

For HMA placed on a deck seal:

1. Place the HMA within 7 days after installing the deck seal.
2. If a paper mask is placed on the deck under section 54-5.03, place the HMA continuously across the paper mask.

3. Place HMA in at least 2 approximately equal layers.
4. For placement of the 1st HMA layer:
  - 4.1. Comply with the HMA application temperature recommended by the deck seal manufacturer.
  - 4.2. Deliver and place HMA using equipment with pneumatic tires or rubber-faced wheels. Do not operate other vehicles or equipment on the bare deck seal.
  - 4.3. Deposit HMA on the deck seal in such a way that the deck seal is not damaged. Do not use a windrow.
  - 4.4. Place HMA in a downhill direction on bridge decks with grades over 2 percent.
  - 4.5. Self-propelled spreading equipment is not required.

**39-2.06D Payment**

Not Used

**39-2.07 MINOR HOT MIX ASPHALT****39-2.07A General****39-2.07A(1) Summary**

Section 39-2.07 includes specifications for producing and placing minor hot mix asphalt.

Minor HMA must comply with the specifications for HMA Type F in 39-2.02 except as specified in this section.

**39-2.07A(2) Definitions**

Reserved

**39-2.07A(3) Submittals**

The QC plan and test results in sections 39-2.01A(3)(c) and 39-2.01A(3)(d) do not apply.

**39-2.07A(4) Quality Assurance****39-2.07A(4)(a) General**

The JMF renewal requirements in section 39-2.01A(4)(d) do not apply.

Test pavement smoothness with a 12 foot straightedge.

**39-2.07A(4)(b) Quality Control**

Testing for compliance with the following quality characteristics is not required:

1. Flat and elongated particles
2. Hamburg wheel track

**39-2.07A(4)(c) Department Acceptance**

The Department accepts minor HMA under section 39-2.02A(4)(e) except for compliance with requirements for the following quality characteristics:

1. Flat and elongated particles
2. Hamburg wheel track



**SECTION 39**

**39-2.07B Materials**

**39-2.07B(1) General**

Reserved

**39-2.07B(2) Minor Hot Mix Asphalt Mix Design**

The Hamburg wheel track requirements do not apply to the mix design for minor HMA.

**39-2.07B(3) Asphalt Binder**

The grade of asphalt binder for minor HMA must be PG-64-10 or PG-64-16.

**39-2.07B(4) Liquid Antistrip Treatment**

Treat minor HMA with liquid antistrip unless you submit California Test 389 test results showing compliance with section 39-2.02B and dated within 24 months of the submittal.

**39-2.07C Construction**

Not Used

**39-2.07D Payment**

Not Used

**39-2.08 RESERVED**

**39-2.09 RESERVED**

**39-3 EXISTING ASPHALT CONCRETE****39-3.01 GENERAL****39-3.01A General**

Section 39-3.01 includes general specifications for performing work on existing asphalt concrete facilities.

Work performed on existing asphalt concrete facilities must comply with City of San Jose Standard Specifications, Section 15.

**39-3.01B Materials**

Not Used

**39-3.01C Construction**

Before removing a portion of an asphalt concrete facility, make a 2-inch deep saw cut to a true line along the limits of the removal area.

**39-3.01D Payment**

Not Used

**39-3.02 REPLACE ASPHALT CONCRETE SURFACING (DIGOUTS)****39-3.02A General**

Section 39-3.02 includes specifications for replacing asphalt concrete surfacing.

**39-3.02B Materials**

HMA to be used for replacing asphalt concrete surfacing must comply with HMA Type F as specified in section 39-2.02, unless otherwise specified by the Engineer

The grade of asphalt binder must be PG 64-10 or PG 64-16.

Tack coat must comply with section 39-2.01B(10).

**39-3.02C Construction**

Where replace asphalt concrete surfacing is shown, remove the existing asphalt concrete surfacing as specified in the contract and replace with HMA. The Engineer determines the exact limits of asphalt concrete surfacing to be replaced.

Replace asphalt concrete in a lane before the lane is specified to be opened to traffic.

Before removing asphalt concrete, outline the replacement area and cut neat lines with a saw or grind to full depth of the existing asphalt concrete. Do not damage asphalt concrete and base remaining in place.

If you excavate the base beyond the specified plane, replace it with HMA.

Do not use a material transfer vehicle for replacing asphalt concrete surfacing.

Before placing HMA, apply a tack coat as specified in section 39-2.01C(3)(f).

Place HMA using **method compaction** as specified in sections 39-2.01C(2)(c) and 39-2.01C(15)(b).

**39-3.02D Payment**

The payment quantity for replace asphalt concrete surfacing is the volume determined from the dimensions shown.

**39-3.03 RESERVED****39-3.04 COLD PLANING ASPHALT CONCRETE PAVEMENT****39-3.04A General**

Section 39-3.04 includes specifications for cold planning asphalt concrete pavement.

Cold planning asphalt concrete pavement includes the removal of pavement markers, traffic stripes, and pavement markings within the area of cold planning.

Schedule cold planing activities such that the pavement is cold planed, the HMA is placed, and the area is opened to traffic during the same work shift.

**39-3.04B Materials**

HMA for temporary tapers must be of the same quality that is used for the HMA overlay or comply with the specifications for minor HMA in section 39-2.07.

**39-3.04C Construction****39-3.04C(1) General**

Do not use a heating device to soften the pavement.

The cold planing machine must be:

1. Equipped with a cutter head width that matches the planing width unless a wider cutter head is authorized.
2. Equipped with automatic controls for the longitudinal grade and transverse slope of the cutter head and:
  - 2.1. If a ski device is used, it must be at least 30 feet long, rigid, and a 1-piece unit. The entire length must be used in activating the sensor.
  - 2.2. If referencing from existing pavement, the cold planing machine must be controlled by a self-contained grade reference system. The system must be used at or near the centerline of the roadway. On the adjacent pass with the cold planing machine, a joint-matching shoe may be used.
3. Equipped to effectively control dust generated by the planing operation
4. Operated such that no fumes or smoke is produced.

Replace broken, missing, or worn machine teeth.

If you do not complete placing the HMA surfacing before opening the area to traffic, you must:

1. Construct a temporary HMA taper to the level of the existing pavement.
2. Place HMA during the next work shift.
3. Submit a corrective action plan that shows you will complete cold planing and placement of HMA in the same work shift. Do not restart cold planing activities until the corrective action plan is authorized.

**39-3.04C(2) Grade Control and Surface Smoothness**

Install and maintain grade and transverse slope references. You may adjust the planed depth up to  $\pm 0.03$  foot from the depth shown to achieve uniform pavement profile, cross slope, and surface smoothness. The average cold planed depth must be equal to or greater than the depth shown.

The final cut must result in a neat and uniform surface.

The completed surface of the planed pavement must not vary more than 0.02 foot when measured with a 12-foot straightedge parallel with the centerline. With the straightedge at right angles to the centerline, the transverse slope of the planed surface must not vary more than 0.03 foot.

If you encounter delaminations during planing operations notify the Engineer immediately. If authorized, adjust the planed depth up to  $\pm 0.05$  foot to eliminate delaminations. Authorized work beyond the  $\pm 0.05$  foot range or other authorized mitigation work is change order work.

Where lanes are open to traffic, the drop-off of between adjacent lanes must not be more than 0.15 foot.

**39-3.04C(3) Planed Material**

Remove cold planed material concurrently with planing activities such that the removal does not lag more than 50 feet behind the planer.

**39-3.04C(4) Temporary HMA Tapers**

If a drop-off between the existing pavement and the planed area at transverse joints cannot be avoided before opening to traffic, construct a temporary HMA taper.

Completely remove temporary tapers before placing permanent surfacing.

**39-3.04D Payment**

Not Used

**39-3.05 – 39-3.10 RESERVED**

**END OF SECTION**

**SECTION 40**

**PORTLAND CEMENT CONCRETE PAVEMENT**

Portland cement concrete pavement shall conform to Section 40 of the Caltrans Standard Specifications and these City Standard Specifications.

**40-1.01 Description.** - Subgrade preparation shall conform to Section 21 of these City Standard Specifications.



**SECTION 41**

**PAVEMENT SUBSEALING AND JACKING**

Pavement subsealing and jacking shall conform to Section 41 of the Caltrans Standard Specifications.





**SECTION 42**

**GROOVE AND GRIND PAVEMENT**

Grooving and grinding pavement shall conform to Section 42 of the Caltrans Standard Specifications.



## SECTION 49

## PILING

Piling shall conform to Section 49 of the Caltrans Standard Specifications and these City Standard Specifications.

## 49-1 GENERAL

**49-1.02 Materials.** - Concrete and steel shell piles are classified and designated by design loading in tons as Class 45 or Class 70 with configuration options. Where corrosion resistant piles are required, the letter "C" is added to the class designation.

**49-1.11 Defective Piles.** - The method used in driving piles shall not subject them to excessive and undue abuse producing crushing and spalling of the concrete, injurious splitting, splintering, and brooming of the wood, or deformation of the steel. Manipulation of piles to force them into proper position, if considered by the Engineer to be excessive, will not be permitted. Any pile damaged in driving by reason of internal defects, damaged by improper driving or driven out of its proper location shall be corrected at the Contractor's expense by one of the following methods approved by the Engineer for the pile in question.

1. The pile shall be withdrawn and replaced by a new and, when necessary, longer pile.
2. A second pile shall be driven adjacent to the defective pile.
3. The pile shall be spliced or built up as otherwise provided herein or a sufficient portion of the footing extended to properly imbed the pile.

## 49-6 MEASUREMENT AND PAYMENT

**49-6.02 Payment.** - In the sixth paragraph of the Caltrans Standard Specifications, delete both "Sacramento and Los Angeles" the 3 places it appears and substitute "City of San Jose" therefor.



**SECTION 50**

**PRESTRESSING CONCRETE**

Prestressing concrete shall conform to Section 50 of the Caltrans Standard Specifications.



**SECTION 51**

**CONCRETE STRUCTURES**

Concrete structures shall conform to Section 51 of the Caltrans Standard Specifications.





## SECTION 52

## REINFORCEMENT

Reinforcement shall conform to Section 52 of the Caltrans Standard Specifications and these City Standard Specifications.

**52-1.03 Steel Lists.** - Before placing reinforcement, 5 copies of all shop drawings of all reinforcing steel shall be furnished, along with, and under the same conditions specified for steel lists.

**52-1.04 Inspection.** - Each bundle of steel shall be tagged at the mill with an identifying mill tag showing the name of the mill and the melt or heat number. The tag shall be of a durable material, shall be securely attached, and shall be placed in an exposed location for easy identification by the Engineer.



**SECTION 53**

**AIR-BLOWN MORTAR**

Air-blown mortar shall conform to Section 53 of the Caltrans Standard Specifications.



**SECTION 54  
WATERPROOFING**

Waterproofing shall conform to Section 54 of the Caltrans Standard Specifications.



**SECTION 55**

**STEEL STRUCTURES**

Steel structures shall conform to Section 55 of the Caltrans Standard Specifications and these City Standard Specifications.

**55-1.02 Drawings.** - Drawings shall conform to Section 55-1.02 of the Caltrans Standard Specifications, except that Contractor shall make the required submittals to the Engineer.





## SECTION 56

## SIGNS

Signs shall conform to Section 56 of the Caltrans Standard Specifications and these City Standard Specifications.

**56-1 OVERHEAD SIGN STRUCTURES**

**56-1.04 Welding.** - Contractor shall be responsible for welder certification. Delete last sentence of last paragraph in Section 56-1.04 of the Caltrans Standard Specifications.

**56-2 ROADSIDE SIGNS**

**56-2.01 Description.** - Unless otherwise shown on the plans or specified in the special provisions, all sign panels for permanent installation as standard roadside signs will be furnished by the City. Construction signs, including sign panels, shall be furnished and installed by the Contractor. This work shall also include park signs, as specified in Section 56-2.02G which will be furnished by the City.

Signs shall conform to the provisions of the Caltrans "Traffic Manual" and the U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices."

**56-2.01A Sign Types.** - Traffic signs are classified by general types, as indicated herein, according to message imparted or traffic control required.

- (1) Warning Signs call attention to conditions on or adjacent to a traveled way that are potentially hazardous to traffic.
- (2) Regulatory Signs give notice of traffic laws or regulations.
- (3) Guide Signs show route designation, guidance and directional information.
- (4) Construction Signs give guidance, regulate and warn traffic through construction zones. Construction signs include warning, regulatory, and guide signs as well as specific instructional signs.

Traffic signs shall be identified by codes: warning, regulatory, guide, and construction signs are numbered with a number preceded by a letter - W, R, G, or C, respectively.

Installation and mounting of traffic signs shall be designated by type, according to the sign chart shown on the plans. The detailed plans shall indicate installation and mounting required.

**56-2.02D Sign Panel Fastening Hardware.** - Lag screws, bolts, metal washers, and nuts may be cadmium plated steel in lieu of commercial quality galvanized steel.

**56-2.02E Sign Panels.** - Sign panels shall be sheet aluminum, except temporary construction signs, which may be plywood if approved by the Engineer. The gage thickness of sheet aluminum shall be commensurate with the size of the

sign. Reflective sheeting and porcelain enamel for signs shall conform to the State of California specifications for "Reflective Sheeting on Aluminum" and "Porcelain Enameled Aluminum Single Sheet and Laminated Panel Signs."

**56-2.02F Certificate of Compliance.** - The Contractor shall establish or be responsible for the necessary quality control and inspection practice to assure compliance with these specifications. The Contractor shall furnish, when required, a certificate of compliance, as specified in Section 6-1.07, "Certificates of Compliance," that all the required tests have been made and the results comply with the requirements of these specifications.

**56-2.02G Park Signs.** - "Park Rules and Regulations" and "Park Hours" signs shall be City standard and shall be obtained from the Parks and Recreation Department. Poles for park signs shall be 2-3/8" o.d. galvanized steel, 14 feet in length with minimum pipe wall thickness of .116", and shall be furnished by the Contractor. Poles for park signs shall be placed in a 3'-6" deep x 10" diameter Portland cement concrete footing, leaving 10'-6" foot height from top of grade.

**56-2.03 Construction.** - Wood posts located in traffic islands, after backfilling shall be wedged in place at the surface with redwood wedges. The space around wood posts set in sidewalk areas after backfill shall be capped with concrete and finished to the surrounding surface.

**56-2.04 Sign Panel Installation.** - Sign panel installation shall conform to Section 56-2.04 of the Caltrans Standard Specifications, except that sign panels, blind rivets, and closure inserts shall be furnished by the Contractor and shall otherwise be of materials as specified herein.

The exposed portion of fastening hardware of the face of signs shall be painted out using touch-up enamel that matches the background.

Park rules signs shall be mounted flush with top of pole with park hours sign mounted directly under, allowing 7'-0" clearance from the base of park hours sign to grade.

**56-2.05 Measurement.** - Delete Subsection 56-2.05, "Measurement" of the Caltrans Standard Specifications. Roadside signs will be measured by the unit from actual count, in place.

**56-2.06 Payment.** - Roadside signs measured as specified in Subsection 56-2.05, "Measurement" will be paid for at the contract unit price each. The contract unit price each shall include full compensation for furnishing all labor, materials (except City-furnished materials), tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing roadside signs, complete in place, including the installation of sign panels, as shown on the plans, and as specified in these standard specifications and the special provisions, and as directed by the Engineer.

**SECTION 57**

**TIMBER STRUCTURES**

Timber structures shall conform to Section 57 of the Caltrans Standard Specifications.



**SECTION 58**

**PRESERVATIVE TREATMENT OF LUMBER, TIMBER AND PILING**

Preservative treatment of lumber, timber, and piling shall conform to Section 58 of the Caltrans Standard Specifications and these City Standard Specifications.

**58-1.02 Treatment and Retention.** - When lumber, timber, or piling is treated with fluor chrome arsenate phenol, the retention shall be at least 0.50 pound per cubic foot.



**SECTION 59**

**PAINTING**

Painting shall conform to Section 59 of the Caltrans Standard Specifications.





**SECTION 72**

**SLOPE PROTECTION**

Slope protection shall conform to Section 72 of the Caltrans Standard Specifications.



SECTION 73

CONCRETE CURBS AND SIDEWALKS

Concrete curbs and sidewalks shall conform to Section 73 of the Caltrans Standard Specifications and these City Standard Specifications.

**73-1.01 Description.** - Portland cement concrete to be used for this work shall be Class A concrete.

**73-1.01A Curb and Gutter Types.** - Curbs and gutters are designated by type, in accordance with the dimensions shown on the plans and standard plan details and as described below.

<u>Type</u>	<u>Description</u>
A1	Standard curb with 6-inch curb face, 3/4-inch batter, overall depth of 14-inches, no gutter section.
A2	Standard curb and gutter, with 6-inch curb face, 3/4-inch batter, and 24-inch gutter section.
B1	Island barrier curb 24-inches overall in height, 8-inch curb face, 3 1/2-inch batter; used for landscaped islands.
B3-6	Island curb 6-inches in height with 3 1/2-inch batter; superimposed on existing pavement.
B3-8	Island curb same as above, except 8-inches in height.
V	Standard valley gutter, 4-foot width, 3 percent slope each way in cross-section.

**73-1.05 Curb Construction.** - Weakened plane joints shall be constructed at intervals of 10 feet or as shown on the plans. When a Portland cement concrete sidewalk or pavement is adjacent thereto or to be constructed adjacent thereto, the joints shall coincide with score marks in the sidewalk or pavement.

The weakened plane joint shall be constructed by scoring the partially set concrete to a minimum depth of 2 inches by 1/4-inch with a tool that will leave the corners rounded.

Expansion joints shall be installed only where specifically called for on the plans or as directed by the Engineer.

All curb and gutter joints shall conform to City Standard Plan Details.

The batter of the curb face and lip of gutter shall be constructed true to the dimensions as shown on the plans.

The use of an existing asphalt pavement edge as the lip of a gutter form will be allowed only upon express approval by the Engineer. The use of the

excavated embankment for backforms will not be allowed, except for the bottom portions of A1 and B1 barrier curbs.

Defective curb shall be repaired by removing and replacing no less than 5 feet and leaving no less than 5 feet from a joint.

**73-1.05C Drain Openings.** - Where required, drainage openings or outlets shall be constructed through curbs. The opening may consist of curb opening castings, in the configuration of the curb, or may be hand formed using a suitable mold the size of the drain. Care shall be exercised in placing concrete around hand formed openings to prevent cracking of the curb after the concrete has cured.

**73-1.05D Flow Line Test.** - Before approval or acceptance of integral curb and gutter, a flow line test shall be conducted to the satisfaction of the Engineer. Water, in a quantity determined by the Engineer, shall be released at the high point in the gutter and allowed to flow naturally. Any obstructions to the water flow shall be noted, as directed by the Engineer. The noted obstructions shall be corrected by either grinding off the high spots or removing and reconstructing the affected portions of curb and gutter.

**73-1.05E Curb Markings.** - The street name shall be imprinted into the face of the curb on the tangent section of curb adjacent to the curb return and at all other places indicated on the plans and specified in the special provisions.

The location of all sanitary sewer lateral that intersect the curb and gutter shall be marked by an "S" impressed directly above the lateral.

The letters used for markings shall be at least 2-3/4 inches high and impressed at least 1/4-inch into the concrete on the face of the curb.

**73-1.05F Backfilling.** - After the concrete has set sufficiently (minimum of 3 days), the spaces in back of and in front of curbs shall be backfilled to the required elevations with suitable material.

**73-1.05G Protecting Concrete.** - Newly completed concrete work shall be protected from damage. No construction equipment will be allowed adjacent to concrete curb and/or gutter until the fourth day following placement of the concrete. No paving operation will be permitted adjacent to concrete curb or gutter until the seventh day following the placement of the concrete. No equipment will be allowed on or to travel over newly placed concrete until the seventh day following placement of concrete, unless adequate provisions are made to transfer the loads off of the concrete.

**73-1.06 Sidewalk, Gutter Depression, Island Paving, Wheelchair Ramp, and Driveway Construction.** - Sidewalks shall be either detached, that is separated from the curb or structure, or marginal, that is adjacent to the curb, as shown on the plans. Under no circumstance shall concrete curbs and marginal sidewalks be constructed or poured monolithically.

Driveway aprons and wheelchair ramps shall be constructed as an integral part of the sidewalk with the thickness of sidewalk the same as the apron or ramp unless shown otherwise on the plans.

Flared ends of curbs for driveways and wheelchair openings shall be uniform and symmetrical.

The top of driveway or wheelchair curbs shall be true and straight and free from humps, sags, or other irregularities. The face rise of the driveway or wheelchair curb at flow line of gutter shall be formed with a driveway finishing tool as approved by the Engineer.

Forms for island pavement shall consist of previously constructed or existing type B-3 curbs. Screed forms shall be used where crowns are required in the island pavement. All other forms shall conform to the provisions as specified in Section 73-1.04, "Fixed Forms," of the Caltrans Standard Specifications.

In curing exposed aggregate surfaces, care shall be exercised to insure the curing compound used will not stain the surface.

Expansion joint filler, 1/4-inch thick, shall be installed between concrete sidewalks and any fixed structure such as a building or bridge. The expansion joint filler material shall extend for the full depth of the walk.

**73-1.06A Weakened Plane Joints.** - Weakened plane joints in sidewalks, driveway aprons, and wheelchair ramps shall be constructed in the concrete slab at intervals of 10 feet or at intervals shown on the plans. Weakened plane joints shall coincide with any existing joints in adjacent curbs or other facility.

Weakened plane joints shall be constructed by use of mechanical separators which shall be T shaped plastic strips at least one inch deep with a suitable anchor to prevent vertical movement. The top stiffener shall be at least 3/4-inch in width and shall be capable of separating from the web with a minimum amount of effort. The thickness of the web and separator shall be at least 1/16-inch and the length of the strip shall be sufficient to span the width of the concrete slab.

After preliminary trowelling, the concrete shall be parted at the designated locations, to a depth of approximately 2 inches, with an approved thin metal straight edge. The mechanical separator shall then be inserted in the impression so that the upper surface of the pull-top stiffener is flush with the concrete. The pull-top stiffener shall then be peeled off. After the pull-top stiffener is removed, the concrete shall be floated or trowelled to fill all voids adjacent to the joint strip.

During final trowelling, the edges of the mechanical separator shall be finished to a radius not to exceed 1/8-inch, using an approved slit edge jointing tool. Ordinary single edge jointers or groovers shall not be used, as they cause the joint strip to move out of alignment.

The sidewalk slab shall be divided into sections, between weakened plane joints, at 5 foot intervals, or at intervals shown on the plans, by score marks or dummy joints.

The score marks or dummy joints shall be formed by a jointing or grooving tool. The score mark or dummy joint shall extend into the concrete at least 1/4-inch and shall be approximately 1/8-inch wide. Score marks or joints normally shall be perpendicular to the line of work except at curves, where the mark or joint shall be radial to the curve. When longitudinal marks or joints are required, they shall be parallel to or concentric with the line of work.

Weakened plane joints for island paving or exposed aggregate paving shall be in accordance with the provisions above or may be accomplished by sawing to a depth of 1/4 to 1/5 the thickness of the slab.

**73-1.06B Finishing.** - Sidewalks, driveway aprons and wheelchair ramps are designated as to style of finish to be applied to the surface. The style of surface finishes are as follows:

Ordinary -- trowelled, medium broom finish

Exposed Aggregate -- seeded, transfer, or surface retarder methods

Special -- colored, decorative, or contrast.

Unless otherwise specified in the special provisions or shown on the plans, the style of surface finish for sidewalks, driveway aprons, or wheelchair ramps shall be "ordinary" as specified herein, except for wheelchair ramps without interior score marks, it shall be rough broom finish.

After the concrete has set sufficiently, the surface to receive "Ordinary" finish shall be given a final trowelling, and all joints, score marks, and edges shall be reopened or refinished. The finished surface shall then be lightly broomed transverse to the direction of the sidewalk.

Exposed aggregate surface finish shall be accomplished as follows:

- (1) Immediately after the slab has been screeded, floated, and edges rounded with an edging tool, the selected aggregate as specified in the special provisions or shown on the plans, shall be scattered by hand and evenly distributed so that the entire surface is completely covered. The initial embedding of the aggregate shall be done by patting with a darby.
- (2) As soon as the concrete can support the weight of a mason on kneeboards, the surface shall be hand floated so that the aggregate is entirely embedded just beneath the surface. Concrete mortar paste should completely surround and slightly cover the aggregate, leaving no holes or voids in the surface.
- (3) After the hand floating is completed, a set retarder shall be sprayed or brushed over the surface in accordance to the manufacturer's recommendation. The rate of application of the retarder shall be sufficient so that the depth of mortar paste removed, on exposing the aggregate, shall be no more than 1/8-inch. The surface treated with retarder shall be protected by covering with polyethylene sheeting or paper to prevent drying out. The retarded mortar paste shall be removed within 12 hours after placement. The use of a set retarder may be waived by the Engineer, provided assurance is guaranteed that the exposed aggregate surface finish is uniform in exposure and appearance.
- (4) The exposing of the aggregate shall be accomplished by simultaneously brushing and hosing of the mortar with water. Care shall be exercised not to overexpose or dislodge the aggregate.
- (5) After the exposing of aggregate has been completed, the residue of the work shall be removed and disposed of, and any existing surface or facility splattered or stained shall be cleaned.

Special surface finish shall be as specified in the special provisions.

**73-1.06C Protecting Concrete.** - All newly completed concrete work shall be protected from damage, including damage by vandalism. No construction equipment or vehicles shall be allowed on or adjacent to newly completed concrete work as specified in Subsection 73-1.05G "Protecting Concrete."

**73-1.06D Damaged or Defective Work.** - Damaged or defective concrete work shall be removed and replaced. Removal of unacceptable concrete work shall be the entire unit between joints, or score marks if saw cut.





SECTION 74

PUMPING PLANT EQUIPMENT

Pumping plant equipment shall conform to Section 74 of the Caltrans Standard Specifications.



**SECTION 75**

**MISCELLANEOUS METAL**

Miscellaneous metal shall conform to Section 75 of the Caltrans Standard Specifications.



**SECTION 80****FENCES**

Fences shall conform to Section 80 of the Caltrans Standard Specifications and these City Standard Specifications.

**80-1 GENERAL**

**80-1.05 Temporary Fencing.** - Temporary fencing, for the control, safety or convenience of traffic or the preservation of property required during the course of construction, shall conform to Section 80-4 of these specifications or as otherwise specified in the special provisions.

**80-4 CHAIN LINK FENCE**

**80-4.01 Materials.** - Chain link fence and gate materials shall conform to the specification provisions of AASHTO M181 and ASTM A392 and as modified herein.

The Contractor, through the manufacturer or fabricator, shall establish the necessary quality control and inspection practice to assure compliance with these specifications. The Contractor shall furnish a certificate of compliance, as specified in Section 6-1.07, "Certificates of Compliance," that all of the required tests have been made and the results comply with the requirements of these specifications.

**80-4.01A Posts and Braces.** - The base metal for the manufacture of posts and braces shall conform to the requirements of AASHTO M 181, except that steel made by the oxygen furnace process will be acceptable.

Gate posts shall be fabricated from pipe conforming to the requirements of ASTM A120 (Schedule 40).

Posts and braces shall be galvanized in accordance with the provisions in Section 75-1.05 "Galvanizing," except that galvanizing and sampling of pipe posts for performing galvanizing tests shall conform to the requirements of ASTM A120.

Posts and rails for vinyl coated chain link fence shall be hot dipped galvanized and covered with 2 coats of black metal paint applied over a metal primer.

**80-4.01B Fabric.** - The wire used in the manufacture of the fabric shall be 9-gage, or 0.148-inch nominal diameter coated wire, for all fences. The base metal of the fence fabric shall be steel of a quality and purity that, when drawn to the gage size of the wire specified and coated with zinc, the finished fence shall be of uniform quality and have the properties and characteristics as prescribed herein.

The diameter of the coated wire shall be determined as the average of 2 readings taken at right angles to each other on the straight portion of parallel sides of the mesh and measured to the nearest 0.001 inch. The permissible variation in diameter of the coated wire shall be plus or minus 0.005 inch. The tolerances shall apply to uniform areas of the galvanized wire only.

The size of mesh shall be 2 inches except for tennis court fabric, which shall be 1-3/4 inches. The permissible variation in size of mesh shall be plus or minus 1/8-inch. The size of mesh shall be determined by measuring the minimum clear distances between the wires forming the parallel sides of the mesh.

Chain link mesh to have slats inserted shall be 3 inch by 5 inch mesh.

Steel chain-link fabric is classified according to the weight of zinc coating on the fabric. The weight of zinc coating on Class 1 fabric shall be 1.2 ounces per square foot of uncoated wire surface. The average weight of zinc coating for Class 2 fabric shall not be less than 2.0 ounces per square foot of uncoated wire surface as determined from the average results of 2 or more specimens and not less than 1.8 ounces per square foot of uncoated wire surface for any individual specimen.

Unless otherwise shown on the plans or specified in the special provisions, Class 1 chain link fence fabric shall be used.

Vinyl coated chain link fence shall be black polyvinyl chloride coated steel link fabric and fittings. Polyvinyl chloride shall be applied by the thermal extrusion process.

**80-4.01C Miscellaneous.** - Wire fasteners, if required, shall consist of a 12-gage (0.108 inch diameter) galvanized, hard, bright, basic iron wire "S" clip with 1/2-inch inside diameter loops and 1/4-inch end openings.

**80-4.01D Gates.** - Drive gates are classified as either single or double. Welding shall conform to the requirements of AWS D2.0. Gate frames shall be galvanized after fabrication.

**80-4.01E Slats.** - Chain link with slats shall be Viewguard Fabric with PDS slats or approved equal. Chain link fabric shall be pre-woven with 2-3/8 inches wide brown virgin polyethylene slats with ultra violet inhibitors with a wall thickness of .030 inch plus .003 inch. The length of the slats shall be 3-1/2 to 3-3/4 inches shorter than the height of the chain link fence to allow for the installation of the bottom retaining channel.

**80-4.02 Construction.** - At locations where breaks in a run of fencing are required for gates or at intersections with existing fences, adjustments in post spacing shall be made to conform to the requirements for the type of closure indicated.

Unless directed by the Engineer, temporary guys or other braces as required shall be installed to hold posts in proper position until the concrete has set.

## SECTION 81

## MONUMENTS

Monuments shall conform to Section 81 of the Caltrans Standard Specifications and these City Standard Specifications.

**81-1.01 Description.** - This work shall include furnishing and installing monuments.

**81-1.02 Materials.** - Survey monuments shall be portland cement concrete structures with brass discs. Concrete shall be "Class B" conforming to Section 90, "Portland Cement Concrete." The maximum aggregate size used shall be 3/4-inch.

Unless otherwise specified in the special provisions, survey marker discs shall be supplied by Contractor and shall be leaded red or semi-red brass conforming to ASTM Designation: B 584-88, Copper Alloy UNS No. C84400. The disc shall be 2-1/2 inches in diameter and not less than 2-1/2 inches long.

Mortar shall be "Class 1" as specified in Section 51-1.135, "Mortar."

Delete references to "Type D" from Section 81-1.02 of the Caltrans Standard Specifications.

The materials used in the construction of survey monuments shall conform to, and be tested for, the physical and composition requirements in accordance with the referenced ASTM Designation, or referenced specification sections.

**81-1.03 Construction.** - The brass disc shall be imbedded in the fresh concrete and centered within the cross ties of the survey point. The finished survey monument shall be cured and protected for such time as the Engineer may direct.

**81-1.04 Monument Cases.** - Where called for, monument cases shall be installed over new or existing monuments in accordance with the details as shown on the plans. The finished monument case shall be flush with the surrounding area and shall be secured by a concrete or mortar collar.

**81-1.06 Payment.** - The contract unit prices paid for survey monuments shall include brass discs unless otherwise specified in the specified provisions. The method of payment for monument cases is same as that provided for survey monuments.





**SECTION 82**

**MARKERS AND DELINEATORS**

Markers and delineators shall conform to Section 82 of the Caltrans Standard Specifications.



## SECTION 83

## RAILINGS AND BARRIERS

Railings and barriers shall conform to Section 83 of the Caltrans Standard Specifications and these City Standard Specifications.

**83-2 BARRIERS**

**83-2.01 Description.** - This work shall also consist of furnishing, placing, and maintaining, Type I, II, and III portable construction barriers, with or without warning lights, and Type IV permanent barriers at the locations as directed by the Engineer, in accordance with specifications in Section 12-3.02B, "Materials."

**83-2.01F Construction Barriers.** - Construction barriers of the type specified in the special provisions shall be furnished and set at locations as the Engineer may direct. The barriers shall be maintained for as long as necessary and shall be checked for their position location at the close of each day's activity and more often as necessary.

The batteries of warning lights shall be maintained at a high rate of charge at all times.



## SECTION 84

## TRAFFIC STRIPES AND PAVEMENT MARKINGS

Traffic stripes and pavement markings shall conform to Section 84 of the Caltrans Standard Specifications and these City Standard Specifications.

## 84-1 GENERAL

**84-1.01 Description.** - The traffic striping and pavement message markings shall conform to the standards, dimensions, and details as specified in the "Manual on Uniform Traffic Control Devices for Streets and Highways," U.S. Department of Transportation, Federal Highway Administration and the Caltrans "Traffic Manual."

**84-1.05 Striping Pattern.** - Traffic striping is classified by pattern of the center line or lane line and the marking line as follows:

Single Traffic Stripe	-	4 inch wide broken yellow line for center line or white for lane line.
Two-way Barrier Stripe	-	Double 4 inch wide solid yellow lines with 3 inch space between lines.
One-way Barrier Stripe	-	Double 4 inch wide yellow lines, one line broken and the other line solid, with 3 inch space between lines.
Edge Stripe	-	3 inch wide solid white line.
Stop Bar	-	Solid 12 inch wide white line.
Crosswalk Lines	-	Solid 12 inch wide white line each side of crosswalk boundary.

The pattern and color of traffic striping shall be as shown on the plans or as directed by the Engineer.

**84-1.06 Message Unit.** - Pavement message markings are classified by unit for the message conveyed as shown in the manuals referenced in Section 84-1.01.

The message marking shall be as shown on the plans or as directed by the Engineer.

**84-2 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS**

**84-2.02 Materials.** - Thermoplastic traffic stripe material is classified by color only as either white or traffic yellow.

**84-2.04(A) Removal.** - Thermoplastic stripes and markings on existing surfacing shall be removed by grinding before placement of asphaltic concrete overlay.

**84-3 PAINTED TRAFFIC STRIPES AND PAVEMENT MARKINGS**

**84-3.02 Materials.** - Delete Rapid Dry Solvent Borne and Rapid Dry Water Borne paints from Section 84-3.02 "Materials" of the Caltrans Standard Specifications.

**84-3.05 Application.** - The finished paint shall have an opaque, well painted appearance, with no black or other discolorations showing through.

In restriping broken lines, the newly painted line shall exactly coincide with the original painting.

Traffic paint shall be applied at the following rates:

**BROKEN STRIPE**

**First Painting**

New surface, first coat . . . . .	4 to 5 gallons per mile
Second coat . . . . .	7 to 7.4 gallons per mile
Glass beads with second coat . . .	42 pounds per mile
Restriping . . . . .	7 to 7.4 gallons per mile
Glass beads . . . . .	42 pounds per mile

**SOLID STRIPE**

**First Painting**

New surface, first coat . . . . .	12 to 14 gallons per mile
Second coat . . . . .	16 to 18 gallons per mile
Glass beads with second coat . . .	110 pounds per mile
Restriping . . . . .	16 to 18 gallons per mile
Glass beads . . . . .	110 pounds per mile
Black traffic paint . . . . .	8 gallons per mile

**PAVEMENT MARKINGS**

**First Painting - Light Application to Seal Pavement**

Second coat . . . . .	1 gallon per 100 square feet
Glass beads . . . . .	6 pounds per gallon of paint
Repainting . . . . .	1 gallon per 100 square feet
Glass beads . . . . .	6 pounds per gallon of paint

When specified in the special provisions for single application of traffic paint, the rates shown for "second coat" shall apply.

**84-3.05A Temporary Striping.** - Self-sticking traffic marking tape, vinyl or otherwise, developed for such use, shall be used for temporary striping as required, unless shown otherwise on the plans or specified in the special provisions.





SECTION 85

PAVEMENT MARKERS

Pavement markers shall conform to Section 85 of the Caltrans Standard Specifications and these City Standard Specifications.

**85-1.01 Description.** - The manufacturer shall furnish a certificate of compliance, as specified in Section 6-1.07, "Certificates of Compliance."



**SECTION 86****SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS**

Signals, Lighting and Electrical Systems shall conform to Section 86 of the Caltrans Standard Specifications and these City Standard Specifications.

**86-1 GENERAL**

**86-1.01 Description.** - Delete paragraph 1 of Section 86-1.01 of the Caltrans Standard Specifications.

Electrical work shall consist of furnishing and installing, modifying, extending or removing one or more of the following systems: electrical distribution, controller assemblies, traffic signal, detectors, lighting, communications, flashing beacons, interconnection facilities, traffic count, sprinkler control, falsework lighting, pumping stations and sewer lift stations, temporary installations, and provisions for future systems or combinations thereof as shown

Where required, Traffic Controller Assemblies will be furnished by the City and shall be installed by the Contractor as part of the work unless otherwise noted on the Plans or in the Special Provisions.

Existing facilities which are to remain in place shall be protected as required by Section 7-1.11, "Preservation of Property."

The Engineer shall establish locations for standards, service cabinets and controller cabinets using stakes or marks on existing pavements or curbs. Such location stakes or marks shall be protected and preserved for however long as is necessary.

**86-1.015 Definitions.** -

**Programmed Visibility Signal Head** - A type of signal head which can be optically programmed to restrict visibility of indication(s) to only those areas or lanes designated.

**Signal Cycle** - A complete sequence of signal indications.

**Signal Standard** - Any pole which supports signal head(s).

**Traffic Signal Communications** - A method by which traffic signals are connected electrically through a multi-point analog communications system for central control, monitoring and data collection at individual intersections.

**86-1.02 Regulations and Code.** - Electrical equipment shall also conform to the following additional standards wherever applicable: The International Municipal Signal Association (IMSA); The Insulated Power Cable Engineers Association (IPCEA); The National Electrical Code as amended by the City of San Jose Municipal Code.

**86-1.03 Equipment List and Drawings.** - Delete paragraphs 2 and 3 of Section 86-1.03 of the Caltrans Standard Specifications.

## SECTION 86 SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

Following the review of the equipment and material lists, any correction or modifications shall be made, and not less than five complete sets shall be resubmitted to the Engineer. The City will not be liable for any material purchased, labor performed, or delay to the work prior to such review.

If ordered by the Engineer, the Contractor shall submit for review, sample articles of the material proposed for use. After review, said sample articles will be returned.

The equipment and materials proposed for use on any project must be approved before starting work.

Where electrical equipment is provided by City for installation by the Contractor, the submission of detailed drawings and diagrams will not be required providing the Contractor makes no changes or modifications to the equipment.

Upon completion of the work, the Contractor shall prepare and submit one complete set of record drawings showing in detail construction changes of all traffic signal and streetlight wiring, conduits, standards, and associated equipment. In particular, record drawings shall accurately depict the location and depth of conduits, location of standards, pull boxes and wiring changes.

Record drawings shall be submitted prior to the time of acceptance of the work and shall meet the requirements of Section 5-1.04A "Record Drawings."

**86-1.05 Maintaining Existing and Temporary Electrical Systems. -** Delete paragraphs 1 and 2 of Section 86-1.05 of the Caltrans Standard Specifications.

Existing electrical systems, including traffic signals, traffic signal vehicle and pedestrian detection facilities, traffic signal communication and monitoring facilities, streetlighting facilities, flashing beacons and sign illumination facilities, or approved temporary replacements thereof, shall be kept in effective operation for the benefit of the traveling public during the progress of the work, except when shutdown is permitted to allow for alterations or final removal of the systems.

The Contractor shall notify the Engineer at least 24 hours prior to performing any work on existing systems, including any work which may take vehicle detectors or pedestrian push-buttons out of service, or may reroute traffic off of existing vehicle detectors.

The Contractor shall notify the Engineer at least 24 hours prior to any operational shutdown of traffic signals, streetlighting or other electrical systems or facilities.

Traffic signal activations shall follow the Public Works procedures for "Signal Activation," or shall be as specified in the Special Provisions.

Police officers shall be provided, at the Contractor's expense, to direct traffic during the shutdown of a traffic signal system. The Contractor shall arrange for police officer traffic control at least 24 hours prior to the shutdown of a traffic signal system. Traffic signal shutdowns shall be limited to Monday through Thursday excluding holidays, from 9:00 AM to 4:00 PM, or as specified in the special provisions.

Where a facility requires continuous lighting, the shutdown time shall be limited to one-half hour as scheduled by the Engineer, unless otherwise permitted by the Engineer. The shutdown of lighting systems shall not interfere with the regular lighting schedule, unless otherwise permitted by the Engineer.

Vehicle detectors and pedestrian push-buttons shall remain in effective operation at all times during the progress of the work on an existing actuated traffic signal system, except as indicated in the special provisions, or as provided herein.

Vehicle detectors or pedestrian push-buttons taken out of service shall be repaired or replaced within 72 hours. New vehicle detectors for rerouted traffic shall be installed within 72 hours. Where worksite conditions do not permit the installation of permanent vehicle detectors within 72 hours, temporary vehicle detectors shall be installed, at the Contractor's expense, as directed by the Engineer. Permanent vehicle detectors shall be installed as soon as worksite conditions permit.

**86-1.06 Scheduling of Work.** - "Hot cutovers" will not be allowed for electrical circuits, wiring, or equipment involving any traffic signals, streetlights and other electrical systems. The traffic signals and streetlights shall be shutdown for "cutovers" and the Contractor shall provide police officers for traffic control at the Contractor's expense. All work requiring shutdowns shall be performed in accordance with Section 86-1.05, "Maintaining Existing and Temporary Electrical Systems."

24 hour notice shall be given to the Telephone Company and/or Pacific Gas and Electric Company before the beginning of any operation involving their facilities or systems.

Traffic signal activations shall follow the Public Works procedures for "Signal Activation," or shall be as specified in the Special Provisions. The Signal Activation procedure is available from the City upon request.

**86-1.08 Inspection.** - Prior to backfilling of conduit trenches or the pouring of concrete foundations, the Contractor shall notify the Department of Public Works Inspector and request inspection of all conduits and foundation forms.

All conduits, conduit couplings, conduit bends and ground bushings shall be in place and tightened and all anchor rods/bolts and ground rods shall be in place in the foundation form prior to the request for inspection. Wire shall not be pulled in conduits until inspection, backfilling and pouring of foundations are completed. Stub ends of all conduits shall have approved caps and ground bushings installed prior to backfilling or pouring of foundations.

The contractor shall not backfill, enclose or otherwise cover up any electrical work prior to inspection and/or testing. Should any of the work be backfilled, enclosed or covered up, the Contractor shall, at his expense, expose such work for such inspection and/or testing.

## **86-2 MATERIALS AND INSTALLATION**

**86-2.01 Excavating and Backfilling.** - The trenches shall be straight and true to line and grade, and the bottom shall be smooth and even.

**86-2.02 Removing and Replacing Improvements.** - Add the following to paragraph 1 of Section 86-2.02 of the Caltrans Standard Specifications: Improvements such as sprinkler and irrigation systems.

Delete paragraphs 2 and 3 of Section 86-2.02 of the Caltrans Standard Specifications.

Whenever a part of a square or slab of existing concrete sidewalk, curb, gutter, driveway or driveway approach is broken or damaged, the entire square, section or slab from score line to score line shall be removed and the concrete reconstructed as specified in Section 73, "Concrete Curbs and Sidewalks."

## SECTION 86 SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

All areas of Portland cement concrete sidewalks, driveways and driveway approaches and asphalt and/or concrete pavements to be removed shall be cut to a minimum depth of 0.17-foot with an abrasive type saw prior to removal. Cuts shall be neat and true along score lines.

**86-2.03 Foundations.** - Delete paragraphs 16, 19, 20, 21 and 22 of Section 86-2.03 of the Caltrans Standard Specifications.

Foundations shall be the type and constructed to the lines, dimensions and configurations as shown on the Plans and Standard Plan Details.

Foundations shall be installed at the locations shown on the Plans or as designated by the Engineer.

Unless otherwise specified or shown on the plans, foundations not to be reused shall be removed or abandoned.

When a foundation is abandoned, the top of foundation, anchor bolts, and conduits shall be removed to a depth of not less than one foot below surface of sidewalk or unimproved ground and one foot below the pavement structure in street areas. The resulting hole shall be backfilled with material equivalent to the surrounding material and the surface areas restored in kind, or as directed by the Engineer.

Where obstructions prevent the construction of a planned foundation, the Contractor shall consult with the Engineer to determine an effective resolution.

Unless otherwise specified by the Engineer, posts and standards shall be erected within 10 calendar days after commencement of excavation of the foundation, but not until the foundation has set at least 7 calendar days. They shall be plumbed or raked as directed by the Engineer. Plumbing of posts and standards shall be accomplished before the foundation is finished to final grade and/or before placing the mortar between the base plate and the foundation cap or structure.

Conduit shall enter the foundation at the locations as shown on the plans or as directed by the Engineer. Conduit elbows shall be integrally cast with the foundation.

Forms for foundation caps shall be rigid, at least 0.30 foot in width, and shall be accurately placed and secured. The elevation or grade of the foundation cap shall conform to existing surrounding grades or as directed by the Engineer.

The top portion of the foundation or cap shall not be constructed until after the post, standard or pedestal is set in proper position, and other improvement constructed, unless otherwise directed.

Mortar shall be placed between the base plate and foundation cap or structure. The thickness of mortar for signal standards shall be at least 0.10 foot and not more than 0.30 foot. The thickness of mortar for streetlighting standards shall be a maximum of 0.10 foot. The mortar shall be struck off and brushed smooth to present a neat appearance.

In paved areas, the top of foundation shall be at least 1-1/4 inches but not more than 4 inches below finished grade. Mortar, topping slab, or pavers shall be placed after the post or standard is in proper position. Mortar shall conform to provisions of Caltrans Section 51-1.135, "Mortar."

In unpaved areas posts and standards without adjacent pull boxes shall have a foundation cap formed a minimum of 2 feet square. When posts or standards are within 1.5 feet of other finished concrete work, finish foundation cap shall extend to existing adjacent surfaces.

In unpaved areas posts and standards with adjacent pull boxes shall have a foundation cap constructed to include the pull box.

In unpaved areas, cabinets shall be provided with a raised pad of portland cement concrete in front of the doors: a minimum 3-1/2 inches thick, 3 feet long and 4 feet wide, or as indicated.

Anchor bolts shall be of the sizes and lengths as shown on the Standard Plan Details.

Anchor bolts 5/8 inch through 1-1/4 inch shall have cut threads; rolled threads are not permitted.

Bending of anchor bolts will not be permitted. For traffic signal standards, anchor bolts shall extend a minimum of three full threads, but no more than 2 inches above the top nut. For streetlight standards, anchor bolts shall extend a minimum of three full threads above the top nut, but shall not extend so as to interfere with the installation of the ornamental leaf design nut cover.

All anchor bolts, nuts, and washers shall be galvanized. Anchor bolts with reinforcing bars or plates shall be set in a bolt circle using a template and securely attached to the foundation forms. The anchor bolts shall be set so that the exposed threads will accommodate the thickness of the foundation cap, mortar, base plate, locking nuts and washers.

If anchor bolts require extension, contractor shall provide structural details to City for approval prior to start of work.

Ground rods when installed in foundations of standards shall be located to either side of the handhole opening with top of ground rod even with bottom of handhole opening.

**86-2.04 Standards, Steel Pedestal and Posts.** - Delete paragraph 33 of Section 86-2.04 of the Caltrans Standard Specifications.

Standards, steel pedestals, and posts shall be of the type indicated on the Plans.

The mast arm(s), signal equipment, luminaire and other devices may be assembled and attached to a standard prior to its being erected and set.

After erection, standards and posts shall be plumbed or raked as directed by the engineer. Plumbing or raking of standards and posts shall be accomplished by adjusting the leveling nuts before the foundation cap is placed. The use of shims or other similar devices for plumbing or raking of standards and posts is not acceptable.

Signal equipment shall be plumbed and aimed and luminaires shall be leveled after the standard has been erected and set.

Guard posts shall be installed when the axis of a standard is located within three feet of a driveway approach to protect the standard from damage by moving vehicles or as directed by the Engineer. Guard posts shall be galvanized standard pipe conforming to the specifications of ASTM Designation: A53 or A120.

Existing standards to be relocated or reused in place shall be repaired as directed by the Engineer. Holes shall be welded closed, large dents shall be removed, shafts shall be straightened, and portions which are in poor condition due to rust, corrosion or damage shall be replaced. Repaired areas shall be ground smooth and primed for application of finish.

Existing standards having a painted finish which are modified, relocated, repaired or upon which equipment is altered by the Contractor shall be repainted.

The Contractor shall apply pressure-sensitive identification number labels to all lighting standards and all signal standards with luminaires, as directed by the Engineer. Labels shall conform to the specifications indicated in the Standard Plan Details.

## SECTION 86 SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

**86-2.04(A) Octafluted Lighting Standards.** - Octafluted lighting standards shall conform to the dimensions, design and gage indicated in the Standard Plan Details. Octafluted standards shall be certified by the fabricator to be of such manufacture as to retain a minimum yield strength safety factor of 1.8 when subjected to a 23 pounds per square foot basic wind pressure.

Lighting standards to be installed shall be type 10B (octafluted) with type C-8 mast arm per the Standard Plan Details, unless indicated otherwise on the Plans.

Octafluted lighting standards shall have a uniform 0.14 inch per foot taper over the length of the 30 foot shaft. The shaft shall be straight with a permissive variation not to exceed one inch as measured at the midpoint of the shaft.

The shaft of octafluted lighting standards shall be fabricated from a single sheet of 7 gauge or 11 gauge hot rolled basic open hearth steel conforming to the Standard Plan Details and to ASTM Designation: A 570, Grade C. Base plates shall be one piece cast steel, conforming to ASTM Designation: A27, Grade 65-35. Mast arms shall be fabricated from standard two inch pipe conforming to the specifications of ASTM Designation: A53 or A120.

The shaft of octafluted lighting standards shall have a single, continuous longitudinal welded seam from the base to the top of the standard. Longitudinal welds shall be formed by the submerged process. After fabrication of the shaft, the longitudinal weld shall be rolled smooth. The base plate shall be secured to the shaft by two continuous welds, one inside the standard and one outside.

The shaft of octafluted lighting standards shall be tapered and shall consist of eight equally spaced doric flutes which shall be formed by the cold rolling process. Flutes shall have sharp crests and be uniform in size, taper and radius over the entire length of the shaft. The radius of the crest shall be less than the thickness of the metal in the shaft.

The standard pipe for mast arms shall be reamed, free from burrs, and without intermediate splices or couplings.

Mast arms for octafluted lighting standards shall be attached to the shaft by means of a steel fitting welded to the mast arm and a matching steel fitting welded to the shaft. When assembled, the fittings on the mast arm and the shaft shall interlock and be secured by means of a hexagon head cadmium plated cap screw. The connection between the mast arm and the standard shall be weather resistant and shall form a smooth wireway.

Type C mast arms for octafluted lighting standards shall be provided with an ornamental scroll bracket as depicted in the Standard Plan Details. The scroll bracket shall be fabricated from cold-rolled steel "U"- channel stock, 1/8-inch by 1-1/2 inches wide by 1/2 inch deep. The bracket shall be drilled at the ends and secured to the standard by means of hexagon head cadmium plated cap screws and 1/2-inch nuts welded to the shaft and the mast arm.

Type E mast arms for octafluted lighting standards shall be as shown in the Standard Plan details.

Transformer base pedestals for type 10A octafluted standards shall conform to the dimensions and design as indicated in the Standard Plan Details. The top and bottom plates of the transformer base pedestals shall be fabricated from 3/4-inch steel plate and the sides from 7 gauge hot-rolled steel. After fabrication, exposed welds shall be ground smooth. Transformer base pedestals shall have a trapezoidal access door a minimum of 8-1/2 inches wide at the top, 9 7/8 inches wide at the bottom and 13-1/4 inches high. The door shall be provided with tamper resistant locking hardware. To facilitate plumbing, leveling and positioning of the



transformer base pedestal, two 1/2-inch steel anchor clip plates of the design depicted in the Standard Details shall be provided for each anchor bolt.

Each of the four anchor bolt nuts on octafluted lighting standards shall be concealed by an ornamental cast steel or cast aluminum leaf-design cover held in place by a hexagon head cadmium plated cap screw.

Octafluted standards shall be provided with an ornamental cast steel or cast aluminum spear point finial held in place by four cadmium plated set screws.

Octafluted standards shall be provided with a handhole as indicated in the Standard Plan Details. The handhole cover shall be secured with a cadmium plated allen-head screw and steel locking bar or other tamper resistant device as approved by the Engineer. A 1/2-inch diameter N.C. by 1 inch long ground lug shall be welded to the inside of the shaft directly opposite the handhole. A hex nut and two flat washers shall be provided on the ground lug.

Octafluted standards and all ferrous accessories shall have a hot-dipped galvanized finish, unless specified otherwise on the Plans.

Lighting standards which are fed overhead shall be provided with pole band(s), clevis(es), spool(s) and a mastarm with a 1-1/2 inch diameter conduit entrance nipple and insulated bushing welded to the underside of the mast arm as indicated in the Standard Plan Details. The connection between the entrance nipple and the mast arm shall form a smooth wireway.

**86-2.04(B) Signal Standards.** - Signal equipment and other devices shall be secured to signal standards using cadmium plated threaded bolts and/or screws. Signal standards shall be drilled and tapped as required to accept such bolts and/or screws. The use of "through-bolts" with nuts to secure equipment to standards is not acceptable.

Signal mast arms shall have the end signal head mounting tenon located on the side of the mast arm, rather than at the tip.

Drilling, tapping and machining of signal standards shall be performed on the job site. Holes in standards shall be cut using drills or hole saws. The use of a cutting torch for the purpose of producing holes in standards will not be permitted unless authorized by the Engineer prior to performing the work.

When modifying signal or lighting equipment on existing signal standards, the Contractor shall de-energize and remove circuit conductors prior to drilling, cutting, welding and/or tapping the pole. When performing this work, the Contractor shall schedule a system shutdown in accordance with Section 86-1.05, "Maintaining Existing and Temporary Electrical Systems."

**86-2.05 Conduit.** - Conduit shall be of the sizes and types as shown on the Plans or as specified in the specifications or the special provisions.

**86-2.05A Material.** - Replace the entire Section 86-2.05A of the Caltrans Standard Specifications with the following:

Conduit and conduit fittings shall be UL or ETL listed and shall be of one of the following types:

- (1) Galvanized Rigid Steel (GRS). GRS conduit shall conform to the requirements of UL Publication UL6 for Rigid Metallic Conduit. The zinc coating shall be

## SECTION 86 SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

- applied by the hot-dip process and shall conform to the requirements of ASTM Designation: A239.
- (2) Plastic Coated Galvanized Rigid Steel (PCGRS). PCGRS conduit shall conform to (1) above and shall have an external coating of polyvinyl chloride. The thermoplastic coating shall have a minimum thickness of 40 mils.
  - (3) Rigid Non-Metallic Polyvinyl Chloride (PVC). PVC conduit shall conform to the requirements of the UL Standard for Rigid Non-Metallic Conduit (UL Publication 651).

GRS and PCGRS conduit shall be terminated with insulated bonding type ground bushings. PVC conduit shall be terminated with end bell fittings.

All fittings used for installing, supporting, joining and connecting conduit shall be specifically designed and manufactured for electrical use.

All metal conduit couplings shall have straight non-tapered threads and shall be marked by the manufacturer with an "E" to identify them as being of electrical grade. Tapered plumbing type couplings and couplings with slip joints, set screws or running threads will not be permitted for joining conduits.

**86-2.05B Use.** - Replace the entire Section 86-2.05B of the Caltrans Standard Specifications with the following:

Conduit that is installed underground or in concrete foundations shall be Schedule 40 PVC or PCGRS. Conduit that is installed as a service riser shall be Schedule 80 PVC and shall conform to the requirements of the Pacific Gas and Electric Company. Conduit that is installed in exposed locations or in structures shall be GRS.

Exposed conduit installed on a painted structure shall be painted the same color as the structure as specified in Section 86-2.16, "Painting."

Conduit runs shall be continuous and uniform in kind and diameter. Where existing conduit runs are to be modified or extended, new conduit shall match existing in kind. Reducing couplings shall not be permitted.

Conduit diameter shall be as indicated on the Plans or, if not specified, shall be a minimum of the following:

- (1) 1-1/2 inches between an electrolier and pull box.
- (2) One inch between a pedestrian push button post and pull box.
- (3) 2 inches between a signal standard and pull box.
- (4) 2 inches for detector lead-in cable runs.
- (5) 3 inches between a type "M" controller cabinet and pull box.
- (6) 3 inches (two conduits) between a type "P" controller cabinet and pull box.
- (7) One inch between the detector loop termination at the lip-of-gutter and pull box.
- (8) 3 inches for traffic signal conduits between pull boxes where the conduit crosses a roadway.
- (9) 1-1/2 inches for streetlighting systems.

- (10) 2 inches for traffic signal systems.

**86-2.05C Installation.** - Delete paragraphs 2, 8, 10, 11, 13, 18, 19, and 20 of Section 86-2.05C of the Caltrans Standard Specifications. Conduit installed underground shall be installed in open trenches, unless approved otherwise by the Engineer. Trenches for conduit shall be straight and uniform in depth, free of ridges and depressions. Conduit shall not be covered until the installation has been approved by the Engineer.

Trench-laid conduit shall have a minimum of 18 inches of cover in non-roadway areas and 24 inches of cover (below finished grade) in roadway areas, including driveways, unless otherwise indicated or approved by the Engineer. Conduit depth requirements shall not apply at locations where conduit slopes upward to a pull box or standard.

The minimum cover requirements for trench-laid conduit may be reduced if the conduit is protected in a portland cement concrete encasement. Revisions to the minimum conduit depth requirements will be at the Contractor's expense and will require written approval from the Engineer, prior to conduit placement.

Conduit less than 18 inches below the surface and not encased in concrete or less than 10 feet above the finished surface shall be PCGRS or GRS conduit unless specifically indicated otherwise on the Plans or allowed by the Engineer.

Parallel conduit runs installed in a common trench without concrete encasement shall have a minimum of 6 inches of separation between conduits. Where parallel conduit runs installed in a common trench are encased in concrete, a minimum of 2 inches of separation shall be maintained between the conduits and the trench walls and floor and between individual conduits. Conduit spacers and anchors shall be installed as required to insure a complete and uniform flow of concrete around the conduits. Distances between conduit spacers and between anchors shall not exceed 5 feet.

Where an underground obstruction is encountered which prevents the installation of a conduit run as shown on the plans the alignment of the conduit run may be revised and/or additional pull box(es) may be installed as required to avoid the obstruction. Such revisions to the conduit alignment and pull box layout will be at Contractor's expense and will require the prior written approval of the Engineer.

Contractor shall, at the request of the Engineer, open inspection holes as required to determine compliance with the requirements for trench-laid conduit depth and alignment. Inspection holes shall not be backfilled until the conduit installation has been approved by the Engineer. Upon completion of inspection, inspection holes shall be filled to the satisfaction of the Engineer. The opening and filling of inspection holes shall be at the expense of the Contractor.

Backfilling, compaction and restoration of the surface of trenches shall be in accordance with the provisions of the applicable section of these Specifications.

In traffic signal installations GRS or PCGRS conduit runs may be laid on top of existing pavement within curbed median islands that are to have Portland cement concrete surfacing.

Conduit runs for streetlighting shall be installed either parallel to or perpendicular to the curb, unless otherwise approved by the Engineer prior to placement. Conduit at an oblique angle to the curb will not be permitted. Conduit runs parallel to the curb shall be located not more than 27 inches nor less than 6 inches behind the face of curb, unless otherwise indicated on the Plans or approved by the Engineer.

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Conduit shall not be installed by the "impact driving" method.

With the approval of the Engineer, conduit may be installed by either the jacking or drilling method. When a conduit jacking or drilling pit is to be left open overnight, it shall be covered in accordance with the requirements set forth by the Engineer, and/or the American Railway Engineering Association (AREA) Standard Specifications, for railroad crossings.

Conduit installed under a roadway by jacking or drilling shall not be less than 24 inches nor more than 48 inches below the flow line of the gutter or edge-of-pavement grade where no gutter exists.

Where conduit is installed under a roadway by the drilling method, any excessive voids shall be filled to the satisfaction of the Engineer.

Conduit bends shall be avoided wherever possible and where required shall be of the largest possible radius. Where underground conduit changes direction, long radius sweeps shall be used instead of short radius bends.

The radius of conduit bends and elbows entering foundations shall not be less than 12 times the internal conduit diameter. Unless specified otherwise, other conduit bends and elbows shall not have a radius less than 30 inches.

PVC conduit elbows shall be factory manufactured. Field bending of PVC conduit is not permitted.

Conduit bends and elbows shall be free of flattening, kinks and indentations.

No single conduit bend or elbow shall exceed an angle of 90 degrees.

Unless otherwise approved by the Engineer, there shall be no more than the equivalent of:

- (1) 135 degrees of bends in a conduit run from a pull box to a foundation.
- (2) 90 degrees of bends in a conduit run from a pull box to a pull box where the conduit is installed parallel to and on the sidewalk side of curb.
- (3) 270 degrees of bends in a conduit run from a pull box to a pull box where the conduit is installed parallel to and on the streetside of the curb.
- (4) 180 degrees of bends in a conduit run from a pull box to a pull box where the conduit is installed perpendicular to the curb.

PVC conduit, elbows, couplings and fittings shall be joined by solvent welding. Solvent weld cement shall conform to the requirements of ASTM D2564. In solvent welding of PVC conduit and components, the Contractor shall thoroughly coat the mating surfaces of the joint with cement and, after insertion, shall twist the joint 180 degrees to insure a complete bond.

Conduit in the foundation of a standard or an enclosure shall terminate not more than 2 inches and not less than 1 inch above the top surface of the foundation.

The uppermost 8 inches of conduit terminating in a standard or an enclosure shall be straight and shall be so positioned in the foundation that its prolongation would pass through the handhole opening.

Any conduit elbow stub leaving a foundation shall extend a minimum of 6 inches from the face of the foundation and shall have at least 18 inches of cover. The elbow stub shall exit the foundation in the direction indicated on the Plans and shall be capped until conduit is attached or a bushing is installed.

Conduit between a foundation and an adjacent pull box shall be continuous, without couplings, from the elbow stub at the foundation to the elbow into the pull box. The conduits entering foundations shall be PVC schedule 40 or PCGRS.

Conduit shall enter a concrete pull box through the short side and shall be so positioned that the prolongation of the conduit would pass through the top opening of the pull box. Conduit shall not enter from the bottom or from the long side of a pull box unless otherwise approved by the Engineer. Conduit shall enter a pull box in the direction of the conduit run. Conduit shall terminate not more than 2 inches and not less than one inch from the inside wall or bottom of the pull box.

Where a new pull box is installed in an existing metallic conduit run, the conduit shall be cut, threaded, fitted with grounding bushings and bonded.

The exterior surface of conduit which will be partially or completely imbedded in concrete structures shall be cleaned before the concrete is placed.

Conduit to be placed beneath a railroad track shall be installed in conformance with the American Railway Engineering Association Standard Specifications, any local railroad regulations and the requirements set forth by the Public Utilities Commission. Conduit beneath a railroad track shall be installed by jacking or drilling methods. The neat side of each conduit jacking pit shall be constructed not less than 12 feet from the centerline of track. Conduit shall be PCGRS, a minimum of 2 inches in diameter and shall be installed with a minimum of 36 inches of cover below the bottom of ties. The Contractor shall contact the railroad company involved 20 working days prior to the start of work for approval of construction methods.

The installation of conduit into a manhole, vault, and/or pull box of the Pacific Gas and Electric Company, Pacific Bell Telephone Company or other agency shall conform to the requirements of the respective agency. The Contractor shall contact representatives of those organizations for instructions regarding the preferred location of entry and termination method of such conduit. The conduit shall project into the manhole, vault and/or pull box only far enough for a bushing to be placed on the conduit end. The opening around the conduit shall be carefully and completely filled with mortar and neatly finished.

A pull rope shall be installed in all conduits which are designated for future use. The pull rope shall be nylon or polypropylene with a minimum tensile strength of 500 pounds. At least two feet of pull rope shall be doubled back into the conduit at each termination.

Prior to the installation of conductors or cables in either existing or newly installed conduit, the Contractor shall prove and clean the conduit by pulling a mandrel or wire brush through the conduit or by rodding, then blowing out the conduit with compressed air.

Rodding shall be performed by simultaneously pushing and turning a straight steel or wooden rod through the conduit, taking care not to damage the conduit walls.

The cost of proving conduit shall be considered as included in the price paid for electrical installations and no extra payment shall be made therefor.

**86-2.06 Pull Boxes.** - Delete paragraph 1 of Section 86-2.06 of the Caltrans Standard Specifications.

Except as noted below, pull boxes shall be installed at the locations shown on the Plans and shall be of the sizes specified. To facilitate his work, the

## SECTION 86 SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

Contractor may, at his option and expense, install additional pull boxes or pull boxes of a larger standard size than those shown or specified. The locations of additional pull boxes shall be established by the Engineer.

**86-2.06A Materials.** - Replace the entire Section 86-2.06A of the Caltrans Standard Specifications with the following:

Pull boxes, extensions and covers for installation in the ground or in sidewalk areas shall be constructed of pre-cast reinforced concrete. Pull boxes shall be of the sizes shown on the Plans and, unless indicated otherwise, shall conform to the dimensions indicated in the Standard Plan Details. Pull boxes shall have gray plastic coated rims. Each pull box cover shall be secured with two 3/8-inch brass hold down bolts with brass washers and nuts. Nuts shall be recessed below the surface of the cover.

Pull boxes and extension for installation in areas subject to traffic loads shall be constructed of pre-cast reinforced concrete. Traffic pull boxes shall be of the sizes shown on the Plans and, unless indicated otherwise, shall conform to the dimensions indicated in the Standard Plan Details. Each traffic pull box shall be provided with a checkered steel plate cover, a minimum of 1/4-inch thick, conforming to the design indicated in the Standard Plan Details. The steel cover shall be electrically grounded by means of a 3 foot length of copper braid equivalent to a Number 8 AWG or larger copper conductor. The copper braid shall be attached to a suitable grounding lug welded to the underside of the traffic cover and shall be bonded to either a metallic conduit or a grounding conductor which shall be bonded to the service grounding electrode.

Pull boxes and covers for installation in structures shall be of the sizes and details shown on the Plans. In lieu of the structure pull box shown on the Plans, the Contractor may use a telescoping steel pull box, with interior dimensions, conduit entrances and cast iron cover conforming to the details shown in the Standard Plan Details. The design of the steel pull box shall be submitted to the Engineer for approval prior to fabrication.

**86-2.06B Cover Markings.** - Replace the entire Section 86-2.06B of the Caltrans Standard Specifications with the following:

The covers for pull boxes except ceiling pull boxes shall be clearly marked with a legend that identifies the electrical system served by the pull box. Pull box cover legends shall be as follows:

- |                        |  |
|------------------------|--|
| CSJ TRAFFIC SIGNAL:    | for traffic signal systems with or without streetlighting systems. |
| CSJ STREETLIGHTING:    | for streetlighting systems only.                                   |
| CSJ COMMUNICATIONS:    | for traffic signal communications only.                            |
| CSJ TREE LIGHTING:     | for tree lighting systems only.                                    |
| CSJ SPRINKLER CONTROL: | for sprinkler control systems only.                                |

CSJ COUNT STATION:	for traffic count stations only.
CSJ SERVICE:	for service laterals to utility facilities termination point only.
CSJ ELECTRICAL:	for combined electrical systems or miscellaneous systems not mentioned above.

The pull box cover legend shall be formed of capital block letters between one and 3 inches in height. The legend may be parallel to either the long or short side of the cover.

Concrete pull box covers shall have the legend cast into the cover at the time of manufacture. The lettering of the legend shall be sharply defined, uniform in depth, evenly spaced and neatly aligned.

Steel pull box covers shall have the legend applied to the cover prior to galvanizing using one of the following methods:

- (1) Cast iron strips, at least 1/4-inch thick with the letters raised a minimum 1/16-inch. Strips shall be fastened to covers with 1/4-inch flathead stainless steel bolts and nuts. Bolts shall be peened after tightening.
- (2) Sheet steel strips at least 22 gage with the letters raised a minimum of 1/16-inch above the surrounding surface of the strips. Strips shall be fastened to the covers by spot welding, tack welding, brazing, with 1/4-inch stainless steel rivets or 1/4-inch roundhead stainless steel machine bolts and nuts. Bolts shall be peened after tightening.
- (3) Bead welding the letters on the covers. The letters shall be raised at least 3/32-inch.

**86-2.06C Installation and Use.** - Replace the entire Section 86-2.06C of the Caltrans Standard Specifications with the following:

Pull boxes shall be installed at the locations shown on the Plans. Pull boxes shall not be spaced at intervals over 200 feet whether indicated on the Plans or not, unless otherwise directed by the Engineer. Pull boxes shall not be installed in roadways, driveways, driveway approaches, gutters, or wheelchair ramps.

The bottoms of pull boxes installed in the ground or in sidewalk areas, shall be bedded in washed river drain rock as shown in the Standard Plan Details and shall be grouted prior to the installation of conductors. The grout shall be between one and 2 inches thick and shall be sloped toward the drain hole. One layer of roofing paper shall be placed between the grout and the rock sump. A one inch diameter drain hole shall be provided in the center of the pull box through the grout and the roofing paper.

Existing pull boxes disturbed by the Contractor's operations shall, at Contractor's expense, have drain rock sumps and grouted bottoms installed and shall be reconstructed in conformance with these Specifications, or as directed by the Engineer. Pull boxes shall be CSJ Number 3-1/2 minimum for lighting systems and Number 5 minimum for traffic signal systems or other systems, unless specified otherwise.

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Pull boxes shall be installed with the long dimension parallel to the main conduit run. In the vicinity of curbs, pull boxes shall be placed adjacent to the back of curb. In the vicinity of standards, pull boxes shall be placed alongside the foundation as indicated in the Standard Plan Details. The top of the pull box shall be flush with the surrounding grade or top of adjacent curb unless otherwise indicated.

Where pull boxes are placed in areas subject to traffic loads, (when permitted by the Engineer), they shall be installed on suitable concrete footings as shown in the Standard Plan Details.

**86-2.08 Conductors.** - Replace the entire Section 86-2.08 of the Caltrans Standard Specifications with the following:

Conductors shall be copper of the gage shown on the plans, unless specified otherwise.

The minimum wire gages for streetlighting systems shall be as follows: Number 8 AWG for service and feeder conductors from the service point to the main disconnect and branch circuits, Number 12 AWG for branch circuits from feeder to lamp ballasts, and Number 14 AWG for control circuits from photo-electric-unit (PEU) to contactor.

Copper wire shall conform to the specifications of ASTM Designations: B3 and B8.

Wire sizes, other than conductors used in loop detector lead-in cable, shall be based on American Wire Gage (AWG). Conductor diameter shall be not less than 98 percent of the specified AWG diameter. Conductors used in loop detector lead-in cable shall conform to the specifications of ASTM Designation: B 286.

Conductors shall be UL or ETL listed and rated for 600-volt operation. The insulation for traffic signal conductors installed between a traffic signal controller and related traffic signal appurtenances shall conform to one of the following:

- (1) Type UF, with a minimum insulation thickness of 60 mils at any point, for conductor sizes Number 14 AWG through Number 10 AWG.
- (2) Type THW or UF, with a minimum insulation thickness of 60 mils at any point, for conductor sizes Number 8 AWG and larger.

The insulation for all conductors other than traffic signal conductors as specified above shall conform to one of the following:

- (1) Type THW, with a minimum insulation thickness of 45 mils at any point, for conductor sizes Number 14 AWG through Number 10 AWG.
- (2) Type THW or UF, with a minimum insulation thickness of 60 mils at any point, for conductor sizes Number 8 AWG and larger.

Type THW polyvinyl chloride conductor insulation shall conform to the requirements of ASTM Designation: D 2220.



Conductors for wiring wall luminaries shall be stranded copper, Type AVL, with insulation rated for use at temperatures up to 125°C.

Overhead feeder conductors shall be of the multiconductor aerial power cable with self-supporting messenger cable type. The cable shall consist of one or more weather-resisting cross-linked polyethylene insulated aluminum conductors, as required, bound to an aluminum-clad steel messenger cable by means of a flat metallic strip applied with open-lay "figure eight" spiraling helical wrap, not to exceed one rotation per 4 feet of cable length. Conductors shall be No. 6 AWG minimum size, seven strand insulated aluminum with a No. 6 steel reinforced bare aluminum neutral when required, suitable for maximum operating temperature of 90 degrees Celsius and rated 600-volt AC, 1170 pound ultimate strength. The minimum conductor insulation shall be 45 mils, conforming to IPCEA standard #566-524 and IPCEA standard #561-402.

Aerial power cable shall be installed at the locations shown on the plans or as specified.

Aerial power cable shall be installed on existing poles or on new poles as required. The pole mounting brackets shall be installed at a height as shown in the Standard Plan Details or as directed by the Engineer.

Aerial power cable shall be supported by its integral messenger securely attached at each end with approved devices as shown in the Standard Plan Details or as directed by the Engineer.

Aerial power cable mounting supports, hangers, clamps, and all other ferrous hardware shall be hot dipped galvanized in conformance with Section 75-1.05, "Galvanizing." Size and strength requirements shall conform to the Standard Plan Details and the manufacturers recommendations for the size of cable and length of span supported.

Aerial power cable shall be installed with stringing pulleys or other acceptable means to carry the cable at each pole during the pulling operation. The dragging of cable across the top of steel or "unroofed" cross arms in aerial installations will not be permitted.

The cable shall be so tensioned to maintain legal clearance over roadway and non-roadway areas. The sag in no case shall be more than eight percent (8%) nor less than two percent (2%) of the span length.

Aerial cables shall be bonded in accordance with Section 86-2.10, "Bonding and Grounding." Aerial cables shall be installed in accordance with Caltrans Section 86-2.09, "Wiring" and shall be marked in accordance with the provisions of Section 86-2.08A, "Conductor Identification."

All aerial cable splices shall be readily accessible.

**86-2.08A Conductor Identification.** - Replace the entire "Conductor Table" of the Caltrans Standard Specifications with the following "Conductor Table."

CONDUCTOR TABLE

CONDUCTOR USE	SIGNAL PHASE or FUNCTION	INSULATION COLOR			IDENTIFICATION		CONDUCTOR SIZE
		BASE	STRIPE	DESIGNATION	LABEL DESIGNATION		
Vehicle Signals	2,6	Re, Ye, Bm	Black	2,6		14	
	4,8	"	Orange	4,7		14	
	1,5	"	None	1,5		14	
	3,7	"	Purple	3,7		14	
	Overlaps	"	Note 1	OL#		14	
Pedestrian Signals	2p, 6p	Red, Brown	Black	2p, 6p		14	
	4p, 8p	"	Orange	4p, 8p		14	
	1p, 5p	"	None	1p, 5p		14	
	3p, 7p	"	Purple	3p, 7p		14	
Pedestrian Push Buttons	2p, 6p	Blue	Black	pb2, pb6		14	
	4p, 8p	"	Orange	pb4, pb8		14	
	1p, 5p	"	None	pb1, pb5		14	
	3p, 7p	"	Purple	pb3, pb7		14	
Traffic Signal Controller Cabinet	Ungrounded-Line 1	Black	None	CN1		As	
	Grounded-Neutral	White	None	CNN		Req'd	

CONDUCTOR TABLE (CONT.)

CONDUCTOR USE	SIGNAL PHASE or FUNCTION	INSULATION COLOR			IDENTIFICATION		CONDUCTOR SIZE
		BASE	STRIPE	LABEL DESIGNATION	CONDUCTOR SIZE		
Streetlighting	Ungrounded-Line 1	Black	None	SL1	As		
	Ungrounded-Line 2	Red	None	SL2	Req'd		
	Grounded-Neutral	White	None	SLN			
Lighting Control	Ungrounded to Photo- electric unit (PEU)	Black	None	C1	14		
	Switched leg from PEU unit	Red	None	C2	14		
	Grounded-Neutral	White	None	C3	14		
Irrigation Control	Undergrounded-Line 1	Black	None	IR1	As		
	Grounded-Neutral	White	None	IRN	Req'd		
Service	Undergrounded-Line 1	Black	None	SR1	As		
	Undergrounded-Line 2	Red	None	SR2	Req'd		
	Grounded-Neutral	White	None	SRN			
Sign Lighting	Undergrounded-Line 1	Black	None	SN1	12		
	Undergrounded-Line 2	Red	None	SN2	12		

CONDUCTOR TABLE (CONT.)

CONDUCTOR USE	SIGNAL PHASE or FUNCTION	INSULATION COLOR			IDENTIFICATION	
		BASE	STRIPE	DESIGNATION	LABEL DESIGNATION	CONDUCTOR SIZE
Flashing Beacons	Undergrounded between flasher & beacons Grounded-Neutral	Red or Yellow	None	Flasher- location FLN		14
		White	None			14
Logic Common	Pedestrian Push Buttons . . . . .	White	Black	None		14
Grounded Neutral	Traffic Signals	White	None	TSN		As Req'd
Traffic Signal Communications	As required . .	As Req'd	As Req'd	Per Sect. 86-2.09G		As Req'd
Railroad Pre-emption	As Required . .	Black	None	RR		14
Emergency Vehicle Pre-emption	As Required . .	Black or as req'd	None	EV#1,2,3 as Req'd		14 or as Req'd
Spares	Traffic Signal Spares	Black	None	None		14

CONDUCTOR TABLE (CONT.)

CONDUCTOR USE	SIGNAL PHASE or FUNCTION	INSULATION COLOR		IDENTIFICATION	
		BASE	STRIPE	LABEL DESIGNATION	CONDUCTOR SIZE
Inductive Loop Detector Circuits	Vehicle Detection	As Req'd	None	Per Sect. 86-5.01A(5)	As Req'd

## Notes:

1. Conductors for overlap traffic signal phases shall have their insulation striped for the first signal phase in the designation. For example, a phase (2+3) overlap conductor shall have its insulation striped as phase 2.
2. Conductors for overlap traffic signal phases, special traffic signal phases and other special functions shall be labeled accordingly.
3. Conductors shall be labeled in each pull box and at termination points. Ungrounded traffic signal conductors shall be labeled by banding groups of conductors comprising a signal phase or function.

**86-2.08B Multiple Circuit Conductors.** - Delete the entire Section 86-2.08B of the Caltrans Standard Specifications.

**86-2.08C Series Circuit Conductors.** - Delete the entire Section 86-2.08C of the Caltrans Standard Specifications.

**86-2.09A Circuitry.** - Delete paragraphs 2 and 5 of Section 86-2.09A of the Caltrans Standard Specifications.

The "common" for pedestrian push button circuits shall be a separate conductor and shall not be used for any other purpose.

**86-2.09B Installation.** - Delete paragraphs 4, 6, 7, and 10 through 14 of Section 86-2.09B of the Caltrans Standard Specifications.

Conductors shall not be pulled into conduits until after pull boxes are set to grade, drain rock sumps installed, conduit grouted in place, bottoms of concrete boxes grouted, and the conduits bonded.

The conduit system shall be complete and approved by the Engineer before any conductors are installed in conduits. All conductors shall be run in conduit except overhead installations or where conductors are installed inside poles, pull boxes or cabinets. Conductors shall be installed by means which will not in any way damage the conductor or its insulation.

Conductors entering conduits shall be carefully fed and "positioned" to avoid "tangles" and "crossovers." All conductors shall be installed simultaneously.

Conductors and cables in all pull boxes shall be grouped and arranged in a workmanlike manner. Conductors and cables in manholes shall be supported by strapping to the side wall.

A UL or ETL listed inert lubricant such as powdered soapstone or talc shall be used in placing conductors in conduit.

Conductors shall be pulled into conduit by hand; use of winches or other power actuated pulling equipment will not be permitted.

When conductors are to be added to existing conductors in a conduit, all conductors shall be removed; the conduit shall be cleaned as provided in Section 86-2.05C, "Installation" and all conductors shall be pulled into the conduit as a unit. Traffic signal and streetlighting conductors receiving power from different service points shall not be installed in the same standard, conduit, pull boxes or other enclosures. Service conductors shall not be installed in traffic signal or streetlighting conduits.

Temporary conductors less than 10 feet above grade shall be enclosed in flexible or rigid metal conduit.

At least 2 feet of slack shall be left in traffic signal conductors at each signal or combined lighting/signal standard, where a pull box is not adjacent to the standard and/or there is more than one conduit in the base of the standard. Slack shall be measured by removing the handhole cover on the standard and extending the wire horizontally beyond the handhole opening.

At least 2 feet of slack shall be left in lighting conductors at each standard to facilitate the removal of fused spliced connectors. Slack shall be measured by removing the handhole cover on the standard and extending the conductors horizontally beyond the handhole opening.

At least 3 feet of conductor slack shall be left in all conductors, at each pull box. Slack shall be measured by removing the pull box lid and extending the conductors vertically above the pull box grade.

Conductors shall be permanently identified as to function (vehicle signal phase, pedestrian signal phase, streetlight circuit, streetlight controls, irrigation circuit, etc.) as detailed in the "Conductor Table" of Section 86-2.08A, "Conductor Identification." Identification shall be means of encircling individual conductors/cables or functional groups of conductors with a permanent identification label in each pull box and at the termination of the conductors/cables. Labels shall be fastened in such a manner that they will not move along the conductors/cables.

**86-2.09C Connectors and Terminals.** - Replace the entire Section 86-2.09C of the Caltrans Standard Specifications with the following:

Conductors shall be joined by means of approved spring-type pressure connectors, crimp style terminal lugs, or by other methods approved by the Engineer. Crimp style terminals shall have continuous barrels or seams shall be brazed so they shall not separate during crimping.

Finished connections and terminals shall comply with all UL requirements.

All stranded conductors smaller than number 14 AWG shall be terminated in crimp style terminal lugs.

Crimp tools shall be of the type that necessitates a crimp pressure of manufacturer's required value before tool will unlock. Where splices are required to be soldered they shall be soldered using the Hot Iron method with rosin core solder. Soldering with an open flame shall not be allowed.

All joints shall be covered with insulation equivalent to the voltage and temperature rating of the insulation on the conductors and as indicated in the Standard Plan Details.

Split bolt connectors shall not be used except where specifically authorized by the Engineer.

Connectors and terminals for use with aluminum conductors shall be approved for aluminum-to-aluminum or aluminum-to-copper as required, and shall comply with all UL requirements, unless otherwise approved by the Engineer.

**86-2.09D Splicing.** - Replace the entire Section 86-2.09D of the Caltrans Standard Specifications with the following:

Unless specified otherwise or permitted by the Engineer, splices shall conform to the Standard Plan Details. Conductor splices will not be permitted in controller cabinets. Use of terminal compartments or terminal blocks on standards shall not be permitted.

Splices will be permitted only in the following types of circuits at the following locations:

- (1) Grounded conductors and branch signal light neutrals in pull boxes.
- (2) Pedestrian push button conductors in pull boxes.
- (3) Multiple lighting and power conductors shall be spliced in a pull box adjacent to the standard.
- (4) Traffic signal conductors shall be spliced in pull boxes only at locations shown on the plans.

- (5) Ungrounded traffic signal conductors to a signal head on a standard shall be spliced to through conductors of the same phase in the pull box adjacent to the standard.

**86-2.09E Splice Insulation.** - Replace the entire Section 86-2.09E of the Caltrans Standard Specifications with the following:

Splice insulation shall conform to the Standard Plan Details.

Low-voltage tape shall be UL or ETL listed and shall be the following types:

- (1) Self-fusing, oil and flame-resistant, synthetic rubber.
- (2) Pressure-sensitive, adhesive, polyvinyl chloride, 0.007 inch minimum thickness.

Where polyvinyl chloride tape is used for a final layer, an electrical insulating coating, compatible with the tape, shall be used. It shall be fast drying, resistant to oil, acid, alkalis and corrosive atmospheric conditions.

The Contractor may elect to use, with approval of the engineer, one of the following splice insulation methods:

- (1) A minimum of 2 thicknesses of electrical insulating pad, composed of a laminate of 0.085 inch thickness of electrical grade polyvinyl chloride and a 0.125 inch thickness of butyl splicing compound with removable liner. Pads shall be applied to the splice in accordance with the manufacturer's recommendations. The applied pad shall be wrapped with polyvinyl chloride tape half lapped over the conductor insulation.
- (2) Heat shrinkable insulating tubing shall be applied after completing the splicing procedure shown on the Standard Plan Details. Insulation over the connector shall consist of a heat shrinkable, mastic lined, heavy wall polyolefin cable sleeve, or cover, to which heat shall be applied at a temperature greater than 120°C until the sleeve or cover, shrinks and covers the connector and the mastic material has flowed completely around the cable to form a waterproof insulation.

Where splices are below grade or exposed overhead, the insulation and taping shall be applied between the conductors in such a manner as to provide a watertight joint. The splice shall be capable of satisfactory operation under continuous submersion in water.

Multi-conductor cables shall be spliced and insulated to provide a watertight joint and to prevent absorption of moisture by the cable.

**86-2.09F Fused Splice Connector.** - Replace the entire Section 86-2.09F of the Caltrans Standard Specifications with the following:

Fused disconnect splice connectors with fuses shall be installed as shown in the Standard Plan Details and as specified as follows:



- (1) In the service conductors of unmetered underground streetlight and irrigation controller services or other services as specified and shall be placed in the "service" pullbox.
- (2) In the drip loop of unmetered overhead streetlight service conductors.
- (3) In branch circuit conductors of each streetlight.

A fused disconnect splice connector shall be installed in each ungrounded service conductor and shall be located as required, in the designated service pullbox or the drip loop.

Circuits with two un-grounded conductors shall use a fused disconnect splice connector that will disconnect both conductors simultaneously.

A fused disconnect splice connector shall be installed in each ungrounded conductor between the line and the ballast of the luminaire.

A fused disconnect splice connector shall be located in the base of the streetlight standard directly behind the hand hole and readily accessible, for streetlights fed from underground wiring systems. A fused disconnect splice connector for overhead fed streetlight standards shall be located in the drip loop.

The fused disconnect 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. Springs shall not carry current. When the fuse holder is disassembled, the fuse shall remain in the load end of the fuse holder. The terminals of the fused disconnect splice connector shall be rigidly crimped, onto the conductors using a tool of the type recommended by the manufacturer of the fused splice connector, and shall be insulated and made waterproof in accordance with the splice connector manufacturer's recommendations, the Standard Plan Details and Section 2.09E, "Splice Insulation."

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-inch below the top of a plastic boss which surrounds the head.

Fused disconnect splice connectors shall be rated 30A, 250V AC minimum and shall accept 13/32" X 1-1/2" standard midget ferrule type fuses of the ampacity and types specified. Fused disconnect splice connectors shall be TRON type "HEX" for 240V or TRON type "HEB" for 120V applications, as manufactured by Bussman Div., McGraw-Edison Co., or approved equal.

Fuses for individual streetlight fusing applications shall be rated 10A, 250V AC, general purpose non-time delay types "BAF" or "BAN."

Fuses for streetlight services feeding more than one streetlight shall be rated 30A, 500V AC, TRON time-delay type "FNQ."

Fuses for streetlight services feeding only one streetlight shall be rated 10A, 500V AC TRON time-delay type "FNQ."

Fuses for irrigation controllers shall be rated 15A, 500V AC TRON time-delay type "FNQ."

Fuses shall be as manufactured by Bussman Div., McGraw-Edison Co. or approved equal.

**86-2.09G Traffic Signal Communications Cable.** - Cable intended for use in Traffic Signal Communications shall conform to the provisions of the National Electrical Code "Communication Systems," the requirements of the Rural

Electrification Administration, (REA) Specification: PE-89, REA Designation BFCAE, and to the requirements as herein specified:

- o Conductor Size: Number 22 AWG, solid
- o Conductor Type: Commercially pure annealed copper
- o Conductor Insulation, Inner: Expanded Polyethylene
- o Conductor Insulation, Outer: Solid Polyethylene
- o Core: Gel-Filled, with Petrolatum-Polyethylene Compound
- o Shield: Coated Aluminum

The number of conductors per cable shall be as indicated on the plans. The conductor insulation shall be color coded per REA specifications. Cables containing more than 25 pairs shall be assembled in binder-groups. The binder-groups shall be identified by spirally applied color coded non-hygroscopic binding tapes. Binder-group assemblies and binding color code shall be per REA specifications.

The outer jacket of the cable shall be black, low-density polyethylene with an ultraviolet ray blocking material to prevent damage to the polyethylene.

The cable shall be factory tested on reels for each pair's mutual capacitance, crosstalk loss, insulation resistance, and conductor resistance as per REA specifications. The Contractor shall furnish a certificate report from the cable manufacturer for each cable reel showing compliance with the REA specifications, the factory test results, and the date that the cable was manufactured. Cable manufactured more than one year prior to installation shall not be used.

**86-2.09G1 Traffic Signal Communications Cable Installation.** - The Traffic Signal Communications cable shall be installed in conduit as specified. Precautions shall be taken to ensure that the cable is not damaged during storage or installation. The cable shall not be stepped on by workmen nor run over by any vehicle or equipment. The cable shall not be pulled along the ground, over or around obstructions.

Cable ends shall be kept sealed at all times during installation, using an approved cable end cap. Tape shall not be used to seal the cable ends. The cable ends shall remain sealed until termination takes place. Cables that are not immediately terminated shall have a minimum of five feet of slack. Slack is defined as the length of cable extending out of the traffic signal or termination cabinet opening when the cable is held straight outward.

The cable shall enter controller and termination cabinets, as specified, through existing conduit or through new conduit installed in existing or new foundations.

Approved duct seals shall be placed around the communications cable(s) in the end of each conduit or riser assembly entering a controller cabinet or termination cabinet.

Communications cables shall be labeled in conformance with Section 86-2.09B, "Installation" and as follows:

- (1) In all pull boxes cables shall be labeled "TS-COM."

- (2) In controller cabinets and termination cabinets, cables shall be suitably labeled with location of origin and destination respectively.

Where communications cable is installed, the cable installer shall not damage the existing cables, and shall exercise care during installation of equipment to provide safety to the public and to prevent damage to existing facilities. Should any damage be caused to existing cables and/or equipment, the City shall be immediately notified and repairs shall be made by the Contractor at no cost to the City.

Any existing cables shall be removed as specified in Section 86-2.09B, "Installation." All cables and other conductors to be installed in a given conduit shall be pulled into the conduit as a unit. Before installation of new cable(s), a mandrel shall be pulled through all existing conduit and ducts to be used as specified. If the mandrel does not satisfactorily pass through the conduit, the Contractor shall rod and clean the conduit by pulling a stiff bristled wire brush through the conduit. In the event a section of existing conduit or duct is blocked or impassable, the City shall be notified immediately.

Before any communications cable installation is performed, four copies of the cable manufacturer's recommended and maximum pulling tensions for each cable size and type shall be provided to the City. These pulling tensions shall be specified for pulling from the cable's outer jacket. A list of the cable manufacturer's approved pulling lubricants and application guidelines shall also be provided to the City. Only these lubricants shall be permitted. These lubricants shall be harmless to conduit, duct, jackets, and insulation.

The allowable pulling tension shall be the smaller of the cable manufacturer's recommended pulling tension for that cable for pulling by the outer jacket, or 80 percent of the manufacturer's maximum pulling tension for pulling by the outer jacket. The contractor shall ensure that the allowable pulling tension is not exceeded at anytime during cable installation by using one of the following methods, as approved by the engineer:

- (1) Pulling the cable by hand.
- (2) Using a winch with an adjustable clutch for taking up the pulling line. The clutch shall be set such that the clutch slips, and the winch immediately ceases taking up the pulling line, whenever the allowable pulling tension of the cable is exceeded. The proper operation of the winch/clutch assembly shall be demonstrated to the City for approval prior to any cable installation, and at any time during cable installation as may be directed by the City.

Cables shall be attached to the pulling line with one of the following methods:

- (1) For cable sizes 25 pairs or less - a cable grip designed to provide a firm hold on the exterior covering of the cable, and with heat shrinkable end caps placed on the cable ends.
- (2) For cable sizes greater than 25 pairs - cable shall be ordered in the proper cut lengths (i.e., termination to

termination distances plus additional length for terminations) with factory equipped pulling eyes.

The pulling eye/cable grip shall be attached to the pulling line by means of a "B" swivel of 0.75-inch links minimum.

To prevent damage to the cable, voice communications shall be established and maintained between the cable feeding location and the cable pulling equipment location prior to, and during all pulling operations. A qualified person shall be stationed at the "feed" end at all times during the cable pulling operation. The cable reels shall be set up on the same side of the junction box as the conduit section in which the cable is to be placed. The reel axle shall be made level and brought into proper alignment with the conduit section such that the cable shall pass from the top of the reel in a long smooth bend into the duct without twisting. The cable shall not be pulled from the bottom of the reel. The cable shall be fed by manually rotating the reel.

The cable shall not be pulled through any intermediate junction box, pull box, handhole, or any other opening in the conduit not shown on the plans unless specifically approved by the Engineer. Once the installation of a necessary length of cable to be pulled from a cabinet to the immediate next downstream cabinet begins, the cable installation shall be completed that same work day. Cable that has to be temporarily stored during the work day shall be carefully stored in a manner that is not hazardous to pedestrian or vehicular traffic, and which ensures that no damage to the cable shall occur. When cable is stored temporarily it shall be stored in a manner that allows that length of cable to be safely pulled into the next conduit directly from the cable reel or storage rack. Cable shall not be stored on the jobsite overnight unless approved by the Engineer.

The Contractor shall determine the length of cable necessary to reach from termination point to termination point. Splicing of cable at any location other than controller cabinets and termination cabinets shown on the plans is not permitted. Splicing of cable in conduit, pull boxes, junction boxes, or handholes is not permitted.

A cable feeder guide designed for the purpose shall be used between the cable reel or storage stack and the face of the duct to protect the cable, and to guide the cable into the conduit as it is paid off the reel or from the storage stack. The dimensions and set-up of the feeder guide shall be such that the cable does not bend at any location to a radius less than 10 times the diameter of the cable's outside dimensions. This minimum bending radius of the cable shall not be exceeded at any time during cable installation. The cable shall not be pulled over edges or corners, over or around obstructions, or through unnecessary curves or bends. Cables shall be looped in and out of pull boxes to provide adequate slack and the least amount of stress on conductors.

A lubricant approved for the installation, in the amount recommended by the cable manufacturer, shall be used to facilitate pulling the cable. The cable shall be lubricated as it is rolled off the cable reel or storage stack into the cable feeder. An approved cable lubricator (funnel) shall be placed around the cable just ahead of the cable feeder to facilitate proper lubrication of the cable. After the cable has been installed, the exposed cable in a pull box or cabinet must be wiped clean of cable lubricant with a cloth before leaving the pull box or cabinet.

At the start of the pull, tension shall be kept on both the cable reel or storage stack, and the pulling line. As far as possible, the cable shall be pulled

without stopping until the required amount of cable is at the downstream pull box or cabinet. If for any reason the pulling operation is halted between pull boxes and/or cabinets, the tension shall not be released. In restarting the pulling operation, the inertia of the cable shall be overcome by gradually increasing the tension, in small steps a few seconds apart, until the cable is once again in motion.

**86-2.09G2 Traffic Signal Communications Cable Terminations.** - All communications cable entering controller cabinets and termination cabinets shall be terminated by the City.

**86-2.09G3 Traffic Signal Communications Cable Testing.** - The ultimate acceptance of new cable(s) shall be determined by testing performed by the City. The City will perform a DC characteristics test and a signal level test. The DC characteristics test will be performed within 30 days, after the installation of the cables. The signal level test will be performed after the cables are terminated and operationally complete back to the central computer. The City will use the following testing specifications for performing the prescribed acceptance tests.

- (1) DC Characteristics Test
  - a. Insulation resistance of the cable shield and all conductors shall exceed 500 megohm miles. Insulation resistance testing will be performed with the shield bonded to ground. Test will be between shield or ground and to each conductor and each conductor to every other conductor.
  - b. Continuity shall be less than 18 ohms per 1,000 ft per one cable pair.
- (2) Signal Level Test - test frequencies 1200, 1700, 2200, Hz
  - a. The total attenuation at each frequency shall not be greater than 3 Db per cable mile.
  - b. The communications channel shall have a differential signal level less than 6 Db between 1200 and 2200 Hz.

Prior to cables being accepted by the City they shall meet or exceed these test values. If the cable is determined to be defective or damaged, the Contractor shall replace the cable with new cable at no cost to the City. And testing shall be repeated accordingly.

**86-2.10 Bonding and Grounding.** - Replace the entire Section 86-2.10 of the Caltrans Standard Specifications with the following:

Metallic cable sheaths, metal pull box covers, metal conduit, equipment grounding conductors, ballast and transformer cases, service equipment, sign switches, anchor bolts, 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 Number 8 AWG or larger copper wire or copper braid, except where bonding and grounding wire is provided as an integral part of manufacturer's splice kit and is in conformance with the Code. Equipment grounding conductors shall be color coded to Code requirements or may be bare.

Bonding of standards and pedestals with handholes shall be by means of a 3/8-inch or larger noncorrosive grounding lug installed in the lower portion of the pole shaft as indicated in the Standard Plan Details. Standards without handholes shall be bonded by a Number 8 AWG minimum jumper, attached to all anchor bolts, and run to the conduit or bonding wire in the adjacent pull box. The grounding jumper shall be visible after the foundation cap has been placed on the foundation.

Where a pull box is located adjacent to the standard the grounding electrode shall be driven in the pull box. Grounding electrodes in foundations shall be set obliquely through the foundation and shall extend above the finished foundation sufficiently to attach a ground clamp and bare copper wire ground conductor. Ground rod identifying marks shall be visible. Both the bolt and ground rod clamp shall be visible from the door or 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 that the grounding electrode conductor shall be Number 6 AWG minimum for Type III service cabinets and Number 8 AWG minimum for all other service types.

Bonding to grounding electrodes shall be by use of UL approved ground clamps or as approved by the Engineer.

A Number 8 AWG or larger stranded copper equipment grounding conductor shall be provided in all conduits carrying traffic signal and/or streetlight conductors. The equipment grounding conductor shall not be required under the following conditions:

- (1) Where a conduit is to be left empty for future use, provided that the conduit is terminated in pull box(es) that do not have metallic covers or components.
- (2) Where a conduit contains only detector lead-in cable(s) and/or signal communication cable(s), provided that the conduit is terminated in pull box(es) that do not have metallic covers or components.

The equipment grounding conductor shall be bonded in accordance with the Standard Plan Details.

At each multiple service point and at each pole, or within 10 feet of each pole a grounding electrode shall be furnished and installed.

Grounding electrodes shall be 5/8-inch x 10 foot copper clad rods or 3/4-inch x 10 foot galvanized steel rod; resistance to ground shall not exceed 25 ohms. Grounding electrodes shall be installed in accordance with the provisions of the Code.

On wood poles, all metallic equipment mounted less than 8 feet above ground surface shall be grounded.

Bonding of metallic conduit shall be by means of galvanized or bronze grounding bushings and bonding jumpers.

Bonding of metallic conduit in steel pull boxes shall be by means of locknuts, one inside and one outside of the box.

**86-2.11 Service.** - Replace the entire Section 86-2.11 of the Caltrans Standard Specifications with the following:

Service points shall be at the locations shown on the plans or as established by the Engineer. Electrical service installations and materials shall conform to the requirements of the serving utility company, the Standard Plan Details, these specifications and the Special Provisions.

Services shall be underground to a service cabinet or pull box, or overhead to electroliers or as established by the Engineer. Service equipment shall be installed as soon as possible to enable the utility to schedule its work well in advance of the completion of the project.

At all service locations, the Contractor shall furnish and install all material and equipment necessary to complete the installation of the service including but not limited to, the service entrance conductors, service drops, service risers, conduits or laterals, conductors, pull boxes, cabinets and related equipment such as: disconnecting means, circuit protection, lighting contactor(s) and grounding system. The position of the riser shall be determined by the utility. Service conduit shall conform to the requirements of the serving utility and these specifications and shall not be less than 1-1/2 inches in size.

The conductors between the service equipment and the utility company service connection point shall be continuous and shall not be spliced. When these conductors pass through pull boxes, they shall be looped one complete loop in the pull box following the perimeter of the pull box tightly before exiting.

The Contractor shall install pull boxes, conduit, and conductors between the utility company service point and the service equipment. Where the service point is a utility-owned pole, the Contractor shall install a 2 inch service conduit riser up the pole one foot above grade in the quadrant assigned by the serving utility company and shall also install a pull box at the base of the utility pole in accordance with the utility company and City requirements.

Service cabinets and related equipment shall be UL listed as suitable for use as service equipment.

Service equipment enclosures shall be CSJ "Type III" (unmetered) or "Type III M" (metered), suitable for outdoor installation, NEMA 3R construction and shall conform to the provisions of Section 86-1.02, "Regulations and Code." Equipment enclosures shall be fabricated from cold rolled sheet steel, 12 gauge exterior, 14 gauge interior, welded by the wire fed inert gas process. All welds shall be ground smooth. Doors shall be padlockable and vandal resistant. Door hinges shall be continuous stainless steel piano type. No screws, rivets, or bolts shall be visible outside the enclosure. Measurements of the enclosure shall conform to those shown on the plans. Inside dead-front door and back panel shall be white. Enclosures shall be painted in accordance with the provisions in Section 86-2.16, "Painting."

For metered service cabinets, a meter socket equipped with manual closing devices or space for a test block and sealing ring shall be provided, as approved by the serving utility.

Each service equipment enclosure shall be factory pre-wired conforming to the plans and specifications and delivered to the job site ready to bolt to the foundation and connect to service and load wires. The Contractor shall furnish 3

sets of wiring diagrams showing location and describing components and wiring connections. One set shall be sealed in plastic and attached to the inside of the cabinet door.

All circuit breakers for service cabinets shall be quick-break on either automatic or manual operation and shall be identified with a permanently affixed laminated phenolic nameplate designating the connected circuit. The circuit breaker operating mechanism shall be enclosed and shall be trip-free from the operating handle on overload, shall be trip-indicating and shall have trip and frame size plainly marked. Overload tripping of circuit breakers shall not be influenced by an ambient temperature range from minus 18 to plus 50°C. Multiple-pole breakers shall have a common trip. All circuit breakers shall be listed by UL or ETL. Current rating of breakers shall be as shown on the plans. Circuit breakers shall have a minimum short circuit current interrupting capacity rating of 10,000 amperes, root-mean-square symmetrical, at applied voltage. Circuit breakers shall be installed in dead-front panels. For service cabinets which have both unmetered and metered sections, provide a separate main disconnect means for the metered and the unmetered service sections of the cabinet. Service disconnecting means shall be designed to disconnect all ungrounded conductors simultaneously.

Service equipment enclosure wiring shall conform to NEMA class II C. Wiring troughs shall be provided in the enclosure as necessary. Control wiring shall be 7 strand copper, Number 14 AWG with type TW insulation except for hinge wiring, which shall be 19 strand copper, Number 14 AWG with type THWN insulation. Wiring shall be arranged so that any piece of apparatus may be removed without disconnecting any wiring except the leads to that piece of apparatus. All wiring shall be marked with permanent clip sleeve wire markers. Felt, pencil, or stick back markers will not be acceptable.

Nameplates shall be provided for each control component and circuit breaker of the service equipment enclosure. The nameplates shall be phenolic, black background with white lettering except main breaker(s) which shall be red with white lettering. All nameplates shall be fastened to the inside dead-front door with two screws each minimum. If an alternate design is proposed for the service equipment enclosure, plans of such design shall be submitted to the Engineer for review and approval.

Overhead services to electroliers shall have circuit protection installed in the drip loop in accordance with the Standard Plan Details.

Unmetered underground services to streetlights shall have circuit protection installed in the "service" pull box in accordance with the Standard Plan Details.

Only when a temporary service is required can service equipment be installed on a wood pole if permitted by the utility company, or at the direction of the Engineer.

Temporary power for the Contractor's operations shall be arranged by the Contractor with the serving utility. Requests shall not be submitted less than 15 days before service connections are required. Expenses of the service and cost of energy shall be born by the Contractor except when service or energy is used for public benefit or when ordered by the Engineer which will be at the expense of the City.

Full compensation for furnishing and installing City-owned or permanent service poles, service equipment, conduit, conductors and pull boxes (including equipment, conduit, and conductors placed on utility-owned poles) shall be



considered as included in the contract item of electrical work involved and no additional compensation will be allowed therefor.

Where the service point is indeterminate and is shown on the plans as an "approximate location" or "service point not yet established," the labor and materials required for making the connection between the service point, when established, and the nearest pull box shown on the plans will be paid for as extra work as provided in Section 4-1.03D, "Extra Work."

**86-2.12 Wood Poles.** - The bottom of the hole shall be free of loose dirt and shall be compacted equal to or greater than the density of the surrounding soil. Compaction shall exceed 90 percent. Sufficient additional soil shall be heaped around the pole to provide drainage away from the base of the pole.

Mast arms for wood lighting standards shall conform to the requirements of mast arms for octafluted standards contained in Section 86-2.04, "Standards, Steel Pedestals and Posts," except that the steel fitting welded to the end of the mast arm shall be specifically designed for wood pole mounting. Unless shown otherwise on the Plans, mast arms for wood lighting standards shall be 6 feet in length.

**86-2.14A Material Testing.** - Delete the last paragraph of Section 86-2.14A of the Caltrans Standard Specifications.

The Contractor shall allow 30 days for testing or re-testing of material or equipment. The Contractor shall be responsible for delivery of equipment to the City for testing. The Contractor will be notified by the City when testing of the equipment has been completed and it shall be his responsibility to deliver said equipment to the site of work.

**86-2.14B Field Testing.** - Any fault in any material or in any part of the installation revealed by these tests shall be replaced or repaired by the Contractor at his expense in a manner approved by the Engineer, and the same test shall be repeated until no fault appears.

**86-2.14B(3) Insulation Resistance.** - All traffic signal phases and their conductors, hardware, and associated wiring shall be considered a circuit. The complete traffic signal system with all associated wiring shall have an insulation resistance of not less than 10 megohms.

**86-2.14B(4) Inductive Loop Detector Testing.** - Inductive loop detector circuit(s) shall be tested in accordance with Section 86-5.01A(5), "Installation Details."

**86-2.14C Functional Testing.** - Delete paragraphs 2 and 5 of Section 86-2.14C of the Caltrans Standard Specifications.

The functional test for each new or modified traffic signal, traffic signal system, flashing beacon, traffic count station, lighting system, and such other electrical installation work as the Engineer may direct shall consist of not less than 5 days of continuous, satisfactory operation. If unsatisfactory performance of the system develops, the condition shall be corrected by the Contractor at his expense and the test shall be repeated until the 5 days of continuous, satisfactory operation is obtained.

**86-2.16 Painting.** - Delete paragraphs 13, 24, and 27 of Section 86-2.16 of the Caltrans Standard Specifications.

Unless specified otherwise in the Special Provisions or Plans, two applications of Traffic Signal Dark Olive Green enamel paint, Section 91-4.02, shall be applied to the following non-galvanized equipment: reused and/or City furnished lighting and signal standards, signal heads and hardware.

Reused and City furnished equipment previously finished as specified in this Section 86-2.16, except for galvanized standards shall be given a spot finishing application on newly primed areas, followed by one finishing application over the entire surface.

Equipment numbers shall be applied to standards through the use of adhesive labels in accordance with the Standard Plan Details after all finish painting or galvanizing has been performed. The number designation will be determined by the Engineer.

### 86-3 CONTROLLER ASSEMBLIES

**86-3.01 Controller Assemblies.** - The Contractor shall install the controller cabinet on a prepared foundation. Seams, where the controller cabinet rests on the foundation, shall be sealed with approved joint sealing compound.

The cabinet door shall be installed on the side of the foundation as directed by the Engineer.

**86-3.06 Type 90 Controller Assembly.** - Type 90 controller assemblies shall conform to the requirements specified in Caltrans specifications, the NEMA Standards Publication No. TS 1-1989, Sections 1, 2, 13 and 14 and the latest CSJ "Cabinet and Controller Specifications" and these specifications.

**86-3.07A Cabinet Construction.** - Cabinets shall be constructed of aluminum as specified. Cold rolled steel and stainless steel shall not be used.

**86-3.07B Cabinet Ventilation.** - Each controller cabinet shall be provided with a louvered vent and a replaceable filter held firmly in place, which will permit the fan to pass the volume of air specified. The filter shall be as specified in the CSJ "Cabinet and Controller Specifications."

**86-3.07C Cabinet Wiring.** - The use of optional flat cable in lieu of individual conductors shall not be permitted.

**86-3.07D Cabinet Accessories.** - A convenience receptacle shall be mounted in a readily accessible location inside the cabinet on the right wall. It shall not be mounted in any other location.

**86-3.08A Interconnect Isolation Relay Unit.** - Delete the entire Section 86-3.08A of the Caltrans Standard Specifications.

**86-3.08B Pre-emption Equipment.** - Delete paragraphs 1 and 2 of Section 86-3.08B of the Caltrans Standard Specifications.

The pre-emptor shall be an integral part of the controller unit. Separate solid-state units shall not be used. The controller unit shall be provided with timing

controls for the intervals as shown in the City Cabinet and Controller Specifications. Indicator lights shall not be provided.

**86-3.08C Monitoring Device.** - Delete the last paragraph of Section 86-3.08C of the Caltrans Standard Specifications.

**86-3.08D Solid-State Switching Devices.** - Each circuit shall have a minimum rating of 1,800 watts. The referenced NEMA Standards Publication shall be TS1-1989.

**86-3.08G Calling Detector Disconnect.** - Calling detector disconnect function shall be internal to the controller unit. External units shall not be used.

**86-3.08K Convenience Receptacle.** - Convenience receptacle shall be GFCI type.

**86-3.08L Flasher.** - The referenced NEMA Standard Publication shall be TS1-1989. The flasher capacity per circuit shall be 20 amperes.

**86-3.09G Circuit Breakers.** - Circuit breaker minimum short circuit current interrupting capacity shall be 10,000 amperes, root-mean-squared symmetrical, at applied voltage.

**86-3.09H Printed Circuit Boards.** - Identification shall be made by both part identification markings and by providing a pictorial diagram in the maintenance manual for the unit showing the physical location and identification of each component.

**86-3.09K Lighting Fixture.** - The "On-Off" switch for the lighting fixture shall be a door-activated switch (type B) that turns the light on when the door is opened and off when the door is closed. Type (A) shall not be used.

#### **86-4 TRAFFIC SIGNAL FACES AND FITTINGS**

**86-4.00 Traffic Signal Equipment.** - Traffic signal equipment shall include the traffic signal head (vehicular and pedestrian) consisting of an assembly containing one or more signal faces together with optical units, the assembly housing, mountings, and other appurtenant devices.

Signal assemblies shall meet the requirements of the latest edition of ITE Publication "Adjustable Face Vehicular Traffic Control Signal Heads," in addition to the requirements contained herein.

**86-4.01 Vehicle Signal Faces.** - The various mounting types for vehicle and pedestrian traffic signals are shown in the Standard Plan Details. The type of mountings to be used shall be as indicated on the Plans.

Signal sections shall be metal. Plastic signal sections shall not be allowed. Vehicle signal heads mounted on mastarms shall have 12 inch sections. Vehicle signal heads for left turn indications shall have all 12 inch arrows.

Signal faces shall be the adjustable, colored light, vertical type with the number and type of lights (faces) shown on the plans. Each signal face shall provide an indication in one direction only.

**86-4.01A Optical Units.** - Each reflector, lens, and hood shall be designed in such a manner as to reduce sun-phantom to a minimum. The lens design shall produce high illumination transmission, and outward and downward light distribution, with minimum of light distributed above the horizontal. Lamp receptacle openings in reflectors shall be designed so that there will be no dark spots cast on the lens.

Lamps for signal assemblies shall be incandescent, suitable for horizontal operation with medium base, 130-volt, 8,000 hour rated life, clear traffic signal lamps.

Lamps for 8-inch vehicle traffic signal sections shall be, ANSI Designation A21, with an initial rated output of 685 lumens.

Lamps for 12 inch vehicle traffic signal sections shall be, ANSI Designation P25, with an initial rated output of 1950 lumens.

**86-4.01B Signal Sections.** - Each signal section housing shall be either die-cast or permanent mold-cast aluminum conforming to ANSI Standard: D-10.1. Plastic signal sections shall not be used.

Each signal section shall be constructed in such a manner that structural failure of the housing will not occur with a wind load pressure of 25 pounds per square foot on the projected area of the complete signal face housing, including back plate and visors.

A sample, consisting of a complete signal section assembly, with the optical unit, shall be submitted to the City for testing prior to acceptance of any design or fabrication method not previously tested and accepted by the City.

The signal face housing, or case shall consist of an assembly of separate interchangeable sections, expandible type for vertical mounting without tie rods, substantially secured together in a water tight manner to form a unit. Each section shall house an individual optical unit.

Each section shall be complete with a one-piece, hinged door mounting for the lens and other parts of the optical system, watertight gaskets, and simple door-locking device. The optical system shall be so mounted that the various parts may be swung open for ready access or removal. The sections shall be interchangeable and so constructed that sections can be removed or added.

**86-4.01B(1) Metal Signal Sections.** - All metal signal faces shall be provided with metal backplates.

**86-4.01B(2) Plastic Signal Sections.** - Delete the entire Section 86-4.01B(2) of Caltrans Standard Specifications.

**86-4.01C Electrical Components.** - Lamp receptacles shall have a heat-resistant molded phenolic housing and shall be designed to accommodate standard traffic signal lamps, ANSI Designation A21 or P25. The lamp receptacle shall be capable of positioning the lamp at the exact focal point of the reflector. The lamp receptacle shall provide proper lamp filament orientation without affecting lamp focus.

The lamp receptacle conductors shall be connected to the shell of the lamp receptacle by an approved mechanical method. Solder shall not be used for the only means of conductor attachment to the lamp receptacle shell.

**86-4.01D Visors.** - Each signal section shall be provided with a removable metal visor conforming to ANSI Standard D-10.1. Plastic visors shall not be used.

**86-4.03 Backplates.** - Metal backplates shall be furnished and installed on all vehicle signal faces. Plastic backplates shall not be used.

Backplates shall be constructed of 5052-H32 aluminum alloy sheet 0.051-inch minimum thickness, and of the dimensions shown on the plans.

**86-4.05A Pedestrian Signal Faces.** - Pedestrian signal faces shall be Type A. Types B and C shall not be used.

**86-4.05A(1) Type A.** - Each message plate shall be one piece and shall be made of 3/16 inch tempered glass. Polycarbonate plastic shall not be used.

Lamps for pedestrian signal assemblies shall be incandescent, ANSI Designation A21, suitable for horizontal operation with medium base, 130-volt, 8,000 hour rated life, clear traffic signal lamps with an initial rated output of 685 lumens.

**86-4.05A(2) Type B.** - Delete the entire Section 86-4.05A(2) of the Caltrans Standard Specifications.

**86-4.05A(3) Type C.** - Delete the entire Section 86-4.05(3) of the Caltrans Standard Specifications.

**86-4.05B Front Screen.** - A front screen shall be provided on each Type A signal face. The front screen shall be of the 1-1/2 inch deep eggcrate or Z-crate type. Aluminum honeycomb screens shall not be used.

The screen and frame shall be fabricated from aluminum anodized flat black, or finished with flat black enamel. Flat black plastic shall not be used.

**86-4.05D Visors.** - Delete the entire Section 86-4.05D of the Caltrans Standard Specifications.

**86-4.06 Signal Mounting Assemblies.** - Signal mounting assemblies shall consist of 1-1/2 inch standard steel pipe, necessary fittings of either brass or malleable iron and cast bronze slip fitters. The following shall not be used in signal mounting assemblies: galvanized conduit; galvanized steel, copper or bronze conduit fittings; terminal compartments; and clamshell mounting assemblies. All mounting assemblies shall be painted as specified in Section 86-2.16, "Painting."

Traffic signals, conforming to the provisions of Section 86-4 "Traffic Signal Faces and Fittings" shall be assembled and mounted to signal standards in accordance to the provisions of Section 86-2.04 "Standards, Steel Pedestals and Posts."

The dimensions of mounting bracket assemblies, as well as fittings and slip-fitters shall be as shown in the Standard Plan Details. Each slip-fitter shall be provided with 2 rows of steel set screws, with 3 screws in each row to secure the assembly in plumb position. Set screws shall be cadmium plated.

Signal heads shall be equipped with positive brass lock rings and fittings designed to prevent heads from turning due to external forces. Lock ring and

connecting fittings shall have serrated contacts as shown in the Standard Plan Details.

Signal head assemblies for suspension from mast arms shall be equipped with slip-fitters as shown in the Standard Plan Details.

Quadrants for mounting of signal fixtures shall be verified with the City prior to drilling or cutting holes in signal standards.

Traffic signal vehicle and pedestrian heads that are mounted and erected, and are not in operation, shall be immediately directed away from traffic and covered with an approved weather resistant cover. Standards that are erected with the signal heads already mounted and not placed in operation, shall have the signal heads directed away from the proposed direction of traffic and covered before the standard is erected.

On the day of the traffic signal system activation, the signal faces shall be uncovered and properly oriented to traffic as directed by the Engineer.

### 86-5 DETECTORS

**86-5.01 Vehicle Detectors.** - Circuitry shall be solid state including the output circuit. Relays shall not be used. The detector delay/extension enable circuit, when activated with a "low" state voltage, shall inhibit the delay detector operation.

Splices shall be insulated by method C handcrafted insulation only. Methods A and B shall not be used.

Detector lead-in cables shall be continuous, without splices, from the controller cabinet detector panel terminal block to the loop termination pull box.

**86-5.01A(3) Sensor Unit Construction.** - Sensor units shall conform to the requirements in Section 15 of the NEMA Standards Publication No. TS 1-1989, "Traffic Control Systems."

**86-5.01A(4) Construction Materials.** - Conductors for inductive detector loops shall be continuous and unspliced and shall be Type 1 loop wire. Type 2 loop wire shall not be used. Loop detector lead in-cable shall be type B, unless specified otherwise.

**86-5.01A(5) Installation Details.** - Replace the entire Section 86-5.01A(5) of the Caltrans Standard Specifications with the following:

Installation and testing shall conform to the details and notes shown in the Standard Plan Details, Caltrans 1 Section 86-2.14 "Testing," and these specifications.

Unless specified otherwise, each loop shall consist of the number of turns of conductor as shown in the Standard Plan Details and shall be constructed of the material as specified in Section 86-5.01A(4), "Construction Materials."

Sawcut slots shall be cut into the pavement to the depth and width shown on the Standard Plan Details and at the location laid out by the Engineer. Sawcuts shall be overlapped at all corners so that slots are full depth at the corners. The bottom of the sawcut slots shall be smooth and even.

After conductors are installed in the slots cut in the pavement, one inch strips of 3/8-inch diameter foam backer rod shall be inserted in the slot over the loop wires, spaced as necessary, but not more than 5 feet apart to prevent the loop wires from rising up in the slot when the slots are being filled with sealant. The

slots shall be filled with sealant to within 1/8-inch of the pavement surface. The sealant shall be a minimum of 1-1/4 inch thick above the top conductor in the slot. Conductors in asphalt concrete pavement and within 4 feet of the lip of gutter shall have a minimum cover of 3 inches. Before setting, surplus sealant shall be removed from the adjacent road surfaces without the use of solvents.

The sealant for filling slots shall conform to the following:

**Elastomeric Sealant.** - Elastomeric Sealant shall conform to the requirements of Section 86-5.01A(5), "Installation Details," of the Caltrans Standard Specifications for the performance characteristics on "Elastomeric Sealant." Elastomeric sealant shall be used only in Portland Cement concrete.

**Asphaltic Emulsion Sealant.** - Asphaltic Emulsion Sealant shall conform to the requirements of Section 86-5.01A(5), "Installation Details," of the Caltrans Standard Specifications on "Asphaltic Emulsion Sealant."

Loop conductors shall be installed without splices and shall terminate in the pull box indicated on the Plans. The loop conductors shall be spliced to the lead-in cables in the termination pull box adjacent to the loops. Each loop shall be provided with its own detector lead-in cable. Detector lead-in cables shall be continuous, without splices between the loop termination pull box and the detector panel terminal block in the controller cabinet. The shield and drain wire of the detector lead-in cable shall be grounded in the traffic signal controller cabinet only.

The start (S) and finish (F) conductors of each loop shall be permanently labeled with a (S) on the start conductor and a (F) on the finish conductor and then grouped together as a pair. The start (S) loop conductor shall be spliced to the black conductor in the lead-in cable and the finish (F) loop conductor to the white conductor in the lead-in cable. Each loop pair and lead-in cable shall be identified as to direction, lane, and signal phase in all pull boxes and in controller cabinets. Labeling shall conform to the provisions in Section 86-2.09B, "Installation."

The end of the lead-in cable shall be taped and waterproofed prior to installing in conduit to prevent moisture from entering the cable. Where loop conductors are not immediately to be spliced to a lead-in cable, the ends of both the loop conductors and lead-in cable shall be taped and waterproofed with an electrical insulating coating. If the ends of the loop and lead-in cable are left not taped and waterproofed for more than 24 hours the loop and the lead-in cable shall both be replaced at the contractors expense.

All adjacent loops shall be wound in the same direction. No more than 4 loop conductors (2 twisted pairs) shall be installed in one home-run slot. Loop conductors for more than one signal phase shall not be combined in a common home-run slot.

Loops shall be set back 2 feet from stop bar and shall be centered in lanes except for curb lanes greater than 12 feet where they shall be installed 3 feet from the lane line, unless specified otherwise. The distance between the side of the loop and the home-run saw cut from the adjacent loops shall be 2 feet minimum. The distance between home-run saw cuts shall be 6 inches minimum. Loop conductors shall be installed a minimum of 3 feet from any metal obstacles in the street such as metal manhole covers unless otherwise approved by the Engineer prior to installation.

If loops are to be installed in asphalt concrete pavement, the loop conductors may, at the Contractor's discretion, be installed either in the finished surface layer of asphalt concrete or in the compacted layer of asphalt concrete immediately below the uppermost layer.

Before installing loop conductors in the sawed slots, the slots shall be thoroughly washed with water and then blown out with compressed air and allowed to dry thoroughly.

The loop conductor shall be installed into the slot using a 3/16-inch to 1/4-inch thick wood paddle or roller designed and approved for the purpose. The loop conductors shall be carefully installed in the sawcut slots to prevent insulation damage. The loop conductors shall be loosely installed around the sawcut slot corners to prevent tension from being placed on the conductors at the corners.

The loop shall be wound in accordance with the standard plan details unless otherwise specified.

Four feet of loop conductor slack for each loop, shall be left in the loop termination pull box.

The loop conductor home-run for each loop shall have its start (S) and finish (F) conductors twisted together into a pair (at least 3 turns per foot) before being placed in the home-run slot, conduit, and termination pull box.

Each loop shall be tested at the termination pull box before the slots are filled with sealant. Each loop shall not exceed 0.5 ohms circuit resistance and shall not measure less than 200 meg-ohms insulation resistance. As measured with a 500 VDC megger.

The loop conductors shall be spliced to the detector lead-in cables using non-insulated crimp style butt splice connectors and soldered in accordance with Section 86-2.09C, "Connectors and Terminals."

In the loop termination pull box the outer jacket of detector lead-in cable shall be removed a maximum of 4 inches. The loop conductor to lead-in cable splices and the lead-in cable conductors back to and over to the lead-in cable outer jacket ending point shall be taped and water-proofed in accordance with Section 86-5.01, "Vehicle Detectors," method C. The tape and waterproofing shall overlap the ending point of the outer jacket of the lead-in cable a minimum of 2 inches.

In the controller cabinet the outer jacket of the detector lead-in cable shall be removed between the cable termination point on the detector panel to the bottom of the controller cabinet.

Care shall be taken not to nick or otherwise damage the detector lead-in cable conductor insulation while removing the outer jacket.

The detector lead-in cable drain wire shall be terminated on the detector panel ground bus using spade lug terminals. Only one drain wire shall be connected to each spade lug terminal.

All detector loop circuits shall be tested for circuit resistance, insulation resistance, and inductance at the controller cabinet with the drain wires terminated before final termination of the detector lead-in cable to detector panel terminal blocks.

The detector loop circuit resistance shall not exceed 0.5 ohms plus 0.35 ohms per 100 feet of lead-in cable. The complete detector loop circuit insulation resistance shall not be lower than 100 meg-ohms between any conductor and earth ground. The complete detector loop circuit inductance shall be between 250 and 450 micro-henries for type "C" loops and between 150 and 300 micro-henries for type "Q" loops.



The detector lead-in cables shall be terminated in the controller cabinet using non-insulated crimp style spade lugs and then soldered in accordance with Section 86-2.09C, "Connectors and Terminals." The detector lead-in cable conductors shall be twisted together into a pair (at least 3 turns per foot) before termination on the detector panel terminal blocks.

**86-5.01C Magnetic Detectors.** - Delete the entire Section 86-5.01C of the Caltrans Standard Specifications.

**86-5.02 Pedestrian Push Buttons.** - Pedestrian push buttons shall be Type B. Types A and C shall not be used.

Pedestrian push buttons signs shall be porcelain enameled metal. Structural plastic signs shall not be used.

Pedestrian push button housings shall be either die-cast or permanent mold cast aluminum. They shall be mounted at the height shown in the Standard Plan Details.

## 86-6 LIGHTING

**86-6.00 Luminaire Class and Types.** - Luminaires are classified by class according to the method by which illumination is provided, and by type as differentiated by power absorption (watts), initial lumens, light dispersion characteristics, and photocell requirements. The luminaire class and types are as shown in the Standard Plan Details and the class and type to be used in the work will be shown on the Plans or specified in the Special Provisions.

**86-6.01 High Pressure Sodium Luminaires.** - Replace the entire Section 86-6.01 of the Caltrans Standard Specifications with the following:

All luminaires shall conform to ANSI performance standards and the provisions as specified herein.

High pressure sodium luminaires shall be of the semi-cutoff type as designated by the Illuminating Engineering Society (IES). Luminaires shall match existing City Standards.

The refractor shall be capable of producing the light pattern and optical characteristics specified. The optical system shall produce the maximum usable light with minimum glare. Light distributions obtainable shall conform to IES standards.

The refractor shall be securely hinged to the housing in such a manner that the lower assembly cannot accidentally become detached and fall when the luminaire is opened.

Conductor insulations shall be a high temperature formulation suitable for use in street lighting luminaires.

All wiring connections shall be at terminals or made with quick-disconnect plugs that are polarized or keyed to prevent incorrect connections.

All luminaires shall have wiring diagrams, voltage ratings, lamp wattage and all other pertinent electrical data prominently and permanently displayed on a durable label in each luminaire. The label shall be conspicuous when the luminaire is open for servicing.

No luminaire supplied under this specification shall have appearance incompatible with those already in use by the City nor shall it have any feature making it impractical, unsafe or expensive to use and maintain.

All parts shall be smooth and free of sharp edges. Mating parts shall fit together easily, and without strain. Wiring shall be neatly arranged.

Luminaires requiring photocells shall have a NEMA 15 amp twistlock receptacle. A shorting cap shall be installed in the receptacle when a photocell is not required.

A durable label shall be provided in a conspicuous place within the luminaire housing displaying wiring diagrams, voltage ratings, lamp wattage and other pertinent electrical data.

The housing shall be die-cast aluminum with natural or aluminum colored epoxy coating. Latches shall have a protruding handle so that the ring and refractor assembly can be easily opened for lamp replacement and closed by hand wearing lineman's gloves.

Mounting shall be secured to withstand an impact on the pole which does not knock the pole to the ground.

Sealing shall be provided by a high-temperature felt or elastomer gasket to produce a dust-proof seal without strain on the mating parts.

**86-6.01A - High Pressure Sodium Lamp Ballast.** - Delete paragraph 10 of Section 86-6.01A of the Caltrans Standard Specifications.

Ballast coils shall be heavily encapsulated in epoxy, electrical varnish or other suitable compounds to prevent ballast noise. Ballasts shall be the regulator type.

Ballast shall be the multi-tap type for different voltage ranges. Ballast shall be an integral part of the luminaire and held securely in place with devices that allow easy and safe removal and replacement in the field without the necessity of removing the luminaire from the bracket arm.

The lamp current wave-shape crest factor shall not exceed 2 at rated line voltage.

Ballast shall maintain wattage output within 14% to 18% of rated value with 10% fluctuation of supply voltage.

After a warm-up period of 15 minutes, input current and output watts shall not vary more than 5% from the ballast rating when operated at the rated voltage with a lamp of the correct type and wattage.

Ballast starting current shall be lower than operating current.

**86-6.01B High Pressure Sodium Lamps.** - Lamps shall be either:

- 150 watts with minimum initial output of 16,000 lumens, or
- 200 watts with minimum initial output of 22,000 lumens, or
- 250 watts with minimum initial output of 27,500 lumens, or
- 310 watts with minimum initial output of 37,000 lumens, or
- 400 watts with minimum initial output of 50,000 lumens

with an average rated life of 24,000 hours operating a minimum of 10 hours per start. Lamps shall operate in any position.

**86-6.02 Low Pressure Sodium Luminaires.** - All luminaires shall conform to ANSI performance standards and the provisions as specified herein.

Low pressure sodium luminaires shall be completely assembled and shall consist of a housing, reflector, refractor or lens, lamp socket, lamp support, integral ballast and removable ballast tray, terminal block, slip fitter and lamp.

Luminaires shall be of the enclosed type with a horizontal burning lamp.

Luminaries shall be the semi cut-off type as classified by the IES, with a minimum total downward Coefficient of Utilization of 67 percent for 55W luminaires and 59 percent for 90W luminaires.

Luminaires shall be manufactured by a manufacturer who is now regularly engaged in the manufacture of street lighting luminaires.

Housing shall be of corrosion resistant die cast aluminum - 0.0625 inch minimum thickness, corrosion resistant aluminum sheet and plate with concealed continuous welds, or acrylonitrile butadiene styrene sheet material - 3/32 inch minimum wall thickness, in a cast aluminum frame that provides mounting for all electrical components and slipfitter. The housing shall be divided into optical and power compartments that are individually accessible for service and maintenance. Positioning and clamping of the luminaire to the pipe tenon shall be accomplished by tightening mounting bolts.

Housings shall be painted with a fused coating of electrostatically applied polyester powder paint or other ultraviolet inhibiting film. Color shall be aluminum grey.

A high temperature neoprene, or equal, sealing ring shall be installed in the pipe tenon opening to prevent entry of water and insects into the power and optical compartments.

Access to the power unit assembly shall be through a weathertight hinged cover secured with spring type latches or captive screws to the luminaire housing.

Hardware shall be stainless steel or cadmium plated. Machine screws or bolts shall be used to secure removable components. Sheet metal screws shall not be used.

Reflectors shall have a minimum Reflection Factor of 88 percent.

Refractors or lenses shall be one piece polycarbonate of 3/32-inch minimum thickness, constructed to rigidly maintain its shape, and hinged and secured to the luminaire housing with captive latches.

The refractor shall be capable of producing the light pattern and optical characteristics specified. The optical system shall produce the maximum usable light with minimum glare. Light distributions obtainable shall conform to IES standards.

Conductor insulations shall be a high temperature formulation suitable for use in street lighting luminaires.

All wiring connections shall be at terminals or made with quick-disconnect plugs that are polarized or keyed to prevent incorrect connections.

All luminaires shall have wiring diagrams, voltage ratings, lamp wattage and all other pertinent electrical data prominently and permanently displayed on a durable label in each luminaire. The label shall be conspicuous when the luminaire is open for servicing.

All parts shall be smooth and free of sharp edges. All mating parts shall fit together easily and without strain and wiring shall be neatly arranged.

No luminaire supplied under this specification shall have appearance incompatible with those already in use in San Jose nor shall it have any feature making it impractical, unsafe or expensive to use and maintain.

Lamp socket of high temperature flame retardant material with self-wiping, silver plated copper alloy contacts, shall be rated for 660 watts and 1,000 volts.

Lamp support shall maintain positive lamp retention and position.

Terminal block shall be mounted to the inner support frame within the ballast compartment, pre-wired to the ballast and other integral controls if required, and provide for quick disconnect for removal of the integral ballast tray.

Integral ballast tray shall be removable and replaceable without the use of tools, and provide a single multi-circuit connector for quick and easy disconnection of the ballast tray.

Slipfitter shall mount onto standard 1-1/4 inch to 2 inch diameter by 6-3/4 inch long tenons and provide plus or minus 5 degree leveling with positive mounting clamps.

**86-6.02A Low Pressure Sodium Lamp Ballasts.** - Each ballast shall be designed for the type, characteristics and wattage of the lamp it is to operate and shall provide the proper starting and operating waveforms, voltage and current.

Ballasts shall be the autotransformer or high reactance type. Ballast shall be the multi-tap type for different voltage ranges. Ballast shall be an integral part of the luminaire and held securely in place with devices that allow easy and safe removal and replacement in the field without the necessity of removing the luminaire from the bracket arm.

The power factor shall not be less than 90 percent when the ballast is operated at nominal line voltage.

Lamp wattage regulation shall not vary by more than plus or minus 6 percent for plus or minus 10 percent input voltage variation.

Lamp current crest factor shall not exceed 1.8 at line voltage.

**86-6.02B Low Pressure Sodium Lamps.** - Low pressure sodium lamps shall conform to the applicable ANSI Standard for Lamp Designation L74-RF-135. Lamps shall be:

- 55 watts with minimum initial output of 8,000 lumens, or
- 90 watts with minimum initial output of 13,500 lumens, or
- 135 watts with minimum initial output of 22,500 lumens

Lamps shall have an average rated life of 18,000 hours operating a minimum of 10 hours per start. Lamp depreciation over life shall not exceed 2 percent.

Operating position shall be horizontal plus or minus 20 degrees.

**86-6.04 Pedestrian Crossing Fixtures.** - Replace the entire Section 86-6.04 of the Caltrans Standard Specifications with the following:

Pedestrian crossing fixtures shall consist of lighting fixtures for pedestrian undercrossings and for pedestrian overcrossings as shown on the plans.

**86-6.055 Sign Lighting Fixtures - Mercury.** - Delete the entire Section 86-6.055 of the Caltrans Standard Specifications.

**86-6.07 Photoelectric Controls.** - Streetlighting systems shall be switched as indicated on the Plans. The control circuit wiring between the photoelectric unit and the contactor shall be installed as indicated on the Plans. The photoelectric unit shall be normally oriented north or as directed by the Engineer.

**86-6.07A Types.** - Replace the entire Section 86-6.07A of the Caltrans Standard Specifications with the following:

The types of photoelectric controls shall be as follows:

Type II photoelectric control shall consist of a remote photoelectric unit in a weatherproof housing, a separate contactor and a test switch located in the service equipment enclosure unless shown otherwise. The photoelectric control unit shall be pole-top mounted unless otherwise specified.

Type IV photoelectric control shall consist of a photoelectric unit in a weatherproof housing which plugs into an EEI-NEMA twist lock receptacle integral with the luminaire.

A switch to permit manual operations of the lighting circuit shall be provided for each Type II photoelectric control. Switches shall be of the single-hole mounting toggle type, single-pole, single-throw, rated at 12 amperes, 125 volts. Switches shall be furnished with an indicating nameplate reading "Auto-Test" and shall be connected in parallel with the load contacts of the photoelectric unit. The test switch shall not have an "off" position.

**86-6.07B(1) Photoelectric Unit.** - Delete paragraphs 7, 10, and 11 of Section 86-6.07B(1) of the Caltrans Standard Specifications.

The supply voltage rating shall be 60 Hz, 105-130, 210-240, 105-240 volts as specified or as required.

The load rating shall be 1800 watts minimum, high pressure sodium or low pressure sodium.

**86-6.07B(2) Contactor.** - Replace the entire Section 86-6.07B(2) of the Caltrans Standard Specifications with the following:

The contactor shall have 4 normally open poles rated to switch the specified lighting load, rated 600 volts, 60 hertz industrial duty, or as indicated. The contacts shall be rated to switch the actual connected load, and not less than 30 amperes per contact. Contactors shall be capable of making and breaking any load within its rating without the assistance of auxiliary arcing contacts; arcing contacts are not permitted. All contacts must be removable without disturbing line or load wiring.

Contactor shall be electrically held with coil operating on 120 volts and rated for continuous load. The contactor coil shall be fully encapsulated.

**86-6.07B(3) Contactor and Test Switch Housing.** - Delete the entire Section 86-6.07B(3) of the Caltrans Standard Specifications.

**86-6.09 Transformers.** - Delete the entire Section 86-6.09 of the Caltrans Standard Specifications.

**86-6.09A Electrical Requirements.** - Delete the entire Section 86-6.09A of the Caltrans Standard Specifications.

**86-6.09B Physical Requirements.** - Delete the entire Section 86-6.09B of the Caltrans Standard Specifications.

**86-6.09C Submersible Type Transformers.** - Delete the entire Section 86-6.09C of the Caltrans Standard Specifications.

### 86-7 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

**86-7.01 Removing Electrical Equipment.** - Delete the last sentence of paragraph one of Section 86-7.01 of the Caltrans Standard Specifications.

This work shall consist of removing and/or salvaging existing lighting and traffic signal electrical equipment where shown on the Plans, or as specified in the Special Provisions, or directed by the Engineer.

Items scheduled for salvage or items to become the property of the Contractor shall not be reused in the work.

The contractor shall replace, at his expense, any electrical equipment scheduled for salvage as well as any facilities to remain, which, as determined by the Engineer, has been damaged or destroyed by reason of his operations.

Electrical equipment to be salvaged shall be as indicated on the Plans and includes but shall not be restricted to such items as: controller units, cabinets, signal heads, luminaires, standards, mast arms, ballasts, service equipment, conduit, conductors, cables, and detector contact units.

The items to be salvaged shall be disassembled, dismantled or otherwise removed to the extent necessary for transporting to the salvage stockpile.

The Contractor shall transport the salvaged items to the stockpile location, as specified in the Special Provisions, and will off-load the items as directed. The Contractor shall give the City 24 hours. notice before delivering salvaged materials. An itemized receipt, in duplicate, shall be prepared by the Contractor prior to delivery of salvaged equipment to the City and shall be signed by the City custodian at the stockpile site. One copy of the receipt shall be given to the City custodian and one copy shall be delivered to the Engineer by the Contractor.

### 86-8 MEASUREMENT AND PAYMENT

**86-8.01 Measurement.** - Replace the entire Section 86-8.01 of the Caltrans Standard Specifications with the following:

Where shown on the bid estimate, the quantities for items specified to be paid for will be measured in units as specified in Section 9-1.01 "Measurement of Quantities".

Conduit, by size and type, except in traffic signal systems, shall be measured by the linear foot installed, completed, and accepted. Measurement will be from center of facility structure to center of facility structure. Horizontal bends will be measured by arc length. No allowance or payment will be made for vertical sweeps and bends into pull boxes or bases. Separate measurements will be made for each conduit run.

Pull boxes, by size number, except in traffic signal systems, shall be measured by the individual unit, installed in place, completed and accepted as satisfactory.

Conductors, by size and type, except in traffic signal systems, will be measured by the linear foot from center of pole or structure to center of pole or structure with no allowance for slack. Each conductor will be measured separately.

Cables for traffic signal communications, by size and number of paired conductors, except when installed as a part of a traffic signal system, will be measured by the linear foot from the center of facility structure to the center of

facility structure. No allowance or payment will be made for slack in pull boxes. Separate measurement will be made for each cable run.

Service installation by type will be measured per each installed complete, except when installed as a part of a traffic signal system.

Guard posts will be measured by the individual unit, installed in place, completed and accepted as satisfactory.

Electroliers, for streetlight installations will be measured per each unit by class and type of luminaire, and type of standard, installed complete in place. If the lighting system is contiguous and part of a traffic signal system, the standard with luminaire will be considered as incidental to the electrical work of the traffic signal system and no separate measurement or payment will be made.

Traffic signal system, installations or modifications will be determined as a completed item and paid for on a lump sum basis.

Salvage electrical equipment, will be determined as a completed item and paid for on a lump sum basis unless specified otherwise in the special provisions.

#### 86-8.02 Payment. -

Conduit will be paid for at the contract unit price per linear foot, for each size and type completed and accepted. Such price shall be full compensation for furnishing all materials and for all preparation, trenching, jacking or drilling assembly, installation of pull wires, and backfill of trench, restoration of pavement, curb, gutters, and sidewalks.

Pull boxes for each size, will be paid for at the contract unit price per each complete and in place. Such price will be full compensation for furnishing all materials and for all preparation, excavation, drain rock, grout, extensions, hangers, grounding electrodes, covers with hold down lugs, and such other items as may be necessary to complete the item.

Conductors will be paid for at the contract price per linear foot for each size and type completed and accepted. Such price shall be full compensation for furnishing all materials, tools, labor, and equipment necessary to install the conductor or conductors.

Cables, for traffic signal communications systems, by size and number of paired conductors, will be paid for at the contract unit price per linear foot completed and accepted. Such price will be full compensation for furnishing all materials, tools, labor, and equipment necessary to install cable.

Service installation by type, will be paid for at the contract unit price per each complete and in place. Such price will include full compensation for furnishing and installing the type of service specified and foundation where required.

Guard posts will be paid for at the contract unit price per each complete and in place. Such price will be full compensation for furnishing all materials and for all preparation and installation materials.

Electroliers by class and type, will be paid for at the contract unit price per each complete and in place. Such unit price will include full compensation for furnishing and installing the light standard, mast arm where required, luminaire, ballast and photocell where required, lamp, conductors (internal to the light standard), foundation, foundation cap, bonding and grounding including the ground rod, and all required painting and numbering.

Traffic Signal System - The contract lump sum price paid for traffic signal systems or for modifying traffic signals shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for performing the work involved in furnishing and installing or modifying the systems, combinations or units thereof, including luminaires, as shown on the plans, as specified in these specifications and the special provisions and as directed by the Engineer, including any necessary pull boxes, excavation and backfill; concrete foundations; restoring sidewalks, pavements, and other such facilities, and making all required tests.

Salvage Electrical Equipment - The contract lump sum price paid for Salvage Electrical Equipment shall include full compensation for furnishing all labor, materials, equipment and incidentals, and for performing all work involved in removing, dismantling items to be salvaged and the removal and disposal of all other facilities so designated.

Transportation costs incurred for delivering salvaged item to the stockpile location shall be considered as incidental to the work and no additional compensation will be allowed therefor.

Full compensation for all additional materials and labor, not shown on the plans or specified, which are necessary to complete the installation of the various systems, shall be considered as included in the prices paid for the systems, or units thereof, and no additional compensation will be allowed.

Payment will be made under:

Conduit, (Size), (Type) - per linear foot  
Pull Box, (Size) - per each  
Conductors, (Size), (Type) - per linear foot  
Cable, (Size), (Pairs) - per linear foot  
Service, (Type) - per each  
Guard Posts - per each  
Electroliers, (Class), (Type) - per each  
Traffic Signal System - per lump sum  
Modify Traffic Signals - per lump sum  
Salvage Electrical Equipment - per lump sum



**SECTION 88**

**ENGINEERING FABRICS**

Engineering fabrics shall conform to Section 88 of the Caltrans Standard Specifications.



**SECTION 89**

**LIGHTWEIGHT PORTLAND CEMENT CONCRETE**

Lightweight Portland cement concrete shall conform to Section 89 of the Caltrans Standard Specifications.



SECTION 90

PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to Section 90 of the Caltrans Standard Specifications, and these City Standard Specifications.

90-1 GENERAL

90-1.01 Description. - Delete paragraphs 3 through 11 and 13 through 15 of Section 90-1.01 of the Caltrans Standard Specifications.

Portland cement concrete is designated by class based on 28-day compressive strengths (when tested in accordance with ASTM C 39) as specified herein:

- Class A Concrete shall contain approximately 564 pounds of portland cement per cubic yard and have a 28-day compressive strength of not less than 3000 psi.
- Class B Concrete shall contain approximately 470 pounds of portland cement per cubic yard and have a 28-day compressive strength of not less than 2500 psi.
- Class C Concrete shall contain approximately 376 pounds of portland cement per cubic yard and have a 28-day compressive strength of not less than 2000 psi.
- Class D Concrete shall contain not less than 658 pounds of portland cement per cubic yard and have a 28-day compressive strength of not less than 3500 psi.

<u>Class</u>	<u>Intended Use</u>
A	General Construction - structures, curbs, gutters, sidewalks, cast-in-place pipe, minor structures, thrust and anchor blocks.
B	Pavements, pavement base, slope pavement.
C	Nonreinforced concrete as gravity walls, backfills, jackets, cradles.
D	Emergency pavement, underwater placement, seals.

If the class of concrete is not specified on the plans or in these specifications, or otherwise directed by the Engineer, it shall be Class A.

The Contractor shall determine the mix proportions and consistency (slump) and shall furnish concrete which conforms to the strengths designated by class or as shown on the plans or specified in the special provisions. All mix designs shall be submitted for the Engineer's approval.

The Contractor shall be limited to one approved mix for each specific use.

**90-2 MATERIALS**

**90-2.01 Portland Cement.** - Unless otherwise specified, cement shall be Type II modified as described in Section 90 of Caltrans. Portland cement shall be specified, on the plans or in the special provisions, by the type (I, IA, IP (MS) Modified, II, IIA, II Modified, II Prestress, III, IIIA, IV, or V) and shall conform to the applicable provisions of ASTM Designation: C595 for type IP and ASTM Designation: C150 for other types.

Type II Prestress is for the same use as Type II Modified and where low contraction in air is required. Portland cement designated Type II Prestress shall conform to the requirements of Type II Modified, except that the mortar, when tested in accordance with California Test 527, shall not contract in air more than 0.053 percent.

Portland cement used for precast, prestressed concrete pilings and precast, prestressed concrete members shall be Type II Prestress.

Portland cement used for sanitary sewer facilities as specified in these specifications shall be Type V.

Either Type II Prestress or Type II Modified cement may be used in steam-cured concrete products.

**90-6 MIXING AND TRANSPORTING**

**90-6.06 Amount of Water and Penetration.** - Delete paragraph one of Section 90-6.06 of the Caltrans Standard Specifications, along with accompanying table.

The amount of water used in concrete mixes shall not exceed the amount necessary to produce suitable concrete, and shall be regulated so that the consistency of the concrete as determined by ASTM Designation: C 143 is within the nominal slump range for the mix design. When the nominal slump is exceeded, the moisture shall be adjusted as directed by the Engineer to reduce the slump to a value within the nominal range. The nominal slump of the mix design shall be stated on all delivery tags. Loads containing concrete that exceeds the maximum slump allowable based on the mix design and ASTM C94 shall be rejected.

**90-10 MINOR CONCRETE**

**90-10.02 Materials.** - Minor concrete shall be Class A, 3000 psi concrete and shall contain not less than 564 pounds of cement per cubic yard unless otherwise specified on the plans or in the special provisions. The cement per cubic yard requirement may be waived by the Engineer in writing, provided the mix as designed consistently produces concrete whose compressive strength is in excess of 3000 psi and has a moving average of 3500 psi or more.

The compressive strength of the concrete will be determined according to the procedures and provisions of Section 90-9, "Compressive Strength" of Caltrans Standard Specifications, except that sampling and testing will be done according to ASTM C172 and C39.

Concrete samples for compressive strength requirements as a basis for acceptance of minor concrete will be molded, cured and tested as provided for in Section 90-9 of the Caltrans Standard Specifications, except that sampling and testing will be done according to ASTM C172, ASTM C31, and ASTM C39. The

evaluation of compressive strength tests for minor concrete will be as provided for in Section 90-9 of the Caltrans Standard Specifications and as specified herein.

Acceptance of concrete will be based on the individual test and operating range test results representing accepted concrete. In the event of variations from these criteria, enforcement of these specifications shall be according to the nature of variation, as follows:

- (1) Individual test result above 3000 psi, moving average above 3500 psi: Concrete is acceptable. No effect on mix design. Moving average is continued.
- (2) Individual test result between 2850 psi and 3000 psi, moving average above 3500 psi: Concrete is deemed acceptable. No effect on mix design. Moving average is continued.
- (3) Individual test result between 2550 psi and 2850 psi, moving average above 3500 psi: Non conformance of this concrete may be waived by the Engineer. Mix design may be reviewed for possible changes. Moving average is continued.
- (4) Individual test below 2550 psi, moving average above 3000 psi and below 3500 psi: Concrete will be deemed not acceptable unless certified to be above 3000 psi at 28 days by an approved private laboratory according to Section 90-9.01 above. Mix design shall be reviewed for possible changes or improvements. No test results representing this concrete will be used in moving average calculations.
- (5) Individual test result above 3000 psi moving average below 3000 psi: Concrete is acceptable. Mix design is rejected. A redesigned mix will be required per #6 below. Moving average is continued.
- (6) Individual test result between 2850 and 3000 psi, moving average below 3000 psi: Concrete may be deemed acceptable. Supplier will be notified that moving average is below 3000 psi. Supplier will be required to redesign mix. Moving average will be continued until test results of new redesigned mix are available, at which time a new moving average will be started. The first individual test and from then on the moving average of the new redesigned mix up to 5 tests must be above 3000 psi. If either the first individual test or the moving average up to 5 tests is below 3000 psi, the supplier will not be allowed to supply concrete for the specific use of the mix until it is again redesigned and 28-day specimen shows it is above 3000 psi.
- (7) Individual test result between 2550 psi and 2850 psi, moving average below 3000 psi: Concrete is deemed not acceptable unless certified to be above 3000 psi at 28 days by an approved private laboratory according to Section 90-9.01 above. Supplier will be notified that

operating range is below 3000 psi. Supplier will be required to redesign mix. Moving average will be continued until test results of new redesigned mix are available, at which time a new moving average will be started. The first individual test and, from then on, the moving average of this new redesigned mix up to 5 tests must be above 3000 psi. If either the first individual test or the moving average up to 5 tests is below 3000 psi, the supplier will not be allowed to supply concrete for the specific use of the mix until it is again redesigned and 28-day specimens show that it is above 3000 psi.

- (8) Individual test result below 2550 psi, moving average below 3000 psi: Concrete is not acceptable.

Within 15 calendar days from date of receipt of test results, the Contractor or supplier shall have the option of either removing that portion of concrete represented by the test result below the designed compressive strength or, at their expense, have the concrete tested by a certified private testing laboratory who shall attest to the fact that the concrete does in fact conform to the compressive strength requirements of these specifications.

Each load of ready-mixed concrete shall be accompanied by a ticket, which shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise ordered by the Engineer. The ticket shall be clearly marked by stamping or imprinting with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started. The delivery ticket shall also indicate the mix design designation and the nominal slump thereof.

A certificate of compliance in accordance with the provisions in Section 6-1.07 "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously certified by the City or used on City work, stating that minor concrete to be furnished meets all contract requirements, including minimum cement content specified.

**90-10.02A Portland Cement.** - Portland cement shall be Type II Modified, conforming to Section 90-2.01 of the Caltrans Standard Specifications and these City Standard Specifications.



**SECTION 91**

**PAINT**

Paint shall conform to Section 91 of the Caltrans Standard Specifications and these City Standard Specifications.

**91-1.03 Manufacturing and Packaging.** - Paint containers shall be of steel, non-tapered, and of metal not thinner than 24 gage. Containers shall have lug type crimp lids with ring seals, and be equipped with ears, as well as bails.

**91-1.05 Certificate of Compliance.** - A certificate of compliance for each type of paint used on the project shall be furnished to the Engineer in accordance with the provisions of Section 6-1.07, "Certificates of Compliance."



**SECTION 92**

**ASPHALTS**

Asphalts shall conform to Section 92 of the Caltrans Standard Specifications and these City Standard Specifications.

**92-1.02 Grades.** - At no time shall the temperature of asphalt in storage be higher than 10°F below the actual flash point of the asphalt.

**92-1.03 Test Report.** - At the time of delivery of each shipment of paving asphalt by tank car or truck load or fraction thereof, the vendor shall furnish the purchaser with certificate of compliance. The certificate of compliance shall indicate the name of the vendor, type and grade of asphalt delivered, date and point of delivery, contract number or purchase order number, quantity, and the results of specified tests. The certificate of compliance, signed by an authorized representative of the vendor, shall certify that the product delivered conforms to these specifications for the type and grade indicated. The purchaser shall provide the City the certified test reports, when requested by the Engineer, in accordance with the provisions of Section 6-1.07 "Certificates of Compliance."

**92-1.04 Applying Asphalt.** - Unless otherwise specified, paving asphalts shall be applied at temperatures within the limits given in the following table.

Grade of Asphalt	Pugmill Mixing Temperature °F		Distributor Application Temperature °F	
	Min.	Max.	Min.	Max.
AR-1000	225	275	270	350
AR-2000	275	325	285	350
AR-4000	275	325	290	350
AR-8000	275	325	295	350
AR-16000	300	350	300	350



**SECTION 93**

**LIQUID ASPHALTS**

Liquid asphalts shall conform to Section 93 of the Caltrans Standard Specifications and these City Standard Specifications.

**93-1.03 Mixing and Applying.** - Liquid asphalt shall not be heated during manufacture, storage, or construction to a degree to cause the formation of carbonized particles, and in no case shall the temperature be higher than 10 degrees fahrenheit below the actual flash point.

Unless otherwise authorized by the Engineer, no liquid asphalt, except tack coats, shall be applied when the air temperature is lower than 50 degrees fahrenheit.



SECTION 94

ASPHALTIC EMULSIONS

Asphaltic emulsions shall conform to Section 94 of the Caltrans Standard Specifications and these City Standard Specifications.

**94-1.01 Description.** - In addition to the bituminous emulsions specified in Section 94 of the Caltrans Standard Specifications, this Section includes a cationic maltenes emulsion material composed of a petroleum resin oil base uniformly emulsified with water.

Emulsified asphalts are classified according to penetration, high viscosity or mixing type, either as anionic or cationic as described herein.

- RS1 - Rapid setting penetration type anionic emulsion.
- RS2 - Rapid setting penetration high viscosity type anionic emulsion.
- SS1 - Slow setting mixing type anionic emulsion.
- SS1h - Slow setting mixing type anionic emulsion hard.
- CRS1 - Rapid setting penetration type cationic emulsion.
- CRS2 - Rapid setting penetration high viscosity type cationic emulsion.
- CMS2S - Medium setting sand mixing type cationic emulsion.
- CMS2 - Medium setting coarse aggregate mixing type cationic emulsion.
- CMS2h - Medium setting coarse aggregate mixing type cationic emulsion hard.
- CQS1h - Quick setting asphaltic emulsion for slurry seal.
- CSS1 - Slow setting coarse aggregate mixing type cationic emulsion.
- CSS1h - Slow setting coarse aggregate mixing type cationic emulsion hard.
- LMCRS2 - Rapid setting latex modified cationic emulsion.
- LMCRS1-1/2h - Rapid setting latex modified cationic emulsion hard.
- LMCRS2h - Rapid setting latex modified cationic emulsion hard.
- Maltenes cationic emulsion.

**94-1.02 Requirements.** - The asphaltic emulsion shall conform to the requirements prescribed in Tables 1 and 2 of Section 94 of the Caltrans Standard Specifications and in Tables 3, 4, and 5 of these specifications.

**94-1.04 Method of Test.** - The properties of the asphaltic emulsions given in Tables 3 and 4 shall be in accordance with AASHTO Designation: T59, "Testing Emulsified Asphalt" except as otherwise noted.

TABLE 3

## Requirements for Latex Modified Cationic Emulsion

	<u>LMCRS2</u>	<u>LMCRS2h</u>	<u>LMCRS1-1/2h</u>
Tests on Emulsions:			
Viscosity SSF @ 122° F sec	75-300	75-300	40-100
Sieve, percent	--	0.3	0.3
Settlement, 5 days, percent	5	5	5
Demulsibility, percent	0.3 max.	40 min.	40 min.
Storage Stability Test, 1 day, %	--	1	1
Particle Charge	Positive	Positive	Positive
Ash Content (ASTM D3723), %	0.2 max.	0.2 max.	0.2 max.
Tests on Residue by Drying:			
Residue, percent (Calif. Test 331)	65 min.	65 min.	65 min.
Penetration @ 77° F	100-200	40-90	40-90
Ductility @ 77° F 5 cm/min, cm	40 min.	40 min.	40 min.
Torsional Recovery % (Calif. Test 332)	18 min.	18 min.	18 min.

TABLE 4

## Requirements for Cationic Maltenes Emulsion

<u>Specification Designation</u>	<u>Test Method</u>	<u>Requirements</u>
Viscosity, S.F. at 77° F, seconds	AASHTO T 59	15-40
Residue - % Min	California Test 351	60
Miscibility Test (b)	AASHTO T 59	No coagulation
Sieve Test (a)		
(Distilled Water) % Max.	AASHTO T 59	0.10
Particle Charge Test	California Test 343	Positive
Tests on Residue from California Test 351		
Viscosity, CS 140° F	ASTM D 445	100-200
Asphaltenes, % Max.	California Test 352	0.75

- (a) Test procedure identical with AASTHTO T 59 except that distilled water shall be used in place of 2 percent sodium oleate solution.
- (b) Test procedure identical with AASHTO T 59 except that .02 normal calcium chloride solution shall be used in place of distilled water.



**TABLE 5**  
**Requirements for CQS1h Asphaltic Emulsion**

<u>Test on Emulsion</u>		
<u>Test</u>	<u>Test Method</u>	<u>Requirement</u>
Viscosity, SSF @ 122°F.	AASHTO T 59 ASTM D 244	15-90 seconds
Sieve ASTM D 244	AASHTO T 59 maximum	0.30 percent
Storage Stability, 1 day	AASHTO T 59 ASTM D 244	1 maximum
Residue by Distillation	AASHTO T 59 ASTM D 244	57 percent minimum

Test on Residue from Distillation Test

Penetration @ 77°F.	AASHTO T 49 ASTM D 5	40 - 90
Ductility @ 77°F., 5 cm per minute	AASHTO T 51 ASTM D 113	40 cm. minimum
Solubility in Trichloroethylene	AASHTO T 44	97 percent minimum

In addition, quick setting Type CQS1h asphaltic emulsion shall test Positive for Particle Charge when tested in accordance with ASTM E 70. If the Particle Charge Test result is inconclusive the asphaltic emulsion shall meet a pH requirement of 6.7 maximum.

**94-1.06 Applying.** - Setting Grade 1-1/2 asphaltic emulsions shall be applied between 80° F and 140° F, unless otherwise directed by the Engineer.

Distributing equipment shall be the same as specified in Section 93, "Liquid Asphalts," except that hand spraying by means of hose or bar through a gear pump or air tank will be acceptable for applications to 0.10 gallon per square yard for flat work or tacking of vertical edges.



**SECTION 95**

**EPOXY**

Epoxy shall conform to Section 95 of the Caltrans Standard Specifications.



## SECTION 101

## PIPE AND FITTINGS

## 101-1 GENERAL

**101-1.01 Description.** - This work consists of furnishing and installing water system pipe and fittings within City of San Jose, San Jose Municipal Water System service areas. Related work is specified in the following sections:

Section 19, "Earthwork"

Section 102, "Valves, Hydrants, and Appurtenances"

Section 103, "Miscellaneous Equipment"

Section 104, "Disinfecting and Pressure Testing"

Sewer and drainage work is specified in Section 1207 through 1501 of these City Standard Specifications.

**101-1.02 Submittals.** - Within 60 days after the date of the Notice to Proceed, the Contractor shall submit:

1. Working drawings showing the layout of all water lines showing pipe lengths, location and angles of bends, joint locations, and class of pipe.
2. Manufacturers' catalog data and details on the proposed pipe and fittings including joint details.
3. Manufacturers' installation instructions for pipe and fittings.

Test reports required by the various standards shall be submitted not later than the date the material is delivered to the job site.

**101-1.03 Trenching.** - Attention is directed to Section 5-1.02A, "Trench Excavation Safety Plans" of the General Conditions.

The City of San Jose does not issue a "Permit to perform Excavation or Trench Work," the Contractor shall secure a permit from the State, as required by Section 6500 of the State of California Labor Code.

The permit, together with a copy of approved trench excavation safety plan, shall be maintained on the job site at all times.

**101-1.04 Certificates of Compliance.** - The manufacturer shall establish the necessary quality control and inspection practice to assure compliance with these specifications. The manufacturer shall furnish a certificate of compliance, as specified in Section 6-1.07, "Certificates of Compliance," that all of the required tests have been made and the results thereof comply with the requirements of these specifications.

**101-1.05 Existing Facilities.** - Existing facilities shall be protected in accordance with the provisions in Section 7-1.11 "Preservation of Property" and in Section 8-1.10 "Utility and Non-Highway Facilities" of the General Provisions. Any damage done to utility lines shall be reported to the respective utility owner

by the Contractor, and any repair work required shall be done by such company's repair crew. All repair work will be approved by the Engineer prior to backfilling.

All sewer and utility lines that cross or lie along the trench shall be adequately supported during construction and such supports left in place. Care shall be exercised when backfilling around such lines to avoid any damage to them. Any pipeline or lateral, storm or sanitary, cut or damaged in any way shall be replaced in kind by the Contractor at no cost to the City. The damaged pipe shall be replaced between adjacent joints. Patching of damaged pipe will not be permitted.

**101-1.06 Delivery, Storage, and Handling.** - All materials shall be delivered and distributed at the site by the Contractor. Materials furnished by the City shall be picked up by the Contractor at points designated by the Engineer or at points indicated in the special provisions.

In distributing pipe and fittings at the site of work, each piece shall be unloaded with care opposite or near the place where it is to be laid in the trench. Under no circumstances shall such material be dropped, skidded or rolled against pipe or fittings already on the ground.

Should any part of coating or lining of the pipe or fitting be damaged, the repair shall be equal to, or better than the original coating or lining and the repair shall be done in accordance with the manufacturer's recommendation or in accordance with the applicable standards specified for the work.

## 101-2 MATERIALS

**101-2.01 Ductile Iron Pipe.** - Ductile iron pipe shall conform to the requirements of AWWA Standard C151. If the thickness class is not specified on the plans or in the special provisions, the appropriate class for a rated working pressure of 150 psi and for a depth of cover of 10 feet shall be furnished.

**101-2.01A Coating and Lining.** - Unless otherwise specified in the special provisions, ductile iron pipe shall receive an asphaltic coating as specified in AWWA Standard C151 and a cement-mortar lining as specified in AWWA Standard C104.

**101-2.01B Joints.** - Joints for ductile iron pipe shall be as specified in the special provisions and shall conform to the requirements of the following:

- (1) Rubber gasket joints, push-on or mechanical: AWWA Standard C111
- (2) Flanged joints: AWWA Standard C115

**101-2.01C Fittings.** - Fittings for ductile iron pipe shall be compatible with the pipe joint specified and shall conform to the requirements of AWWA Standard C110. If specified in the special provisions, compact fittings conforming to the requirements of AWWA Standard C153 shall be furnished, unless otherwise indicated on the plans.

**101-2.02 Polyvinyl Chloride (PVC) Pipe.** - Polyvinyl chloride pipe shall conform to the requirements of AWWA Standard C900 for nominal sizes 4 through 12 inches and AWWA Standard C905 for nominal sizes 14 inches and larger. Dimensions furnished shall be the cast-iron-pipe-equivalent outside diameters. If

the dimension ratio is not specified on the plans or in the special provisions, a pressure class or pressure rating of at least 150 psi at 73.4° F shall be furnished, unless otherwise indicated on the plans.

**101-2.02A Joints.** - Unless otherwise specified on the plans or in the special provisions, elastomeric gasket joints conforming to the referenced AWWA standards shall be furnished.

**101-2.02B Fittings.** - Fittings shall be specifically designed for use with dimension ratio and pressure rating of the pipe on which they are to be installed. Fittings shall be of the same material as the pipe and shall be marked as specified for couplings in AWWA Standard C900.

**101-2.03 Concrete Pipe.** - Concrete pipe shall be either reinforced concrete pressure pipe, steel cylinder type, or reinforced concrete pressure pipe, noncylinder type as specified on the plans or in the special provisions. Steel cylinder pipe shall conform to the requirements of AWWA Standard C300. Noncylinder pipe shall conform to AWWA Standard C302.

Pipe shall be designed for the design pressure and surge pressure specified on the plans or in the special provisions. If the design pressure is not specified, the pipe shall be designed for 150 psi design pressure and 200 psi surge pressure.

Where more than 1 design pressure and surge pressure are required for the project, the highest design-surge pressure combination shall be used throughout each reach of the pipeline. A reach is defined as a definite break in the pipeline such as a structure, open pit valve or other feature apparent at the ground surface. Identification marks of pipe sections shall be indicated on the layout drawings submitted as specified in Section 101-1.02, "Submittals."

**101-2.03A Joints.** - Joints shall be bell and spigot type employing steel joint rings and rubber gaskets in accordance with the appropriate AWWA standards specified herein.

**101-2.03B Fittings.** - Fittings shall be in accordance with the approved working drawings and in accordance with the requirements of appropriate AWWA standards specified herein.

**101-2.04 Water Service Pipe.** - Water service pipe shall be copper water tube. Copper water tube Type K, shall conform to the requirements of ASTM B 88 shall be annealed (Temper 0).

**101-2.04A Joints and Fittings.** - Joints and fittings shall be compression type. Unless otherwise shown on the plans or specified in the special provisions, component castings of service line fittings shall be composed of Copper Alloy UNS No. C83600, conforming to the requirements of ASTM B 62. The copper alloy consists of 85 percent copper and 5 percent each of tin, lead and zinc. The alloy is also known as red brass or composition bronze.

Threaded joints and fittings shall be made up with teflon tape applied to external threads.

**101-2.05 Miscellaneous Materials.** -

**101-2.05A Anchor and Thrust Blocks.** - Anchor and thrust blocks shall be Class A concrete conforming to Section 90, "Portland Cement Concrete" of these City Standard Specifications.

**101-2.05B Bedding.** - Bedding materials shall be as specified in Section 1301-2, "Materials", the plans and special provisions.

### 101-3 LAYING

**101-3.01 General.** - Pipelines shall be laid and maintained true to the line and grade as shown on the plans with fittings, valves and hydrants at the locations shown. If the grade and gradient are not shown on the plans, the pipe shall be laid for a minimum depth of cover from finished grade, of 36 inches for pipe 8 inches or less in diameter, and 42 inches for pipe greater than 8 inches in diameter. In new constructions areas where the proposed pavement section is 12 inches or greater, the pipe shall not be installed until the street base or subgrade has been prepared and accepted.

**101-3.02 Excavation and Backfill.** - Excavation and backfill shall conform to the applicable provision of Section 19, "Earthwork" of these City Standard Specifications and as specified herein.

The minimum clear width of trench measured at the horizontal diameter of the pipe shall be 18 inches or one foot greater than the outside diameter of the barrel of the pipe, whichever is greater. The maximum clear width of trench at the top of the pipe shall be not more than the outside diameter of the barrel of the pipe plus 2 feet and shall rise vertically to a height of at least 12 inches above the pipe.

**101-3.03 Bedding.** - Pipe shall be laid on a firm bedding foundation of the type and class as specified on the plans or in the special provisions, and shall have a constant bearing for its entire length except at joints. Bells or couplings shall not rest on solid original trench bottoms; bell or coupling holes shall be excavated. Laying of pipe on earth mounds or blocking will not be permitted.

#### 101-3.03A Bedding Types. -

**Type A.** - Bedding material shall have a minimum thickness beneath the pipe of 4 inches, or 1/8 of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the trench to 12 inches above the top of the pipe.

Category of Pipe	Type of Bedding	Class of Material
Ductile Iron Pipe	A	I
Concrete Pipe		I
24" Diameter and Less	A	
25" Diameter and Greater	A	
Polyvinyl Chloride Pipe	A	I

**101-3.03B Placing.** - According to the class and type of bedding specified, the bedding material may be required to be placed and compacted in more than one lift. Class I material requires little or no compacting. Class III material, if specified for



use in the special provisions, requires hand or mechanical compaction. If no imported material is required for bedding the pipe, the initial backfill of the trench shall be native soil carefully shaded around the pipe and carefully compacted to the haunchline of the pipe. Precautions shall be taken to prevent movement of the pipe during placement of initial backfill.

**101-3.04 Laying.** - Regardless of the type of pipe shown on the plans or specified in the special provisions, the standard procedures for pipe laying specified herein shall apply.

Pipe will be carefully inspected by the Engineer in the field before and after laying. If any cause for rejection is discovered in the pipe, or its installation, the pipe shall be removed and any corrective action taken subject to the approval of the Engineer.

Laying of pipe and assembly of joints shall be in accordance with the printed instructions of the manufacturer and as specified herein.

At the time of laying pipe, the prepared trench shall be in a firm and dry condition. If trench is not in such condition, the contractor shall furnish and operate such pumps or other devices as may be necessary for removing water from trenches during the construction of pipeline system.

Necessary facilities shall be provided for lowering and properly placing the sections of pipe in the trench without damage. Each section of pipe, of the diameter as called for shall be laid true to the lines and grades as shown on the plans.

Pipe interiors shall be thoroughly cleaned of all foreign matter before being lowered into the trench. At all times when work is not in progress, ends of pipe and fittings shall be securely closed so that trench water, earth, or other substances cannot enter.

The pipe shall be laid on a firm bedding foundation of the type and class as indicated on the plans and shall have a constant bearing for its entire length. Wedging or blocking of pipe will not be permitted. Under no circumstances shall pipe be dropped into the trench.

Cutting of pipe for closures or other reasons shall be done in a neat and workmanlike manner by methods which will not damage the pipe or cement lining and will leave the cut end smooth and at right angles to the axis of the pipe.

Deflections from a straight line or grade resulting from horizontal or vertical curves or offsets shall not exceed the limits recommended by the manufacturer. If the required alignment requires deflections in excess of such limits for standard sections of pipe, special bends or a sufficient number of shorter lengths shall be provided to meet the offset limits.

When connections are to be made to any existing pipe or other appurtenances, the actual elevation or position shall be verified before laying any pipe. The engineer will inspect the existing pipe or appurtenance before connection is made. All adjustments in line or grade which may be necessary shall be made. The Contractor will be paid for any additional excavation required, below one foot of the designed grade, as extra work in accordance with the provisions of Section 4-1.03D, "Extra Work" of the General Conditions. The first one foot below designed grade will be considered as being included in the price paid for installing pipe.

**101-3.05 Field Joints. -****101-3.05A Ductile Iron Pipe.**

(1) **Push-on.** - The gasket and gasket seal inside the bell shall be wiped clean before the gasket is inserted. A thin film of soft vegetable soap compound shall be applied to the gasket and the outside of the plain-end of the pipe. Lubricant other than that furnished with the pipe shall not be used unless approved by the Engineer. The plain end of the pipe shall be forced completely into the bell socket to complete the joint.

(2) **Mechanical.** - 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.

(3) **Flanged.** - Flanged joints shall be firmly and fully bolted with machine bolts of proper size. Approved gaskets shall be used at all flanged joints.

**101-3.05B Polyvinyl Chloride Pipe.** - Polyvinyl chloride pipe shall be joined with elastomeric gaskets in the pipe bell end or in couplings. Spigot ends of pipe and gasket grooves shall be wiped clean. Gaskets shall be inserted in the grooves insuring that they are faced properly and completely seated. Apply lubricant to spigot end or machined end of pipe to the stop shoulder. Use only lubricant supplied with the pipe, unless otherwise approved by the engineer. Do not lubricate rubber rings. Assemble pipe using a bar and wood block or 'level' or 'friction' pullers. After assembly the ring position shall be checked with a feeler gage supplied by the pipe manufacturer.

**101-3.05C Concrete Pipe.** - Concrete pipe shall be joined with rubber gaskets.

Under ordinary laying conditions, the work shall be scheduled so that the bell end of the pipe faces in the direction of laying. Prior to placing the spigot into the bell of the pipe previously laid, the spigot groove, the gasket and the inside of the bell shall be thoroughly cleaned. Then the spigot groove, the gasket and the first 2 inches of the inside surface of the socket shall be lubricated with a compound supplied by the pipe manufacturer.

The gasket after lubrication shall be uniformly stretched when placing it in the spigot groove so that the gasket is distributed evenly around the circumference.

For pipe in which the inside joints are to be pointed, suitable spacers shall be placed against the inside shoulder of the socket to provide the proper space between abutting ends of the pipe.

After the joint is assembled, a thin metal feeler gage shall be inserted between the socket and the spigot and the position of the gasket checked around the complete circumference of the pipe. If the gasket is not in the proper position, the pipe shall be withdrawn, the gasket checked to see that it is not cut or damaged, the pipe relaid, and the gasket position again checked.

Where steel joint rings are used, a suitable cloth, plastic or paper band shall be placed around the outside of the pipe and centered over the joint to prevent dirt from entering the joint recess.

The joint band shall be bound to the pipe by the use of steel box strapping or by an equivalent method, and shall completely and snugly encase the outside joint

except for an opening near the top where grout is to be poured into the joint recess. Grout shall be poured and allowed to set before backfill is placed over the top of the pipe. The grout shall completely fill the outside annular space between the ends of the pipe and around the complete circumference. After the recess has been filled, the jointing band shall be replaced over the opening left for pouring and the mortar allowed to set. After the bedding and backfill have been compacted, the inside joint recess shall first be moistened, then filled with stiff mortar. The finished joint shall be smooth and flush with the adjacent pipe surfaces.

**101-3.05D Water Service Pipe.** - The various types of water service pipe shall be joined in accordance with the manufacturers' printed instructions, the applicable provisions of this section, and as approved by the Engineer.

Materials used in making joints shall be compatible with the pipe to be joined.

**101-3.06 Anchor and Thrust Blocks.** - Concrete anchors and thrust blocks shall be furnished and installed as shown on the plans and as specified herein.

Anchor blocks with harnesses, in accordance with the size and details as shown on the plans, shall be provided for vertical angle bend fittings to control upward thrust and for all gate valves 3 inches or larger. Anchor block or collar shall be provided for all reducer fittings 6" x 4" and larger.

Concrete thrust blocks shall be provided for all angle fittings, tees, crosses, and at the bowl of each hydrant. The dimensions of the thrust blocks shall be not less than as indicated on the plans and the block shall bear against firm natural ground. Great care shall be exercised on placement of thrust blocks so that the pipe and fitting joints are free and clear of concrete and are readily accessible for repair.

**101-3.07 Connection to Existing Mains.** - Connection to existing mains shall be made where indicated on the plans. The actual tap, if required, will be performed by Engineer approved personnel only. Normally, connections of new facilities to existing mains will be made at a "dead end" gate valve. In any case, the newly installed facilities shall be kept isolated from existing systems until the new facilities are bacteriologically acceptable, and pressure and leakage tests have been conducted.

Connections to existing valves prior to obtaining satisfactory leakage and pressure tests of the new facilities shall be at the Contractor's risk. The City will assume no responsibility for the water tightness of existing valves.

**101-3.08 Installing Service Lines.** - Generally, a water service line connection shall consist of a corporation stop with or without a saddle at the main, copper tubing, or other approved pipe, with coupling nuts, angle meter stop fitting and a meter box with base plate.

The water main shall be tapped at the service locations as shown on the plans. A minimum distance of 18 inches shall be maintained between taps. The tap shall be made at an angle of 45 degrees from top-dead-center of the main and on the same side as the direction of the service run. Under no circumstances shall service lines loop over the top of the water main, nor be laid in same trench with the sewer lateral.

The service line may be installed in open trench or placed through a hole produced by jacking or drilling. Services to adjacent lots may be laid in a common trench, provided 18 inches of clearance is maintained between services. The depth of service line, at the flow line of gutter, shall be not less than 24 inches. The end

of service line shall terminate 12 inches plus or minus one inch behind back of curb. The service line trench shall be backfilled in the same manner as specified in Section 19, "Earthwork" for backfilling pipeline trenches. After backfill has been completed, the meter box with base plate shall be set, with top of box at the same grade as top of curb.

**101-3.09 Water Meters.** - Meters will be set by City forces only after the following conditions are met: the curb and gutter are constructed, backfill and grading is completed between curb and sidewalk and the meter boxes installed. The Contractor shall notify the City of San Jose Municipal Water System in writing, 5 working days in advance of need for installation of water meters.

**101-3.10 Backfill.** - All trenches shall be backfilled with Type A bedding and Class I materials as specified in 1301-4.1.1, "Type of Bedding" and 1301-2.1.1, "Class I". The balance of the trench shall be backfilled with native material and mechanically compacted by approved methods. Care shall be exercised while compacting initial backfill so as not to dislodge the pipe, fittings, or appurtenances.

**101-3.11 Surface Restoration.** - All pavement, sidewalk, curbing, gutters, shrubbery, fences, sod or other disturbed surfaces or structures shall be restored or replaced to a condition equal to that before the work began. Such work shall be in accordance with the applicable provisions of these City Standard Specifications.

#### 101-4 MEASUREMENT AND PAYMENT

**101-4.01 Measurement.** - The work to be performed under this Section will be listed in the contract item by pipe size, type, thickness, or whatever information is necessary for identification.

The length of pipe mains to be paid for will be the horizontal length measured from centerline of structure to centerline of structure or terminus. Pipe placed in excess of the length designated will not be paid for. Laterals will be measured and paid for by the horizontal measurement from inside face of structure to inside face of structure or terminus. Stub outs will be measured per linear foot and paid for by length designated on the plans or the length actually installed if ordered by the Engineer.

Measurement will be made continuously through bends, wyes, tees, and other special sections.

**101-4.02 Payment.** - Pipe, measured as specified above, will be paid for at the contract unit price, per linear foot for the various types, sizes, and classes of pipe installed.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing various sizes and classes of pipe including all bends, wyes, tees, and other special sections, connecting new pipe to existing facilities, complete in place, restoration of pavement, testing, flushing and cleaning, disinfecting, all as shown on the plans, as specified in these specifications and as directed by the Engineer.

## SECTION 102

## VALVES, HYDRANTS, AND APPURTENANCES

## 102-1 GENERAL

**102-1.01 Description.** - This work consists of furnishing and installing valves, hydrants, and appurtenances. Related work is specified in the following sections:

Section 19, "Earthwork"  
Section 101, "Pipe and Fittings"  
Section 103, "Miscellaneous Equipment"  
Section 104, "Disinfecting and Pressure Testing"

**102-1.02 Submittals.** - Within 60 days after the date of Notice to Proceed, the Contractor shall submit:

1. Working drawings and manufacturer's data showing unit assembly, operators, component parts, dimensions, and net weight.
2. Details of end connections.
3. Manufacturer's installation, and operation and maintenance instructions.
4. Test records.

**102-1.03 Certificates of Compliance.** - The manufacturer shall establish the necessary quality control and inspection practice to assure compliance with these specifications. The manufacturer shall furnish a Certificate of Compliance as specified in Section 6-1.07, "Certificates of Compliance" of the General Conditions, that all the required tests have been made and the results comply with the requirements of these specifications.

**102-1.04 Interruption of Service.** - Service in existing mains can be interrupted only upon authorization of the Engineer who will specify time and duration of the outage. The Contractor shall notify all affected users in writing at least 24 hours in advance of service interruption, using printed forms provided by the Engineer. The Contractor shall also request the Engineer to notify the Municipal Water System personnel at least 48 hours in advance of scheduled valve closing for service interruption. Manipulation of existing valves shall only be done by or under the direction of Municipal Water System personnel.

**102-1.05 Marking.** - Valves and hydrants shall be marked in accordance with the requirements of the appropriate specified standard.

## 102-2 VALVES

**102-2.01 Butterfly Valves.** - Butterfly valves shall conform to the requirements of AWWA Standard C504, as specified herein and in the special provisions. The following will be specified in the special provisions or on the

plans: Class, if no class is specified, Class 150B valves shall be furnished; valve ends, operator requirements, and other special requirements.

**102-2.01A Body.** - Valve body shall be of ASTM A 126 Class B cast or ductile iron.

Valve designs utilizing continuous rubber lining on the internal body surfaces and extending over the flanges or a disk which sits at an angle to the axis of the pipe shall not be furnished.

**102-2.01B Seats.** - Seats for potable water service shall be of molded new natural rubber or approved synthetic rubber.

Seat shall be mounted on disc or in body.

Seats mounted on disc shall be mechanically fastened to the disc with stainless steel hex head screws. Rubber seat shall be reinforced with stainless steel retaining ring. Seats vulcanized or bonded to the disc are not acceptable.

Seats mounted on body shall be clamped or mechanically secured with stainless steel fasteners or bonded to the body by an approved process.

**102-2.01C Mating Surfaces.** - Mating surfaces for valves with seat on disc shall be Type 304 or 316 stainless steel. Mating surface shall be mechanically retained in body and sealed with an O-ring.

Mating surfaces for valves with the seat in the body shall be Type 304 or 316 stainless steel or plasma applied nickel-chromium material containing 80 percent nickel, 20 percent chrome.

Plated or sprayed-on mating surface material is not acceptable.

**102-2.01D Discs.** - If seat is on the disc, the disc shall be of ASTM A 126 Class B cast or ductile iron. If seat is in the body, the disc shall be of ASTM A 126 Class B cast iron, ductile iron, or Type 304 or 316 stainless steel. Stainless steel edge on cast or ductile-iron discs shall be secured with stainless steel threaded fasteners, heat shrunk on disc, a welded-on overlay, or a plasma applied nickel-chrome material.

**102-2.01E Shafts.** - Shaft shall be of Type 304 or 316 stainless steel. Shaft shall be either one piece extending completely through disc or stub shafts inserted into valve disc stubs.

Shaft seal shall be of the split-V type or O-ring type. Seal shall be replaceable without disassembly of valve.

**102-2.01F Actuators.** - Each valve shall have a position indicator.

Actuators shall be capable of valve operation at rated pressure with a pull not exceeding 80 pounds on actuator. Operator shall be self-locking.

**102-2.01G Dimensions and Tolerances.** - Butterfly valves and parts shall conform to the dimensions and tolerances as specified in AWWA Standard C504 and when assembled, valves shall be well fitted and smooth operating.

**102-2.01H Quality Requirements.** - Butterfly valve parts shall be tested for the physical and chemical properties as specified in AWWA Standard C504. After manufacture, each butterfly valve shall be subjected to operation and hydrostatic tests as required by AWWA Standard C504.

**102-2.02 Resilient Seated Gate Valves.** - Gate valves shall conform to the requirements of AWWA Standard C509, as specified herein and in the special provisions. The following will be specified in the special provisions or on the plans: type of valve ends, and type of stem seal.

The intended position of the valves is approximately level with the stem positioned vertical. The operating wrench nut shall be 2 inches square with direction of opening, counterclockwise.

The valve main connection fittings shall be compatible with the type of pipe to which the valve will be attached.

**102-2.02A Disc Wedging Mechanism, Valves 10-Inch and Larger.** - For gate valves 10 inches and larger, the operating mechanisms of the parallel bronze discs shall be designed so that the seating pressure is applied to the discs equally at 4 separate contact points near the outer edge of each disc. The discs and wedging mechanism shall be held together as a unit. The side spreaders of the wedging mechanism shall be self adjusting to act as equalizers between the top equally to the 4 contact points. In closing the valve, the discs shall move freely to a position opposite the port openings of the body before engaging the side spreaders against wedges cast integrally with each disc. In opening the valve, the first movement of the stem shall lift the top wedge nut directly away from the side spreaders to relieve the wedging pressure before the discs can begin to rise.

**102-2.02B Disc Wedging Mechanism, Valves 8-Inch and Smaller.** - The disc wedging mechanism for gate valves 8 inches and smaller shall be as indicated above or may be of the bottom wedging type with 2 point floating wedge contacts.

**102-2.02C Dimensions and Tolerances.** - Gate valve parts shall conform to the dimensions and tolerances as specified in AWWA Standard C500 and when assembled, valves shall be well fitted and smooth operating.

**102-2.02D Quality Requirements.** - Gate valve parts shall conform to and shall be tested for the physical and chemical properties as specified in AWWA Standard C500. After manufacture, each gate valve shall be subjected to operation and hydrostatic tests as required by AWWA Standard C500.

**102-2.03 Air Relief Valves.** - Air relief valves shall have one-inch inlet and outlet connections and 3/8-inch orifice. Air relief valves shall be constructed of the following materials: body and cover, ASTM A48 Class 30 cast iron; float and leverage mechanism, ASTM A 240 or A 276 stainless steel. The orifice and seat shall be stainless steel against Buna-N or Viton. All other valve internals shall be stainless steel or bronze.

**102-2.04 Combination Air Relief and Vacuum Valves.** - Combination air relief and vacuum valves with flanged inlet and outlet connections as shown on the plans. High pressure air release valve shall be a one-inch inlet and outlet and 3/8-inch orifice. Vacuum valve shall be constructed of the following materials: body and cover, ASTM A48 Class 30 cast iron; float, ASTM A240 stainless steel; seat, Buna-N. The air relief valve shall be constructed as specified in Section 102-2.03, above.

**102-2.05 Tapping Sleeves and Valves.** - Tapping sleeves shall be split sleeve, fabricated of steel and fusion epoxy coated. Tapping valves shall conform to the requirements for gate valves as specified in Section 102-2.02.

### 102-3 HYDRANTS

**102-3.01 Fire Hydrants.** - Fire hydrants shall be obtained from the City of San Jose Fire Department. The Contractor shall pay the City Department of Public Works for each hydrant at the price current as of the date of the Notice to Contractors. Each bidder shall obtain the current price from the Department prior to submitting the bid, if fire hydrants are part of the work under this contract.

### 102-4 INSTALLATION

**102-4.01 General.** - All debris, dirt, and other foreign matter shall be cleaned from pipes and mating surfaces before valves and hydrants are installed.

Valves and hydrants shall be erected and supported in their proper positions such that they are free from distortion until completely installed and blocked. All debris and other foreign matter shall be cleared from openings, seats and other parts. Operating mechanisms shall be tested and adjusted for proper function. Bolts and nuts shall be checked and tightened, if necessary.

Items shall be set plumb and in line and shall be shimmed and grouted in place as required to complete the work.

Valves shall have extension stems such that the length of the operating wrench will not exceed 6 feet.

**102-4.02 Valves.** - Valves shall be installed at the locations shown on the plans in accordance with manufacturer's recommended practice. Valves shall be set in a vertical position. Temporary blocking will be allowed to support valve or fitting until permanent anchor or thrust block is installed.

**102-4.02A Valve Boxes.** - A valve box shall be provided for valves as indicated on the plans. Valve boxes shall be firmly supported and shall be centered and plumb over the wrench nut of the gate valve, the box cover shall be flush with the surface of the finished pavement.

**102-4.03 Fire Hydrants.** - Fire hydrants shall be installed at the locations as shown on the plans. When placed behind the curb, the hydrant barrel shall be set 6 feet behind face of curb with hose nozzles parallel with the curb, and pumper nozzle facing the curb. The nozzles of hydrants set at locations without curbs shall be oriented as directed by the Engineer. Each hydrant shall stand plumb with the flange of the bury located 2-1/2 inches to 4 inches above the top of curb.

Each hydrant shall be connected to the main with a 6 inch ductile-iron branch controlled by an independent 6 inch gate valve. A thrust block of 3 square feet of bearing minimum shall be provided at the tee fitting (bowl) of each hydrant.

**102-4.04 Air Relief Valves.** - Air relief valves shall be installed in accordance with the details shown on the plans. In addition to the locations shown on the plans, air relief valves shall be installed at such locations, as determined by the Engineer, whenever any high point occurs in the line caused by a vertical change in grade of the main.



**102-5 MEASUREMENT AND PAYMENT**

**102-5.01 Measurement.** - Valves and hydrants will be measured as units for each type and size from actual count as installed in the work.

**102-5.02 Payment.** - Valves and hydrants, measured as specified above, will be paid for at the contract unit price each.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing the valves and hydrants, including valve vaults and boxes, thrust and anchor blocks, connecting to pipes, testing, flushing, cleaning, disinfecting, complete in place, as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer.



## SECTION 103

## MISCELLANEOUS EQUIPMENT

## 103-1 GENERAL

**103-1.01 Description.** - This work consists of furnishing and installing valve vaults, valve boxes, and meter boxes. Related work is specified in the following sections:

Section 19, "Earthwork"

Section 101, "Pipe and Fittings"

Section 102, "Valves, Hydrants, and Appurtenances"

**103-1.02 Submittals.** - Within 30 days after the date of Notice to Proceed, the Contractor shall submit:

1. Working drawings showing dimensions and details of precast units.
2. Manufacturers' catalog data on the proposed precast units.

**103-1.03 Quality.** - Valve and meter boxes and vaults shall be manufactured in conformance to the requirements of these specifications and shall be tested for the strength requirements as specified in these and referenced specifications.

**103-1.04 Certificates of Compliance.** - The manufacturer shall establish the necessary quality control and inspection practice to assure compliance with these specifications. The manufacturer shall furnish a certificate of compliance, as specified in Section 6-1.07, "Certificates of Compliance" of the General Conditions, that all of the required tests have been made and the results thereof comply with the requirements of these specifications.

**103-1.05 Classification.** - Meter boxes are classified by nominal size according to size of meter to be contained therein. The nominal size of the meter boxes to be furnished and installed shall be as shown on the plans and shall conform to actual dimensions as shown in the standard details. Valve boxes are not classified as such as only one size, as shown on the plans, shall be used in the work for the Municipal Water System.

## 103-2 MATERIALS AND FABRICATION

**103-2.01 Concrete.** - Concrete shall be in accordance with the requirements of Section 90, "Portland Cement Concrete." Class A concrete shall be used for valve and meter boxes. Where precast units are to be used for valves and meter boxes, concrete shall have compressive strength of 4,000 psi.

**103-2.02 Reinforcement.** - Concrete reinforcement shall conform to Section 52, "Reinforcement." Grade 40 or 60 bars shall be used in valve and meter boxes, and Grade 60 bars shall be used in vaults.

**103-2.03 Metals.** - Metals shall conform to Section 75, "Miscellaneous Metal." Covers, lid seats, and ring seats shall be gray iron castings Class 30 B. Steel floor plate shall be galvanized steel conforming to the requirements of ASTM A 525, G 90 or heavier zinc coating.

**103-2.04 Fabrication.** - Meter and valve boxes shall conform to the dimensions as shown in the standard details.

Meter box covers of the same nominal size shall be interchangeable yet close fitting but easily removable. Meter boxes shall have nonsettling outside shoulders. Each meter box shall have a base plate or slab conforming to outside dimensions of the meter box. Reading lids shall be machined for close fit and ease of operation.

Vaults shall be sectionalized and shall conform to the dimensions as shown in the standard details.

Valve box ring seats and covers shall have machined seating surfaces and shall be completely "rattleproof." Extensions shall fit inside of the valve box and may be of any rigid thin wall pipe material.

**103-2.05 Markings.** - Covers for water meter boxes and vaults shall be marked with the words "WATER METER" and valve box covers shall be marked with the work "WATER."

### **103-3 INSTALLATION**

**103-3.01 Earthwork.** - Excavation and backfill shall conform to the requirements for structure excavation and backfill in Section 19, "Earthwork."

**103-3.02 Setting.** - Unless otherwise shown on the plans or specified in the special provisions, a valve box or vault shall be provided for every valve as indicated on the plans. Valve boxes shall be firmly supported and shall be centered and plumb over the wrench nut of the gate valve, the box cover shall be flush with the surface of the finished pavement. Boxes and vaults shall be accurately set to grade of the surrounding surface or at such elevation as shown on the plans or as determined by the Engineer, and the box or vault shall rest on a firm foundation.

A meter box shall be provided for each meter as shown on the plans.

### **103-4 MEASUREMENT AND PAYMENT**

**103-4.01 Measurement and Payment.** - Full compensation for furnishing and installing valve vaults, valve boxes, and meter boxes shall be considered as included in the contract unit price for the applicable valve or meter and no separate payment will be made.

## SECTION 104

## DISINFECTING AND PRESSURE TESTING

## 104-1 GENERAL

**104-1.01 Description.** - This work consists of disinfecting and pressure testing water systems. All incidental materials and equipment not mentioned in these specifications or the special provisions, or shown on the plans which may be necessary to complete testing and disinfecting, shall be furnished and installed as required to complete the work. The City will furnish all water required, and the Contractor shall provide for safe and adequate disposal of all water upon completion of testing and disinfecting.

## 104-2 DISINFECTING

**104-2.01 Description.** - This work consists of disinfecting water system initial installations and after repair. The work shall be accomplished in accordance with the provisions of AWWA Standard C651, as specified herein, the special provisions, and as directed by the Engineer.

**104-2.02 Submittals.** - At least 14 days prior to the start of disinfecting, a description of the method and procedure to be used shall be submitted.

**104-2.03 Certification.** -

**104-2.03A Quality Requirements.** - Liquid Chlorine and hypochlorites to be used as disinfectants shall conform to the physical requirements and shall be tested in accordance with the provisions of AWWA Standard B301 or B300.

**104-2.03B Packing and Marking.** - Liquid Chlorine and hypochlorites shall be sampled, inspected, packed and shipped in containers as specified in reference AWWA Standards.

**104-2.03C Certificate of Compliance.** - The manufacturer or producer of Liquid Chlorine or hypochlorites shall establish the necessary quality control and inspection practice to assure compliance with these specifications. The manufacturer or producer shall furnish a Certificate of Compliance, as specified in Section 6-1.07, "Certificates of Compliance" that all of the required tests have been made and the results thereof comply with the requirements of these specifications.

**104-2.04 Materials.** -

**104-2.04A Classification.** - Disinfectants of the chemical element chlorine are classified as to the form of the compound as follows:

- Liquid Chlorine - (gas atmosphere pressure)
- Calcium hypochlorite granules
- Sodium hypochlorite solutions
- Calcium hypochlorite tablets

**104-2.04B Liquid Chlorine.** - Liquid Chlorine shall be produced and supplied in accordance with the provisions of AWWA Standard B301.

**104-2.04C Hypochlorites.** - Hypochlorites for use as disinfectants shall conform to the provisions of AWWA Standard B300.

**104-2.05 Flushing.** - The main shall be flushed prior to disinfection, except when the tablet method is used. The flushing velocity should not be less than 2.5 feet/second. It must be understood that flushing removes only the lighter solids and cannot be relied upon to remove caked deposits or heavy materials allowed to get into the main during laying. The disposal site for flushing water shall be as directed by the Engineer. Flushing shall be done after the pressure test is made, for mains not connected to existing systems.

**104-2.06 Chlorine Application.** - Disinfection of all portions of newly installed water systems, including all valves and appurtenances, by application of chlorine shall be as specified herein.

**104-2.06A Continuous Feed Method.** - Water from the existing distribution system or other approved sources of supply shall be made to flow at a constant, measured rate into the newly-laid pipeline. The water shall receive a dose of chlorine, also fed at a constant, measured rate. The two rates shall be proportioned so that the chlorine concentration in the water in the pipe is maintained at a minimum of 50 mg/l available chlorine. To assure that this concentration is maintained, the chlorine residual should be measured at regular intervals in accordance with the procedures described in Section 104-2.07 "Chlorine Residual Measurement" or other approved methods.

Table 1 gives the amount of chlorine required to produce 50 mg/l concentration for each 100 feet of pipe of various diameters. Solutions of one percent chlorine may be prepared with sodium hypochlorite or calcium hypochlorite. The latter solution requires approximately one pound of calcium hypochlorite in 8.5 gallons of water.

During the application of the chlorine, valves shall be manipulated to prevent the treatment dosage from flowing back into the line supplying the water. Chlorine application shall not cease until the entire main is filled with the chlorine solution. The chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. At the end of this 24 hour period, the treated water shall contain no less than 25 mg/l chlorine throughout the length of the main.

**Table 1**  
**REQUIRED CHLORINE**  
**50 Mg/l Concentration**

Pipe Size In.	100 percent Chlorine lb.	1 percent Chlorine Solutions gal.
4	0.027	0.33
6	0.061	0.73
8	0.108	1.30
10	0.170	2.04
12	0.240	2.88

**104-2.06B Slug Method.** - This method is suitable for use with mains of large diameter for which, because of the volumes of water involved, the continuous feed method is not practical.

Water from the existing distribution system or other approved source of supply shall be made to flow at a constant, measured rate into the newly laid pipeline. The water shall receive a dose of chlorine, also fed at a constant, measured rate. The two rates shall be proportioned so that the concentration in the water entering the pipeline is maintained at no less than 300 mg/l. The chlorine shall be applied continuously and for a sufficient period to develop a solid column or "slug" of chlorinated water that will, as it passes along the line, expose all interior surfaces to a concentration of at least 300 mg/l for at least 3 hours. The application shall be checked at a tap near the upstream end of the line by chlorine residual measurements made according to the procedures described in Section 104-2.07 "Chlorine Residual Measurement."

As the chlorinated water flows past tees and crosses, related valves and hydrants shall be operated so as to disinfect appurtenances.

**104-2.06C Tablet Method.** - Tablet disinfection is best suited to short extensions (up to 2,500 feet) and smaller diameter mains (up to 12 inches). Because the preliminary flushing step must be eliminated, this method shall be used only when scrupulous cleanliness has been exercised in laying of the pipe. Tablet method shall not be used if trench water or foreign material has entered the main or if the water is below 5 °C (41 °F).

**104-2.06C(1) Placement of Tablets.** - Tablets are placed in each section of pipe and also in hydrants, hydrant branches, and other appurtenances. They shall be attached by an adhesive, except for the tablets placed in hydrants and in the joints between the pipe sections. All the tablets within the main must be at the top of the main. If the tablets are fastened before the pipe section is placed in the trench, their position should be marked on the section to assure that there will be no rotation. In placing tablets in joints, they are either crushed and placed on the inside annular space, or, if the type of assembly does not permit, they are rubbed like chalk on the butt ends of the sections to coat them with calcium hypochlorite.

The adhesive may be any inert substance, approved by the Engineer. There shall be no adhesive on the tablet except on the broad side next to the surface to which the tablet is attached.

The number of Hypochlorite Tablets required for a minimum concentration of 50 mg/l of available chlorine in water is as indicated in Table 2. The number of tablets is based on 3-3/4 grams of available chlorine per tablet.

**Table 2**  
**HYPOCHLORITE TABLETS**

Length of Section Feet	Diameter of Pipe Inches						
	2	4	6	8	10	12	18
13 or less	1	1	2	2	3	5	12
18	1	1	2	3	5	6	15
20	1	1	2	3	5	7	16
30	1	2	3	5	7	10	24
40	1	2	4	6	9	14	30

**104-2.06(C) Filling and Contact.** - When installation has been completed, the main shall be filled with water at a velocity of less than one foot/second. This water shall remain in the pipe for at least 24 hours.

Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water.

**104-2.07 Chlorine Residual Measurement.** - The chlorine residual may be measured by the drop dilution method. The drop dilution method of approximating total residual chlorine, as specified herein, is suitable for concentrations above 10 mg/l. The procedure is taken from AWWA Standard M12 "Simplified Procedures for Water Examination."

**104-2.07A Apparatus.** -

- (1) A graduated cylinder for measuring distilled water
- (2) An automatic or safety pipet
- (3) A dropping pipet that delivers a one milliliter sample in 20 drops. This pipet is for measuring the water sample and should not be used for any other purpose.
- (4) A comparator kit containing a suitable range of standards.

**104-2.07B Procedures.** -

- (1) Ascertain the volume of the comparator cell and using an automatic or safety pipet add 0.5 milliliters of orthotolidine for each 9.5 milliliters of distilled water to be added.
- (2) Using a graduated cylinder, add a measured volume of distilled water.
- (3) With the dropping pipet, add the water sample a drop at a time, allowing mixing, until a yellow color is formed that matches one of the color standards.
- (4) Record the total number of drops used and the final chlorine value obtained.



- (5) Calculate the milligrams per liter residual chlorine as follows:
- (a) Multiply by 20 the number of milliliters of distilled water used in step (2).
  - (b) Multiply this product by the final chlorine value in milligrams per liter recorded in step (4).
  - (c) Divide the product found in step (b) by the total number of drops of water sample recorded in step (4).

**104-2.08 Final Flushing.** - After the applicable retention period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the water leaving the main is no higher than that generally prevailing in the system, or less than one mg/l. Chlorine residual determination shall be made to ascertain that the heavily chlorinated water has been removed from the pipeline.

**104-2.09 Bacteriologic Tests.** - After final flushing, and before the water main is pressure tested, a sample or samples shall be collected in locations specified by the Engineer and tested for bacteriologic quality and shall show the absence of coliform organisms.

Samples for bacteriologic analysis shall be collected in sterile bottles treated with sodium thiosulphate. No hose or fire hydrant shall be used in collection of samples. Samples shall be tested in accordance with, and shall conform to the requirements of the Santa Clara County Health Department, and/or the State of California Department of Public Health. Testing shall be performed at a Certified Laboratory approved by the City and at no cost to the City.

If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained. The tablet method cannot be used in these subsequent disinfections. When the samples are satisfactory, the main may be placed in service.

**104-2.10 Emergency Disinfection Treatment.** - The procedures outlined in this section apply primarily when mains are wholly or partially dewatered. Leaks or breaks that are repaired with clamping devices while the mains remain full of water under pressure present little danger of contamination and require no disinfection.

**104-2.10A Trench Treatment.** - When an existing main is opened, either by accident or by design, the excavation will likely be wet and badly contaminated from nearby sewers. Liberal quantities of hypochlorite, in tablet form, applied to open trench areas will lessen the danger from such pollution. Tablets have the advantage in such a situation because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation.

**104-2.10B Main Disinfection.** - The following procedure is considered as a minimum that may be used.

**104-2.10B(1) Swabbing with Hypochlorite Solution.** - The interior of all pipe and fittings used in making the repair (particularly couplings and tapping sleeves) shall be swabbed with a 5 percent hypochlorite solution (commercial bleach) before they are installed.

**104-2.10B(2) Flushing.** - Thorough flushing is the most practical means of removing contamination introduced during repairs. If valving and hydrant locations permit, flushing from both directions is recommended. Flushing shall be started as soon as the repairs are completed and continued until discolored water is eliminated.

**104-2.10B(3) Slug Method.** - Where practicable, in addition to the procedures above, a section of main in which the break is located shall be isolated, all service connections shut off, and the section flushed and chlorinated as described in this section, except that the dose may be increased to as much as 500 mg/l, and the contact time reduced to as little as 1/2 hour. After chlorination, flushing shall be resumed and continued until discolored water is eliminated.

**104-2.10B(4) Sampling.** - Bacteriologic samples shall be taken after repairs to provide a record by which the effectiveness of the procedures used can be determined. If the direction of flow is unknown, samples shall be taken on each side of the main break.

**104-2.11 Measurement and Payment.** - Separate payment will not be made for disinfecting water systems. Full compensation for such disinfecting shall be considered as included in the various contract items of work involved.

### 104-3 HYDROSTATIC TESTING

**104-3.01 Description.** - This work shall consist of hydrostatically testing newly installed water systems for leakage and soundness and the furnishing of all necessary materials and equipment required therewith. All water mains and service connection work shall be subjected to both pressure and leakage tests.

The procedure as specified herein is based on the assumption that the pressure and leakage test will be performed at the same time. Should the Contractor desire, separate tests may be made. If separate tests are made, the pressure test will be performed first.

In as much as trenches have to be backfilled immediately after the pipe has been laid for safety and other reasons, pressure and leakage tests shall be made after backfilling has been completed but before placement of permanent paving.

When the newly installed water system is connected to existing mains, bacteriological clearance shall be obtained before conducting pressure and leakage tests.

Each valved section of line shall be brought to test pressure of 200 psi unless otherwise specified and maintained for one hour minimum, using either pneumatic or hydraulic means to maintain the pressure. At the end of the test period, the volume of water pumped into the line shall be measured and recorded as the leakage for that test section.

For acceptance of the water system, each test section shall not exceed the allowable leakage as determined in accordance with the following formula:

$$L = SD \times \sqrt{P} \div 133, 200$$

in which L is the maximum acceptable leakage (Gallons/Hr.);  
 S is the reach or length of the test section in feet;  
 D is the diameter of pipe in inches; and  
 P is the test pressure

If the leakage rate exceeds the allowable limit, the pressure shall be maintained for a sufficient length of time as necessary to locate the leak or leaks. After the leak or leaks are corrected to the satisfaction of the Engineer, the hydrostatic pressure and leakage test shall be repeated.

**104-3.02 Test Report.** - The Contractor shall maintain a record of all hydrostatic tests made, and shall submit to the Engineer a written report of the results of such tests. The report shall include: (1) date and time of test, (2) description of pipe section tested, (3) average pressure used, (4) duration of test, (5) amount of measured leakage, and (6) location of leaks, if any, and corrective action taken. The Engineer shall monitor all tests and the test report shall be signed by the Contractor and the Engineer.

**104-3.03 Measurement and Payment.** - Separate payment will not be made for testing water systems. Full compensation for such testing shall be considered as included in the various contract items of work involved.



**SECTION 1207****PIPE AND STRUCTURES**

Pipe and structures for storm drainage and sanitary sewers shall conform to Sections 202, 206, and 207 of the APWA Standard Specifications and these City Standard Specifications.

**1207-1 NONREINFORCED CONCRETE PIPE**

**1207-1.2 Materials.** - Delete Section 207-1.2, "Materials" of the APWA Standard Specifications and substitute the following:

Materials used in manufacturing the pipe shall be as specified in ASTM C 14, with the following exceptions:

- 1) The portland cement for sanitary sewer pipe shall be Type II modified in conformance with ASTM C 150 or Type IP (MS) in conformance with ASTM C 595.
- 2) Portland cement for drainage pipe shall be Type II in conformance with ASTM C 150 or Type IP in conformance with ASTM C 595.
- 3) All aggregates shall conform to Section 90, "Portland Cement Concrete" of these City Standard Specifications.

**1207-1.7 Perforated Pipe.** - Delete Section 207-1.7 "Perforated Pipe" of the APWA.

**1207-2 REINFORCED CONCRETE PIPE (RCP)**

**1207-2.1 General.** - Delete Section 207-2.1, "General" of the APWA Standard Specifications and substitute the following:

It shall be the Contractor's responsibility to insure the timely delivery and proper storage of all pipe materials.

All pipe sizes refer to the nominal inside diameter of pipe (including any pipe linings) and no pipe, except where specified herein, shall deviate from the nominal size designated by more than plus or minus one percent. All pipe, pipe joints incorporated into the pipe, and manufactured fittings connecting pipe between structures shall be of one and only one manufacturer's brand and of the same type, quality, class, and size unless otherwise specified or detailed on the plans. All field cut pipe shall be accomplished by methods and equipment recommended by the pipe manufacturer. No hammer and chisel cuts will be permitted.

The Contractor shall submit at his own expense, working drawings and material details of all special pipe for approval before the pipe shall be manufactured or used on the work. All pipe and fittings delivered to the job site shall be marked by the manufacturer with such inventory and identification as to be

properly identified in the field as meeting the requirements for the work.

**1207-2.1.1 Quality Assurance/Control.** - The pipe manufacturer shall designate one person for Quality Assurance. It shall be that individual's responsibility to assure pipe manufacturing Quality Control. This individual shall be responsible for all pipe testing, keeping quality control records, insuring that quality assurance procedures are followed during the manufacture of the pipe, and inspecting each pipe length before leaving the plant.

Pipe shall be separated in lots of no more than 400 feet in order of manufacture. Each pipe shall be dated according to date of manufacture and numbered sequentially for each date of manufacture, pipe class indicated for each pipe, and D-load.

- (a) **D-Load Test:** All pipe shall be subject to a D-load test at the manufacturer's plant. The Engineer may select at random and test as specified one length of each class of pipe for the D-load test as specified in ASTM C 497. Three-edge bearing test loads shall be applied to produce a 0.01-inch crack except that applied test loading may be terminated without producing a 0.01-inch maximum crack if or when such loading has reached one hundred ten percent (110%) of that required for and relative to the specified D-load for the subject pipe.

The cost of the pipe and the tests shall be borne by the Contractor. Pipe will be acceptable under the test requirements specified herein when all the test specimens conform to the test requirements. Should any of the test specimens fail to meet the test requirements, the manufacturer will be allowed to retest 2 additional specimens for each specimen that failed, and the pipe shall be acceptable only when all of the retest specimens meet the strength requirements.

Test results shall be submitted to the City prior to shipment to the project jobsite. Results shall indicate the specified D-load applied.

- (b) **Reinforcing Steel Placement:** The pipe manufacturer shall cut a minimum of four cores, at least 2-1/2 inch diameter, as indicated in the Table of Frequency of Sampling and Testing. Two cores taken near the bell end, 180 degrees apart, and two cores taken near the spigot end, 180 degrees apart, and 90 degrees from the opposite to determine the reinforcing steel location. If the steel is misplaced more than plus or minus 1/2-inch in any one core the manufacturer shall core two other sections of pipe selected by the Engineer from the lot from which the original pipe was selected. If the four cores of each pipe retested indicates the steel is in the proper location, the remainder of the pipe in that period run will be accepted. If the steel is not in the proper place that period's run will not be accepted.

All of these cores shall be checked to determine that the reinforcing steel is completely embedded in concrete and that the concrete adheres to the steel surface. The exposed surfaces of the cores shall be inspected for concrete to reinforcing steel contact. Contact between the circumferential reinforcement and the concrete shall be considered noncontinuous if a void is found in which a 1/16-inch diameter pin can be inserted 1/4-inch deep, without undue force, between the reinforcement and concrete. The lot will be acceptable if the total number of noncontinuous contact surfaces is 10% or less of the total number of steel bars exposed by the cut. If more than 10 percent noncontinuous contact surfaces are found in the first series of cores, the manufacturer may cut an additional series of cores, and if the additional cores bring the total to 10% or less, the lot will be acceptable.

If the steel location meets the specification requirements, the pipe core holes shall be filled with approved Epoxy mortar. If all other specifications requirements are met, the pipe will be accepted.

- c) Pipe Joint Shear Test: The shear load for the pipe joint shear test shall be 150 lb/in. of nominal diameter and shall be uniformly applied over an arc of not less than 120 degrees along a longitudinal distance of 12 inches. The assembled pipe shall rest on three supports. A support shall be located at each extreme end of the assembly. The third support shall be placed within 14 inches of the joint for flush bell pipe. The shear load shall be placed on a loading block (cradle) immediately adjacent to the joint. During these tests, the ends of the tested pipe shall be restrained only in the amount necessary to prevent longitudinal movement, and there shall be no joint leakage when tested either with water or air as described under "Acceptance Tests for Sanitary and Storm Drainage Systems."

Upon removal of the test load and the disassembly of the joint, neither the bell nor the spigot shall show permanent deformation or damage. If any joint tested should fail, two additional joints shall be tested. Failure of any of the additional joints so tested shall be cause for the rejection of that 400 feet of manufactured pipe.

**1207-2.1.2 Contractor Submittals.** - The Contractor shall submit the following to the Engineer:

- 1) Test Certificates or Certificate of Compliance guaranteeing that the pipe furnished hereunder is in compliance with the requirements of these City Standard Specifications.

- 2) Quality Control records of test as required by the attached "Table of Frequency of Sampling and Testing," and as specified herein.

**TABLE OF FREQUENCY OF SAMPLING AND TESTING**

Item Test	Frequency	Remarks
<u>At Manufacturing Plant</u>		
1. RCP Core	*	1207-2.1.1(b)
2. PVC lining ** Pull Test	1 per 50 pipe	Without regard to type of pipe or lot
3. RCP D-Load	*	ASTM C 497
4. RCP Hydrotesting, 12 PS: for 1 hr.	*	ASTM C 361
5. Absorption	1 core from item #1	ASTM C 497 Sec. 7 Method A, Max 7%
6. Concrete Strength	5 cyl 6"x 12"	ASTM C 361, Sec 10 daily Mfg cast/ independent lab test
7. Aggregate	weekly	ASTM C 33 except gradation shall not apply
8. Cert. of Type II modified cement, mix design, and gasket ASTM C-361 Sec. 9.1.2	As required	
9. PVC lining spark Flaw Test**	Each section of pipe	15,000 VAC
10. PVC lining Chemical Resistance	certification by manufacturer permitted	
11. Carbonate Equiv. Test	*	Section 12.07-2.5(5)
12. Pipe joint shear test	2 joints on first lot	
<u>In Field</u>		
13. Joint Leakage, Air hydrostatic test	each joint and each completed section	ASTM C 1103
14. PVC lining** spark Flaw Test	Each section of pipe	15,000 VAC

- \* For the purpose of these specifications, a lot is defined as 400 feet but no more than 50 sections of pipe, or fraction thereof, of one size and class manufactured on consecutive working days. If the 400 feet, but no more than 50 sections, of pipe are not made on consecutive working days, then only those made on consecutive working days shall be considered a lot. If an interruption in the manufacture of a lot occurs, the Engineer may permit the pipe made after the interruption to be included in the lot,



provided the interruption does not last more than 7 calendar days. A new lot number will be assigned if any change occurs in the size or spacing of reinforcing steel, in the concrete mix, or in the curing method.

\*\* Lined RCP pipe only.

3) Detailed fabrication and laying working drawings.

**1207-2.1.3 Quality Control Records.** - The Contractor shall, prior to pipe delivery, submit to the Engineer with two copy sets of the manufacturer's quality control records for pipe manufactured in accordance with this section. Records shall indicate thereon: (1) the agency and technician performing the test, (2) frequency of sampling and testing, (3) the test date, (4) the City's Job Number assigned to the project, (5) the pipe size, (6) lot number and date manufactured, and (7) required test results and additional information as required herein. Each test record sheet shall be endorsed by the manufacturer, (and the agency performing the test if other than the manufacturer), as certifying compliance with this Section.

**1207-2.2 Materials.** - Delete Section 207-2.2, "Pipe Materials " of the APWA Standard Specifications and substitute the following:

Materials shall comply with Section 6 of the appropriate ASTM Designation under which the subject pipe is to be manufactured, modified as specified hereunder.

- 1) Portland cement used in the manufacture of sanitary sewer pipe shall be Type II modified in conformance with ASTM C 150 or Type IP (MS) in conformance with ASTM C 595.
- 2) Portland cement used in the manufacture of all other pipes shall be Type II in conformance with ASTM C 150 or Type IP in conformance with ASTM C 595.
- 3) No admixtures shall be introduced to concrete mixes without specific approval by the Engineer. Approval for admixture or blend usage for pipe for a specific project shall not be considered a general use approval for subsequent projects unless stated.
- 4) Rubber for gaskets shall be neoprene and shall comply with the requirements of ASTM C 361.

**1207-2.5 Pipe Design.** Delete Section 207-2.5 "Joints" of the APWA Standards and substitute the following: Design shall comply with Section 7 of the appropriate ASTM Designation under which the subject pipe is to be manufactured, modified as specified hereunder:

- 1) In no case shall pipe be less than that specified under ASTM C 76 provisions for Class III RCP, Wall B, unless otherwise specified.
- 2) Joint assembly design shall be reinforced concrete bell and spigot type incorporating a fully retained, single or

- double rubber gasket in accordance with ASTM C 361. Steel joint rings will not be allowed. The joint shall meet the thickness requirements of the United States Bureau of Reclamation (USBR) Type R-4 joint whether flared or flush bell pipe is supplied. Reinforcement steel shall be in each end of the pipe bell and spigot.
- 3) Manufacturer's design working drawings shall be submitted to the Engineer for approval prior to fabrication. Drawings shall indicate, at relative scale, concrete covers, reinforcement placements and joint assembly design. Submittals shall also include the design pipe size, D-load, Cement type, concrete strength and areas, and types and placements of reinforcement.
  - 4) Pipe minimum and maximum lengths, except where required otherwise, shall be in accordance with Section 3.1.2 of ASTM C 361.
  - 5) Carbonate Equivalence Test for Non PVC-Lined RCP: The method and procedure for determining the alkalinity content for the inner wall of RCP shall be as follows:
    - a) A minimum of two carbonate equivalence tests shall be run on sample pipe manufactured from concrete ingredients batched each week of manufacture for each pipe size manufactured. Additional testing on different pipe sections shall be required if the carbonate equivalence results of individual tests per pipe sample vary more than 10%.
    - b) Test samples of concrete shall be obtained from randomly selected pipe sections by drilling, using carbide concrete bits as will procure at least 5 grams of material per drilling. Sample material shall be taken at two locations on the pipe interior at least 12 inches apart longitudinally and to the depth of the steel reinforcements, surface. (For elliptically placed reinforcements, sample material shall be taken at the minor axis as marked on the pipe.)
    - c) All drilled holes shall be repaired with cement and fine aggregate as specified and used in the manufacture of the subject pipe.
    - d) Each material sample shall be tested separately as obtained from the subject pipe. Test material shall be ground or pulverized sample material, oven dried for at least four hours at a temperature of 100 degrees plus 5 degrees Celsius prior to testing.
    - e) Testing shall involve the following equipment and procedures:

- 1) Equipment - Sample weighing shall be performed with a precision balance accurate to at least the nearest 10 milligrams. Liquid measures shall be performed with precision burettes accurate to at least 2/10 of a milliliter. Meters for measuring pH shall read to at least the nearest tenth of a unit. Weighing and pH meter equipment shall have been properly calibrated for correctness.
  - 2) Test procedure - Weigh at least one gram of the test material of each sample into an appropriately sized Erlenmeyer flask and add about 100 ml of distilled water. (Place glass funnel in neck of flask to minimize spray losses). Slowly add 50 ml of Standardized I-Normal Hydrochloric Acid per gram of test material. When effervescence has subsided, heat to boiling and boil about 1/2 minute period. Cool and add 50-100 ml distilled water. Titrate with standardized, carbonate-free, 1-normal Sodium Hydroxide solution to an end point of pH 6.8 minimum to 7.8 maximum. End point reading must be stabilized for not less than two minutes.
- f) Calculation of Carbonate Equivalence - Calculation shall be based upon the chemical reaction of equivalent weights of Calcium Carbonate,  $\text{CaCO}_3$ , and the liquid measures of specifically standardized acid and base titrating solutions, to the nearest tenth of one gram at the stabilized end point. The equivalence of the tested sample shall be expressed in a percentage as  $\text{CaCO}_3$  to the nearest tenth of one percent.
- g) Test results shall be submitted to the City prior to shipment to the project jobsite. Results shall indicate the: (1) weight of the test material, (2) actual standardized normality of the acid and titrate solutions and the test amounts used, and (3) individual sample and pipe section average equivalent  $\text{CaCO}_3$  percentage.

**1207-2.7.2 Curing Procedures.** - Delete Section 207-2.7.2 of the APWA and add the following:

Cast and spun pipe shall be cured by steam or water, or a combination of both in conformance with ASTM C 76 Section 10.2.1, 10.2.2, or 10.2.3.

**1207-2.8 Causes for Rejection.** - Rejection of pipes shall be in accordance with APWA Section 207-2.8 and these City Standard Specifications. The quality of materials, the process of manufacture and the finished pipe shall be subject to inspection and approval by the Engineer. Pipe shall be substantially free of fractures and surface roughness. The ends of the pipe shall be normal to the walls and center line of the pipe, within the limits of variation given in Sections 12.3 and 12.4 of ASTM C 76. Pipe shall be subject to rejection as described in Section 15 of ASTM C 76, and in addition to the following:

- 1) Any shattering or flaking of concrete or other conditions indicating an improper concrete mix or molding.
- 2) PVC liner with bubbles, T-lock not properly embedded in the concrete or voids behind the PVC liner.
- 3) Any exposed reinforcing steel.
- 4) Voids around the reinforcing steel.

The Engineer's decision regarding rejection of the pipe shall be final and the rejected pipe shall be immediately removed from the jobsite at no cost to the City. Rejected pipe shall be clearly and indelibly marked accordingly so as to prevent confusion with pipe delivered under subsequent shipments.

Bell and spigot repairs shall be done with epoxy mortar only and shall be limited to normal pipe dressing operation. Any other repair in this area of the pipe shall require the prior approval of the Engineer before the repair is done. Other repairs outside of the bell and spigot shall be limited to a 12-inch square in any direction at the surface of the pipe and 3/4-inch deep.

Painting with cementitious slurry without the prior approval of the Engineer is strictly prohibited and shall be cause for rejection of the pipe.

The City reserves to right to accept damaged pipe after being suitably repaired by the Contractor, at no cost to the City. Repair procedures shall be submitted by the Contractor for the Engineer's review and approval prior to performing any repair work. The Engineer's approval of any repaired pipe shall not waive the right to reject repair of any subsequent damaged pipe regardless of whether or not it is similarly damaged.

**1207-9 DUCTILE IRON PIPE (DIP).** - Delete Section 207-9 of the APWA Standard Specifications and substitute the following:

Ductile Iron Pipe shall be class 150, with compression (TYCON or equal) type joints, unless otherwise specified. Pipe shall be wrapped with an 8 mils thick polyethylene in conformance with AWWA C105 (Polywrap) for corrosion resistance.

**1207-20 PIPELINE STRUCTURES.** - Pipeline structures shall conform to the requirements of these City Standard Specifications. All manhole structures shall be watertight. Eccentric manholes will not be allowed unless permitted by the Engineer.

Concrete for sewer structures shall be Class A with Type II modified cement in conformance with ASTM C 150 or Type IP (MS) in conformance with ASTM C 595. Concrete for drainage structures shall be Class A with Type II cement in conformance with ASTM C 150 or type IP in conformance with ASTM C-595.

Manholes shall be provided with covers to prevent the intrusion of debris into the sewer pipe as soon as the manhole is constructed or as directed by the Engineer. This measure does not relieve the Contractor from his duties as to alert the public from hazardous conditions as specified in these Standard Specifications.

Manholes shall have non-rocking manhole frame and covers, as shown on Standard Detail D-10, unless otherwise noted on the plans.

Manhole brick shall conform to Section 202-1.2 of the APWA Standard Specifications.

All manholes shall be provided with concrete collars to hold the frame firmly in place.

**1207-21 MEASUREMENT AND PAYMENT.** The work of this section will not be separately measured for payment. Full compensation for the materials specified in this section shall be considered as included in the various contract unit prices paid for pipe and structures and no additional compensation will be allowed therefor.



## SECTION 1301

## TRENCH EXCAVATION, BEDDING AND BACKFILL

## 1301-1 GENERAL

**1301-1.1 Description.** - This work shall consist of the excavating and backfilling of trenches, including the restoration of surfaces, for the installation or repair of storm and sanitary sewers, and other such drainage facilities and their appurtenant structures as shown on the plans, as specified in specifications and the special provisions, and as directed by the Engineer.

**1301-1.2 Utilities Excavation Permit.** - Before any excavation within an existing City street will be allowed, a Utility Excavation Permit or written approval by the Director shall be obtained and a copy of said permit or approval shall be available at the site of the work. Signed and executed contracts for public improvements or sewer lateral permits issued by the City shall constitute compliance with this Section. The Utilities Excavation Permit shall be maintained on the job at all times.

**1301-1.3 Permit to Perform Excavation or Trench Work.** - Attention is directed to Section 5-1.02A "Trench Excavation Safety Plans," of the General Conditions. Inasmuch as the City of San Jose does not issue "Permit to Perform Excavation or Trench Work," the Contractor shall secure such a permit from the State of California, Division of Industrial Safety, as required by Section 6500 of the State of California Labor Code.

The permit together with a copy of approved plan for trench excavation safety plan shall be maintained on the job site at all times.

**1301-1.4 Survey Monuments and Points.** - Whenever monuments, property corners, or other survey points are so located that they may be damaged or destroyed by the proposed excavation, the Contractor shall notify the Engineer, 48 hours prior to start of construction, so that such monuments, property corners, or survey points may be tied out.

**1301-1.5 Existing Utilities.** - In accordance with the provisions of Section 7-1.11 "Preservation of Property" and in Section 8-1.10 "Utility and Non-Highway Facilities" of the General Conditions, existing facilities shall be protected from damage. Any damage done to utility facilities shall be reported to the respective utility owner by the Contractor, and any repair work required shall be done by such company's repair crew. Prior to backfilling, all repair work shall be approved by the Engineer.

All sewer and utility lines that cross or lie along the trench shall be adequately supported during construction and such supports left in place. Care should be exercised when backfilling around such lines to avoid any damage to them. Any pipeline or lateral, storm or sanitary, cut or damaged in any way shall be replaced in kind. The damaged pipe shall be replaced between adjacent joints. No patching of damaged pipe will be permitted. When it is impossible to avoid damaging signal facilities installed in the pavement, coordination with the City Streets and Traffic Department is required. Damage to traffic signal loops, pads,

**SECTION 1301****TRENCH EXCAVATION, BEDDING AND BACKFILL**

interconnect cables, conduits or fire alarm conduits shall be repaired or replaced as directed by the Engineer.

All traffic markers and markings damaged or destroyed shall be replaced unless otherwise directed by the Engineer.

**1301-1.6 Backfill and Surface Restoration Methods.** - Backfill and restoration of surface for trenches are classified by method in accordance with the type of backfill and surfacing materials required, depending on the location of the trench. The methods are as specified in Section 1301-4.2 "Backfill and Surface Restoration," and as shown below:

**Table 1301-1  
Backfill & Surface Restoration Methods**

<u>Method</u>	<u>Backfill</u>	<u>Restoration of Surface Material</u>	<u>Location</u>
A	Structural Backfill	1" Surface over 8" Deeplift AC or as shown on plans	(1) Transverse Crossing All Streets (2) Longitudinal Trench Openings - Select Major Streets (3) Inspection Cuts or Pot Holes
B	Native	12" Agg. Base w/ 3" AC Type 'B' 1" Surface AC	(1) Longitudinal Trench Openings - All Streets except as above
C	Native	In Kind	(1) Outside of AC Traveled Way

**1301-1.7 Dewatering.** - Trenches shall be dewatered as specified on Section 1302-3 "Trench Dewatering" of these City Standard Specification.

### 1301-2 MATERIALS

**1301-2.1 Bedding.** - Bedding material shall conform to the following criteria:

**1301-2.1.1 Class I.** - Class I Bedding shall have a Durability Index (Calif. Test No. 29) of not less than 30. Where percent passing the #1 sieve is equal or greater than 8%, the Sand equivalent (Calif. Test No. 217) shall not be less than 40. Gradation requirements are shown in Table I.

**1301-2.1.2 Class II.** - Class II Bedding shall have a Durability Index (Calif. Test No. 229) of not less than 40 and a Sand Equivalent (Calif. Test No. 217) of not less than 60. Gradation requirements are shown in Table I.

**1301-2.1.3 Class III.** - Class III Bedding shall meet the gradation and Sand Equivalent (Calif. Test No. 217) requirements of Structure Backfill described in Section 19-3.06 of the Standard Specifications.



**1301-2.1.4 Class IV.** - Class IV Bedding shall be native soils and not be bedrock, cobbles, etc. Gradation requirements are shown in Table I.

**1301-2.1.5 Class V.** - Class V Bedding shall be plain or reinforced Class A Portland cement concrete, constructed as specified in the special provisions and shown on the plans.

**Table 1**  
**Bedding Gradation**

Sieve Size	Bedding Class (Gradation - Percent Passing)			
	I	II	III	IV
1"	100	100	see Sec.	100
3/4"	90-100	90-100	19-3.06	90-100
1/2"	---	---		
3/8"	20-55	40-100		
#4	0-10	25-40		
#8	0-5	18-33		
#30		5-15		
#50		0-7		
#200		0-4		

**1301-2.2 Backfill.** - Backfill material shall conform to the following:

**1301-2.2.1 Native Material.** - Native material shall be free of vegetation and debris and shall be free of all rocks larger than 3 inches in maximum dimension.

**1301-2.2.2 Structural Backfill.** - Structural Backfill shall be a mixture of clay, sands, and gravel; shall have a sand equivalent of not less than 20; and shall conform to the following grading:

<u>Sieve Size</u>	<u>Percent Passing</u>
3 Inch	100
No. 4	35-100
No. 30	20-100

In addition, if the material is to be densified by jetting, its grading shall be such that it will permit proper densification and draining of the material.

**1301-2.3 Controlled Density Fill.** - Controlled density fill shall consist of a mixture of aggregate, portland cement, mineral admixtures, water, and at the option of the Engineer, chemical accelerating admixtures.

**1301-2.3.1 Portland Cement.** - Portland cement shall be Type II Modified conforming to the provisions in Section 90-2.01, "Portland Cement," of

these City Standard Specifications. Mineral admixtures shall not be substituted for portland cement.

**1301-2.3.2 Water.** - Water shall conform to the provisions in Caltrans Section 90-2.03, "Water" of these City Standard Specifications. Chemical admixtures for accelerating shall be Type C or Type E conforming to the requirements in ASTM C 494.

**1301-2.3.3 Aggregates.** - Aggregate shall conform to the quality requirements of Caltrans Section 90-2.02, "Aggregates" of these City Standard Specifications. Aggregate shall be well graded from coarse to fine. Aggregate shall have a Sand Equivalent, as tested by California Test 217, of not less than 40.

Aggregate shall be of such size and gradation that, when mixed with Type II modified portland cement and mineral admixtures, and tested in accordance with ASTM C 39, the compressive strength of a sample will not be less than 100 or greater than 200 pounds per square inch at 28 days.

The Contractor shall notify the Engineer, in writing, of the source and grading of the aggregate to be used in the CDF. If material supplier is not approved by the City for CDF, Contractor shall make such material available to the Engineer for sampling and testing at least 45 days prior to scheduled placing of the fill. Should the Contractor change his source of supply, he shall notify the Engineer in writing of the new source and grading, and make that material available for sampling and testing at least 45 days prior to intended use.

**1301-2.3.4 Proportioning, Mixing, and Transporting.** - The Portland cement content of the controlled density fill shall be not less than 47 pounds per cubic yard except that, after testing samples of the Contractor's proposed supply, the Engineer may order an increase in cement content, if necessary to meet the compressive strength requirement specified above.

Proportioning for controlled density fill shall conform to the requirements for proportioning concrete mixes in Section 90-5, "Proportioning," of these City Standard Specifications except that dividing of aggregate into sizes will not be required.

Mixing and transporting controlled density fill shall conform to the requirements for mixing and transporting concrete in Section 90-6, "Mixing and Transporting," of these City Standard Specifications. Controlled density fill shall have a slump, as tested by ASTM C 43, of not more than 10 inches.

**1301-2.4 Surface Restoration Materials.** - Surface restoration materials shall conform to the applicable provisions for bases and surfacing specified elsewhere in these City Standard Specifications.

### **1301-3 EXCAVATION**

**1301-3.1 General.** - Excavation for installation of underground facilities shall conform to the provisions as specified herein.

When excavation is within existing asphalt concrete or Portland cement concrete pavements, the edges of the trench outline shall be cut, before the trenching operation is begun, to a neat line with a cutting device approved by the Engineer.

The removal of asphalt concrete or Portland cement concrete pavements, curbs, gutters, sidewalks, or driveways shall be in accordance with the applicable provisions of Section 16 "Clearing and Grubbing," of these City Standard Specifications.

Excavations shall be performed in such a manner as to avoid any unnecessary damage to streets, sidewalks, landscaping and other existing improvements or facilities.

All underground facilities, such as sewer laterals, water services, gas services and underground electrical or telephone conduit crossing the trench line shall be located and exposed if necessary ahead of any trenching operations. All underground facilities within the limits of work shall be protected from damage due to construction related activities. Excavations in the street shall be performed in such a manner that not more than one traffic lane is restricted in either direction at any time, unless otherwise provided for in these City Standard Specifications, the special provisions, or the permit.

Excavation shall not commence until immediately before installation of the underground facilities. The material from the excavation shall be placed in a position that will not cause damage to or cause obstruction to vehicular and pedestrian traffic nor interfere with surface drainage. All public utility trenches shall be color coded according to Underground Services Alert (USA).

Rubble from the removal of asphalt or portland cement concrete pavements, curbs, gutters, sidewalks, or driveway shall be immediately removed from the site of the work so as to preclude the possibility of contaminating the backfill material.

Unless otherwise permitted in writing by the Engineer, all surplus excavated material shall be immediately removed and disposed of outside of the project limits.

The Contractor shall not sweep construction and other debris into the storm drainage system and shall prevent such materials from entering the storm drains.

The Contractor is advised that disposal of dirt and other debris into the public storm drain system is prohibited under the San Jose Municipal Code and under California State Fish and Game Code. Any fines and penalties levied against the Contractor for violation of the above and related regulations are the sole responsibility of the Contractor.

**1301-3.2 Width and Depth of Trench.** - All trenches in existing paved areas shall be excavated vertically and shall be of sufficient width to provide free working space on either side of the applicable installation. For installation of pipe conduits (water, storm, sanitary) the width of the trench, clear of shoring, shall allow a minimum clearance of 4 inches on each side of the pipe or bell, for pipe of 4 inches to 24 inches in diameter, and 6 inches on each side of the pipe or bell, the pipe of 27 inches and greater diameter. The maximum width of the trench on each side of the pipe shall not exceed the above minimum plus 25 percent of the outside diameter of the pipe. The walls of the trench shall rise vertically to a height of at least 12 inches above the pipe.

**1301-3.3 Bottom of Trench.** - The bottom of the trench, with or without bedding material, shall be graded and prepared to provide a firm unyielding and uniform bearing throughout the entire length of pipe conduit. The trench bottom shall be smooth and free from irregularities greater than 1/2-inch diameter, large dirt clods, and any frozen material. If the native material in the trench bottom is not

conductive to fine grading, or as otherwise specified, bedding material shall be used. Bedding shall conform to the requirements of Section 1301-4.1 "Bedding."

**1301-3.4 Bracing and Excavations.** - Attention is directed to the provisions in Section 7-1.01E, "Trench Safety" of the General Conditions.

The Contractor shall furnish and install all sheet piling, shoring, bracing, lagging or other precautions against caving in or sloughing in of the sides of the trench.

#### **1301-4 BEDDING AND BACKFILL**

**1301-4.1 Bedding.** - Bedding material of the class and type designated on the plans or in the special provisions shall be placed under and about the pipe to the depths shown on the plans, except that Type D does not require bedding material.

Where it becomes necessary to remove boulders or other interfering objects at subgrade for bedding, any void below such subgrade shall be filled with the class and type of bedding material designated in the contract documents. Where concrete is specified to cover the pipe, the top of the concrete shall be considered as the top of the bedding.

If soft spongy, unstable, or other similar material is encountered upon which the bedding material or pipe is to be placed, this unsuitable material shall be removed to a depth ordered by the Engineer and replaced with bedding material suitably densified. Additional bedding so ordered, over the amount required by the contract documents, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work" of the General Conditions. If the necessity for such additional bedding material has been caused by an act or failure to act on the part of the Contractor, or is required for the control of groundwater, the Contractor shall bear the expense of the additional excavation and bedding.

Bedding material shall first be placed so that the pipe is supported for the full length of the barrel. If the pipe is laid in a rock cut, there shall be at least 4 inches of bedding below the pipe, even if Type D bedding has been indicated in the contract documents. Then the remainder of the bedding shall be placed.

**1301-4.1.1 Type of Bedding.** - Pipe shall be embedded entirely, partially or not at all, in accordance to the following types:

- Type A Bedding material shall have a minimum thickness beneath the pipe of 4 inches, or one-eighth of the outside diameter of the pipe, whichever is greater, and shall be placed around the pipe and extend up the sides of the trench to a height of 12 inches above the pipe.
- Type B Bedding material shall have a minimum thickness beneath the pipe of 4 inches, or one-eighth of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the trench to the springline of the pipe (mid or quarter point of pipe).
- Type C Bedding material shall have a minimum thickness beneath the pipe of 4 inches, or one-eighth of the outside diameter of the pipe, whichever is greater, and shall

extend up the sides of the trench to the pipe haunchline (eighth point of pipe).

Type D No bedding material required. Pipe shall be laid on trench bottom and backfilled.

**Table 1301-2  
Bedding Type**

<u>Category of Pipe</u>	<u>Type of Bedding</u>
ABS Composite Pipe	A
ABS Solid Wall Pipe	A
Ductile Iron Pipe	C
Concrete Pipe Plain and Reinforced	
24" Diameter and Less	B
25" Diameter and Greater	A
Corrugated Aluminum Pipe	A
Corrugated Steel Pipe	A
Poly-Vinyl Chloride Pipe	A
Reinforced Plastic Mortar Pipe	A
Vitrified Clay Pipe	A

**1301-4.1.2 Placing Bedding or Initial Backfill.** - According to the Class and Type of bedding, the bedding material may be required to be placed and compacted in more than one lift. Class I material requires no compacting. Class II and III material requires hand or mechanical compaction. If no material is required for bedding the pipe, the initial backfill shall be carefully shaded around the pipe and carefully compacted to the haunchline of the pipe. Precautions shall be taken to prevent movement of the pipe during placement of bedding or initial backfill.

**1301-4.2 Backfill and Surface Restoration.** - Surface restoration of pavements in the traveled way shall be replaced in kind or as designated for Method A or B, whichever is greater. Restoration of surfaces outside of traveled way shall be as designated for Method C or as required by the Engineer.

When deemed necessary, the Engineer will make the final determination of backfill and surface restoration methods and materials to be used.

The type of backfill and surface restoration methods shall be as shown on the plans, or as designated on the permit, or special provisions and shall be in accordance with these specifications.

The material supporting, surrounding and/or extending to one foot above the top of the pipe shall be considered as bedding and shall conform to the provisions of Section 1301-4.1 "Bedding." Material from the bedding to the finished or subgrade shall be considered as backfill and shall conform to the provisions for the appropriate method of backfill as herein provided.

No broken pavement, regardless of size, shall be permitted in any back-fill. Not more than one 30 foot segment of trench shall be left open at the end of the day at each independent operation, unless otherwise permitted by the Engineer. Where Method A backfill is required, none of the trench shall be left open at the end of the day except as specifically authorized by the Engineer.

**1301-4.2.1. Method A Backfill and Surface Restoration.** - Method A backfill and surface restoration shall be used on all sewer and other utility line trenches which are excavated: (1) across existing streets, (2) in the general longitudinal direction of traffic of major city streets, except that when the trench opening is in the parking lane Method B may be allowed, and (3) all inspection or repair cuts in existing streets.

The trench shall be backfilled with either imported backfill material compacted to at least 95 percent compaction or with Controlled Density Fill. Any compaction method is acceptable except jetting. Jetting will only be allowed if approved by the Engineer. The trench backfill may be capped with 8 inches of deep lift asphalt base placed in 2 lifts and one inch surface, finished to the surrounding grade. The asphalt base material shall be Type B Gradation: 3/4-inch maximum, Class medium, Asphalt Concrete, and shall be compacted to a relative density of 98 percent.

All Asphalt Concrete surfaces shall be sealed with type SS-1 Asphalt Emulsion, applied at the rate as designated by the Engineer.

**1301-4.2.2 Method B Backfill and Surface Restoration.** - Method B backfill and surface restoration shall be used on all sewer and utility line trenches which are excavated in the general longitudinal direction of traffic in improved street sections. In unimproved areas scheduled for development Method B backfill shall be used without the surfacing requirement.

Backfill material shall be either approved native material or imported material and shall be placed in horizontal, uniform layers not exceeding 0.75 foot in thickness before compaction, except as specified for jetting below. Each layer of backfill from the bottom of the trench to 2.5 feet below finished grade shall be compacted to a relative compaction equal to the surrounding soil, but not less than 85 percent. Backfill within 2.5 feet of finished grade in existing improved areas or the basement grade in areas to be developed shall be compacted to a relative compaction of not less than 95 percent.

Compaction of backfill by jetting will be permitted only when, as determined by the Engineer, the backfill material is of such character that it will be self-draining when compacted and that foundation materials will not soften or be otherwise damaged by the applied water.

A wetting agent, approved by the Engineer, shall be added to the jetting water at a rate recommended by the manufacturer.

The length of the jetting tube shall be such that the end of the tube extends to the springline of the pipe and shall be alternately placed on both sides of the pipe during the jetting of the backfill. The backfill shall be jetted in separate layers, not to exceed 4 feet in thickness.

During jetting, the length of the jetting tube shall be adjusted so the end of the tube extends to within one foot of the bottom of the layer being saturated.

Water jetting of the backfill shall take place as soon after placing the backfill as construction will allow. No equipment capable of compacting the top layer of the unjetted backfill shall be allowed in the trench area until after the jetting operation is complete. Any area prematurely surface compacted shall be excavated to a depth of 2 feet prior to jetting.

The pavement section shall be replaced as specified herein. Immediately after completion of the backfill and compaction operation, a minimum of 12 inches of Class III aggregate base (compacted thickness) shall be placed on the compacted

backfill and surfaced with a temporary lift of 3 inches of cutback (cold mix) asphalt mixture.

The trench shall then be maintained for 30 calendar days to allow settlement to take place. The entire trench section shall then be tamped with a tamper of sufficient size to displace the trench section down to the depth of the existing pavement structure, exclusive of base rock, or a minimum of 4 inches, whichever is greater. After tamping, 4 inches or more of AC shall be placed in 2 lifts. The AC shall be Type: B, Gradation: 3/4" or 1/2" maximum, Class: medium. Where tamping is impossible because of existing facilities or other valid reasons, the temporary cold mix and sufficient aggregate base shall be removed to a depth to insure placing of 6 inches of Asphalt Concrete 4-1/2" of Type: B, Gradation: 3/4" maximum, Class: medium and 1-1/2" Type: B, Gradation: 1/2" maximum, Class: medium.

All AC surfaces shall be sealed with SS-1 Asphalt Emulsion, applied at the rate as designated by the Engineer.

**1301-4.2.3 Method C Backfill and Surface Restoration.** - Method C backfill and surfacing shall be used on all sewer and utility line trenches which are excavated in areas outside of existing traveled ways.

The trench shall be backfilled with either approved native or structural backfill material and compacted by jetting with water. Mechanical compaction will only be allowed with approval from the Engineer. The last 2-1/2 feet shall be compacted to not less than 90 percent relative compaction, and the surface area replaced or restored in kind. The replacement or restoration of surface improvements, such as; curbs, curbs and gutters, sidewalks, driveway aprons or other such facilities shall be comparable to or exceed the minimum city standards for such facilities.

In unimproved areas, after compaction, backfill material may be heaped 12-inches above the trench and allowed to settle naturally.

When any portion of a trench is within 4 feet of the edge of pavement or within an improved shoulder area without a curb, the surface of the trench shall be restored either in kind, or with 4-inches of Class III aggregate base, whichever is greater, and any surface improvement restored.

**1301-4.2.4 Temporary Resurfacing.** - Unless permanent pavement is replaced immediately, a temporary surface, consisting of Asphalt Concrete, 3 inches thick, shall be placed and maintained at locations determined by the Engineer, wherever an excavation is made through the pavement. In sidewalk or driveway areas the temporary asphalt concrete surface shall be at least one inch thick. At major intersections and other critical locations, a greater thickness of Asphalt Concrete may be required. The temporary pavement shall be constructed as soon as conditions permit, and shall remain in place and maintained until the permanent restoration of pavement is constructed.

**1301-4.2.5 Mechanically Compacted Backfill.** - Backfill shall be mechanically compacted by means of tamping rollers, sheepfoot rollers, pneumatic tire roller, vibrating rollers, or other mechanical tampers. All such equipment shall be of a size and type approved by the Engineer. Impact-type pavement breaker (stompers) may be permitted only over reinforced concrete pipe or ductile iron pipe.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage

to adjacent ground, existing improvements, or improvements installed under the Contract. The Contractor shall make its own determination in this regard.

Material for mechanically compacted backfill shall be placed in lifts which, prior to compaction, shall not exceed the thickness specified below for the various types of equipment:

- 1) Impact, free-fall, or "stomping" equipment - maximum lift thickness of 2 feet.
- 2) Vibratory equipment, including vibratory plates, vibratory smooth-wheel rollers, and vibratory pneumatic-tired rollers-maximum lift thickness of 2 feet.
- 3) Rolling equipment, including sheepsfoot (except for roadway base), grid, smooth wheel (nonvibratory), pneumatic-tired (nonvibratory), and segmented wheels - maximum lift thickness of one foot.
- 4) Hand-directed mechanical tampers - maximum lift thickness of 2 feet.

Mechanically compacted backfill shall be placed in horizontal layers of thickness, not exceeding those specified above, compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened, or dried, if necessary, and then tamped or rolled until the specified relative compaction has been attained.

**1301-4.2.6 Water Densified Backfill.** - Jetting shall be accomplished by the use of a jet pipe to which a hose is attached, carrying a continuous supply of water under pressure.

Unless flooding is specified or otherwise authorized by the Engineer, all backfill to be densified by water shall be jetted.

The backfill shall be jetted in accordance with the following requirements:

- 1) The jet pipe shall consist of a minimum of 1-1/2 inch diameter pipe to which a minimum 2 inch diameter hose is attached at the upper end. The jet pipe shall be of sufficient length to project to within 2 feet of the bottom of the lift being densified.
- 2) The Contractor shall jet to within 2 feet of the bottom of the lift and apply water in a manner, quantity and at a rate sufficient to thoroughly saturate the thickness of the lift being densified. The jet pipe shall not be moved until the backfill has collapsed and the water has been forced to the surface.
- 3) The lift of backfill shall not exceed that which can be readily densified by jetting, but in no case shall the undensified lift exceed 15 feet.
- 4) Where the nature of the material excavated from the trench is generally unsuitable for densification with water, the Contractor may, at no cost to the City, import suitable material for jetting or densify the excavated material by other methods. The backfill shall be allowed to thoroughly drain until the surface of the



backfill is in a firm and unyielding condition prior to commencement of any subsequent improvements. The Engineer may require the Contractor, at no cost to the City, to provide a sump and pump to remove any accumulated water.

- 5) The Contractor shall make its own determination that jetting will not result in damage and any resulting damage shall be repaired at no cost to the City.

**1301-4.2.7 Controlled Density Fill.** - Controlled density fill shall be placed in a manner as will assure complete filling of the trench without segregation of the fill and without pockets of entrapped air.

**1301-5 MEASUREMENT AND PAYMENT.** - The work of this section will not be separately measured for payment. Full compensation for the excavation, bedding, and backfill specified in this section shall be included in the various contract unit prices paid for pipe and structures and no additional compensation will be allowed therefor.



## SECTION 1302

## PIPE INSTALLATION

## 1302-1 GENERAL

**1302-1.1 Description.** - This work shall consist of laying pipe in trenches or jacking pipe, and making joints as required to complete the pipe installation, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Trenches shall be excavated, trench bottom prepared, and bedding placed and compacted as specified in Section 1301, "Trench Excavation, Bedding, and Backfill" of these City Standard Specifications.

Bell holes shall be excavated at each joint, if necessary, to provide full length barrel support of the pipe and to prevent point loading at the bells or couplings.

Fill material or trench subgrade beneath the pipe shall be graded and shaped to provide a uniform and continuous support beneath the pipe at all points between the bell holes or pipe joints.

Unless otherwise specified or directed by the Engineer, all pipe shall be laid straight between the changes in alignment and at uniform grade between changes in grade. For concrete pipes with elliptical reinforcement, the pipe shall be placed with the minor axis of the reinforcement in a vertical position.

Attention is directed to Section 1301-1.5, "Existing Utilities" of these City Standard Specifications for requirements relating to protection of existing facilities.

**1302-2 MATERIALS.** - Materials shall conform to the requirements of Section 1207, "Pipe and Structures" of these City Standard Specifications and the requirements of this Section.

**1302-3 TRENCH DEWATERING.** - At all times groundwater and surface runoff shall be controlled to maintain the trench in a stable condition during construction.

At the time of laying pipe, the prepared trench shall be in a firm and dry condition. If trench is not in such condition, the Contractor shall furnish and operate such pumps or other devices as may be necessary for removing ground water from trenches during the construction of pipeline system.

When shown on the plans, or ordered by the Engineer, a filter blanket of pervious material or permeable material conforming to the provisions of Section 19-3.065, "Pervious Backfill Material" of the City Standard Specifications shall be placed in accordance to the dimensions shown on the plans or to a depth ordered by the Engineer. If the filter blanket is ordered by the Engineer, it will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the General Conditions.

## 1302-4 PIPE LAYING

**1302-4.1 General.** - Regardless of the type of pipe shown on the plans or as specified in the special provisions the standard procedures for pipe laying specified herein shall apply.

Pipe will be inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection. All corrective work shall be approved by the Engineer and shall be at no cost to the City.

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 improvement before laying any pipe or conduit. The 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, and the Contractor will be paid for any additional work resulting from such change in line or grade as extra work as provided in Section 4-1.03D, "Extra Work" of the General Conditions.

Pipe shall be laid to upgrade with the socket or collar ends of the pipe upgrade unless otherwise approved by the Engineer.

Corrugated metal pipes shall be laid with external laps of the circumferential seams toward the inlet end. Corrugated pipes shall be shipped and handled in such a manner as to prevent damage to protective coatings.

Pipe shall be laid to plan line and grade, within uniform bearing under the full length of the barrel of the pipe. Suitable excavation shall be made to receive the socket or collar which shall not bear upon the subgrade or bedding. Any pipe which is not in true alignment or shows any undue settlement after laying shall be taken up and relaid at no cost to the City.

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 Engineer.

**1302-4.1.1 Laterals.** - The term "sewer lateral connection" or "house lateral" as used in these specifications, on the plans or other drawings, is used to designate the branch sewers laid from the main sewer to points on the property lines from which sewer service can be obtained by proper connection therefrom. When so indicated by the plans, house lateral connections shall be laid either from the upper end of a "y" branch or from a manhole to the property lines. All laterals shall be laid to a grade of 1/4-inch vertical rise to one foot run of pipe, (2%) slope, unless otherwise specified by the Engineer. When the top of the lateral is less than 3 feet below the subgrade at any point, ductile iron pipe shall be used for the lateral unless specified otherwise on plans.

A 2 inch by 2 inch by 3 foot redwood marker shall be placed at the end of the sewer lateral, or, if the curb is already in, a letter "S" shall be stamped on the face of the curb at a point opposite the end of the sewer lateral.

Storm sewer laterals shall be laid on a minimum grade of two percent (1/4" per foot).

#### **1302-4.2 Field Joining of Pipe.** -

**1302-4.2.1. General.** - Materials for pipe joints shall conform to the applicable requirements of Section 1207, "Pipe and Structures."

Pipe joints shall be handled and assembled in accordance with the following general requirements:

- 1) Care shall be taken to avoid dragging the spigot on the ground or allowing it to be damaged by contact with gravel, crushed stone or other hard objects.
- 2) Joint mating surfaces shall be cleaned immediately prior to jointing.

Joining of pipe sections shall be in accordance with the manufacturer's or industry recommendations for the type of joints used and as specified herein. All joints shall be so formed that when the pipe sections are drawn together the system shall be continuous, uniform, and watertight.

**1302-4.2.2. Vitrified Clay Pipe.** - Unless otherwise indicated on the plans or specified in the special provisions, vitrified clay pipe shall be joined as herein specified with either premolded resilient compression joints or compression couplings.

- (1) **Resilient Compression Joints.** - The mating components of premolded resilient compression joints shall be wiped clean of dirt and other foreign matter, and the surfaces coated with an approved lubricant. The spigot end of the pipe to be installed shall be positioned in the bell end of the pipe previously laid and shoved home. For large diameter pipe, a lever attachment or bar cushioned by a wooden block shall be used to mate the pipes. In no case shall a bar be used on the unprotected bell end of pipe.

The mating surfaces of the pipes shall be in tight contact with each other upon completion of the joining installation.

- (2) **Compression Couplings.** - Unless otherwise specified, pipe shall be delivered to the job site with the sleeve attached to one end of each pipe section. The spigot end of the pipe to be joined shall be inserted in the sleeve and the steel compression band shall be tightened immediately.

**1302-4.2.3 Concrete Pipe Joints.** - The ends of concrete pipe (reinforced or nonreinforced) sections shall be so formed that when properly laid together they will make a continuous and uniform line of pipe. The joints shall be such design as will permit placement without appreciable irregularities in the flowline, and capable of being sealed to prevent leakage or infiltration.

Unless otherwise indicated on the plans or specified in the special provisions, concrete pipe shall be joined, as herein specified, with rubber gasketed joints.

- (1) **Rubber Gasketed Joints.** - Gasket type joints shall be watertight and flexible. Each joint shall contain a solid gasket of neoprene or other material approved by the Engineer, which shall be the sole element responsible for

watertightness of the joint. When laying the pipe, the bell end of the pipe shall be laid with the bell upstream. The gasket and bell shall be thoroughly cleaned and then lubricated with a soft vegetable soap compound. The gasket shall be stretched evenly when it is installed on the pipe. The spigot end of the pipe to be laid shall be inserted into the bell end of the previously laid pipe. For pipe in which the inside joints are to be pointed, suitable spacers shall be placed against the inside shoulder of the bell to provide the proper space between the abutting ends of the pipe. After the joint is assembled, a feeler gage shall be inserted between the bell and the spigot and the position of the gasket checked around the complete circumference of the pipe. If the gasket has been improperly placed the pipe shall be withdrawn and the joint remade. The gasket shall not be reused if damaged.

**1302-4.2.4 Cast and Ductile Iron Pipe Joints.** - The type of joint to be used will be indicated on the plans or in the special provisions, and shall be installed as specified by the manufacturer.

**1302-4.2.5 Corrugated Metal Pipe Joints.** - Corrugated metal pipe shall be joined with coupling bands. The separate sections of pipe shall be laid in the trench with outside laps of circumferential joints upgrade, with longitudinal laps positioned other than in the invert, and with a maximum spacing between sections of 1-1/2 inches. The sections shall then be joined with coupling bands. Corrugations or projections on the coupler shall properly engage the pipe corrugations of each section before bolts are tightened.

Paved inverts shall be placed and centered on the bottom of the trench. Any damage to the protective lining and coating shall be repaired prior to the backfilling around the pipe.

If waterproof joints are called for on the plans, or specified, the caulking compound or other waterproofing material used shall be subject to the approval of the Engineer.

Where hydraulic structures such as manholes are constructed in conjunction with corrugated metal pipe, the ends of pipes shall penetrate through structure walls and be placed flush or cut off flush with the structure face, unless otherwise directed by the Engineer.

**1302-4.2.6 Poly-Vinyl Chloride Pipe Joints.** - Poly-Vinyl Chloride pipe shall be sealed with rubber sealing ring premolded in the bell of the pipe for sewer pipe or with insertable rubber sealing rings for pressure pipe. Lubricant shall be applied to spigot end of pipe. The pipe shall be assembled to coupling by using a bar and wood block or level or friction pullers. The spigot end shall be pushed in until the reference mark on the spigot end is flush with the end of the bell. The pipe lengths in the trench shall be continuously supported between bell holes.

**1302-4.2.7 Reinforced Plastic Mortar Pipe Joints.** - Reinforced Plastic Mortar pipe shall be sealed with a rubber sealing ring installed in a factory-formed groove in the spigot end of the pipe section. The mating areas of the pipe shall be

wiped clean, including the groove for the rubber sealing ring. The rubber ring shall be installed in groove. Assemble pipe sections by stabbing, bar and wood block or level or friction pullers making sure spigot end is firmly seated to the shoulder of the bell end of a joining pipe.

**1302-4.2.8 Acrylonitrile-Butadiene-Styrene (ABS) Composite Pipe Joint.** - ABS composite pipe shall be joined and sealed by solvent cement joint coupling and installed as herein specified. Apply a coat of primer to the inside of the socket and to the outside of the spigot end of pipe. Without delay, apply a coating of cement to the same surfaces in sufficient quantity that when the spigot is fully inserted into the socket, a bead of excess cement will form around the complete circumference of the outside juncture of the spigot and socket. Remove excess cement. The pipe lengths in the trench shall be continuously supported between joints.

### 1302-5 JACKING

**1302-5.1 General.** - Before starting excavation, the Contractor shall submit working drawings of jacking pit bracing, casing or conduit, and jacking head proposed to be used.

Unless otherwise specified, the methods and equipment used in jacking casing or pipe shall be optional with the Contractor, provided that the proposed method is approved by the Engineer. Such approval, however, shall in no way relieve the Contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein. Only workers experienced in jacking operations shall be used in performing the work.

The leading section of casing or pipe shall be equipped with a jacking head securely anchored thereto to prevent any wobble or variation in alignment during the jacking operation.

The driving ends of the casing or pipe shall be properly protected against spalling and other damage, and intermediate joints shall be similarly protected by the installation of sufficient bearing shims to properly distribute the jacking stresses. Any sections of casing or pipe conduit showing signs of failure shall be removed and replaced with a new precast section or with a cast-in-place section, which is adequate to carry the loads imposed upon it.

Excavation shall not be made in excess of the outer dimensions of the casing or pipe being jacked unless approved by the Engineer. Every effort shall be made to avoid any loss of earth outside of the jacking head. Excavated material shall be removed from the casing or pipe as excavation progresses, and no accumulation of such material within the conduit will be permitted.

Once the jacking operation has commenced, it shall be continued uninterrupted around the clock until the casing or pipe has been jacked between the specified limits. This requirement may be modified if the Contractor submits to the Engineer for prior approval methods and details that shall prevent the "freezing" of the casing or pipe and ensure that the heading is stable at all times.

Upon completion of the jacking operations, all voids around the outside face of the casing or conduit shall be filled by grouting.

Grouting equipment and material shall be on the work site before jacking operations and drilling of grout holes are completed in order that grouting around the jacked casing or conduit may be started immediately after the jacking operations have finished.

Should appreciable loss of ground occur during the jacking operation, the voids shall be backpacked promptly to the extent practicable with soil cement consisting of a slightly moistened mixture of one part cement to 5 parts granular material. Where the soil is not suitable for this purpose, the Contractor shall import suitable material at no cost to the City. The soil cement shall be thoroughly mixed and rammed into place as soon as possible after the loss of ground.

**1302-5.2 Jacking Reinforced Concrete Pipe.** - When pipe is specified to be jacked into place, the design of such pipe is based upon the superimposed loads and not upon the loads which may be placed upon the pipe as a result of the jacking operations. Any increase in pipe strength in order to withstand jacking loads shall be the responsibility of the Contractor.

Where pipe 60 inches or greater in inside diameter is to be jacked for a distance greater than 32 feet, a pilot tunnel shall be constructed first to ensure accuracy of grade and alignment. The dimensions and support of the pilot tunnel will be optional with the Contractor subject to the approval of the Engineer. Such approval shall in no way relieve the Contractor of the responsibility for damage of any nature which may occur as a result of the method.

Supports for pilot tunnels shall be removed as jacking progresses.

Unless the Contractor submits an alternate proposal to the Engineer for approval and the method is approved by the Engineer, the following method shall be used for supporting and guiding the pipe:

After the pilot tunnel has been constructed, a concrete cradle shall be placed true to line and grade and conforming to the outside radius of the pipe. The cradle shall be of such dimensions as to adequately and uniformly support the pipe under the lower 60 degree sector measured on the outside of the pipe. The curved surface shall be formed or accurately screeded to the proper dimensions. It shall be reinforced with not less than 0.3 percent of longitudinal steel and not less than 0.5 percent of transverse steel with respect to the cross-sectional area of the cradle. The transverse steel shall be bent on a radius equal to the radius of the outside of the pipe plus 2 inches and shall extend to within one inch of the edge of the cradle.

In lieu of the concrete cradle specified above, the Contractor may, subject to the approval of details by the Engineer, set steel rails in the concrete base slab to true line and grade.

Grout holes, pipe, and fittings shall be placed in the pipe invert on centers no greater than 5 feet and shall perform such pressure grouting as is necessary to fill voids and to secure uniform bearing between the cradle and the pipe. The grout shall be neat cement grout. Grouting pressures shall be as determined in the field by the Contractor and approved by the Engineer.

All costs involved in the performance of the work of constructing pilot tunnels and cradles shall be included in the price bid for jacking pipe.

**1302-5.3 Jacking Steel Casing and Installing Pipe Inside Casing.** - Unless otherwise specified on the plans, the size and wall thickness of the casing to be jacked to accommodate the contract pipeline shall be at the Contractor's



option except that the casing thickness shall be not less than 3/8-inch, and the Contractor shall be fully responsible for the sufficiency of the casing provided.

The joints of sections of casing to be jacked shall be welded with a continuous circumferential weld. It shall be the Contractor's responsibility to provide stress transfer across the joints which is capable of resisting the jacking forces involved.

All clay pipe installed in a jacked casing shall have mechanical compression joints. The pipe shall be braced or filled to prevent shifting or flotation during backfilling operations.

Backfill shall be gunite sand, gunite concrete, or pressure concrete, except where specified otherwise in the plans or in the special provisions. Pressure concrete shall not be placed until the mix design, placement method, and equipment have been approved by the Engineer.

If the pressure concrete mix cannot be readily pumped or placed by the placing equipment, additional water may be added, provided the water-cement ratio of the approved mix design is not exceeded.

Where gunite sand backfill is used, the pipe shall be laid on a concrete subbase or on gravel bedding where shown on the plans or approved by the Engineer.

The pipe barrels shall rest upon concrete support blocks with the pipe sockets clearing the concrete subbase by at least 1/2 inch.

In addition to submitting details of the jacking pit bracing, casing, and jacking head required, the Contractor shall submit to the Engineer for approval details of the following in advance of the proposed jacking operation: concrete support blocks, bracing to prevent pipe shifting or flotation, and pressure concrete mix design, placement method, and equipment.

**1302-5.4 Jacking Corrugated Steel Pipe.** - Corrugated steel pipe to be jacked in place between the limits shown on the plans shall conform to the provisions of these specifications and the following: The thickness of the pipe designated in the contract item will be the minimum thickness permitted. Any heavier thickness of pipe or other facilities required to withstand jacking pressure shall be determined and furnished by the Contractor at no cost to the City.

Corrugated pipe lengths may be joined by field riveting. Variation from theoretical alignment and grade at the time of completion of placing shall not exceed 1-inch per 100 feet.

The diameter of the excavated hole shall not be more than 0.1 foot greater than the outside diameter of the pipe. Sluicing or jetting with water will not be permitted. When material tends to cave in from outside of these limits, a shield shall be used ahead of the first section of pipe or the face of excavation shall not extend beyond the end of the pipe greater than 1-1/2 feet, unless permitted by the Engineer.

**1302-5.5 Tolerances.** - Pipe and casing shall be jacked true to line and grade. When a pilot tunnel is required to be constructed in connection with jacking reinforced concrete pipe, variations of the pilot tunnel from theoretical alignment and grade shall not exceed 0.25 percent of the distance from the jacking point to terminus of pilot tunnel, unless otherwise shown on the plans or specified in the special provisions.

**1302-6 MEASUREMENT.** - The work performed under this section will be listed in the contract item by pipe size, type, thickness, or whatever information is necessary for identification.

The length of the various pipes to be paid for will be the horizontal length in linear feet measured from centerline of structure to centerline of structure or terminus. Laterals to be paid for will be the horizontal length in linear feet from inside face of structure or terminus. Stub outs will be measured per linear foot and paid for by length designated on the plans or the length actually installed if ordered by the Engineer.

Pipe bends, wyes, tees and other branches will be measured and paid for per each of the actual number installed.

If the contract item is provided for, jacked casing will be measured per linear foot and paid for by the actual length of casing installed.

**1302-7 PAYMENT.** - The length of pipes and casing measured as specified in Section 1302-6 "Measurement," will be paid for at the contract unit price, per linear foot for the various types, sizes, and classes of pipe or casing installed.

Except when a contract item is provided for jacked casing the cost of furnishing and jacking casing in place shall be included in the contract price per linear foot for that portion of the pipeline to be installed within the casing.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing various sizes and classes of pipe including excavating, furnishing, and placing backfill, jacking pipe or casing, connecting new pipe to existing facilities, restoration of pavement, testing, flushing and cleaning, complete in place as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Structures installed in connection with the pipe main or where otherwise shown separately on the plans will be measured and paid for in accordance with the provisions of Section 1305 "Pipeline Structures."

## SECTION 1305

## PIPELINE STRUCTURES

## 1305-1 GENERAL

**1305-1.1 Description.** - This work shall consist of furnishing all necessary material, equipment, and labor for the construction of manholes, drainage inlets, flushing inlets and other sewer drainage appurtenances, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer. The type of structures will be as designated on the plans.

**1305-1.2 Existing Facilities.** - Existing sewer drainage facilities shall be adjusted to grade, remodeled or abandoned as shown on the plans and in accordance with the provisions of Section 15, "Existing Facilities" of these City Standard Specifications.

New frames, grates and covers shall be set on new structures.

**1305-2 MATERIALS.** - Materials shall conform to the requirements of Section 1207, "Pipe and Structures."

## 1305-3 INSTALLATION

**1305-3.1 Manholes.** - Manholes shall be sound, watertight structures constructed at the locations shown on the plans, in accordance to the standard plan details and these specifications.

All manholes shall be waterproofed by applying a coat of sodium silicate, or other approved waterproofing agent, to the interior surfaces. The waterproofing agent shall contain a dark green pigment, and shall be not soluble in water and shall be easily recognizable.

**1305-3.1.1 Foundation.** - After excavation is completed and approved, a cast-in-place foundation or base block shall be constructed. The excavation for the foundation shall be level and of sufficient width and depth to accommodate the foundation dimensions herein specified.

The foundation specified shall be of such width that the outside edges shall be a minimum of 3 inches beyond the outside wall of the manhole wall at all points and be of such depth that it is a minimum of four inches under the outside bottom of the lowest pipe in the foundation and a minimum of three inches over the outside top of the highest pipe in the foundation.

The concrete for the foundation shall be placed continuous and deposited in such a manner that segregation of material does not occur. Once deposited, the concrete shall be consolidated mechanically so as to secure a dense watertight mass.

Before final set of the concrete, a keyway shall be made in the top of the foundation block by use of a metal form ring. The keyway in the foundation block will only be required for precast manholes.

Whenever possible, the foundation shall be formed around the pipe running continuously through the manhole.

When the pipe cannot be run continuously through the manhole base foundation invert channels shall be shaped and troweled smooth, with transitions,

of line and grade, from one pipe to another. The channels shall conform to and be of such width equal to the inside diameter of the pipes.

The top of the foundation, from inside face of manhole, shall be shaped to slope toward the channels at the rate of one inch per foot minimum.

**1305-3.1.2 Precast Concrete.** - Precast concrete manholes shall consist of cylindrical barrel sections, concentric tapered cones, and grade ring sections.

The various shaft sections shall fit together readily and all jointing and connections shall be cemented with mortar or joined with rubber gaskets or mastic joint fillers. All mortar joints shall be troweled smooth on the inside face and shall be watertight.

The rubber ring gaskets shall be installed so as to form a flexible watertight seal. The mastic joint filler shall be applied in accordance with the manufacturer's recommendations so as to form a watertight seal.

The shaft sections and cone shall be combined in such a manner that a maximum height of the throat or neck is no more than 18 inches to finished grade. The measurement shall include the manhole frame casting.

**1305-3.1.3 Brick Construction.** - All brick masonry shall be double thickness. The brick shall be clean and thoroughly dampened immediately before laying. All brick shall be laid in freshly made mortar and each brick shall be laid with a "push joint." In no case will sluicing or grouting of a joint be allowed nor will a joint be made by working in the mortar after the brick has been laid. Every fifth course of brick shall be a header course.

The joints between the courses, horizontal and vertical shall not be less than 1/4-inch nor more than 1/2-inch wide and shall be uniform throughout the work. The inside and outside surfaces shall be smoothly plastered with cement mortar at least 1/2-inch in thickness.

Upon completion of the brick work all surfaces shall be thoroughly cleaned and all excess mortar removed from foundation and interior of manhole.

**1305-3.1.4 Drop Connections.** - Drop connections to manholes shall be constructed, at the locations shown on the plans, in accordance to the standard details and these specifications.

The lower pipe shall be constructed into the foundation in accordance with the provisions of Section 1305-3.1.1 "Foundation." The upper pipe shall be installed after the manhole shaft is in place. The pipe shall be flush with the inner wall of the manhole and the opening between pipe and wall shall be mortared watertight.

The lower pipe, including the long radius bend shall be encased in concrete. The remaining void including 10 foot reach of the upper pipe shall be backfilled with imported backfill material and compacted to 95 percent relative compaction.

**1305-3.1.5 Setting Manhole Frames Casting.**- The manhole frame castings shall be permanently set when so authorized by the Engineer. The frame casting shall be centered on the manhole neck and set on a layer of mortar. The mortar shall be neatly struck. In flexible pavement areas a concrete collar shall be formed and poured around the manhole neck from the top of the casting to the top of the cone section so as to securely anchor the frame to the manhole neck. The collar shall be of uniform width at least 4 inches wider than the flange of the casting. The concrete mixture for the collar, shall contain lamp black coloring.

The amount of lamp black to be added to the mixture will be specified by the Engineer.

In areas to be paved with asphalt concrete the manhole frame casting and collar shall not be installed until the final paving lift is placed. A steel protection plate of adequate strength, close filled and well secured, shall be kept over the manhole opening until frame casting and collar is installed. Pipeline protection plates shall be installed on top of the foundation channel ledges, to protect the pipeline channels from falling debris and shall not be removed until the frame and cover is installed.

**1305-3.2 Flushing Inlets.** - Flushing inlets shall be constructed at the locations shown on the plans in accordance to the standard plan details and these specifications.

The riser shaft and fittings of the flushing inlet shall be 8 inches in diameter and shall be of the same material as, and joined in the same manner as, the sewer main to which it connects.

The riser shaft shall be a straight piece of pipe joined to the main by means of a 90 degree long radius bend attached directly to the main for terminus of the sewer main.

The 90 degree bend shall be encased in concrete.

In areas to be paved, the riser shaft shall not extend into the structural section of the pavement until after such pavement section is completed. The top and opening of the riser section, below the structural section, shall be protected and temporarily sealed until such time as the riser can be completed and the frame and cover permanently installed.

The finished riser shaft shall be cut smoothly and at right angle and shall extend to within 2 inches of the casting cover.

**1305-3.2.1 Frame and Cover.** - The riser frame and cover shall be permanently set when so authorized by the Engineer. The frame shall be centered on the riser pipe shaft so that the pipe does not touch the frame. When the frame has been set to final grade, a circular concrete collar shall be formed and poured around the frame, not touching the pipe, and bearing on firm ground. The collar shall be at least 12 inches in depth, measured from top of frame, and shall be 8 inches in circular width.

**1305-3.3 Drainage Inlets.** - Drainage inlets or catch basins shall be of the type specified and constructed or installed at the locations shown on the plans in accordance to the standard plan details and these specifications.

**1305-3.3.1 Cast-In-Place.** - Cast-in-place drainage inlets shall be constructed on a compacted subgrade with the natural earth bank serving as the outside form. All other forming and placing of concrete shall conform to the provisions of Section 51 "Concrete Structures." The interior bottom shall be shaped accurately so as to be smooth, uniform, and cause minimum resistance to flowing water. The bottom, from inside walls, shall be sloped toward the outlet.

Hooded curb inlets shall be constructed in 2 phases, The sides and bottom of the inlet shall be poured monolithically with the height of the sides below the grade of the bottom of the curb and gutter. The castings shall be set along with the forming of the curb and gutter, and poured along with or after installation of the curb and gutter.

Flat grate inlets shall be constructed in a single phase.

**1305-3.3.2 Precast.** - Precast inlet structures shall be set on a previously placed or constructed concrete slab foundation. The foundation shall be 6 inches thick and 3 inches wider than outside dimensions of the precast structure.

Provisions shall be made for connections for pipe laterals to be installed in the structure. All joints between vertical sections and openings around pipes shall be grouted with cement mortar.

The top of the inlet shall be accurately set to line and grade as shown on the plans.

**1305-4 MEASUREMENT.** - Quantities of the various type of manholes, flushing inlets and drainage inlets will be determined as units from actual count of the item complete and in place, including castings.

**1305-5 PAYMENT.** - Items of work, measured as specified in Section 1305-4 "Measurement" will be paid for at the contract unit price each by type for manholes, drop manholes, flushing inlets and drainage inlets.

The above prices and payments shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in constructing the manholes and inlets, complete in place, including connections to pipes and other structures, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

## SECTION 1307

## ACCEPTANCE TESTS FOR SEWERS

## 1307-1 GENERAL

**1307-1.1 Description.** - This work shall consist of testing sewers and force mains for leakage and deflection, and the furnishing of all necessary materials and equipment required. Deflection tests will be required for flexible pipe sewers only.

The air pressure test shall be the referee method used to determine watertight integrity of all sewers. The hydrostatic leakage test method will only be used when specifically ordered by the Engineer in writing.

This work shall be accomplished as specified in these specifications and the special provisions, and as directed by the Engineer.

Leakage test shall be performed on the entire sewer main installed, with the length of each test section limited to the pipe segment between manholes.

Deflection test for flexible pipe shall be run on the entire sewer system.

**1302-1.2 Preparation of Sewer System.** - Prior to performing leakage or deflection tests for acceptance, the sewer system installation shall be completed (laid, backfilled and compacted), and cleaned. Cleaning of the sewer system shall be in accordance to the provisions of Section 1308, "Cleaning Pipe Lines" of these City Standard Specifications.

## 1307-2 METHODS OF TESTING

**1307-2.1 Air Pressure Test.** - Air pressure test shall be in accordance with APWA Section 306-1.4.4, "Air Pressure Test."

**1307-2.2 Hydrostatic Leakage Test.** - When the hydrostatic leakage test, in lieu of air test, is ordered by the Engineer, the Contractor shall furnish all water, material and labor necessary to make the test. All testing shall be done in the presence of the Engineer and in accordance with the procedures as specified herein.

Each section of the sewer main to be tested shall be sealed by inserting stoppers in the lower end of the sewer segment, the inlet pipe of the upper manhole, and any side sewers at intervening manholes. The pipe and upstream manhole shall be filled with water to a point not less than 5 feet above the invert of the pipe or prevailing ground water elevation, whichever is higher. The line segment shall be filled approximately 4 hours prior to testing. The line shall be tested for at least 2 hours, maintaining the head specified above by measured additions of water. The sum of the additions of water added shall be the amount of leakage for the test period. When the amount of leakage, in a section tested, exceeds the maximum allowable, the Contractor shall locate the source of the leak or leaks and correct such leaks to the satisfaction of the Engineer. After the leak or leaks has been corrected, and the trench rebackfilled and compacted, the section of line shall then be retested to compliance.

The maximum allowable leakage tolerance for sewers is 500 gallons per inch diameter per mile of pipe per day, (0.066 gallons per minute per inch diameter per 1000 feet of pipe). The maximum allowable leakage tolerance for force mains

is 5 gallons per inch of diameter per mile of pipe per day, (0.0039 gallons per inch of diameter per 100 feet of pipe).

**1307-2.3 Deflection Test.** - The deflection test for flexible pipe sewer systems shall be performed by pulling a mandrel through the pipe line. The mandrel shall have a diameter equal to 95 percent of the inside diameter of the pipe system being tested. When the mandrel cannot be pulled through the pipe line the Contractor shall locate and correct the defect to the satisfaction of the Engineer. After the defect is corrected and trench backfilled, the section of line shall then be retested to compliance.

Deflection tests shall be performed not sooner than 30 days after completion of placement and densification of backfill. The pipe shall be cleaned and inspected for offsets and obstructions prior to testing.

The mandrel shall: (1) be a rigid, nonadjustable, odd number of legs (9 legs minimum), mandrel having an effective length not less than its nominal diameter; and (2) be fabricated of steel, fitted with pulling rings at each end, stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size and be furnished in a suitable carrying case labeled with the same data as stamped or engraved on the mandrel.

The mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded. Prior to use, the mandrel shall be certified by the Engineer. Use of an uncertified mandrel or a mandrel altered or modified after certification will invalidate the test. If the mandrel fails to pass, the pipe will be deemed overdeflected.

Overdeflected pipe shall be uncovered and, if not damaged, reinstalled within 45 calendar days of its removal. Damaged pipe shall not be reinstalled, but shall be removed from the work site. Any pipe subjected to any method or process other than removal, which attempts, even successfully, to reduce or cure overdeflection, shall be uncovered, removed from the work site and replaced with new pipe. The replaced pipe shall be tested for deflection not sooner than 30 days after installation.

**1307-3 TELEVISION INSPECTION.** - After all testing specified in this section has been satisfactorily completed, the entire tested sewer shall be given a television inspection. The Contractor shall inspect internal sanitary sewer mains by color television camera and the inspection shall be recorded in magnetic medium, as specified hereinafter. Television inspection shall be performed before and after installation of the liner. Cleaning of the existing sanitary sewer shall be performed prior to the television inspection by a separate operation.

The inspection shall be recorded in true color in Beta Max II or VHS ("SP") Cassette format with on-screen footage readout on the lower part of the screen.

A written log in City of San Jose Standard Television Inspection format (available from the Engineer) shall accompany the recorded cassette. Including the following information shall accompany the recorded cassette:

- 1) Date
- 2) Tape Number
- 3) Location
- 4) Pipe Material and Size
- 5) Name of Equipment Operator



- 6) Name of Firm Performing the Inspection
- 7) All deficiencies in the sewer installation shall be noted and their location referenced to their on-screen footage readout

The recorded cassette and accompanying report shall be delivered to the Engineer not later than 24 hours after completion of the inspection. The cassette and report shall become the property of the City. The Engineer will review the recorded television inspection and will notify the Contractor whether:

- 1) The review revealed a satisfactory installation, or
- 2) The review revealed deficiencies

The Contractor may review the recorded television inspection by requesting and arranging the review with the Engineer.

The following deficiencies in sanitary sewer liner installation shall be corrected by the Contractor at no cost to the City:

- 1) Joint separation (if applicable)
- 2) Offset joints (if applicable)
- 3) Cracked or damaged liner pipe
- 4) Infiltration points
- 5) Debris in the line

The City will not accept a credit, maintenance bond, or any other form of compensation in lieu of corrective measures that may be required to correct any sections of sewer that are improperly installed or do not meet the requirements of these specifications. In addition, all corrective measures proposed by the Contractor shall be approved by the Engineer. In addition, should repairs of the sewers be accomplished by the use of any unauthorized materials or procedure, the Engineer will require replacement of those substandard portions or repairs made to conform to the requirements of these specifications.

Upon completion of repairs the sewer main shall be TV inspected and the recorded TV inspection will be reviewed by the Engineer. This process shall be repeated until the review of the recorded television inspection reveals a satisfactory installation.

**1307-4 MEASUREMENT AND PAYMENT.** - The work specified in this section will not be separately measured for payment. Full compensation for the acceptance tests specified in this section shall be considered as included in the various contract unit prices paid for sewer pipe and no additional compensation will be allowed therefor.



**SECTION 1308**

**CLEANING PIPE LINES**

**1308-1 GENERAL**

**1308-1.1 Description.** - This work shall consist of flushing and cleaning of installed pipe lines, and the furnishing of all necessary materials and equipment required, in accordance with these specifications, the special provisions and as may be directed by the Engineer.

**1308-2 FLUSHING AND CLEANING.** - After the pipe line has been installed and the trench backfill has been completed, the Contractor shall flush and clean all sewer mains to be free of all debris.

**1308-3 MEASUREMENT AND PAYMENT.** - The work specified in this section will not be separately measured for payment. Full compensation for the work specified in this section for sanitary sewer lines shall be considered as included in the various contract unit prices paid for sewer pipe and no additional compensation will be allowed therefor.



## SECTION 1501

## SEWER REHABILITATION

## 1501-1 GENERAL

**1501-1.1 Description.** - This work shall consist of rehabilitation of sewers by a lining process as shown the plans, as specified in those specifications and the special provisions, and as directed by the Engineer.

Rehabilitation of sewers shall conform to the requirements of Section 500-1, "Pipeline Rehabilitation" of the APWA Standard Specifications and these City Standard Specifications.

The type or types of materials and methods for the project shall be as designated on the plans.

**1501-2 MATERIALS.** - The City will require testing of the materials for compliance with these specifications prior to delivery to the project. Materials shall not be more than six months old from the date of manufacture to the time of installation.

**1501-3 MISCELLANEOUS REQUIREMENTS.** - If the Contractor uses any material or method other than that approved by the Engineer, the Contractor shall, at no cost to the City, remove the rehabilitated pipe, and replace it with a new pipe. The material of the new pipe shall be as approved by the Engineer.

**1501-3.1 Odor and Noise Mitigation.** - When working inside manholes and sewer lines, the Contractor shall exercise caution and comply with OSHA requirements when working in the presence of hydrogen sulfide.

To minimize the dispersal of sewer odors above ground the Contractor shall:

- 1) Seal all open sanitary manholes or access openings in the lines when his operations have been suspended for a period of two hours or more.
- 2) During construction operations when open manholes or access openings can not be sealed, the Contractor shall vent and filter hydrogen sulfide gases upstream of the openings in the line.

The hydrogen sulfide gas level shall not exceed 5 ppm (by volume) at the outside wall of any habitable structure or at any point within 25 feet of the sewer opening.

The noise level from the Contractor's operation shall not exceed 86 dbA at the outside wall of any habitable structure or at any point within 50 feet of the noise source.

Within 30 days after execution of the contract the Contractor shall submit odor and noise mitigation plans for the approval by the Engineer.

**1501-3.2 Plugging and Diversion of Sewage Flow.** - The work may require the temporary plugging of the sewer upstream of the construction area and diversion of sewage flows. The Contractor shall submit a diversion plan, at least

one week in advance, to the Engineer and provide all material, labor, and equipment to plug lines, and divert and pump sewage flows. The Contractor shall be responsible for any damages that may result from the blockage of sewage.

Flow charts are available for viewing at the Public Works Department in the San Jose City Hall. The charts are only meant to represent flow at the time that the measurements were taken.

If the Engineer determines that the Contractor's diversion plan is inadequate, the Contractor shall provide equipment, materials, and labor, to develop a viable diversion and pumping plan.

Prior to plugging any lines, the contractor shall notify the Sewer Engineering Section of the Streets and Traffic Department, at least 24 hours in advance at (408) 277-4373.

Included in this item of work is pumping of local depressions in the pipe that may or may not be shown on the plans.

**1501-3.3 Sewer Lateral Verification.** - The Contractor shall dye test all laterals to verify active laterals, if required by the Engineer or the plans, and shall be responsible for connecting only those laterals that are actively in service.

**1501-3.4 Existing Sewer Service Lateral Connections.** - The Contractor shall be responsible for the reconnection of existing laterals to the new liner according to the recommendations of the liner manufacturer and these City Standard Specifications.

**1501-4 CLEANING OF PIPELINES.** - All sewer lines to be relined shall be cleaned prior to video inspection or rehabilitation of the existing line.

Video tapes provided by the City are only intended for the observation of the structural condition of the pipe at the time of the taping. The tapes do not indicate to what extent cleaning is required. It is the responsibility of the Contractor to investigate, before bidding, the amount of cleaning required to perform the insertion of the liner.

Cleaning shall be accomplished using standard mechanically-powered or hydraulically-propelled cleaning tools. Selection of the equipment to be used shall be based on the condition of the lines at the time the work commences and shall be as approved by the Engineer.

The pipelines shall be cleaned by removing all sludge, dirt, sand, grease, rocks, roots, and other material and obstructions from the sewer lines and manholes that would prevent proper installation of the pipe liner. All necessary precautions shall be taken to protect the sewer lines from damage due to the use of cleaning equipment. Whenever hydraulically-propelled cleaning tools (those dependent upon water pressure to provide cleaning force, or any tools which require the flow of water in the sewer line) are used, precautions shall be taken to ensure that the water pressure created does not cause any damage or flooding to public or private property being serviced by the manhole sections involved.

All sludge and other solid or semi-solid materials resulting from the cleaning operation shall be removed at the upstream or downstream manhole of the section being cleaned. Material shall not be allowed to pass from one section to another. When hydraulic cleaning equipment is used, a suitable weir or dam shall be constructed in the downstream manhole to trap all solid material.

All materials resulting from pipeline cleaning operations shall be removed and conveyed by the Contractor to a waste disposal site. The Contractor shall

locate and select a suitable waste disposal site and pay all disposal fees involved. Under no circumstances shall materials removed from sewer lines be dumped or spilled onto the streets or into ditches, catch basins or storm drains or downstream sanitary sewer lines.

Vehicles used to convey the waste materials to the disposal sites shall be tightly covered.

**1501-5 TELEVISION INSPECTION.** - Refer to Section 1307-3, "Television Inspection" of these Specifications.

### **1501-6 POINT REPAIRS**

**1501-6.1 General.** - The point repair contract item covers work required to prepare defective sections of existing sewer lines for rehabilitation that requires excavation. Generally, the work will include repair of joints or replacement of pipe. Flow control of affected reaches of sewer shall be performed as specified herein.

Point repair locations indicated on video tapes, provided by the City or Contractor, or indicated on the plans can not always exactly be determined before the pipe is exposed. The location shown on the plans shall be considered accurate if within five feet of the actual location. All work to expose and correct the defect, materials, and equipment shall conform to applicable provisions of this Section.

All point repairs shall be visually inspected by the Engineer prior to backfilling.

The repair method for severe offset joints, sags, obstructions, and broken pipe is as described below:

- 1) For offset joints and sags, the Contractor may realign the existing pipe. Voids created by realignment shall be backfilled to prevent further movement of the pipe.
- 2) For obstructions, broken pipe, and sags and obstructions that can not be realigned the Contractor shall remove the necessary length of pipe by cutting perpendicular to the pipe axis to leave a plain end. The section shall be replaced with the same pipe material and diameter as the existing pipe. The new section shall be banded to the existing section and concrete poured around the band.

**1501-6.2 Materials.** - Unless otherwise indicated by the plans or the Engineer, the pipe and materials shall be the same as that of the existing line and shall conform to the requirements of Section 1207, "Pipe and Structures" of these City Standard Specifications for type and class.

**1501-6.3 Earthwork.** - All trenching and backfill shall be performed as specified in Section 1301, "Trench Excavation, Bedding and Backfill" of these City Standard Specifications."

**1501-6.4 Sewage Diversion and Dewatering.** - When required by the plans, the Contractor shall divert sewage flows around the work and dewater the excavation. This work shall be performed as specified in this section and Section 1302, "Pipe Installation" of these City Standard Specifications.

**1501-6.5 Notification.** - The Contractor shall notify the Engineer at least 24 hours prior to performing the work and obtain approval of the work to be performed.

**1501-7 MEASUREMENT.** - The work performed under this section will be listed in the contract item by pipe size and type, and type of liner or whatever information is necessary for identification.

The length of pipe rehabilitation to be paid for will be the horizontal length measured in feet from terminus to terminus as shown on the plans with the length in feet of intervening structures deleted.

Verification of sewer lateral and reconnection of sewer lateral will be measured as units determined from actual count in place.

**1501-8 PAYMENT.** - The lengths of rehabilitated pipe, measured as specified in Section 1501-7, "Measurement" will be paid for at the contract price per linear foot for the sizes of pipes and types of liner installed.

The pay quantity for verification of sewer lateral and reconnection of sewer lateral, measured as specified in Section 1501-7, "Measurement," will be paid for at the appropriate contract unit price for the number of laterals verified and reconnected.

Pumping and diversion of sewage, and odor and noise mitigation each will be paid for at the appropriate contract lump sum price.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all work involved in pumping and diversion of sewage, cleaning, TV inspection before and after lining, furnishing and installing liner, point repairs, verification and reconnection of laterals, odor and noise mitigation, all complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.



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