County of Sacramento
Municipal Services

Robert B. Leonard, Chief Deputy County Executive

STANDARD CONSTRUCTION SPECIFICATIONS

September 2001
Revised March 2004
Revised January 2008
Revised January 1, 2016
Revised January 1, 2017
Revised February 1, 2017

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Unless otherwise stated in the Special Provisions, these specifications will become effective for contracts approved for advertisement for bids on and after January 1, 2016. For any contract approved for advertisement between January 1, 2008 and December 31, 2015, the January 2008 version of the Specifications shall apply. For any contract approved for advertisement between March 15, 2004 and December 31, 2007, the March 2004 version of the Specifications shall apply. For Contracts advertised prior to March 15, 2004, the September 2001 version of the Specifications shall apply. All addenda or variances issued relative to the September 2001 Specifications shall remain in effect for projects subject to the September 2001 Specifications. All addenda or variances issued relative to the March 2004 Specifications shall remain in effect for projects subject to the March 2004 Specifications. All addenda or variances issued relative to the January 2008 Specifications shall remain in effect for projects subject to the January 2008 Specifications.

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GENERAL PROVISIONS

SECTION 1 – TERMS AND DEFINITIONS

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SECTION 1 TERMS AND DEFINITIONS

1-1 GENERAL

Whenever the following terms, titles, or abbreviations are used in these Specifications or in any document or instrument where these Specifications govern, the intent and meaning are as noted. Working titles having a masculine gender, such as "workman" and "journeyman" and the pronoun "he," are utilized in the specifications for the sake of brevity and are intended to refer to persons of either gender.

1-2 ABBREVIATIONS

AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
AB	Aggregate Base
AC	Asphalt Concrete
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APA	American Plywood Association
ASA	American Standards Association
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gage
AWS	American Welding Society
AWWA	American Water Works Association
BMP	Best Management Practice
Cal/OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CBC	California Building Code
CFR	Code of Federal Regulations
CICP	Cost Incentive Change Proposal
CIH	Certified Industrial Hygienist
CIP	Cast-In-Place
CL	Centerline
CMU	Concrete Masonry Units
CPM	Critical Path Method
CRM	Crumb Rubber Modifier
CSI	Construction Specifications Institute
CY	Cubic Yard(s)
DBE	Disadvantaged Business Enterprise
DI	Drop Inlet
EA	Each
ESCP	Erosion and Sediment Control Program
EP	Edge of Pavement
F	Fahrenheit
FHWA	Federal Highway Administration

FS	Federal Specifications
ICC	International Code Council
Inv	Invert
ISA	International Society of Arboriculture
ITE	Institute of Transportation Engineers
LB	Pound
LF	Linear Feet
LS	Lump Sum
MUTCD	Manual on Uniform Traffic Control Devices – latest California version
NBFU	National Board of Fire Underwriters
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPDES	National Pollution Discharge Elimination System
NPT	National Pipe Thread Taper
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Act
PCC	Portland Cement Concrete
PSI	Pounds Per Square Inch
PSIG	Pounds per square inch, gauge
QA	Quality Assurance
QC	Quality Control
RSP	Rock Slope Protection
RWQCB	Regional Water Quality Control Board
SD	Storm Drain
SDS	Safety Data Sheets
SF	Square Foot/Feet
SS	Sanitary Sewer
STA	Station
SWPPP	Storm Water Pollution Prevention Plan
TIA	Time Impact Analysis
Title 8	Title 8 (Construction Safety Orders) of the California Code of Regulations
Title 19	Title 19 (Public Safety) of the California Code of Regulations
Title 24	Title 24 (Building Standards) of the California Code of Regulations
TOC	Top of Curb
Typ.	Typical
UL	Underwriters' Laboratories, Inc.
USBR	United States Bureau of Reclamation
WCLA	West Coast Lumbermen's Association
WIC	Woodwork Institute of California
WPCP	Water Pollution Control Program

1-3 DEFINITIONS

Agency -- Means the County of Sacramento, or another agency or district that may adopt these Specifications, acting through its authorized representatives.

Allowance -- An amount of money set aside under the Contract for a special purpose identified in the Contract. See Section 8-2.05, "Allowances."

Architect and/or Consulting Engineer-- A person or persons, firm, partnership, joint venture, corporation, or combination thereof or authorized representative thereof, acting in the capacity of consultant to the Agency. The Architect or Consulting Engineer will only issue directions to the Contractor through the Agency. When the Specifications require that approval be obtained from the Architect or Consulting Engineer, the approval must be requested from and be given by the Agency.

Asphalt Concrete, or AC – Is the same as "Hot Mix Asphalt" or "HMA."

Asphalt Rubber Hot Mix or ARHM - Is the same as "Rubberized Hot Mix Asphalt" or "RHMA"

As Shown, Etc. -- Where "as shown," "as indicated," "as detailed," or similar words are used, the reference is to the Contract unless specifically stated otherwise. Where "as directed," "as permitted," "approved," or similar words are used, they mean the direction, permission, or approval of the Agency.

Bid -- When submitted on the prescribed bid proposal form, properly signed and guaranteed, the Bid constitutes the offer of the Bidder to complete the Work at the price shown on the Bidder's bid proposal form.

Bidder -- Any person, persons, firm, partnership, joint venture, corporation, or combination thereof, submitting a Bid for the Work, acting directly or through a duly authorized representative.

Bid Documents -- The sum of the documents that comprise the Bid by a Bidder to perform the Work.

Bid Opening -- The event conducted by the Agency during which sealed Bids, submitted by Bidders to perform the Work, are publicly opened and read.

Board Of Supervisors -- The Board of Supervisors of the County of Sacramento, a political subdivision of the State of California. Also referred to as "Board."

Board of Directors -- The Board of Directors of the special district or agency named in the Notice to Contractors. Also referred to as "Board."

Calendar Day -- Every day shown on the calendar including weekends and legal holidays. When the s stated in Calendar Days, every day will be charged toward the Contract Time. See Section 7-17, "Inclement Weather and Contract Time," for the sole exception.

Contract -- The written Agreement signed by the Agency and the Contractor covering the Work. The Contract includes the Notice to Contractors, Bid Proposal, Plans, Specifications, Special Provisions, contract bonds, project-specific specifications or documents; and all Contract Change Orders or other written orders or directives of the Agency, and all other project-specific documents. .

Contract Change Order -- A Contract amendment approved by the Agency or by the Board that includes, but is not limited to, alterations, deviations, additions to, or deletions from, the Contract. A single Contract Change Order may address one or more contract changes.

Contract Completion Date - Contract Time as adjusted by additional days granted for unavoidable delays.

Contract Documents – The documents that describe the Work to be performed, including these Standard Construction Specifications, the Special Provisions, the Contract Plans, all addenda, the Notice to Contractors, the Bid Proposal, all required bonds, all Contract Change Orders or other written orders or directives of the Agency, including, but not limited to, Field Instructions or other written directives, and written responses to Requests for Information, and all other project-specific documents. See Section 4-1, "Intent of Contract Documents," of these

Specifications.

Contractor -- The person or persons, firm, partnership, joint venture, corporation, or combination thereof, private or municipal, who (that) has (have) entered into a Contract, as defined in these Specifications, with the Agency. Also referred to as Prime Contractor.

Contract Time – The time stated in the Contract for completion of the Work. The Contract Time may be a single allotment of time, milestones, or a group of times specific to portions of the Work, or a combination thereof.

County -- The County of Sacramento, a political subdivision of the State of California.

Engineer -- The County Engineer of Sacramento County, or Agency Engineer of the district, or agency for which work will be done under these Specifications, acting personally or through agents or assistants duly authorized by the Engineer.

Estimated Quantities -- The list of items of work and the estimated quantities associated with the Work. The Estimated Quantities provide the basis for the Bid.

Inspector -- The person or persons authorized to act as agent(s) for the Agency in the inspection of the Work.

Legal Holidays -- The following days are recognized as legal holidays by the Agency:

New Year's Day	January First
Martin Luther King, Jr. Day	Third Monday in January
Lincoln's Birthday	February Twelfth
Washington's Birthday	Third Monday in February
Cesar Chavez Day	March Thirty First
Memorial Day	Last Monday in May
Independence Day	July Fourth
Labor Day	First Monday in September
Columbus Day	Second Monday in October
Veterans' Day	November Eleventh
Thanksgiving Day	Fourth Thursday in November
Thanksgiving Friday	Friday after Thanksgiving
Christmas	December Twenty-fifth

Notice To Contractors -- The written notice whereby interested parties are informed of the date, location, and time of the Bid Opening of a proposed Agency Project and the terms and conditions of submitting Bids to perform the Work. Also, Notice to Bidders, Invitation to Bid.

Notice To Proceed -- The written authorization by the Agency to the Contractor specifying the date the Work may begin and any conditions regarding the beginning of the Work.

Plans -- Plans, drawings, profiles, cross sections, details, working drawings, and supplemental drawings, approved by the Agency, which show the locations, character, dimensions, and details of the Work.

Project -- Means the Work.

Proposal – Means "Bid."

Record Drawings -- Drawings prepared by the Contractor that document changes and additions to, or deductions from, the Plans, and that represent the Work as constructed. Final Record Drawings are the permanent record and are archived by the Agency.

See Section 11-3, "Record Drawings," of these Specifications.

Schedule of Values -- A statement furnished by the Contractor to the Agency reflecting the portions of the Total Contract Price allotted for the various parts of the Work for each work activity contained on the project schedule. Unless otherwise indicated, the total of the Schedule of Values must equal the full cost of the Work, including all labor, materials, equipment, overhead, and profit. For lump sum contracts, the Schedule of Values is the basis for reviewing the Contractor's application for progress payments.

Special Provisions -- The Special Provisions are specific clauses setting forth conditions or requirements unique or specific to the Work and supplementary to these Standard Construction Specifications.

Standard Construction Specifications -- The directions, provisions, and requirements contained herein. When the term “Standard Specifications" or "these Specifications" is used, it means the provisions as set forth herein, together with any amendments or revisions that may be set forth in the Special Provisions. The Standard Specifications are comprised of “General Provisions” and “Technical Provisions.”

Standard Drawings -- The Standard Drawings of the Agency which are incorporated into the Standard Construction Specifications and made a part of the Plans by reference.

State -- The State of California.

State Specifications -- The version of the State of California Standard Specifications, issued by the California Department of Transportation, in effect at the time of Notice to Contractors unless noted otherwise.

State Plans -- The version of the State of California Standard Plans issued by the California Department of Transportation in effect at the time of Notice to Contractors, unless noted otherwise.

Subcontractor -- A properly licensed party under contract and responsible to the Contractor for performing a specified part of the Work; or a properly licensed party under contract and responsible to a Subcontractor of the Contractor. Includes all lower tiered Subcontractors.

Supplemental Drawing -- Supplemental drawings define the Plans or Specifications in greater detail by providing additional information that may have not been specifically or clearly shown or called out on the Plans or in the Specifications.

Total Contract Price – The total price for the Work as bid by the Contractor including any additions or subtractions made via Contract Change Orders.

Work -- All actions which the Contractor is contractually required to do as specified, indicated, shown, reasonably inferred, or fairly implied in the Contract to construct the Work, including all alterations, amendments, or extensions made by Contract Change Order or other written orders or directives of the Agency. Unless specified otherwise in the Contract, the Work includes furnishing all materials, supplies, equipment, tools, labor, transportation, supervision, and all incidentals necessary to complete the Work.

Working Day -- Any day except: (a) Saturdays, Sundays, and legal holidays; (b) days on which the Contractor is specifically required by the Special Provisions or by law to suspend construction operations; or (c) days on which the Contractor is prevented from proceeding with the current controlling operation or operations of the Work for at least 5 hours per day due to inclement weather or conditions resulting immediately from the inclement weather. See Section 7-8.06, “Lane and Road Closures during November/December Holiday Season,” of these Specifications regarding Contract Time during the November-December holiday season.

Working Drawing -- Working Drawings detail a particular item of work and the manner in which it is to be accomplished or performed. Working Drawings are prepared by the Contractor as a submittal, or a portion of a submittal, and may be specifically requested by the Agency or required in the Contract or a Field Instruction or other written directive.

Written Directive -- Directives from the Agency includes emails, letters, Field Instructions and RFI responses.

SECTION 2 – BID REQUIREMENTS AND CONDITIONS
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SECTION 2 BID REQUIREMENTS AND CONDITIONS

2-1 BID PROPOSAL

The Agency will furnish to each prospective Bidder a bid proposal, which, when properly completed and executed, is the Bidder's Bid for the Work. Bids must be submitted on the Agency-furnished bid proposal to be valid and accepted. Bids that are not submitted on the Agency-furnished bid proposal can be rejected. The completed bid proposal must be in English and legible and properly signed in longhand by the Bidder if the Bidder is an individual, or by a member of a partnership, by an officer of a corporation authorized to sign contracts on behalf of the corporation, or by an agent of the Bidder. If submitted by a corporation, the Bid must include the name of the state under the laws of which the corporation is chartered or organized.

The Bid must be made on the bid proposal form in clearly legible figures as follows:

2-1.01 Unit Price Bid

Where the bid for an item of work is to be submitted on a unit price basis, the Bidder must bid a unit price as total compensation for completion of one unit of the work described under that item. Multiply the bid unit price by the Estimated Quantity included in the bid proposal form to derive a total bid price for each bid item. The total amount bid for a unit price contract must be entered on the space provided on the Bid proposal as a grand total of all individual items.

The Estimated Quantities included on the Bid proposal are approximate and are only included in the Bid proposal as a basis for comparison of Bids. The Agency does not represent or agree, expressly or by implication, that the actual amount of work will equal the Estimated Quantities. Payment will be made for the actual quantity of Work performed in accordance with the Contract. The Agency reserves the right to increase or decrease the amount of any class or portion of the Work or to omit portions of the Work. If the final quantity of an item of work required under the Contract varies from the Estimated Quantities by 25 percent or more, compensation can be adjusted in accordance with the State Specifications, except that markups are to be applied per Section 9-9, “Markups for Changed Work,” of these Specifications.

2-1.02 Lump Sum Bid

Where the bid for an item of work is to be submitted on a "Lump Sum" or "Job" basis, the Bidder must enter a single lump-sum price in the appropriate place on the Bid proposal. Items bid on a lump-sum basis must result in a complete structure, operating plant, or system in satisfactory working condition with respect to the functional purposes of the installation as described in the Contract, and no extra compensation will be paid for anything omitted but reasonably and fairly implied.

2-1.03 Allowances

Where allowance items have been included on the Bid proposal by the Agency, the total amount entered on the Bid proposal must be included in the Total Bid Price. However, the total amount to be paid for the Work included in the Allowance is the amount of the Allowance actually utilized in the course of completing the Work.

2-2 PREPARATION AND SUBMISSION OF BIDS

By submission of a Bid, the Bidder acknowledges that the Bidder has examined the job site and Bid documents and that the Bidder understands and accepts the nature and location of the Work, the general and local conditions to be encountered, conditions of the site, the character, quality and scope of the Work, the availability of labor, electric power, water, the character, quality, and quantity of surface and subsurface (as identified in the Bid documents or as are readily predictable by an observant person) materials or obstacles on the site, the quantity and

type of materials and equipment to be furnished, and all requirements of the Contract or other matters which can affect the Work or the cost. Failure of a Bidder to become acquainted with all of the available information concerning conditions does not relieve the Bidder of the responsibility for properly estimating the difficulties or cost of the Work.

Bid prices must include everything necessary for the completion of the Work and fulfillment of the Contract, including, but not limited to, furnishing all materials, equipment, tools, excavation sheeting, bracing and supports, plant, labor and services, except as provided otherwise in the Contract. Bid prices must also include labor and material escalation and all Federal, State, and local taxes, and all other fees and costs not expressly paid for by the Agency as stated in the Special Provisions.

Each Bidder must include with the Bid a completed, signed, Non-Collusion Agreement in accordance with Section 7106 of the Public Contract Code. A sample of the required form is included in Appendix A of these Specifications.

If the estimated Contract amount is $1,000,000.00 or more, the Bidder must include with the Bid a completed, signed Iran Contracting Act Disclosure Form in accordance with Sections 2202-2208 of the Public Contract Code. A sample of the required form is included in Appendix A of these Specifications.

The Bid and required documents must be submitted in a single envelope sealed with glue, tape, or in a similar manner so as to be closed against indiscriminate inspection of the contents. The envelope must be clearly and plainly marked, in English, with the project name, Contract number, and bid date, as indicated in the Notice to Bidders or addenda to the Notice to Bidders.

Bids submitted in envelopes that are not properly sealed or marked maybe rejected.

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

The Bidder must carefully examine the site of the proposed Work and the Plans, Specifications and Bid Documents and must be satisfied as to the character, quality, and quantity of the Work, including surface and subsurface materials or obstacles to be encountered. The submission of a Bid is conclusive evidence that the Bidder is satisfied through the Bidder's own investigation as to the conditions to be encountered; the character, quality, quantity and scope of work to be performed; and the materials and equipment to be furnished.

If material discrepancies or errors are found in the Plans and Specifications prior to the opening of Bids, an Addendum may be issued (see Section 2-9, "Addenda," in these Specifications). Otherwise, discrepancies or conflict between Plans and Specifications are governed by Section 4-1, "Intent of Contract Documents."

2-4 SUBSURFACE CONDITIONS

Investigations of subsurface conditions by the Agency are made for the purpose of design only. There is no guaranty, either expressed or implied, that the conditions indicated are representative of those existing throughout the Work, or any part of it, or that unusual site conditions might not occur. Unusual site conditions are defined in Section 7104 of the Public Contract Code and Section 7-6, "Unusual Site Conditions," of these Specifications.

2-5 CONTRACTORS/SUBCONTRACTORS REQUIRED TO BE LICENSED AND REGISTERED

The Bidder must hold a valid Contractor License under the provisions of Chapter 9, Division 3, of the Business and Professions Code and be registered pursuant to Labor Code section 1725.5 as noted in the Notice to Bidders, "Contractor License Required." Unless specified otherwise in the Special Provisions, the Bidder must indicate the license number and class in the space provided on the Bid proposal.

Subcontractors engaged to perform portions of the Work must be licensed under the provisions of Chapter 9, Division 3, of the Business and Professions Code and be registered pursuant to Labor Code section 1725.5 to do the type of work for which they are subcontracted. Subcontractor license numbers must be provided to the Agency as required by Section 2-8, "Subcontractors," of these Specifications.

Failure of the Bidder to obtain proper and adequate licensing prior to Bid opening may constitute a non-responsive bid. Pursuant to Public Contract Code Section 20103.5, projects that receive Federal funding may not be subject to this requirement..

2-6 COMPETENCY OF BIDDERS

It is the intent of the Agency to award a Contract only to a Bidder who furnishes satisfactory evidence of requisite experience and ability and has sufficient capital, facilities, and plant to prosecute the Work successfully and promptly and complete the Work within the time stated in the Contract.

If required by the Special Provisions, a statement of experience and business standing, together with that of all Subcontractors designated in the Bid, must be submitted on an Agency-provided form by the 3 apparent low Bidders within 3 Working Days of Bid opening.

To determine the experience of a Bidder, relevant evidence that the Bidder, or personnel, has satisfactorily performed on other contracts of similar nature and magnitude or difficulty will be considered.

2-7 JOINT VENTURE BIDS

If two or more prospective Bidders desire to bid jointly as a joint venture on a single project, the joint venture Bid must be accompanied by a notarized copy of a valid license issued to the joint venture by the Contractors State License Board. If a copy of the joint venture license is not filed with the Bid, award of the Contract might be delayed or the Bid may be rejected.

2-8 SUBCONTRACTORS

Unless noted otherwise in the Special Provisions, the Contractor agrees to perform with its own organization Contract work amounting to at least thirty percent (30%) of the total bid price excluding specialty items designated by the Agency on the Bid proposal. The total price bid includes the cost of material and manufactured products that are to be purchased or produced by the Contractor under the Contract provisions. Specialty items may be performed by subcontract, and the amount of any such specialty items performed may be deducted from the total bid price before computing the amount of work required to be performed by the contractor's own organization

"Its own organization" means only workers employed and paid directly by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Employees or equipment of a subcontractor, assignee, or agent of the prime contractor are not part of the Contractor's organization.

"Specialty Items" are limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a whole and are limited to minor components of the overall contract.

Where an entire item is subcontracted, the value of work subcontracted is the Contract item bid price. When a portion of an item is subcontracted, the value of work subcontracted is the estimated percentage of the contract item bid price, determined from information submitted by the Contractor, subject to approval by the Agency. In accordance with the Subletting and Subcontracting Fair Practices Act, of the Public Contract Code, Section 4100 et seq., each Bidder must list in his or her Bid each Subcontractor that will perform work in an amount in excess of 1/2

of 1 percent of the total bid or, in the case of a Bid for the construction of streets or highways, including bridges, $10,000, whichever is greater, and the name, address, contractors state license board number and work portions to be performed by each Subcontractor listed. Show work portions by bid item number, description, and percentage of each bid item subcontracted.

If a Bidder fails to specify a Subcontractor for a portion of the Work or specifies more than one Subcontractor for the same work, the Bidder agrees that the Bidder is fully qualified to perform and will perform that portion of the Work. If, after the award of the Contract, the Contractor subcontracts a portion of the Work, except as provided in Section 4107 and Section 4109 of the Act, the Contractor may be subject to the penalties specified in Section 4110 of the Act, and the Agency may refer the violation to the Contractors State Licensing Board.

A listed Subcontractor must perform, with the Subcontractor's own organization and with workers under the Subcontractor's immediate supervision, work of a value of not less than 75 percent of the value of each item of work for which the Subcontractor is listed.

Pursuant to Public Contract Code Section 6109, a Contractor cannot perform work with a Subcontractor who is ineligible to perform work on public works projects pursuant to Labor Code Section 1777.1 and Section 1777.7.

The apparent low Bidder must submit the license numbers of all Subcontractors to the Agency within 3 Working Days of Bid opening. If the low Bidder is not the apparent low Bidder, the low Bidder must submit the license numbers of all listed subcontractors to the Agency within 3 Working Days of the date notified.

The Contractor must include provisions in every Subcontract that the Contract between the Contractor and the Agency is part of the Subcontract, and that all terms and provisions of the Contract are incorporated in the Subcontract. Copies of all Subcontracts are to be provided to the Agency within 2 Working Days of a written request. Subcontracts do not release the Contractor from the Contract or relieve the Contractor of responsibility for the Subcontractor's work.

2-9 ADDENDA

The correction of material discrepancies in, or material additions to/omissions from, the Plans, Specifications, or other Contract document, or an interpretation thereof, during the bidding period will be made only by an Addendum issued by the Agency. A copy of each Addendum issued by the Agency will be mailed or delivered to each planholder listed on the Agency planholder list. Addenda become part of the Contract upon issuance. Interpretations or explanations not included in an addenda will not be considered binding.

2-10 ASSIGNMENT OF ANTITRUST ACTIONS

The Bidder must comply with Public Contract Code Section 7103.5(b):

> "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 must be made and become effective at the time the awarding body tenders final payment to the contractor, without further acknowledgment by the parties."

2-11 BID GUARANTEE

The Bid must be accompanied by a Bid Guarantee in the form of cash, a certified check, a cashier's check, or a bidder's bond. The Bid Guarantee must be executed by an admitted surety insurer in favor of the Agency, the amount of which must be not less than 10 percent of the Base Bid amount, or other security acceptable to the Agency. Bids not accompanied by a Bid Guarantee will be rejected.

The Agency is authorized to forfeit sums of the Bid Guarantee as specified in Section 3-8 of these Specifications.

2-12 WITHDRAWAL OF BID

A Bid can be withdrawn prior to the hour for the submission of Bids in the Notice to Bidders by a written request of the Bidder filed with the Agency at the location where the Bid was submitted. The withdrawal of a Bid does not prejudice the right of a Bidder to file a new Bid in accordance with the Notice to Bidders.

2-13 PUBLIC OPENING OF BIDS

Bids will be publicly opened and read at the time and place indicated in the Notice to Bidders or a subsequent Addendum. Bidders, or their authorized representatives and other interested parties, are invited to be present.

2-14 REJECTION OF BIDS

The Agency reserves the right to reject any and all Bids. Bids containing omissions, erasures, alterations, conditions, or additions not called for can be rejected. The Agency reserves the right to waive irregularities in a Bid and to make an award in the best interest of the Agency

2-15 RELIEF OF BIDDERS

Attention is directed to Public Contract Code Sections 5100 through 5107 concerning relief of Bidders, and in particular to the requirement in Section 5103 that, if the Bidder claims a material mistake was made in its Bid, the Bidder must give the Agency written notice within 5 Working Days after the opening of the bids of the mistake, specifying in detail how the mistake occurred.

SECTION 3 - AWARD AND EXECUTION OF CONTRACT
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SECTION 3 AWARD AND EXECUTION OF CONTRACT

3-1 TIME OF AWARD

If the Contract is awarded, the award is expected to be made within 30 Calendar Days after Bid Opening. Bids shall remain open for 90 Calendar Days after the opening of bids. If the lowest responsive, responsible Bidder refuses or fails to execute the Contract, the Agency may award the Contract to the second lowest responsive, responsible Bidder. The specified period of time within which the award of the Contract may be made may be subject to extension for further periods as agreed upon in writing by the Agency and the Bidder.

3-2 CONSIDERATION OF BIDS

After the Bids have been opened and read, they will be checked for accuracy and compliance with the Specifications.

If the product of a unit price and an estimated quantity does not equal the amount bid, the unit price will govern and the correct product of the unit price and the estimated quantity will be the amount bid. If the sum of two or more items in a bidding schedule or the sum of two or more bidding schedules does not equal the total amounts quoted, the individual item or schedule amounts govern and the correct total is the amount bid. If the Bid is missing a unit price, then it may be rejected as incomplete.

After the Agency has made corrections in mathematical errors, all Bids will be compared based on the bid form.

3-3 AWARD OF CONTRACT

If the Contract is awarded, the award will be to the lowest responsive, responsible Bidder. In addition to price in determining the lowest responsive, responsible Bidder, consideration will be given to:

- The ability, capacity and skill of the Bidder to perform the Work;
- the ability of the Bidder to perform the Work within the time specified, without delay;
- the ability of the Bidder to perform the Work in a safe manner;
- the character, integrity, reputation, judgment, experience and efficiency of the Bidder; and
- the quality of the Bidder's performance on previous work with the Agency.

Award will be based on the lowest total price for the sum of the base bid price plus the bid prices of selected alternate or alternates. Alternates will be taken in order from a list of those items, depending on available funds as identified in the bid solicitation.

3-3.01 Notice Of Intent To Award

After the Agency has fully reviewed the bid documents and identified the lowest responsive, responsible Bidder, the Agency will issue a Notice of Intent to Award to all bidders.

Protests must be filed in writing to the County of Sacramento, Department of General Services, Contract and Purchasing Division, 9660 Ecology Lane, Sacramento CA 95827, within five (5) Working days after the Agency issues the “Notice of Intent to Award”. Protests received after the five (5) Working day deadline will not be considered by the Agency. A copy of the protest should be submitted (electronic or hard copy) to the Agency Contact designated in the Notice to Contractors on the same day.

Denotes 2/1/17 Update

3-4 PERFORMANCE AND PAYMENT BONDS

The format of the Performance Bond and Payment Bond forms must be those contained in Appendix A of these Specifications.

As part of the execution of the Contract, the successful Bidder must furnish Performance and Payment corporate surety bonds to the benefit of the Agency. Bonds must be executed by a surety company authorized to do business in the State of California and listed in the current Federal Department of Treasury Circular 570.

3-4.01 Performance Bond

The Performance Bond to guarantee the performance of all covenants and stipulations of the Contract must be on a form approved by the Agency and must be in a sum not less than 100 percent of the original Total Contract Price.

3-4.02 Payment Bond

The Payment Bond to guarantee the payment of wages and of bills contracted for materials, supplies, or equipment used in the performance of the Contract must be on the form provided by the Agency and must be in a sum not less than 100 percent of the original Total Contract Price.

3-5 NOTIFICATION OF SURETY COMPANIES

The surety company must be familiar with all the provisions and conditions of the Contract. It is understood and agreed that the surety company waives notice of change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or to the specifications accompanying the same, or any other act or acts by the Agency or the Agency's authorized agents under the terms of the Contract; and failure to notify the surety company of changes does not relieve the surety company of its obligations under the Contract.

3-6 RETURN OF BID GUARANTEES

After Bids have been received and reviewed by the Agency, Bid Guarantees, except those submitted by the three lowest responsive, responsible Bidders, will be returned to the Bidders within 10 Calendar Days after the award of the Contract. The Bid Guarantees of the three lowest responsive, responsible Bidders will be returned, except as noted otherwise in Section 3-8, "Failure to Execute Contract", of these Specifications, within 10 Calendar Days after the successful Bidder has filed the specified bonds and proof of insurance and the Bidder and the Agency have executed the Contract.

If all Bids are rejected and no award is made, all Bid Guarantees will be returned within 10 Calendar Days of the decision of the Board not to award the Contract.

3-7 EXECUTION OF CONTRACT

Upon approval from the Agency's governing Board to award the Contract to the lowest responsive responsible bidder, the Contract must be signed by the successful Bidder and returned to the Agency, together with complete, certified copies of the Performance Bond, Payment Bond and certificates of insurance, within 10 Calendar Days of the Bidder's receipt of the documents. Receipt by the Agency of the signed documents from the Contractor constitutes "execution" of the Contract. Insurance certificates must be signed by a person authorized by the insurer to bind coverage on its behalf and must be accompanied by copies of all endorsements required by Section 3-9, "Insurance", of these Specifications. After signing by the

Agency, one copy of the signed Contract, bonds, and certificates of insurance will be returned to the Contractor.

3-8 FAILURE TO EXECUTE CONTRACT

If the Bidder to whom the Contract is awarded fails to execute the Contract and file the required bonds and insurance certificates within 10 Calendar Days from the time the Contract forms are received by the Bidder, the award may be annulled and the Bidder's Bid Guarantee forfeited to the Agency up to the full amount. The Contract may then be awarded to the next lowest responsive, responsible Bidder.

If the Agency awards the Contract to the second lowest responsive, responsible Bidder, the lowest responsive, responsible Bidder's Bid Guarantee will be applied by the Agency to the difference between the lowest Bid and the Bid of the second lowest responsive, responsible Bidder.

On refusal or failure of the second lowest responsive, responsible Bidder to execute the Contract, the Agency may award it to the third lowest responsive, responsible Bidder. If the Agency awards the Contract to the third lowest responsive, responsible Bidder, in addition to application of the lowest Bidder's Bid Guarantee as stated, the second lowest responsive, responsible Bidder's Bid Guarantee will be applied by the Agency to the difference between the Bid of the second lowest responsive, responsible Bidder and the Bid of the third lowest responsive, responsible Bidder.

Additionally, any forfeited Bid Guarantee amounts will be applied as reimbursement for costs incurred for failure of the successful Bidder(s) to enter into a contract. The surplus, if any, will be returned to the defaulting Bidder(s), if a check or cash is used, or credited to the surety on the Bidder's Bond, if a bond is used.

The amount of the Bid Guarantee is not a penalty or liquidated damages. The Agency is not precluded by a Bid Guarantee from recovering from the defaulting Bidder damages in excess of the amount of the Bid Guarantee.

3-9 INSURANCE

The Contractor must procure, maintain, and keep in force at all times during the term of the Contract, at the Contractor's sole expense, the following minimum required insurance policies and limits which are intended for the protection of the Agency and the public. Contractor's obligations for loss or damage arising out of Contractor's work are in no way limited by the types or amounts of insurance set forth herein. In specifying minimum insurance requirements herein, Agency does not assert that the required minimum insurance is adequate to protect the Contractor. Contractor is solely responsible to inform itself of the types and amounts of insurance it may need beyond these requirements to protect itself from loss, damage or liability. It is the sole responsibility of Contractor to notify its insurance advisor or insurance carrier(s) regarding coverage, limits and forms specified in this Section.

The Agency reserves the right to modify the required minimum insurance coverages and limits depending on the scope and hazards of the Work.

Where a specific ISO form is referenced in these Specifications or the Contractor utilizes "a form or policy language as broad in scope and coverage" to satisfy the insurance requirements required herein, Contractor must use the most recently approved State edition or revision of the form(s) or policy language to satisfy the insurance requirements.

3-9.01 General Liability

Commercial General Liability insurance including, but not limited to, protection for claims of bodily injury and property damage, personal and advertising injury, contractual, and products and completed operations. Coverage must be at least as broad as "Insurance Services Office

(ISO) Commercial General Liability Coverage Form CG 0001" (Occurrence Form) or a form as broad in scope and coverage. The limits of liability must be not less than:

Each Occurrence	Two Million Dollars ($2,000,000)
Personal & Advertising Injury	Two Million Dollars ($2,000,000)
Products and Completed Operations Aggregate	Two Million Dollars ($2,000,000)
General Aggregate	Two Million Dollars ($2,000,000)

The Contractor's Commercial General Liability policy must contain the following provisions:

The Agency, its governing Board, officers, directors, officials, employees, and authorized agents and volunteers (collectively, "Additional Insureds") must be included as Additional Insureds as respects liability caused, in whole or in part, by the acts or omissions of the Contractor, or the acts or omissions of those acting on behalf of the Contractor; or premises owned, occupied or used by the Contractor in conjunction with the Work. The required additional insured status of Agency may be satisfied by the following:

A. Use of ISO Form CG 2010 11 85, if commercially available, – Additional Insured – Owners, Lessees, Or Contractors – Scheduled Person or Organization (or a form or policy language as broad in scope and coverage);

Or

B. Use of ISO Form CG 2038 04 13 – Additional Insured – Owners, Lessees, Or Contractors – Automatic Status for Other Parties When Required in Written Construction Agreement (or a form or policy language as broad in scope and coverage);

Or

C. Use of ISO Form CG 2033 04 13 – Additional Insured – Owners, Lessees, Or Contractors – Automatic Status When Required in Construction Agreement with You (or a form or policy language as broad in scope and coverage);

Or

D. Use of CG 20 10 (all editions other than 11 85) – Additional Insured – Owners, Lessees, Or Contractors – Scheduled Person or Organization

3-9.01.A Additional Insured – Completed Operations

Any issuance of an additional insured form other than ISO Form CG 2010 11 85 (which automatically includes Completed Operations for Additional Insureds) must also require issuance of an endorsement to add Completed Operations for the Agency as an additional insured. Contractor may utilize ISO Form CG 20 37 04 13 – Additional Insured – Owners, Lessees, Or Contractors – Completed Operations (or a form or policy language as broad in scope and coverage).

3-9.01.B Additional Insured – Protocols

Any issuance of CG 20 10 (any edition) or a comparable form must utilize the following protocol:

Scheduled Name must be: All entities or persons as required by contract

Scheduled Locations must be: All locations as required by contract

And

Any issuance of CG 20 37 04 13 or a comparable form must utilize the following protocol:

Scheduled Name must be: All entities or persons as required by contract

Scheduled Locations must be: All locations as required by contract.

3-9.01.C General Aggregate Limits

The Contractor's Commercial General Liability insurance policy must include an endorsement or policy language stating that any General Aggregate limits must apply separately to the Work using ISO CG 25 03 05 09 (or a form or policy language as broad in scope and coverage).

3-9.01.D Waiver of Subrogation

The Contractor's Commercial General Liability policy must include a waiver of subrogation in favor of the Additional Insureds. Such waiver of subrogation must be on ISO Form CG 24 04 10 93 – Waiver of Transfer of Rights of Recovery Against Others to Us (or a form or policy language as broad in scope and coverage).

3-9.01.E Primary Insurance

The Contractor's Commercial General Liability policy must contain an endorsement using ISO Form CG 20 01 04 14 (or a form or policy language as broad in scope and coverage) that for any claims related to this Contract, the Contractor's insurance coverage must be primary insurance as respects the Agency, its governing Board, officers, directors, officials, employees, and authorized agents and volunteers (Additional Insureds). Any insurance or self-insurance maintained by the Additional Insureds must be excess of the Contractor's insurance, whether the Contractor's insurance is self-insurance, a primary Commercial General Liability policy, excess or umbrella policy, or a combination thereof, and must not contribute with it.

3-9.01.F Separation of Insured

The Contractor's Commercial General Liability policy must apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

3-9.01.G Insurance Proceeds

If the Contractor maintains higher limits than the minimums shown above, whether on a primary or excess basis, the Agency requires and must be entitled to coverage with the higher limits maintained by the Contractor. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverages shall be available to the Agency.

3-9.01.H Extension of Completed Operations

Contractor must maintain the required Commercial General Liability policy, including Completed Operations, at not less than the required minimum limits, for not less than two (2) years after Final Acceptance of the Work. Contractor must furnish the Agency with original certificates and copies of required amendatory endorsements, or original certificates and copies of the applicable insurance policy language effecting coverage required by this contract; or a combination thereof, for the required two (2) years.

3-9.01.I Contractual Limitations

Contractor is expressly prohibited from using either ISO or manuscript endorsements that

are intended to remove or restrict contractual coverage for an Additional Insured, or an indemnitee in a hold harmless agreement, under the Contractor's Commercial General Liability policy. Such endorsements include, but are not limited to, ISO CG 21 39 10 93 and CG 24 26 04 13; or later approved State editions or revisions.

3-9.01.J Additional Insured Requirements for Sub-Contractors

Contractor must require each of its subcontractors, at every tier, to include the Agency, its governing Board, officers, directors, officials, employees, and authorized agents and volunteers as Additional Insureds. Where commercially available, Contractor must require its subcontractors to use ISO Form CG 20 38 04 13 – Additional Insured – Owners, Lessees, Or Contractors – Automatic Status for Other Parties When Required in Written Construction Agreement (or a form or policy language as broad in scope and coverage). If not commercially available, any other additional insured form or policy language may be used by subcontractors, subject to Contractor's approval.

Contractor must also require each of its subcontractors, at every tier, to include the Agency, its governing Board, officers, directors, officials, employees, and authorized agents and volunteers as Additional Insureds for Completed Operations utilizing an ISO form, if commercially available, or other form or policy language as broad in scope and coverage.

It is the express duty of the Contractor that it verify that its subcontractors, at every tier, have endorsed their respective Commercial General Liability policies to comply with this section to include the Agency, its governing Board, officers, directors, officials, employees, and authorized agents and volunteers as Additional Insureds, including Completed Operations, and in compliance with the protocols as required herein.

Failure of the Contractor to obtain additional insured status for the Agency, its governing Board, officers, directors, officials, employees, and authorized agents and volunteers by its subcontractors, at every tier, must be considered a material breach of the Contract.

3-9.02 Automobile Liability

Automobile Liability insurance providing protection for bodily injury and property damage arising out of ownership, operation, maintenance, or use of owned, hired, and non-owned automobiles. Coverage must be at least as broad as ISO Business Auto Coverage Form CA 0001 (or a form or policy language as broad in scope and coverage), symbol 1 (any auto), if commercially available. Use of any symbols other than symbol 1 for liability for corporate/business owned vehicles must be declared to and approved by the Agency in writing. If there are no owned or leased vehicles, symbols 8 and 9 for non-owned and hired autos must apply.

The Contractor's Commercial Automobile Liability policy must include the Agency, its governing Board, officers, directors, officials, employees, and authorized agents and volunteers as indemnitees and additional (designated) insureds as required by contract.

The minimum limits of liability must not be less than:

Corporate/business owned:	
Vehicle Type and Weight	Minimum Limits
Private passenger	$1,000,000 Combined Single Limit
Light or medium rated trucks	$1,000,000 Combined Single Limit
Heavy, extra-heavy or tractor trailer	$2,000,000 Combined Single Limit*

*Note: Commercial Auto Policies do not allow application of limits by vehicle. If Contractor will utilize any heavy, extra-heavy, or tractor trailer vehicles on the Work, then the minimum $2,000,000 must be required regardless of the number or mix of vehicles. A Commercial

Auto Policy with $1,000,000 Combined Single Limit and an Excess or Umbrella Policy with not less than $1,000,000 Each Occurrence will satisfy the $2,000,000 requirement.

If there are no corporate/business owned vehicles, then personal automobile insurance requirements apply to any individually owned personal vehicles used by the Contractor on the Project.

The limits of liability must not be less than:

Individually owned vehicles: $300,000 Combined Single Limit or, if split limits are used, $100,000 per person, $300,000 each accident, $100,000 property damage.

3-9.03 Workers' Compensation

Workers' Compensation insurance, with coverage as required by the State of California (unless the Contractor is a qualified self-insurer with the State of California), and Employers' Liability coverage. The minimum limits of Employers' Liability are:

Each Accident	One Million Dollars ($1,000,000)
Disease Each Employee	One Million Dollars ($1,000,000)
Disease Policy Limit	One Million Dollars ($1,000,000)

The Workers' Compensation policy required hereunder must be endorsed to state that the Workers' Compensation carrier waives its right of subrogation against the Agency, its governing Board, officers, directors, officials, employees, and authorized agents and volunteers. In the event the Contractor is self-insured, the Contractor must furnish a Certificate of Permission to Self-Insure by the Department of Industrial Relations Administration of Self-Insurance, Sacramento.

3-9.04 Excess or Umbrella Liability

The contractor is granted the option of arranging the required coverages and limits under a single policy or by a combination of underlying policies with the balance provided by an Excess or Umbrella liability policy equal to the total Per Occurrence and Aggregate limits required on the Commercial General Liability policy and the Combined Single Limit on the Commercial Automobile Liability policy.

The Agency, as an Additional Insured, requires and must be entitled to coverage for the higher limits maintained by the Contractor on any Excess or Umbrella policy. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverages must be available to the Agency before the Agency's available self-insurance, primary insurance or excess insurance must be called upon to protect the Agency.

3-9.05 Contractor's Equipment

The Contractor, and each of its Subcontractors, must separately insure its own equipment for loss and damage. The Contractor's Property and Inland Marine policies, and including every Subcontractor at every tier, must include, or be endorsed to include, a waiver of subrogation for the benefit of the Agency, its governing Board, officers, directors, officials, employees, and authorized agents and volunteers which might arise by reason of damage to the Contractor's or Subcontractor's property or equipment (owned, leased, hired or borrowed) in connection with work performed under this Contract by the Contractor or any Subcontractor at any tier.

3-9.06 Railroad Protective Liability

When stated as a requirement in the Special Provisions, the Contractor must procure, maintain, and keep in force at all times during the term of the Contract, at the Contractor's sole expense, Railroad Protective Liability insurance, and other related coverages with limits of liability as set forth in the Special Provisions.

3-9.07 Builder's Risk Insurance

When stated as a requirement in the Special Provisions, Agency must procure, maintain, and keep in force at all times during the term of the Contract and until the date of transfer of the insurable interest to and acceptance by the Agency, at the Agency's sole expense, Builder's Risk insurance with limits of liability equal to one hundred percent (100%) of the replacement cost of the Work, which must include the cost of materials and the cost of labor to install materials. The Contractor and sub-contractors must be included under the Agency's Builder's Risk insurance and listed on a certificate of insurance as additional insureds. The Agency's Builder's Risk insurance must contain a waiver of subrogation in favor of the Contractor and all subcontractors on the project.

1. The Agency's Builder's Risk insurance must cover the project for loss or damage due to all risks of physical damage or loss, land movement and flood.

2. The Contractor must be responsible for the first $25,000, per occurrence, of any loss caused by all risks of physical damage or loss and flood. The Contractor shall not be responsible for the deductible if the loss is caused by land movement.

When stated as a requirement in the Special Provisions, the Contractor must procure, maintain, and keep in force at all times during the term of the Contract and until the date of transfer of the insurable interest to and acceptance by the Agency, at the Contractor's sole expense, Builder's Risk insurance with limits of liability and other related coverages as set forth in the Special Provisions.

3-9.08 Contractor's Pollution Liability Insurance

When stated as a requirement in the Special Provisions, the Contractor must procure, maintain, and keep in force at all times during the term of the Contract, at the Contractor's sole expense, Contractor's Pollution Liability (CPL) insurance which provides coverage for liability arising from the sudden and accidental release of pollution on the project site or transportation of pollutants from or to the project site. The CPL must provide coverage for:

1. Insuring all of the services the Contractor provides in the normal course of operations under the Contract. Partial operations coverage is unacceptable.
2. Bodily injury, sickness, disease, sustained by any person, including death.
3. Property damage includes physical injury to or destruction of tangible property including the resulting loss of use thereof; clean-up costs, and the loss of use of tangible property that has not been physically injured or destroyed including diminution of value and Natural Resources damages.
4. Defense costs including costs, charges and expenses incurred in the investigation, adjustment or defense of claims.
5. Contractual liability coverage, e.g. coverage for liability assumed by the named insured under a written contract or agreement.
6. The full scope of the Contractor's operations as described within the scope of the Work.
7. The policy must provide coverage for third-party claims arising from owned and non-owned disposal sites utilized in the performance of this contract.
8. This coverage can be provided on either claims made or occurrence based policy form.
9. The policy must insure contractual liability, be Primary and Non Contributory and name Agency as an Additional Insured.

Contractor or its subcontractors, if involved with the removal of asbestos or lead, the removal/replacement of underground tanks, or use of toxic chemicals and substances, must purchase and thereafter maintain CPL insurance in the amount of not less than five million dollars ($5,000,000) per claim (or pollution incident) and five million ($5,000,000) aggregate.

If CPL coverage is written on a claims-made form, the following provisions apply:

1. The "Retro Date" must be shown, and must be on or before the date of the Contract or the beginning of the Work.
2. Contractor must maintain the required CPL policy at not less than the required minimum limits, for not less than one (1) year after Final Acceptance of the Work.
3. If coverage is cancelled or non-renewed, and not replaced with another claims-made policy form with a "Retro Date" prior to the Contract effective date, the Contractor must purchase "extended reporting" coverage for a minimum of one (1) year after Final Acceptance of the Work.

3-9.09 Other Provisions

1. Contractor must maintain all insurance coverages and limits in place at all times and provide the Agency with evidence of each policy's renewal within ten (10) Calendar Days after its anniversary date. Contractor is required by this Agreement to immediately notify Agency if it receives a communication from its insurance carrier or agent that any required insurance is to be canceled, non-renewed, reduced in scope or limits (excepting reduction of limits due to claims) or otherwise materially changed. Contractor must provide evidence that such cancelled or non-renewed or otherwise materially changed insurance has been replaced or its cancellation notice withdrawn without any interruption in coverage, scope or limits. If commercially available, each insurance policy must state that coverage must not be cancelled by the Contractor or its insurer, reduced in scope of coverage or limits (excepting reduction by claims), non-renewed, or otherwise materially changed unless the insurer(s) provide thirty (30) Calendar Days written notice to the Agency prior to such change. Ten (10) Calendar Days prior written notice must be given to the Agency in the event of cancellation due to nonpayment of premium.
2. Failure to maintain required insurance in force must be considered a material breach of the Agreement.
3. All of the Contractor's insurance coverage, except as noted below, must be placed with insurance companies with a current A.M. Best rating of at least A-:VII and admitted to write insurance in California. Any use of a non-admitted insurer must be disclosed and must require Agency approval in writing, which approval must not be unreasonably withheld.

   Exceptions:

   a. Underwriters at Lloyd's of London, which are not rated by A.M. Best.
   b. Workers' Compensation which is provided through a State Compensation Insurance Fund or a qualified self-insurer for Workers' Compensation under California law.
4. The Contractor must sign and file with the Agency the following certification prior to commencing performance of the work of the Contract:

   > "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of the 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 must constitute signing and filing of the said certification.

5. The Agency, at its discretion, may require new types of insurance coverage or increase the limits of insurance coverage required hereunder at any time during the term of the Contract by giving thirty (30) Calendar Days written notice to the Contractor. Contractor must immediately procure such insurance or increase the limits of coverage and provide certificates of insurance, including copies of all required endorsements, to the Agency within thirty (30) Calendar Days of receipt of the Agency's request. Agency's requirements must be reasonable but must be imposed to assure protection from and against the kind and extent of risks that exist at the time a change in insurance is required. Any claim by Contractor that Agency's insurance changes result in higher costs will be subject to review and approval by Agency, whose approval will not be unreasonably withheld.
6. All required insurance coverage herein must be subject to the approval of the Agency, but any acceptance of insurance certificates and endorsements by the Agency must in no way limit or relieve the Contractor of its duties and responsibilities in this Contract.
7. If the Contractor fails to procure or maintain insurance as required by this Section and any Special Provisions, or fails to furnish the Agency with proof of such insurance, the Agency, at its discretion, may procure any or all such insurance. Premiums for such insurance procured by the Agency must be deducted and retained from any sums due the Contractor under the Contract. Failure of the Agency to obtain such insurance must in no way relieve the Contractor from any of the Contractor's responsibilities under the Contract. Any failure of the Contractor to maintain any item of the required insurance must be considered a material breach of the Contract.
8. The making of progress payments to the Contractor must not be construed as relieving the Contractor of responsibility for loss or damage, or destruction occurring prior to final acceptance by the Agency.
9. The Agency is authorized to execute amendments and waivers, with or without conditions, to the insurance requirements of the Contract. The Agency will provide such amendments or waivers in writing to the Contractor.
10. Contractor is responsible for the acts and omissions of all its subcontractors, at every tier, and must require all its subcontractors to maintain adequate levels of insurance, including required endorsements and policy coverages, as stated herein.
11. The failure of the Agency to enforce in a timely manner any of the provisions of this Section must not act as a waiver to enforcement of any of these provisions at any time during the term of the Contract.

3-9.10 Deductibles and Self-Insured Retention

Any deductible or self-insured retention that applies to Commercial General Liability or Automobile Liability must be declared to the Agency. Any deductibles or self-insured retention in excess of $100,000 must be declared to and accepted by Agency in writing. Contractor has the option to provide by separate letter the amount of its General Liability, Automobile Liability, and, if applicable, CPL deductible or self-insured retention to Agency's Risk Management Office for Agency's confidential review and acceptance prior to the execution of this Agreement. Agency reserves the right to require Contractor to substantiate its ability to maintain a deductible or self-insured retention in excess of $100,000 through furnishing appropriate financial reports. All deductibles or self-insured retentions must be borne solely by the Contractor, and the Agency must not be responsible to pay any deductible or self-insured retention, in whole or in part.

3-9.11 Verification of Coverage

Contractor must furnish the Agency with original certificates and copies of required amendatory endorsements, or original certificates and copies of the applicable insurance policy language effecting coverage required by these Specifications; or a combination thereof. Agency reserves the right to require that Contractor also provide a copy of the declarations page and a copy of the schedule of forms and endorsements of each policy of insurance required hereunder. Agency also reserves the right to require that Contractor, through its broker, provide explanatory memoranda regarding coverages, endorsements, policy language, or limits as required hereunder. All required verifications of coverage are to be received and approved by the Agency before work commences. However, failure to obtain the required documents prior to the work beginning must not waive the Contractor's obligation to provide them. The Agency reserves the right to require complete copies of all required insurance policies, including endorsements, required by these Specifications, at any time. If the Contractor utilizes proprietary coverage forms or endorsements, the Contractor has the option of having its broker provide explanatory memoranda confirming coverage and limits as required hereunder.

The Agency may approve self-insurance programs in lieu of required policies of insurance if, in the opinion of the Agency, the interest of the Agency and the public is adequately protected.

3-9.12 Notification of Claim or Lawsuit

If any claim for damages is filed with the Contractor or if any lawsuit is instituted against the Contractor that arises out of or is in any way connected to the Contractor's performance under the Contract, and in any way, directly or indirectly, contingently or otherwise, affects or might reasonably affect the Agency, the Contractor must give prompt and timely (within thirty (30) Calendar Days following the date of receipt of a claim or ten (10) Calendar Days following the date of service of process of a lawsuit) written notice thereof to Agency.

3-10 ESCROW BID DOCUMENTS

If noted in the Special Provisions, the three low bidders must submit one copy of all documentary information generated in preparation of bid prices for this project. This material is hereinafter referred to as Escrow Bid Documents (EBDs).

The successful Bidder agrees, as a condition of award of the Contract, that the EBDs constitute the only complete documentary information used in preparation of his bid. No other bid preparation information will be considered in resolving disputes.

Nothing in the EBDs changes or modifies the terms or conditions of the Contract.

3-10.01 Ownership

The EBDs are and will always remain the property of the Contractor subject only to joint review by the Agency and the Contractor, except as provided for herein.

The Agency stipulates and expressly acknowledges that the EBDs, as defined herein, constitute trade secrets. This acknowledgment is based on the Agency's express understanding that the information contained in the EBDs is not known outside the Contractor's business, is known only to a limited extent and only by a limited number of employees of the Contractor, is safeguarded while in the Contractor's possession, and is extremely valuable to competitors by virtue of it reflecting the Contractor's contemplated techniques of construction.

The Agency acknowledges that EBDs and the information contained therein are made available to the Agency only because the action is an express prerequisite to award of the Contract. The Agency acknowledges that the EBDs include a compilation of information used in the Contractor's business, intended to give the Contractor an opportunity to obtain an advantage over competitors who do not know of or use the contents of the documentation. The

Agency agrees to safeguard the EBDs and all information contained therein to the fullest extent permitted by law.

3-10.02 Purpose

EBDs will be used to assist in the negotiation of price adjustments and variations and in the settlement of disputes, claims and other controversies. They will not be used for pre-award evaluation of the Contractor's anticipated methods of construction or to assess the Contractor's qualifications for performing the Work.

3-10.03 Format and Contents

EBDs may be submitted in the Bidder's usual cost estimating format. It is not intended that extra work be required in preparing the bid, but the EBDs must be adequate to enable complete and proper understanding and proper interpretation for their intended use. The EBDs must be in the English language only.

The EBDs must clearly itemize the estimated costs of performing the work of each item contained in the Bid Schedule. Items should be separated into sub-items as required to present a complete and detailed cost estimate and allow a detailed cost review. The EBDs must include all quantity take-offs, crews, equipment, calculations of rates of production and progress, copies of quotations from sub-Contractors and suppliers, and memoranda, narratives, consultants reports, add/deduct sheets and all other information used by the Contractor to arrive at the prices contained in the bid. Estimated costs must be broken down into the Contractor's usual estimate categories such as direct labor, repair labor, equipment operation, equipment ownership, expendable materials, permanent material and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Contractor's usual format. The Contractor's allocation of plant and equipment, indirect costs, contingencies, mark-up and other items to each bid item must be clearly indicated.

The EBDs must clearly show in calculations, text, or both, the relationship between baseline indications presented in the Contract Documents and assumptions that form the basis for the Contractor's means, methods, equipment selection, rates of production, and costs.

All costs must be identified. For bid items with an extended amount less than $10,000 estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials and subcontracts, as applicable, are included and indirect costs, contingencies, and mark-up, as applicable, are allocated.

Bid Documents provided by Agency should not be included in the EBDs unless needed to comply with the above requirements.

3-10.04 Submittal

The three lowest Bidders must submit the EBDs in a sealed container (e.g., sealed envelope, box or carton sealed with tape, locked strongbox, etc.), and the container must be clearly marked on the outside with the Bidder's name, date of submittal, project name, Contract No., and the words "Escrow Bid Documents". The EBDs must be submitted by 4:00PM on the first Monday following the Bid Opening to:

Sacramento County Department of General Services
Contract and Purchasing Services Division
9660 Ecology Lane
Sacramento, CA 95827

The EBDs must be accompanied by the "Bid Documentation Certification", signed by an individual authorized by the bidder to execute the bid, stating that the material in the Escrow Bid Documentation constitutes all the documentary information used in the preparation of the bid

and that he or she has personally examined the contents of the EBDs container and has found that the documents in the container are complete.

"Escrow Bid Document Certification"

The undersigned hereby certifies that the bid documentation contained herein constitutes all the information used in preparation of the bid and that I have personally examined these contents and have found that this bid documentation is complete.

Signature:

Print Name:

Title:

Firm:

Date:

Prior to award of the contract, the EBDs will be examined, organized and inventoried by representatives of the Agency, together with members of the Contractor's staff who are knowledgeable in how the bid was prepared. This examination is to ensure that the EBDs are authentic, legible, and complete. It will not include review of and will not constitute approval of proposed construction methods, estimating assumptions, or interpretations of the contract documents. Examination will not alter any condition(s) or term(s) of the Contract.

If all documentation required in the "Format and Contents" has not been included in the original submittal, additional documentation must be submitted, at the Agency's discretion, prior to award of the Contract. The detailed breakdown of estimated costs must be reconciled and revised, if appropriate, by agreement between the Contractor and Agency before making the award.

Timely submission of the complete EBDs is an essential element of the low Bidder's responsibility and a prerequisite to Contract award. Failure to submit EBDs within the specified time frame may render the bid non-responsive.

If the Bidder's bid is based on subcontracting any part of the Work, each Subcontractor whose total subcontract price exceeds five percent of the total contract price proposed by the bidder must provide separate EBDs to be included with those of the bidder. These documents will be opened and examined in the same manner and at the same time as the examination described above for the apparent successful bidder. Failure to submit EBDs within the specified time frame may render the bid non-responsive.

If the Contractor subcontracts any portion of the Work after award, the Agency retains the right to require the Contractor to submit EBDs from the Subcontractor before the subcontract is approved. This Section is not intended to and must not be interpreted as a waiver by the Agency of any of the requirements or provisions of Public Contract Code Section 4100 et seq. known as the Subletting and Subcontracting Fair Practices Act.

3-10.05 Storage

The EBDs will be stored by the Contract and Purchasing Services Division, Sacramento County Department of General Services, unless the Contractor requests, in writing, that the

EBDs be placed in escrow with a mutually agreeable third-party escrow agent. The cost of storage by a third-party escrow agent will be borne by Contractor.

3-10.06 Examination

The EBDs can be examined by both Agency and the Contractor, at any time deemed necessary by either Agency or the Contractor, to assist in the negotiation of price adjustments and change orders, or the settlement of disputes.

Examination of the EBDs is subject to the following conditions:

As trade secrets, the EBDs are proprietary and confidential as described above.

Agency and Contractor will each designate, in writing to the other party a minimum of ten Calendar Days prior to examination, representatives who are authorized to examine the EBDs. No other persons will have access to the EBDs.

Access to the EBDs will take place only in the presence of duly designated representatives of both Agency and the Contractor.

3-10.07 Final Disposition

The EBDs will be returned to the Contractor when the Contract has been completed and final settlement has been achieved.

The EBDs submitted by unsuccessful bidders will be returned unopened, unless opened as provided for above, following execution of the Contract.

This Specification is not intended to create confidential status to EBDs in the event of litigation between Contractor and Agency. If litigation occurs, all EBDs are subject to discovery and are not considered confidential. If litigation commences between Agency and Contractor, upon ten Calendar Days written notice to contractor, Agency may demand and Contractor must permit Agency to copy all materials submitted into escrow pursuant to this Specification.

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SECTION 4 SCOPE OF WORK

4-1 INTENT OF CONTRACT DOCUMENTS

The Work must be performed and completed according to the Contract documents. The Contract documents provide the details for completing the Work in accordance with the terms of the Contract. Each Contract document is an integral part of the Contract, and a requirement occurring in one is as binding as though occurring in all. The Contract documents are explanatory and complementary and require complete work ready for use and occupancy or operation in satisfactory working conditions with respect to the functional purposes of the installation.

The Contractor must do all of the work and furnish all labor, materials, tools, equipment, and appliances, necessary or proper, for performing and completing the Work, including Change Order and disputed work directed by the Agency in conformity with the true meaning and intent of the Contract, except as otherwise expressly stipulated.

Work shown on the Plans, the dimensions of which are not figured, must be accurately followed to the scale to which the drawings are made; however, figured dimensions must be followed, even if they differ from scaled measurements. Full-size drawings must be followed in the execution of the Work.

If the Contract does not specifically allow the Contractor a choice of quality or cost of items to be furnished, but could be interpreted to permit a choice, the Contractor must furnish the highest quality under current industry standards, regardless of the cost of the item.

Unless otherwise specified, the Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, material, and transportation necessary to perform and complete the Work in a good and workmanlike manner to the satisfaction of the Agency, in the manner designated by, and in strict conformity to, the Contract. When portions of the Work are described in general terms but not in complete detail, the Contractor must employ the best general practice and incorporate the best quality materials and workmanship in the Work.

No extra compensation will be allowed for anything omitted but reasonably and fairly implied. The prices paid for the various items will include full compensation for furnishing all labor, materials, tools, equipment, overhead, markups, profit, and incidentals and doing all work necessary to complete the Work as provided in the Contract.

If, during the course of the Work, the Contractor discovers discrepancies, errors, or omissions between the Contract drawings and conditions in the field, or errors or omissions in the Contract drawings, the Specifications, or in the layout given by stakes, points, or instructions, the Contractor must inform the Agency immediately, and the Agency will promptly verify the same. Work done after discovery, until authorized by the Agency, is done at the Contractor's risk.

4-2 PLANS AND SPECIFICATIONS FURNISHED

The Agency will provide, at no cost to the Contractor, copies of Project Plans (except Standard Drawings or State Plans), Project Specifications (except these Standard Construction Specifications or the State Specifications), and Special Provisions, and the fully executed Contract for the Contractor’s use in prosecuting the Work. The total number of copies of the Plans, Specifications, and Special Provisions provided will be the total of the prime Contractor plus the number of Subcontractors listed in the Bid. The Contractor may purchase additional copies of Plans, Specifications, and Special Provisions at cost.

The Contractor must retain an approved set of Contract documents on the job during the progress of the Work. This set must be used by the Contractor as the Record Drawings described in Section 11-3, “Record Drawings,” of these Specifications.

4-3 CONFORMANCE WITH CODES AND STANDARDS

The Work must be in full compliance with the latest adopted edition of the following applicable standards and regulations:

- California Code of Regulations Title 8 Industrial Relations
- California Code of Regulations Title 24 California Building Standards Code
- Other codes, laws or regulations applicable to the Work or the Contract.

Nothing in the Contract is to be construed to permit work that does not comply with these requirements. When the work detailed in the Plans and Specifications differs from governing codes, the Contractor must complete the Work in accordance with the higher standard. If the higher standard is more expensive than the work detailed in the Plans and Specifications, the Contractor may be compensated for the Contractor's additional costs by Contract Change Order per Section 9, "Changes and Claims," of these Specifications.

4-4 SUPPLEMENTAL DRAWINGS

The Agency may issue Supplemental Drawings to clarify or define in greater detail the intent of the Contract, which may include minor changes in the Work, not involving extra cost and not inconsistent with the nature of the Work. The Supplemental Drawings are part of the Contract.

4-5 FIELD INSTRUCTIONS OR OTHER WRITTEN DIRECTIVES

The Agency may issue Field Instructions or other written directives during the course of the Work, and the Contractor must comply with the Field Instruction or other written directive. A Field Instruction or other written directive can be used to add, delete, modify, or reject work, to note deficiencies in work, to clarify the Contract, or to order work to be performed. Work required by a Field Instruction or other written directive will be in accordance with the Contract and previously executed Contract Change Orders, except as delineated otherwise in the Field Instruction or other written directive. Drawings included with Field Instructions or other written directives are part of the Contract and must be incorporated into the Record Drawings.

If the Contractor neglects to comply with, or make progress in, the execution of a Field Instruction or other written directive, the Agency may employ a person or persons to perform the work, and the Contractor must not interfere with the person or persons so employed.

Field Instructions and other written directives that alter the Contract will be grouped to form a Contract Change Order per Section 9, "Changes and Claims," of these Specifications.

4-6 DOCUMENT PRECEDENCE

The component Contract documents are intended to provide explanation for each other. Work shown on the Plans and not in the Specifications, or vice versa, is to be executed as if indicated in both. In case of conflict in the Contract, the following order of precedence will govern interpretation of the Contract:

1. Field Instructions or other written directives
2. Special Provisions and Project-specific Specifications (Special Provisions)
3. Project Plans
4. County Standard Drawings
5. County Standard Specifications
6. State Standard Plans
7. State Standard Specifications

Work for which there are no provisions in these Specifications, the Special or Technical Provisions, or on the Contract drawings, must be performed in accordance with the State Standard Specifications and Standard Plans.

4-7 REQUESTS FOR INFORMATION

4-7.01 General

The Contractor must prepare a Request for Information (RFI) when additional information, clarification, or interpretation of the Contract is required. RFI's may also be used for apparent conflicts, inconsistencies, ambiguities, or omissions.

RFI's must be submitted to the Agency sufficiently in advance of the work to permit time for investigation and preparation of a response. Work undertaken prior to receipt of a response to an RFI will be at the Contractor's risk. Contract time extensions will not be granted due to the Contractor's failure to submit an RFI sufficiently in advance of the work to permit a response by the Agency in accordance with Section 4-7.03, "Response," of these Specifications.

RFI's may not be used for submittals or for substitution of material or equipment or for waiving of requirements.

4-7.02 Procedure

An RFI must be submitted on an Agency-approved form and must be numbered consecutively. A status log must be prepared and updated by the Contractor and reviewed with the Agency at each progress meeting. Each RFI must deal with only one topic, item, issue, or system.

The RFI must clearly describe and specifically state what is being requested. Relevant portions of the Contract must be cited, marked-up, and attached.

The Contractor must review each RFI before submittal and compare it with the Contract to verify that a response is required. RFI's will only be accepted from the Contractor and not from Subcontractors or suppliers.

The Contractor should include a recommendation or proposed solution when appropriate or expedient.

4-7.03 Response

Unless noted otherwise in the Special Provisions, the Agency will provide a written response within 15 Working Days of receipt of an RFI. The Contractor must comply with the written response in accordance with Section 4-5, "Field Instruction or Other Written Directives," of these Specifications.

If more than 5 RFI's are pending at the same time, the Contractor must indicate a priority for responses to RFI's. In case of a dispute between the Contractor and the Agency, protest may be made as provided in Section 9-16, "Dispute Regarding Contract Requirements," of these Specifications.

Subsequent resubmittals of an RFI must be identified with the same RFI number and a letter designation. Resubmittals must clearly state the reason for the resubmittal. The Agency will respond to each resubmittal within 15 Working Days of receipt of the resubmitted RFI.

Responses to RFI's must be recorded by the Contractor on the Record Documents in accordance with Section 11-3, "Record Drawings," of these Specifications.

4-8 DELETED ITEMS

The Agency may delete any item, or a portion of any item, of work from the Work. The Contractor will be paid for all work done toward the completion of the item prior to the deletion, per Section 9, "Changes and Claims," of these Specifications, but in no event will the amount paid exceed the Bid or Schedule of Values amount less the value of the deleted work.

The Contractor will not receive compensation for profits, for loss of profit, for damages, or for extra payment because of deleted items of work.

4-9 EXTRA WORK

Work not covered by the Contract, but necessary for the proper completion of the Project, may be classed as extra work and must be performed by the Contractor when directed in writing by the Agency. Extra work must be performed in accordance with the Contract and as directed by the Agency.

Extra work must be authorized in writing by the Agency before the work is started. Payment for extra work will not be made unless prior written authorization is obtained.

In the event of an emergency or other situation that endangers the Work or endangers public safety, the Agency will direct the Contractor to perform extra work necessary to protect the Work or the public.

4-10 USE OF COMPLETED PORTIONS

The Agency has the right during the progress of the Work to take over and place in service or operation a completed or partially completed portion of the Work. Taking possession of a portion of the Work is not acceptance of other completed portions of the Work, or work not completed in accordance with the Contract.

4-11 LANDS AND RIGHTS-OF-WAY

The Agency will provide the lands, rights-of-way, and easements upon which the Work is to be done, and other lands as may be designated on the Plans for the use of the Contractor in performance of the Work. The Contractor must confine his operations to within these limits.

The Contractor must provide, at the Contractor's own expense, additional land and access that is required for temporary construction facilities or storage of materials. The Contractor must obtain all required permissions for use of private property prior to taking possession or use. The permission must be obtained in writing and a copy forwarded to the Agency at least 14 Calendar Days prior to the Contractor taking possession of said property.

4-12 WARRANTY

Unless specified otherwise in the Special Provisions, the Performance Bond furnished by the Contractor must define the terms and time period of the Warranty of the Contractor’s work. If no time period is specified in the Bond, the time period will be one year after field acceptance of Work (see Section 7-21.02, “Field Acceptance,” of these Specifications).

If required by the Special Provisions, the Contractor must enter into and sign Warranty statements in the form provided to warranty various segments of the Work for the time specified.

If failure of any portion of the Work is a result of faulty materials, poor workmanship, defective equipment, or any other reason that can be attributed to Contractor’s performance, and occurs within the specified warranty period, the Contractor must promptly make the needed repairs at the Contractor's expense.

If the Contractor fails to undertake, with due diligence, the needed repairs within 10 Calendar Days after the Contractor is given written notice, and without notice to the surety, the Agency may make the repairs. In case of emergency where, in the opinion of the Agency, delay would cause serious loss or damages or a serious hazard to the public, the repairs may be made, or lights, signs, and barricades erected, without prior notice to the Contractor or surety, and the Contractor must pay the entire cost.

SECTION 5 – CONTROL OF WORK AND MATERIALS

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SECTION 5 CONTROL OF WORK AND MATERIALS

5-1 AUTHORITY OF AGENCY

The Agency will decide all questions regarding the quality and acceptability of materials furnished, work performed, and rate of progress of the Work. The Agency will decide all questions regarding the interpretation and fulfillment of the Contract on the part of the Contractor, and all questions as to the rights of different contractors involved with the Work. The Agency will determine the amount and quality of the Work performed and materials furnished for which payment is to be made under the Contract.

The Agency will administer its authority through a duly designated representative identified at the preconstruction meeting. The Contractor and the Agency representative agree to make good faith attempts to resolve disputes that arise during the performance of the Work.

An order given by the Agency not otherwise required by the Contract to be in writing will be given or confirmed by the Agency in writing at the Contractor's written request. The request must state the specific subject of the decision, order, instruction, or notice, and, if it has been given orally, its date, time, place, author, and recipient.

5-2 ATTENTION AND COOPERATION OF CONTRACTOR

The Contractor must comply with all written and verbal instructions delivered to the Contractor or the Contractor's authorized representative by the Agency. See Sections 4-5, "Field Instructions or Other Written Directives," and 5-1, "Authority of Agency."

5-3 SUGGESTIONS TO CONTRACTOR

A plan or method suggested to the Contractor by the Agency, but not specified or required in writing, if adopted or followed in whole or in part by the Contractor, is used at the risk and responsibility of the Contractor. The Agency assumes no responsibility.

5-4 SEPARATE CONTRACTS

The Agency reserves the right to award other contracts in connection with the Work. The Contractor must afford other contractors reasonable opportunity to deliver and store their materials and execute their work, and must properly connect and coordinate their work with the other contractors.

If any part of the Contractor's work depends upon the work of another contractor for proper execution or results, the Contractor must inspect and promptly report to the Agency defects in the work that render it unsuitable for proper execution and results. The Contractor's failure to inspect and promptly report defects constitutes an acceptance of the other contractor's work as fit and proper for the reception of the Contractor's work, unless defects develop in the other contractor's work after the execution of the Contractor's work.

5-5 COOPERATION WITH OTHER ENTITIES

The Agency, utilities, adjacent property owners, and/or other entities may perform work adjacent to or within the Work area concurrent with the Contractor's operations. The Contractor must coordinate with and conduct operations to minimize interference with the work of other forces or contractors.

Disputes or conflicts between the Contractor and other forces or contractors retained by the Agency that create delays or hindrance to each other must be referred to the Agency. If the Contractor's work is delayed because of the acts or omissions of any other force or contractor,

the Contractor has no claim against the Agency other than for an extension of time (see Section 7-18, ”Extension of Time,” of these Specifications).

5-6 CONTRACTOR’S DISMISSAL OF UNSATISFACTORY EMPLOYEES

If a person employed by the Contractor or any Subcontractor fails or refuses to carry out the directions of the Agency or the provisions of the Contract, or is, in the opinion of the Agency, incompetent, unfaithful, intemperate, or disorderly; or uses threatening or abusive language to any person on or associated with the Work; or is acting or working in a manner that compromises the safety of the Work or persons or property involved with the Work, or is otherwise unsatisfactory, the Contractor must, if requested by the Agency, immediately remove them from the Work and must not employ them on the Work except with written consent of the Agency.

5-7 CONTRACTOR'S EQUIPMENT

The Contractor must provide adequate and suitable equipment, labor, and means of construction to meet the requirements of the Work, including completion within the Contract Time. Only equipment suitable to produce the quality of work required will be permitted to operate on the Project. Specific types of equipment may be requested by the Agency on parts of the Work.

The Agency may permit the use of new or improved equipment. If permission is granted, it is granted to test the quality and continuous attainment of work produced by the equipment, and the Agency has the right to withdraw permission if it determines that the equipment is not producing work that is equal to that specified or will not complete the Work in the time specified in the Contract.

If use of a particular type or piece of equipment has been banned, or in cases where the Agency has condemned for use on the Work a piece or pieces of equipment, the Contractor must promptly remove the equipment from the site of the work. Failure to do so within a reasonable time may be considered a breach of contract.

5-8 CONTRACTOR'S SUBMITTALS

5-8.01 Submittals - General

The Contractor must furnish all working drawings, plans, specifications, descriptive data, certificates, samples, tests, methods, schedules, and manufacturer's instructions required by the Contract, and any other information necessary to demonstrate that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the Contract.

Unless noted otherwise in the Special Provisions or elsewhere in these Specifications, submittals must be submitted in a timely manner that allows for adequate review time.

Submittals for systems must be bound together and must include all information for the system.

Unless otherwise noted in the Special Provisions or agreed to by the Agency, the Contractor must furnish 6 copies of all submittals, 2 of which will be returned after review. The Contractor may request, or the Agency may direct, that submittals be made electronically. Submittals must be accompanied by a submittal transmittal form containing, at a minimum, the following information:

1. Contract Number
2. Submittal Number
3. Specification Reference
4. Name of Submittal (e.g. “Landscaping”)

5. List of all items included in the submittal and a description of each item

If noted in the Special Provisions or directed by the Agency, the Contractor must transmit all submittals, and any other documents specified, using an electronic system designated by the Agency. Such a system may employ web-based software and/or require the Contractor to use specific database applications.

If an item of work is required to be installed in accordance with the manufacturer's recommendations, the Contractor must furnish 6 complete sets of the manufacturer's installation recommendations to the Agency at least 14 Calendar Days prior to starting the installation. These submittals will be retained by the Agency, and must consist of hard copies, digital, or electronic versions, as directed by the Agency.

If the information furnished in a submittal shows any deviation from the Contract requirements, the Contractor must, by a statement in writing accompanying the information, advise the Agency of the deviation and state the reasons.If the Contractor fails to provide a statement clearly identifying deviations from the Contract, the Agency may void the entire submittal, and the cost of any action taken by the Agency as a result of the Contractor failing to clearly identify and justify deviations will be borne by the Contractor.

It is the Contractor's responsibility to ensure there is no conflict with other submittals and to notify the Agency if the Contractor's submittal may concern work by another contractor or the Agency. The Contractor is solely responsible for coordination of submittals among all crafts and subcontractors performing the Work. The Contractor must verify that its Subcontractors' submittals are complete in every way and meet the requirements of the Contract.

Depending on the complexity of the submittal, the number of submittals in review, and the express needs of the Contractor, the submittal will be returned to the Contractor within 20 Working Days, excluding time awaiting clarification or further information.

Agency approval of the Contractor's submittals does not relieve the Contractor of responsibility for errors or obligation for accuracy of dimensions and details, agreement with and conformity to the Contract, or completing the Contract as prescribed, nor will approval be considered approval of a deviation or conflict unless the Agency has been expressly advised of, and has expressly approved, the deviation or conflict.

The Contractor must not make changes to a submittal after it has been approved, and the equipment or materials must not deviate except with written approval by the Agency. Fabrication or other work performed in advance of approval, unless directed by the Agency in writing, is at the Contractor's risk.

Minimum requirements for submittals are contained in these Specifications. Additional and/or project-specific requirements may be contained in the Special Provisions. The Contractor is responsible for identifying and providing all required submittals.

5-8.02 Resubmittals

Resubmittals must address all comments from the Agency. The Agency will return the reviewed resubmittal to the Contractor within 15 Working Days. Partial resubmittals may be returned "REJECTED." The Contractor is responsible for the Agency's review costs for each resubmittal in excess of the first resubmittal. These costs will be deducted from progress payments.

5-8.03 NOT USED

5-8.04 Submittals Containing Proprietary Information

All required information must be provided even though some or all of it may be considered proprietary. If any of the information is considered proprietary, a Proprietary Information Agreement must be executed between the Agency and the Contractor, stipulating that the information will be supplied by the Contractor and kept confidential by the Agency. Proprietary data must be identified as part of the Contractor's Bid, and the proprietary agreement must be

executed before award of the Contract. Proprietary information is defined as information or data describing or defining a product, process, or system which 1) was developed at the expense of the Contractor, a Subcontractor or supplier; 2) is not generally available in the industry; and 3) is kept secret by its owner for purposes of preventing its use by others. Application software and other documentation, or any other product prepared by the Contractor, Subcontractor, or supplier at the expense of the Agency for specific use on the facility being constructed under the Contract, is not proprietary.

All submitted proprietary information must describe the final record Work. No part of the Work covered by the proprietary agreement can be modified after proprietary submittal acceptance until updated proprietary information has been submitted by the Contractor and accepted by the Agency. Updated proprietary information must fully document all modifications to be implemented. Proprietary data must be marked "PROPRIETARY" by the Contractor. No more than 70 percent of all electronic/electrical work will be paid for until all proprietary information has been submitted and approved.

5-8.05 Electrical, Instrumentation, Control, and Communication Systems

Electrical, instrumentation, control, and communication system drawings must include elementary and loop diagram drawings, functional single line system layout drawings, connection drawings, interconnection drawings, panel/cabinet fabrication drawings, and detailed circuit board and component drawings. Detailed circuit schematics and circuit board layout drawings must clearly show, locate, and identify all components and wiring. Each circuit board component must be identified by the component's original manufacturer name and part number. Industry standard part numbers must be used. Component values, voltage/current levels, setpoints, and timing values must be defined. Drawings must be in the latest version of AutoCAD or other electronic reproducible medium specified by the Agency.

Complete annotated software/firmware source code listings and program documentation must be provided for electronic/electrical systems, subsystems, assemblies, parts, components, and equipment that incorporate programmable devices. All instructions and hardware necessary to load, store, modify, and activate software/firmware source codes and programs must be provided.

5-8.06 Maintenance and Operations (M&O) Submittals

For use in subsequent maintenance and operations, the Contractor must furnish, unless otherwise provided for in the Special Provisions, 1 original and 5 copies, bound and indexed, of maintenance and operation information, including the highest level of factory maintenance manuals that are available to factory representatives with a three-year subscription to newsletters and updates supplied by the manufacturer covering all equipment and systems included in the Contract. The Agency may withhold up to 30 percent of the Total Contract Price until M&O submittals have been submitted and approved. Documentation must be provided in hard copy form and, where available, in electronic format such as Word, Excel, AutoCAD R14 (min.) or *.pdf. The submittal must include at a minimum:

1. Drawings
2. As-Builts
    a. Electrical
    b. Mechanical
    c. Site
3. Detail drawings of structures on the site
4. Dimensions
5. Site Layout
6. Underground lines including:
    a. Existing underground lines (plumbing, electrical, gas, etc.)
    b. Incoming and outgoing underground lines (plumbing, electrical, gas, etc.)

c. Pre-existing underground lines (plumbing, electrical, gas, etc.)
d. Underground Conduit (Electrical Wiring, Rigid, PVC)

7. Wiring Diagrams for equipment located on-site (Generator, RTU, Hoist, etc.)
8. Wiring Diagrams for structures
9. Wiring Diagrams of systems
10. Parts List
11. Illustrations
12. Internal wiring diagrams and circuit board schematics and layout drawings
13. Manufacturer's recommended spare parts lists
14. Name, address, and phone number of nearest parts and service agency
15. Systems balance data
16. Maintenance and service instructions
17. Operations instructions
18. Software including annotated source lists and programs
19. Calibration Instructions
20. Calibration Reports
21. Diagnostic Manuals

The submittal of maintenance and operation information is required for all mechanical, electrical, instrumentation, control, communications, sound, or special equipment and systems. The Contractor must submit the required data for review at least 30 Calendar Days prior to required training or the final inspection date. Corrections, additions, or resubmittal of data must be made as directed by the Agency.

The Agency must receive complete maintenance and operating instructions for all items included above prior to field acceptance of the Work.

5-9 SURVEYS

5-9.01 Agency-Furnished Surveys

Unless otherwise noted in the Project Specifications or Special Provisions, construction stakes or marks will be set by the Agency. The Resident Engineer in consultation with the Project Surveyor will determine necessary lines and grades required for the completion of the work specified in these specifications, on the plans, and in the Special Provisions. From Agency-furnished line and grade stakes, the Contractor must lay out the Work and set working stakes as required for completion of the Work. The Contractor is responsible for the accuracy of the Contractor's own layout work.

The Contractor must notify the Agency in writing at least 2 Working Days in advance of starting operations that require stakes or marks. Staking requests must take into consideration the level of effort required to provide the controlling stakes and priorities established as necessary. Advance notice must provide sufficient time to complete at least the first priority requested. Unless authorized by the Agency, work done without line and grade is at the Contractor's risk.

The Contractor is responsible for carefully preserving Agency-provided construction stakes and marks. If the stakes or marks are destroyed, damaged, or rendered unusable, whether or not the Contractor is directly responsible for the damage or destruction, they will be re-set at the Agency's earliest convenience. Additionally, the Contractor is responsible for the cost of replacement or restoration of stakes and marks that, in the judgment of the Agency, were carelessly or willfully destroyed, damaged, or rendered unusable by the Contractor's operations.

The Agency will typically provide the following stakes:

1. Clearing Stakes - The stakes will be spaced so the contractor can see from one stake to another stake but not less than 100 feet apart.

2. Rough Grade Stakes - One line of stakes spaced every 50 feet on each side of construction to control cut/fill slopes in areas of heavier grading, large channels, or embankments.
3. Final Grade Stakes -
   a. One line of stakes spaced every 50 feet for each edge of pavement, offset from edge of pavement, back of sidewalk, or curb. Final grade stakes must be used to control all elements of the structural section (subgrade, base, and pavement).
   b. Where leveling courses are required, one set of stakes per lane of traffic spaced every 50 feet or as determined necessary by the Resident Engineer and the Project Surveyor.
4. Traffic Signals/Lighting -
   a. One offset to back of sidewalk (with either a line stake or radius point) with cut or fill to back of sidewalk where signal bases are located within the sidewalk.
   b. Where no curb, gutter, and sidewalk (C. G. & S.W.) are to be constructed, two offset stakes (in line or at approximate right angles) to center of base with cut or fill to top of base
5. Sewer, Water, and Drainage Pipe Lines - One line of stakes spaced every 50 feet offset to the center line of the pipe line with cut to flow line of pipe.
6. Drainage channels – One line of slope stakes spaced every 50 feet on each side of construction, except on channels with a width of 12 feet or less at the top of bank slope stakes, will only be set on one side of construction.
7. Drainage/Miscellaneous structures -
   a. One or two stakes as necessary to locate structure offset to center of structure with cut to flow line of pipe, grate, side opening, or other necessary feature (where not controlled by other improvements such as C. G. & S.W.).
   b. Offset to lip or back of curb (with line stake as necessary) with cut or fill to lip or back of curb and flow line of pipe.
8. Bridges/Major Structures - Agency-furnished stakes will vary depending on the type and complexity of the structure. Generally, two stakes will be set for abutments, bents, wingwalls, etc., offset along the layout line with a cut or fill to finish grade. Stakes will not be set by the Agency for the location of individual piles, pile cutoff elevations, or falsework.
9. Wall Stakes - One line of stakes (line stakes may be set where necessary) spaced every 50 feet, at the beginning and end of curves, angle points, changes in wall height, and changes in footing, offset from the layout line, with a cut or fill to the top of the footing.

Note: At the discretion of the Agency, in consultation with the Project Surveyor, one set of stakes may be used for several purposes, such as slopes, final grades and curbs.

5-9.02 Survey Monuments-Agency Furnished Surveys

The Agency will show the location and character of survey monuments located within the construction area on the construction plans. The Contractor must provide the Agency a minimum of 5 Calendar Days' notice prior to commencing work that could damage or destroy survey monuments shown on the plans. The Agency will reference the monuments in advance of construction activity in accordance with the Land Surveyors Act (Business & Professions Code Section 8700 et seq.). The Agency will replace referenced existing monuments (see section 13-2.03).

Damaged, disturbed or destroyed survey monuments due to the Contractor's carelessness or failure to notify the Agency of the presence of an existing monument must be reset in the positions specified by the Agency and to the dimensions and character as shown in the State of California Standard Plans or substitute location approved by the County Surveyor at the

Contractor's expense by or under the direction of a California Licensee Surveyor or a Californian Registered Civil Engineer authorized to practice Land Surveying.

5-9.03 Contractor Surveys-Construction Staking and Survey Monuments

When set forth in the Contract Documents or Special Provisions, the Contractor is responsible for performing all necessary surveys to lay out and control the Work to the locations, elevations, lines, and dimensions shown or specified in the Contract. Deviations must receive prior written approval of the Agency. Surveys affecting the line or elevation of underground drainage, sewers, or utilities, and all other work within public rights-of-way or easements, must be performed by or under the direction and supervision of a California Registered Civil Engineer authorized to practice land surveying or a California Licensed Land Surveyor.

The Contractor is responsible for protecting and perpetuating survey monuments affected by construction activities in accordance with Business and Professions Code Section 8771. It is the Contractor's responsibility to arrange and pay for a diligent and thorough search for survey monuments. The search must be performed by or under the direction of a California Licensed Land Surveyor or a California Registered Civil Engineer authorized to practice Land Surveying prior to the beginning of construction or maintenance work that could damage, disturb or destroy a survey monument. All monuments found must be referenced and reset by or under the direction of a California Licensed Land Surveyor or a California Registered Civil Engineer authorized to practice Land Surveying in accordance with Business and Professions Code Section 8771 at the expense of the Contractor. On thin surface treatments such as chip seals, the monuments can be covered in advance of the maintenance treatment with a suitable material which must then be removed to expose the monument.

Damaged, disturbed or destroyed survey monuments must be reset and corner records filed in accordance with the Land Surveyors Act (Business & Professions Code 8700 et seq.) at the expense of the Contractor.

5-9.04 Traffic Control

Traffic control to set Agency-provided construction staking must be provided by the Contractor at no additional cost to the Agency. To minimize inconvenience to the traveling public and enhance the safety of all workers to the extent feasible, the Contractor must request construction staking in areas requiring traffic controls during a period of time when the Contractor has work area traffic controls in place.

5-10 RESPONSIBILITY FOR ACCURACY

The Contractor is responsible for the accuracy of the Contractor's own layout work and is liable for the preservation of established lines and grades. The Contractor must obtain all necessary measurements for and from the Work, and must check dimensions, elevations, and grades for all layout and construction work, and must supervise the work; the accuracy for all of which the Contractor is responsible. The Contractor is responsible for adjusting, correcting, and coordinating the work of all Subcontractors so that no discrepancies result.

5-11 DUTIES AND POWERS OF INSPECTORS

Inspectors are the authorized representatives of the Agency. Their duty is to inspect materials and workmanship of those portions of the Work to which they are assigned, either individually or collectively, under instructions of the Agency, and to report all deviations from the Contract.

5-12 INSPECTION

The inspection of the Work does not relieve the Contractor of the obligation to fulfill all Contract requirements. Work, materials, or equipment not meeting the requirements and intent of the Contract will be rejected, and unsuitable work or materials must be made good, notwithstanding the fact that the work or materials may have previously been inspected or approved and payment may have been made.

Reexamination of any part of the Work may be ordered by the Agency, and the part of the Work must be uncovered by the Contractor. The Contractor must pay the entire cost of uncovering, reexamination, and replacement if the reexamined work does not conform to the Contract.

All work and materials furnished pursuant to the Contract are subject to inspection and approval by the Agency. The Contractor must provide the Agency and Inspectors with access to the Work during construction and must furnish every reasonable facility and assistance for ascertaining that the materials and the workmanship are in accordance with the requirements and intent of the Contract.

Unless authorized in writing by the Agency, work done in the absence of an Inspector, whether completed or in progress, is subject to inspection. The Contractor must furnish all tools, labor, materials, access facilities, and other facilities necessary to allow inspection, even to the extent of uncovering or taking down completed portions of the Work. The Contractor must pay all costs incurred, whether or not defective work is discovered. The Contractor is solely responsible for costs associated with the removal of defective work discovered during the inspection and for the complete cost of reconstruction.

The Contractor must notify the Agency of the time and place of factory tests and submit test procedures for approval 30 Calendar Days in advance for tests that are required by the Contract. The Contractor must report the time and place of preparation, manufacture or construction of material for the Work, or any part of the Work, that the Agency wishes to inspect. The Contractor must give 5 Working Days' notice in advance of the beginning of work on the material or of the beginning of the test to allow the Agency to make arrangements for inspecting and testing or witnessing.

5-13 QUALITY OF MATERIALS AND WORKMANSHIP

Unless otherwise allowed or required by the Special Provisions, all materials must be new and of a quality at least equal to that specified. When the Contractor is required to furnish materials or manufactured articles, or do work for which no detailed specifications are set forth, the materials or manufactured articles must be of the best grade in quality and workmanship obtainable in the market. If not ordinarily carried in stock, the articles must conform to the usual standards for first-class materials or articles of the kind required. The work, as a whole or in part, must be performed with the best equipment to the best standard of construction.

At a minimum, all work and materials must be of the quality called for in Sections 11 through 50 of these Specifications, the Contract, and pertinent current industry standards or guidelines.

Materials must be furnished in sufficient quantities and in time to ensure uninterrupted progress of the Work. All required spare parts must be delivered in new condition, not in a used or unknown condition, and with all required certificates and documentation. Materials, supplies, and equipment must be stored properly and protected as required. The Contractor is responsible for damage or loss by weather or other causes.

Trench, fill, or roadway settlement occurring during the life of the contract, including the warranty period, is considered a workmanship defect and must be reconstructed or replaced by the Contractor, regardless of previous acceptance or approval by the Agency.

5-14 SUBSTITUTIONS

The Contractor must submit requests for substitution in writing within 30 Calendar Days after the award of the Contract. Certain materials, articles, or equipment may be designated in the Contract by brand, or trade name, or manufacturer, together with catalog designation or other identifying information. Substitute material, articles, or equipment of equal quality which have the required characteristics for the intended purpose, may be proposed for use provided the Contractor complies with the requirements of the following paragraphs.

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5-14.01 NOT USED

5-14.02 Documentation

If requested by the Agency, a proposal for substitution must be accompanied by complete information and descriptive data, including cost of operation, cost of maintenance, and physical requirements necessary to determine the equality of offered materials, articles, or equipment. The Contractor must also submit shop drawings, descriptive data, and samples as requested. The burden of proof of comparative quality, suitability, and performance of the offered proposal is the Contractor's. The determination of equal quality suitability and performance will be at the sole discretion of the Agency. The Agency will examine submittals with reasonable promptness. If the Agency rejects the request for substitution, then one of the particular products designated by brand name in the Contract must be furnished. Acceptance of substitution by the Agency does not relieve the Contractor of responsibility for deviations from the Contract or from responsibility for errors in submittals.

If mechanical, electrical, structural, or other changes are required for proper installation and fit of substitute materials, articles or equipment, or because of deviations from the Contract, the changes must not be made without the written consent of the Agency and must be made by the Contractor without additional cost to the Agency. The Contractor must pay the costs of design, drafting, architectural or engineering services, and building alterations of the construction required to accommodate Contractor substitutions or construction errors to maintain the original function and design.

5-15 PREPARATION FOR TESTING

The Contractor must maintain proper facilities and provide safe access for inspection by the Agency to all parts of the Work and to the shops wherein parts of the Work are in preparation. Where the Contract requires work to be tested or approved, the work must not be tested or covered up without at least a 5 Working Day notice to the Agency of its readiness for inspection, unless the written approval of the Agency for testing or covering is first obtained.

5-16 MATERIALS SAMPLING AND TESTING

Materials to be used in the Work will be subject to sampling and tests by the Agency. The Contractor must furnish the Agency with a list of the Contractor's sources of materials and the locations where materials will be available for inspection. The list must be submitted on an Agency form and furnished to the Agency in time to permit the inspection and testing of materials in advance of their use.

The Agency will test materials to the standards specified in the Contract.

When requested by the Agency, samples or test specimens of the proposed materials must be prepared at the expense of the Contractor and furnished by the Contractor in quantities and sizes required for proper examination and tests, and with complete information describing type, kind, or size of material, and its source. All samples must be submitted in time to permit the making of proper tests, analyses, or examinations before incorporating the materials into the

Work. No material can be used in the Work unless or until it has been approved by the Agency. All material tests will be made by the Agency in accordance with recognized standard practice or to the standards specified in the Contract. The Contractor must pay the cost of the second retest and subsequent retest of any area or material. The Agency will secure and test samples whenever necessary.

Sampling and testing laboratories used by the Contractor must be accredited laboratories for ASTM D3740, C1077, and D3666. When California Test Methods are used, testers must be approved for method specified.

5-17 APPROVAL OF MATERIALS

5-17.01 Sources Of Supply

Agency approval of a supply source may be required prior to procurement. Approval does not prevent subsequent disapproval or rejection of materials by the Agency if the quality is less than specified in the Contract.

Sand, gravel, or other minerals incorporated into Agency work must comply with Public Contract Code Section 20676. The Agency may request written documentation of compliance.

5-17.02 Plant Inspection

The Agency is not obligated to inspect materials at the source. The Contractor is responsible for incorporating satisfactory materials into the Work, despite Agency inspections or tests.

The Agency will inspect materials at the source if the Contractor submits a written request and if the Agency deems the inspection necessary. The Contractor and the supplier must cooperate with and assist the Agency while performing the inspection. The Agency must have access to all production areas of the plant.

5-18 PROVISIONS FOR EMERGENCIES

The Agency may provide necessary labor, material, and equipment to correct an emergency resulting from the Contractor's operation, including noncompliance with the Contract, public convenience, safety, traffic control, and protection of work, persons, and property. The nature of the emergency may prevent the Agency from notifying the Contractor prior to taking action. The costs of labor, material, and equipment will be deducted from progress payments.

The performance of emergency work under the direction of the Agency does not relieve the Contractor of responsibility for damages resulting from the emergency.

5-19 RIGHT TO RETAIN IMPERFECT WORK

If any portion of the Work or materials incorporated into the Work are defective or not in accordance with the Contract, and if the defect in the work or materials is not of sufficient magnitude or importance to make the work dangerous or undesirable, or if the removal of the work or materials is impracticable or will create dangerous or undesirable conditions, the Agency has the right and authority to retain the work or materials instead of requiring it to be removed and reconstructed or replaced. Progress payment deductions will be made as described in Section 8-9, "Deductions for Imperfect Work," of these Specifications, and a deductive Contract Change Order will be issued in accordance with Section 9, "Changes and Claims," of these Specifications.

5-20 REMOVAL OF REJECTED MATERIALS OR WORK

The Contractor must remove all rejected or condemned materials or structures brought to or incorporated in the Work within 2 Working Days of the Agency's written order. Rejected or

condemned materials may not again be offered for use in the Work. The Contractor must, at the Contractor's expense, bring into Contract compliance all rejected material or work in a manner acceptable to the Agency.

If the Contractor fails to comply with this Section, the Agency may bring the rejected material into Contract compliance. The costs will be deducted from the Progress Payment.

5-21 TEMPORARY SUSPENSION OR DELAY OF WORK

The Agency has the authority to temporarily suspend or delay the Work, wholly or in part, for any reasonable period the Agency deems necessary. The Contractor must immediately comply with the Agency's written order to suspend or delay the Work. The suspended or delayed work can only be resumed upon written direction of the Agency. Public safety and convenience must be maintained throughout the suspension or delay in accordance with Sections 12-2, "Public Convenience and Safety," and 12-3, "Public Safety and Traffic Control," of these Specifications.

Delays due to suspension of work will be classified by the Agency as Avoidable or Unavoidable Delays in accordance with Section 7-12, "Delays," of these Specifications.

Suspension does not relieve the Contractor of the Contractor's responsibilities as described in the Contract.

5-22 TERMINATION OF CONTRACT

5-22.01 Reasons for Termination

The Board reserves the right to terminate the Contract for any of the reasons listed below:

5-22.01.A Contractor Bankrupt

If the Contractor is adjudged bankrupt or makes an assignment for the benefit of the Contractor's creditors, or if a receiver is appointed because of the Contractor's insolvency, the Board may terminate the Contractor's control over the Work and so notify the Contractor and the Contractor's sureties.

5-22.01.B Completion Delay

The Board may terminate the Contract if the Contractor has not completed the Work on or before the completion date adjusted by Contract Change Order. The Contractor is not entitled to any compensation and is liable to the Agency for liquidated damages for all time beyond the Contract completion date until the Work is completed, if the Agency chooses to complete the Work.

5-22.01.C Abandonment and Unsatisfactory Performance

The Board may give the Contractor and the Contractor's surety written notice that the Contract will be terminated if the following breaches are not corrected:

- The Contractor abandons the Work.
- The Work or any portion is sublet or assigned without the Agency's consent.
- The rate of progress is not in accordance with the Contract.
- Any portion of the Work is unnecessarily delayed.
- The Contractor willingly violates terms or conditions of the Contract.
- The Contractor does not supply sufficient materials or properly skilled labor.
- The Contractor fails to promptly pay its Subcontractors.
- The Contractor disregards laws, ordinances, or Agency orders.
- The Contractor fails to respond to defective work notices.

The Contractor must cease and terminate the Work if satisfactory arrangement for correction is not made within 10 Calendar Days from the notification.

5-22.01.D Termination of Contract for Convenience

The Board may at any time and for any reason terminate the Contractor's services and work for its own convenience. The duties and rights of the Contractor after termination are set forth specified in Specification 5-22.03A.

5-22.02 Notice of Termination

The Board may give written Notice of Termination of at least 5 Calendar Days to the Contractor and the Contractor's sureties that the Contractor's control over the Work will be terminated for the reasons stated in the Notice of Termination. The surety has the right to take over and perform the Work. The Agency may take over the Work at the Contractor's expense if the surety does not commence performance within 30 Calendar Days from the date of mailing the Notice of Termination. The Contractor is liable for excess cost incurred by the Agency.

Immediately upon receipt of a Notice of Termination, except as otherwise directed in writing by the Agency, the Contractor must:

1. Stop work under the Contract on the date of, and as specified in, the Notice of Termination.
2. Place no further orders or subcontracts for materials, services, or facilities except as necessary to complete the portion of the Work that is not terminated.
3. Terminate orders and subcontracts to the extent that they relate to the work terminated by the Notice of Termination.
4. Assign to the Agency, in the manner, at the times, and to the extent directed by the Agency, all of the rights, titles, and interests of the Contractor under the terminated orders and subcontracts. The Agency has the right, at its discretion, to settle or pay all claims arising out of the termination of the orders and subcontracts.
5. Settle all outstanding liabilities and all claims arising out of termination of orders and subcontracts with the approval or ratification of the Agency. The Agency's approval or ratification is final.
6. Transfer title to the Agency, and deliver in the manner, at the times, and to the extent directed by the Agency, fabricated or unfabricated parts, work in process, completed work, supplies, other material produced as a part of, or acquired in connection with, the terminated work, and the completed or partially completed drawings, information, and other property that, if the Contract had been completed, would have been submitted to the Agency.
7. Sell, in the manner, at the times, to the extent, and at the price that the Agency directs or authorizes, property of the types referred to in Item 6 above. The Contractor is not required to extend credit to the purchaser, and may acquire the property under the conditions prescribed and at a price approved by the Agency. The proceeds of the transfer or disposition will be used to reduce payments made to the Contractor under the Contract, or credited to the cost of the work covered by the Contract, or paid as the Agency directs.
8. Complete performance of work not terminated by the Notice of Termination.
9. Protect and preserve the property related to the Contract in which the Agency has an interest.

5-22.03 Payments to Contractor Upon Termination of Contract

5-22.03.A Payments to Contractor upon Termination for Convenience

(a) Upon such termination, the Contractor is entitled to payment only as follows:

(i) the reasonable direct cost of the work completed in conformity with this Agreement as determined by the Resident Engineer; plus,

(ii) such other costs actually incurred by the Contractor as are permitted by the prime contract and approved by the Owner; plus,

(iii) five percent (5%) of the cost of the work referred to in subparagraph (i) above for overhead; plus,

(iv) four percent (4%) of the cost of the work referred to in subparagraph (i and ii) above for profit, so long as the Contractor can demonstrate that the project would have experienced a profit upon its completion; plus,

(v) the reasonable costs, including expert and attorney's fees for the preparation of the settlement claim as detailed below.

(b) "Reasonable direct cost" set forth in subparagraph (a)(i) above includes only costs reasonably and necessarily incurred in the performance of the work and will be calculated by the Resident Engineer by comparing costs submitted within the escrow bid documents and any agreed upon change orders or force account work with the Contractor's direct cost report submitted within the claim as detailed below. "Reasonable direct cost" does not include any costs deemed by the Resident Engineer to be incurred as the result of the Contractor's poor performance of the work, the Contractor's ineffective project management, Contractor induced inefficiencies, Contractor caused project delays or any other Contractor deviation from its contractual or legal duties, and will be deducted from the sums to be paid under this section. It is the burden of the Contractor to establish the reasonableness of its costs, including those that have been disallowed by the Resident Engineer in accordance with sub-section (a) or (b) herein.

(c) The costs recoverable in subparagraph (v) must not include any expert and/or attorney's fees or other claim preparation fees incurred after the submission of the initial settlement claim and must not include any costs of litigation including attorney's fees and expert fees brought by the contractor for recovery and any costs allowed under sub sections (a) and (b) herein.

(d) There will be deducted from such sums as provided in this section, the amount of any payments made to the Contractor prior to the date of the termination of this Agreement. The Contractor is not entitled to any claim or claim of lien against the Owner for any additional compensation or damages in the event of such termination for convenience and payment hereunder.

(e) Upon termination of the project for convenience the Contractor, within 30 Calendar Days submit a claim in accordance with Section 9-18 of these specifications detailing the allowed costs pursuant to this section and justification of the reasonableness of said costs.

5-22.03.B Payments to Contractor upon Termination for Reason Other Than Convenience

The Contractor and the Agency may agree upon the amount paid to the Contractor for the total or partial termination of the Work. The amount may include those items specified in Section 9, "Changes and Claims," of these Specifications. However, the agreed amount must not exceed the Total Contract Price, reduced by the amount of payments already made and the Contract price of work not terminated. The Contract will be amended accordingly, and the Contractor will be paid the agreed amount.

If the Contractor and the Agency fail to agree on the amount to pay the Contractor under this Section, the Agency will determine the amount due the Contractor.

If the work is to be completed as provided in this Section, the Contractor is not entitled to receive any portion of the amount to be paid under the Contract until completion. After completion, if the unpaid balance exceeds the sum of the amount expended by the Agency in finishing the work, plus all damages sustained or to be sustained by the Agency, plus unpaid claims for labor, materials, tools, equipment, or supplies contracted for by the Contractor for the Work, provided that sworn statements of said claims have been filed as required by Section 9, "Changes and Claims," of these Specifications, the excess not otherwise required by these Specifications to be retained will be paid to the Contractor. If the sum exceeds the unpaid balance of the Total Contract Price, the Contractor and the Contractor's surety are liable to the Agency for the amount of the excess. If the surety completes the Work as provided above, the surety must be subrogated to money due under the Contract and to money which will become due in the course of completion by the surety.

The Contractor must submit to the Agency any termination claim in the form and with the certification that the Agency prescribes. The claim must be submitted no later than 90 Calendar Days from the effective date of termination unless the Agency grants one or more extensions, in writing, upon the Contractor's written request transmitted within the 90 day period or authorized extension. If the Contractor fails to submit a termination claim within the time allowed, the Agency may determine and pay the amount, if any, due the Contractor because of the termination.

5-22.04 Agency Completion

If the Contract is terminated, the Agency may take possession of and use all or any part of the Contractor's materials, tools, equipment, and appliances on the premises to complete the Work. The Agency assumes the responsibility for returning the equipment in as good condition as when it was taken over, except for reasonable wear and tear. The items will be returned when the Work is completed or sooner, at the Agency's discretion. The Agency agrees to pay a reasonable amount for the use of the tools and equipment.

The Agency may direct that all or any part of the Work be completed by day labor and/or other contractors.

5-22.04.A Payment for Agency Completion

If the Agency completes the Work, no payment will be made to the Contractor until the Work is complete. All costs of completing the Work, including, but not limited to, legal expenses, Agency forces, administration and management, direct and indirect, will be deducted from the sum due the Contractor. If the cost of completing the Work exceeds sums due the Contractor, the Contractor and the Contractor's surety must, upon demand, pay the Agency a sum equal to the difference. If the Agency completes the Work. and there is a sum due the Contractor after the Agency deducts the costs of completing the Work, the Agency will pay the sum to the Contractor and/or the Contractor's surety.

5-22.04.B Agency Completion Not a Waiver of Agency Rights

No act by the Agency before the Work is finally accepted will operate as a waiver or stop the Agency from acting upon a subsequent event, occurrence, or failure by the Contractor to fulfill the terms and conditions of the Contract. The rights of the Agency pursuant to this Section are in addition to all other rights of the Agency pursuant to the Contract, and at law or in equity.

5-23 TERMINATION OF UNSATISFACTORY SUBCONTRACTS

When a portion of the Work subcontracted by the Contractor is not prosecuted in a satisfactory manner, the Contractor must immediately terminate the subcontract upon written notice from the Agency. The Subcontractor must not again be employed for the portion of the work on which the Subcontractor's performance was unsatisfactory.

SECTION 6 - LEGAL RELATIONS AND RESPONSIBILITIES

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SECTION 6 LEGAL RELATIONS AND RESPONSIBILITIES

6-1 COMPLIANCE WITH LAWS AND REGULATIONS

The Contractor must be familiar and comply with all Federal, State, and local laws, ordinances, codes, and regulations that affect the Work, those engaged or employed in the Work, the material or equipment used in or upon the Work, or the conduct of the Work. Pleas of misunderstanding of laws, ordinances, codes, or regulations, or of ignorance of the same on the part of the Contractor do not modify the provisions of the Contract. The Contractor and the Contractor's surety must indemnify and save harmless the Agency, its governing Board, officials, directors, agents, employees, volunteers members, affiliates, and their duly authorized representatives against claims for liability arising from, or based upon, the violation of any law, ordinance, regulation, decree, or order, whether by the Contractor or by the Contractor's employees.

The attention of the Contractor is directed to certain laws that affect the Contract. The listing of these laws in this Section is not to be construed as a listing of all applicable laws. The Contractor is solely responsible for familiarity and compliance with all applicable laws. Particular attention is called to the following:

6-1.01 Hours of Labor

Eight hours of labor is a legal day's work, and the Contractor and any Subcontractor under the Contractor, in the execution of the Contract, cannot require more than 8 hours of labor in a Calendar Day, or 40 hours of labor in a calendar week, from a person employed by the Contractor in the performance of the Work under the Contract, except as permitted under the provisions of Labor Code Sections 1810 through 1815. The Contractor must forfeit, as penalty to the Agency, the amount stipulated in section 1813 of the Labor Code for each worker employed by the Contractor, or a Subcontractor under the Contractor, in the execution of the Contract for each Calendar Day during which a worker is required or permitted to labor more than 8 hours and for each calendar week during which a worker is required or permitted to labor more than 40 hours, in violation of the provisions of the Labor Code.

6-1.02 Prevailing Wage

Pursuant to Labor Code Section 1771, the Contractor and each lower-tier Subcontractor must pay at least the prevailing rate of per diem wages, including, but not limited to, overtime, Saturday, Sunday, and holiday work, travel and subsistence, as determined by the Director of the California Department of Industrial Relations pursuant to Labor Code Section 1773. Copies of the prevailing wage determinations are available upon request at the Labor Compliance Section, 9700 Goethe Road, Suite D, Sacramento, CA 95827, and are also available from the California Department of Industrial Relation's internet website at http://www.dir.ca.gov/DLSR/PWD.

The wage rates determined by the Director of the California Department of Industrial Relations refer to expiration dates. Prevailing wage determinations with a single asterisk (*) after the expiration date that are in effect on the date of Notice to Contractors remain in effect for the duration of the project. Prevailing wage determinations with double asterisks (**) after the expiration date indicate that the basic hourly wage rate, overtime, and holiday wage rates, and employer payments to be paid for work performed after this date have been determined. If work extends past this date, the new rate must be paid and should be incorporated in contracts entered. The Contractor should contact the Department of Industrial Relations as indicated in the prevailing wage determinations to obtain predetermined wage changes. Determinations that do not have double asterisks (**) after the expiration date remain in effect for the duration of the project.

The Contractor and the Contractor's Subcontractors forfeit, as penalty to the Agency, not more than $200 per Calendar Day or portion thereof, for each worker paid less than the prevailing wage rates for work done under the Contract by the Contractor or by a Subcontractor. The Contractor and all Subcontractors must comply with the provisions of Labor Code Sections 1774 and 1775. In addition to the penalty, the Contractor or Subcontractor must pay each worker the difference between the prevailing wage and the amount paid for every hour the worker was paid less than the prevailing wage.

6-1.03 Payroll Records

Contractor must comply with Labor Code Section 1776. Regulations implementing Section 1776 are located in Section 16000 and Sections 16401 through 16403 of California Code of Regulations, Title 8. The Contractor is responsible for compliance by the Contractor's Subcontractors including any lower-tier Subcontractors.

The Contractor and the Contractor's Subcontractors, and any lower-tier Subcontractor, must keep accurate payroll records, showing the name, address, Social Security number, labor classification, straight time and overtime hours worked each day and week, and the actual wages paid to each journeyman, apprentice, worker, or other employee employed in connection with the Work. Records must be certified and available for inspection at all reasonable hours at the principal offices of the Contractor and the Contractor's Subcontractors in a manner set forth in Labor Code Section 1776. The Contractor and the Contractor's Subcontractors must file a certified copy of the records enumerated above with the Agency within 10 Calendar Days after receipt of a written request. The Contractor is responsible for all lower-tier Subcontractors' compliance with this requirement.

The non-compliance penalties specified in subdivision (h) of Labor Code Section 1776 may be deducted from progress payments to the Contractor.

6-1.04 Nondiscrimination

Attention is directed to Labor Code Section 1735, which prohibits discrimination in the employment of persons upon public works because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, genetic information, marital status, sex, gender, gender identity, gender expression, age, or sexual orientation, and provides for penalties.

6-1.05 Apprentices

The Contractor must comply with Labor Code Section 1777.5, concerning the employment of apprentices. The Contractor is responsible for compliance by all lower-tier Subcontractors.

6-1.06 Workers' Compensation

Pursuant to Labor Code Section 1860, in accordance with the provisions of Section 3700 of the Labor Code, the Contractor is required to secure the payment of compensation to his employees.

6-1.07 Fair Labor Standards

The Contractor must comply with the Fair Labor Standards Act of 1938 as amended (29 U.S.C. 3201 et seq.) as applicable.

6-1.08 Contractor's License

The Contractor must comply with Chapter 9 of Division 3 of the Business & Professions Code.

6-1.09 Use of Pesticides

The Contractor must comply with all rules and regulations that govern the use of pesticides required in the performance of the Work, including any certifications that are required for purchase, use, storage or application.

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

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

6-1.10 Reporting Requirements and Sanctions

Failure to provide specific information, records, reports, certifications, or other documents required for compliance with the Contract will be considered noncompliance. At a minimum, documents required include:

1. Form SCLC-0001 - List Of Subcontractors

   Form SCLC-0001 is required from the Contractor and each Subcontractor with a lower-tier Subcontractor. This form is due within 10 Calendar Days after the date of the preconstruction conference or within 10 Calendar Days after the date of award of the subcontract. The later of the two dates will apply.
2. Form SCLC-347 - Certified Payroll Reports

   Form SCLC-347 is required from the Contractor and each lower-tier Subcontractor, regardless of the subcontract amount or the type of procurement, for every payroll period in which work is performed. These reports are due within 10 Working Days of the ending date of the payroll period. The payroll must be accompanied by a "Statement of Compliance" signed by the employer or the employer's agent indicating that all of the information in the payroll is true, correct and complete, and the wage rates contained therein are not less than those required by the Contract. The "Statement of Compliance" must be on forms furnished by the Agency or on a form with identical wording. The Contractor is responsible for the submission of copies of payrolls of all subcontractors.
3. Form SCLC-0002 - Fringe Benefit Statement

   Form SCLC-0002 is required from the Contractor and each lower-tier Subcontractor if fringe benefits are paid to an approved plan, fund, or program. The statement is due with the first certified payroll report and any time the fringe benefit amounts change. The statement is not required if the fringe benefits are paid in cash to the employees.
4. Other Documentation

   Upon request, the contractor must provide the inspector an accurate record of all activities and personnel performing work onsite. This report should provide as much detailed information as possible, including but not limited to the:

   a. Date the work was performed.
   b. Name of contractor and employees on site.
   c. Name of subcontractor and employees on site.

   Detailed description of work performed by each employee, including hours worked and equipment used.

   Other reporting documentation might be required depending on the source of funding for the project.

If the Contractor fails to comply with the provisions of this Section, the Contractor will be advised of the specific deficiencies and requested to make immediate corrections. The Contractor will also be advised that monetary deductions will be made for failure to effect corrections or delinquencies.

If the Contractor fails to correct a deficiency in the reporting requirements within 15 Calendar Days after notification, a deduction may be made. The deduction will be 10 percent of the estimated value of the work done during the month, except that the deduction will not exceed $10,000, nor be less than $1,000, and will be deducted from the next progress payment.

Deductions for non-compliance will be in addition to other deductions provided for in the Contract and will apply irrespective of the number of instances of noncompliance. Deductions will be made separately and will cumulate for each estimate period in which a new deficiency appears. When all deficiencies for a period have been corrected, the deduction covering that period will be released on the next progress payment. Otherwise, the deduction will be retained.

6-1.11 Subcontracting

The Contractor must comply with Section 4101 to Section 4113, inclusive, of the Public Contract Code.

6-1.12 Occupational Safety and Health

The Agency is committed to providing a safe and healthy workplace for employees and the public and to eliminating conditions or hazards that could result in personal injury or ill health. The Contractor and all Subcontractors must comply with all directives given by the Agency to abate a hazard and/or stop a work activity. Failure to comply with a directive could result in the dismissal of the related Contractor/Subcontractor employee(s) as indicated in Section 5 of these Specifications or other sanctions as indicated in the project special provisions. Repeat safety violations of a similar nature and/or a single serious, willful safety violation by a Contractor could warrant review and termination of the contract.

The Contractor must comply with all applicable provisions of the California Occupational Safety and Health Act (Labor Code Sections 6300 et seq.). The foregoing includes, but is not limited to, all applicable California Code of Regulations, Title 8 Safety Orders issued by the State of California Occupational Safety and Health Administration (Cal/OSHA). Failure of the Agency to suspend the work or notify the Contractor of the inadequacy of the Contractor's safety precautions or non-compliance with existing laws and regulations does not relieve the Contractor or a Subcontractor of this responsibility.

6-1.13 Sacramento County Residents

Pursuant to Article V, Section 15 (i), of the Charter of the County of Sacramento, preference must be given in the employment of labor to citizens who have resided in Sacramento County for at least 6 months.

6-2 INDEMNIFICATION

6-2.01 Contractor's Performance

To the fullest extent permitted by law, Contractor shall indemnify, defend, and hold harmless Agency, its governing Board, officers, directors, officials, employees, and authorized volunteers and agents (collectively "Indemnified Parties"), from and against any and all claims, demands, actions, losses, liabilities, damages, and all expenses and costs incidental thereto (collectively "Claims"), including cost of defense, settlement, arbitration, and reasonable attorneys' fees, resulting from injuries to or death of persons, including but not limited to employees of either Party hereto, and damage to or destruction of property, or loss of use or reduction in value thereof, including but not limited to the property of either Party hereto, arising out of, pertaining to, or resulting from the alleged or actual acts or omissions of Contractor, its officers, employees, or agents, or the acts or omissions of anyone else directly or indirectly acting on behalf of the Contractor, or for which Contractor is legally liable under law. Contractor understands and agrees that this indemnity obligation shall apply regardless of whether any loss, damage or cost arises from, whether in whole or in part, any alleged or actual acts or omissions, or any other negligence, concurrent or otherwise, on the part of Agency, or any other party indemnified hereunder, excepting only those Claims to the extent caused by the active negligence or willful misconduct of an Indemnified Party where such indemnification would be invalid under Subdivision (b) of Section 2782 of the Civil Code.

The right to defense and indemnity under this Section arises upon occurrence of an event giving rise to a Claim and upon tender in writing to Contractor. Contractor shall defend Indemnified Parties with counsel reasonably acceptable to Agency. Notwithstanding the foregoing, Agency shall be entitled, on its own behalf, and at the expense of Contractor, to assume control of its defense or the defense of any Indemnified Party in any legal action, with counsel reasonably selected by it. Should Agency elect to initially assume control of its defense, or the defense of any Indemnified Party, it does so without prejudice to its right to subsequently request that Contractor thereafter assume control of the defense and pay all attorneys' fees and costs incurred thereby.

6-2.02 No Limitation of Liability for Indemnification

This indemnity obligation must not be limited by the types and amounts of insurance or self-insurance maintained by Contractor or Contractor's subcontractors at any tier.

Nothing in this indemnity obligation shall be construed to create any duty to, any standard of care with reference to, or any liability or obligation, contractual or otherwise, to any third party.

The provisions of this indemnity obligation must survive the expiration or termination of the Agreement.

6-3 CONTRACTOR'S LEGAL ADDRESS

Both the address given in the Bid and the Contractor's office in the vicinity of the Work are designated as places that samples, notices, letters, or other articles or communications to the Contractor can be mailed or delivered. The delivery to either of these places is sufficient service to the Contractor and the date of service is the date of delivery. The address named in the Bid can be changed by written notice from the Contractor to the Agency. Nothing herein is deemed to preclude or render inoperative the service of any drawing, sample, notice, letter, or other article or communication to the Contractor.

6-4 CONTRACTOR NOT AN AGENT OF AGENCY

The Contractor must be an independent contractor and not an employee, agent, or other representative of the Agency. Nothing in the Contract creates a relationship of joint venture, partnership or association of any nature whatsoever between the Agency and the Contractor other than that of owner and independent contractor. The Agency has the right to direct the Contractor as provided in the Contract. This right does not reduce or abrogate the Contractor's liability for damage or injury to persons, public property, or private property that arises directly or indirectly from the Contractor's execution of the Work.

6-5 SUBSTITUTION OF SUBCONTRACTORS

The Contractor must not, without the written consent of the Agency: (a) substitute any party as Subcontractor in place of the Subcontractor designated in the original bid; (b) permit any such subcontract to be assigned or transferred; or (c) allow the subcontracted work to be performed by anyone other than the original Subcontractor listed on the bid. Consent for substitution or subletting will only be given when:

1. The Subcontractor listed in the bid, after having reasonable opportunity to do so, fails or refuses to execute a written contract that is based upon the Plans and Specifications for the project or the terms of the Subcontractor's written bid and is presented to the Subcontractor by the Contractor; or
2. The listed Subcontractor becomes bankrupt or insolvent; or
3. The listed Subcontractor fails or refuses to perform the subcontract; or
4. The listed Subcontractor fails or refuses to meet the bond requirements of the Contractor as set forth in California Public Contract Code Section 4108; or

5. The Contractor demonstrates to the Agency, subject to the further provisions set forth in California Public Contract Code Section 4107.5, that the name of the Subcontractor was listed as a result of an inadvertent clerical error; or
6. The listed Subcontractor is not licensed pursuant to the Contractor License Law as set forth in the Business and Professions Code; or
7. The Agency determines that the work performed by the listed Subcontractor is substantially unsatisfactory and not in substantial accordance with the Contract, or that the Subcontractor is substantially delaying or disrupting the progress of the work; or
8. The listed Subcontractor is ineligible to work on a public works project pursuant to Section 1777.1 and 1777.7 of the Labor Code.

In the event of substitution, the Agency will give at least 5 Working Days' notice in writing to the listed Subcontractor, unless they have advised the Agency in writing that they have knowledge of the Contractor's request for the substitution.

6-6 ASSIGNMENT OF CONTRACT

The Contract or the performance of the Contract can be assigned by the Contractor, but only upon written consent of the Agency and the Contractor's surety, unless the surety has waived its right of notice of assignment. No assignment or subcontracting is permitted that would relieve the Contractor or the Contractor's surety of their responsibilities under the Contract.

6-7 ASSIGNMENT OF MONIES

The Contractor can assign monies due the Contractor under the Contract, and the assignment will be recognized by the Agency, if given proper notice, to the extent permitted by law. Assignment of monies is subject to deductions provided for in the Contract. All monies withheld can be used by the Agency for the completion of the Work if the Contractor defaults.

6-8 PROTECTION OF AGENCY AGAINST PATENT CLAIMS

The Contractor assumes all costs arising from the use of patented materials, equipment, devices, and processes on or incorporated in the Work, and indemnifies and holds harmless the Agency and the Agency's officers, officials, agents, employees, volunteers, members, affiliates and their duly authorized representatives from actions for, or on account of, the use of patented materials, equipment, devices, or processes in the construction of, or subsequent operation of, the Work. Before final payment, if requested by the Agency, the Contractor must furnish acceptable proof of a proper release from costs or claims arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the Work.

6-9 RESPONSIBILITY OF THE CONTRACTOR

The Contractor is solely responsible for, and has exclusive control over, construction means, methods, techniques, sequences, procedures, and coordination of all portions of the Work under the Contract, unless otherwise provided in the Contract or in an emergency situation where specific direction regarding means, methods, techniques, sequences, procedures, and coordination is necessary to mitigate an imminent and serious health and safety hazard.

Contractors, in coordination with the Agency and its duly authorized representatives as appropriate, must implement measures that create safety awareness and promote safe work practices at the jobsites and must pursue the Contract in the safest manner possible.

The Contractor will take appropriate action, up to and including termination, against a Contractor employee who willfully or repeatedly violates workplace safety rules.

The Work is under the Contractor's responsible care, and the Contractor bears the entire

risk of injury, loss, or damage to any part by any cause until field acceptance of the project or portions thereof. The Contractor must rebuild, repair, restore, and make good all injuries, losses or damage to any portion of the Work or the materials occasioned by any cause, and bear the entire expense.

In no case does the Contractor's use of Subcontractors alter the position of the Contractor or the Contractor's sureties with relation to the Contract. When a Subcontractor is used, the responsibility for every portion of the Work remains with the Contractor. A Subcontractor will not be recognized as having a direct contractual relationship with the Agency. Persons engaged in the Work under the Contract are considered employees of the Contractor and their work is subject to the provisions of the Contract. The Agency will deal only with the Contractor who is responsible for the proper execution of the Work. The Contractor must pay when due all valid claims of Subcontractors, suppliers, and workmen with respect to the Work.

The mention herein of a specific duty or responsibility imposed upon the Contractor is not to be construed as a limitation or restriction of any other responsibility or duty imposed upon the Contractor by the Contract.

6-10 PERMITS, AND LICENSES, AND CERTIFICATIONS

The Contractor, at the Contractor's sole expense, must obtain all necessary permits, registrations, certifications, notifications, and licenses for the normal conduct of the Contractor's business and construction of the Work, and comply with all laws, ordinances, rules and regulations relating to the Work, and to the preservation of the public health and safety.

Unless otherwise noted in the Special Provisions, building, plumbing, heating, electrical, and similar permits that the Contractor is required to obtain from the County's Building Inspection and Permits Division for County-owned projects are fee exempt and will be obtained by the Agency.

The California Environmental Quality Act of 1970 (CEQA) may be applicable to permits, licenses, and other authorizations that the Contractor must obtain from local agencies in connection with performing the Work. The Contractor must comply with the provisions of CEQA in obtaining the permits, licenses, and other authorizations which will be obtained in time to prevent delays to the Work.

The Contractor must obtain and comply with all required permits, registrations, certifications, and notifications applicable to the Work in conformance with the requirements of Cal/OSHA regulations.

The Contractor must comply with permits, licenses, or other authorizations applicable to the Work obtained by the Agency in conformance with the requirements in CEQA.

6-11 EXISTING UTILITIES

6-11.01 General

The Contractor must coordinate and fully cooperate with the Agency and utility operators for the location, relocation, and protection of utilities. The Contractor must become familiar with the existence of utilities, underground and overhead, necessary for buildings in the Work area, and must identify facilities serving these buildings in advance of the actual construction, and arrange for and schedule the relocation of the facilities, if necessary, by the utility operator or the Contractor.

Coordination activities must include communication with all utilities with facilities potentially in conflict with the Work, and working cooperatively with those utilities to schedule any required relocation work by the utilities or their contractors. The Contractor must provide schedule updates to all utilities every two weeks. Copies of all communications between the Contractor or Subcontractors and the utilities must be provided to the Agency.

Section 4216.4 of the Government Code requires that the excavator expose marked subsurface facilities by hand before using power equipment, unless documented notice is provided to the facility operator and the facility operator agrees to allow power-operated or power-driven equipment, as specified in Section 4216.4 of the Government Code. Within 14 Calendar Days of the Notice to Proceed, the Contractor must perform the following work:

- Mark the entire area to be excavated, as defined in Section 6-11.04, "Underground Service Alert (USA North)," of these Specifications.
- Contact USA North to mark existing utilities within the area marked to be excavated.
- Hand excavate (power-operated or power-driven excavating or boring equipment can be used for the removal of existing pavement if there are no subsurface installations contained in the pavement), expose, and protect all existing facilities, including existing utility services, laterals, or appurtenances whenever their presence can be inferred from other visible facilities like buildings, meters, junction boxes, valves, service facilities, identification markings, and other indicators on or adjacent to the Work. If the exact location of the subsurface installation cannot be determined by hand, the excavator must request the operator to provide additional information to the excavator, to the extent that information is available to the operator, to enable the excavator to determine the exact location of the installation.
- Subsurface facilities that are aligned with the proposed location of underground Contract installations and that lie within 24 inches from the outside edge of the installation for a longitudinal distance of 50 feet or more must be potholed at 25-foot intervals, at each change of direction, and at every service line or lateral unless otherwise directed by the Agency.

Upon determination of the existence of a conflicting utility, the Contractor must promptly coordinate utility relocation work. Within 3 weeks of the Notice to Proceed, the Contractor must provide a written statement to the Agency about the existence of conflicting facilities, utility coordination, and schedules for utility relocations both above and below the surface of the ground. All costs and delays for the following are the Contractor's responsibility: (a) The Contractor fails to pothole and locate utilities within 2 weeks of the Notice to Proceed; (b) The Contractor fails to notify the Agency of potential conflicts within 3 weeks of the Notice to Proceed; (c) The Work is delayed or impacted by existing facilities and the delay or impact could have been avoided had the Contractor complied with these requirements.

6-11.02 Maintenance and Protection

Unless otherwise shown or specified in the Contract, the Contractor must maintain in service drainage, water, gas, sewer lines, power, lighting, telephone conduits, signal, interconnect, and any other surface or subsurface utility structure that could be affected by the Work. However, the Contractor, for convenience, can arrange with individual owners to temporarily disconnect service lines or other facilities along the line of the Work. The cost of disconnecting and restoring utilities will be borne by the Contractor.

Unless otherwise specified in the Special Provisions, the Contractor must protect existing utilities on projects being constructed, whether inside or outside of rights-of-way. The utility owner in these cases can elect to provide the necessary protective measures and bill the Contractor for the cost. "Existing utilities" includes traffic control devices, conduits, streetlights, and related appurtenances.

Existing utility facilities that are to be relocated, including joint utility poles, traffic signals, and light poles, must be relocated prior to paving. Paving must not be performed around existing utility facilities that are to be relocated.

6-11.03 Exact Locations Unknown

The locations of existing utility facilities shown on the Plans are approximate and represent the best information obtainable from utility maps and other information furnished by the various

utility owners involved. The Agency warrants neither the accuracy nor the extent of actual installations as shown on the Plans. There might be additional utilities on the property unknown to either party to the Contract. If, during the course of the Work, additional subsurface utilities are discovered, the Agency can make adjustments to the Work. Compensation for adjustments will be in accordance with Section 9, "Changes and Claims," of these Specifications.

In accordance with Government Code Section 4215, the Agency will compensate the Contractor for the costs of locating and repairing damage not due to the failure of the Contractor to exercise reasonable care, removing, relocating or protecting existing main or trunk line utility facilities not indicated in the Plans and Specifications with reasonable accuracy, and for equipment on the Work necessarily idled during the work. In no event will the Agency be liable for any further or additional costs resulting directly or indirectly from the occurrence. Compensation will be in accordance with Section 9, "Changes and Claims," of these Specifications.

If the Contractor discovers utilities not identified in the Plans or Specifications, the Contractor must immediately notify the Agency and the utility owner by the most expeditious means available and later confirm in writing. If the completion of the Work is delayed by failure of the Agency or the utility owner to remove, repair, or relocate the utility, the delay might be an unavoidable delay as defined and provided for in Section 7-12.02, "Unavoidable Delays," of these Specifications. The Contractor will not be assessed liquidated damages for delay in completion of the Work for that portion of the delay as is caused by failure of the Agency or the owner of a utility to provide for the removal or relocation of existing utilities.

6-11.04 Underground Service Alert (USA North)

The Agency is a member of the Underground Service Alert (USA North) One-Call program. The provisions of Government Code Sections 4216 through 4216.9, inclusive, must be followed.

Except in an emergency, the excavator (as defined by Government Code Section 4216) must notify USA North at least 2 Working Days, but not more than 14 Calendar Days, in advance of performing "Excavation" work as defined by Government Code Section 4216(b). USA North can be reached by calling 811 or (toll free) 1-800-227-2600.

Each phase of a project must be called into USA North, and continuing excavation must be reported every 28 Calendar Days. The excavator must not call in to USA North the entire project boundaries or, on road construction projects, the entire length of the project. The excavator must only request the marking of facilities within the area to be excavated within 28 Calendar Days of the call. USA North will provide an inquiry identification ("ticket") number to the person contacting the center. The USA North ticket number must be available to the Inspector at the job site along with the date USA North was called. If the USA North notifications are not kept up-to-date, the excavation will be stopped, and a new 2 Working Day notice will be required before continuing the excavation. If the field markings are no longer reasonably visible during an excavation for which there is a valid ticket number, the excavator must contact USA North to have the area re-marked. The excavator must allow 2 Working Days for re-marking of facilities.

Prior to calling USA North, the excavator must clearly mark the excavation site with white, water-soluble, or spray chalk paint in paved areas, or place flags, stakes, whiskers, or some other approved method in unpaved areas. The excavator must determine the approximate location (24 inches from outside edge on either side of the facility) of utilities in conflict with the proposed excavation by exposing the subsurface installation with hand tools before using power-operated or power-driven equipment. The excavator is responsible for preserving operators' markings or markers until they are removed.

Prior to Field Acceptance, all USA North markings must be removed by the Contractor to the satisfaction of the Agency. During the progress of the Work, markings or markers must be removed within 2 months of the date the markings or markers are no longer needed or upon

completion of the work, whichever is sooner. The Agency will accept natural weathering of markings if the markings disappear within the two-month period or prior to Field Acceptance. If the markings are in brick pavers or concrete areas, and if, by natural weathering or other approved removal methods, the markings still remain, the Contractor must replace the concrete or the brick pavers in-kind, unless the utility operator has failed to use chalk-based paint or other non-permanent marking materials. Excavators and utility operators are encouraged to avoid marking in these areas by using offset markings. Removal methods must be non-destructive, and residual shadowing must not remain.

Removal of markings must comply with requirements of the National Pollutant Discharge Elimination System (NPDES), the Regional Water Quality Control Board (RWQCB), and other applicable federal, state, and local laws, rules, or regulations.

USA North markings not removed by the required timelines can be removed and the sidewalk or street repaired/replaced by the Agency at its discretion. The Agency will charge the excavator a service fee equal to the actual costs of removal for removing the markings and making repairs and/or replacements. This fee will include the cost to comply with NPDES, the RWQCB, and other applicable federal, state, and local laws, rules, or regulations.

6-11.05 Damage to Existing Utilities

The excavator must notify the affected utility of any contact, scrape, dent, nick, or damage to their facility. An operator or excavator who violates Government Code Sections 4216 through 4216.9, is subject to civil penalties.

Table 6-2 designates color codes and abbreviations that must be used by the Contractor and the utility owners to identify utilities.

TABLE 6-2
FIELD MARKINGS - COLOR CODES AND SYMBOLS

Color	Typical Abbreviation	Typical Utility
White	USA	Proposed Excavation
Pink	TSM	Temporary Survey
Red	SL	Street Lighting
	E	Electric
	TS	Traffic Signals
Yellow	G	Gas
	PP	Oil
	STM	Steam
	CH	Chemical
	Company Name	
Blue	W	Water
Purple	RW	Reclaimed Water
	IRR	Irrigation
Green		Slurry
	SS	Sewer
	SD	Storm Drain

COMMON ABBREVIATIONS			
Facility Identifiers			
CH	Chemical	SL	Street Lighting
E	Electric	STM	Steam
FO	Fiber Optic	SP	Slurry System
G	Gas	TEL	Telephone
LPG	Liquefied Petroleum Gas	TS	Traffic Signal
PP	Petroleum Products	TV	Television
RR	Railroad Signal	W	Water
S	Sewer	RW	Reclaimed, Recycled, Non-Potable Water
SD	Storm Drain		
Underground Construction Descriptions			
C	Conduit	HH	Hand Hole
CDR	Corridor	MH	Manhole
D	Distribution Facility	PB	Pull Box
DB	Direct Buried	R	Radius
DE	Dead End	STR	Structure
JT	Joint Trench	T	Transmission Facility
HP	High Pressure		

6-12 APPROVAL OF CONTRACTOR'S PLANS NO RELEASE FROM LIABILITY

The review or approval by the Agency of working drawings or methods of work proposed by the Contractor does not relieve the Contractor of the Contractor's responsibility for errors and is not to be regarded as assumption of risk or liability by the Agency or an officer, official, agent, employee, member, volunteer, affiliate, or their duly authorized representatives. The Contractor has no claim under the Contract because of the failure or partial failure or inefficiency of a reviewed or approved plan or method. Agency review or approval means that the Agency has no objection to the Contractor using the proposed plan or method at the Contractor's responsibility and risk.

6-13 CONTRACTOR MUST NOT MORTGAGE EQUIPMENT

The Contractor must not mortgage or otherwise convey the title of the plant, machinery, tools, appliances, supplies, or materials that are in use, or further required or useful, in the prosecution of the Work, without prior written consent of the Agency.

6-14 PROPERTY RIGHTS IN MATERIALS

Nothing in the Contract is to be construed as vesting in the Contractor right of property in materials after they have been installed, attached or affixed to the Work, and on which partial payments have been made by the Agency. All materials are the property of the Contractor and the Agency jointly as their interests may appear, and must not be removed from the Work by the Contractor without the Agency's consent.

SECTION 7 - PROSECUTION OF THE WORK

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SECTION 7 PROSECUTION OF THE WORK

7-1 BEGINNING OF WORK

No work can take place prior to receipt by the Agency of the executed Contract (as defined in Section 3-7, "Execution of Contract") and review and approval of the prescribed bonds and insurance. After the Agency signs the Contract and receives and approves the bonds and insurance, a Notice to Proceed (NTP) will be issued which constitutes authorization to begin the Work. The NTP will state the date on which the counting of Contract Time will commence and the Contract completion date. See Section 1-2, "Definitions," of these Specifications for the definition of the Notice to Proceed. The counting of Contract Time will begin no later than 30 Calendar Days from the time the Contractor receives the Contract forms for execution.

7-2 AMOUNT OF WORK UNDER CONSTRUCTION

The Contractor must not have more work under construction than can be prosecuted properly with regard to the rights of the public. The Agency has the right to direct the Contractor's operations or schedule to ensure compliance with this requirement.

7-3 PRECONSTRUCTION CONFERENCE AND PROGRESS MEETINGS

Prior to beginning work, a preconstruction conference will be held to review the Work. The Contractor must attend this preconstruction conference and must invite Subcontractors and others necessary to ensure all topics are adequately covered. Topics discussed will include mobilization, access, temporary facilities, utilities, subcontractors, schedules, procedures, correspondence, progress payments, payroll records, Storm Water Pollution Prevention Plans (SWPPP), coordination, safety, after-hour contacts for Contractor and Agency personnel, quality control/quality assurance, personnel assignments, and other appropriate topics.

Progress meetings, as stipulated in the Special Provisions or as required by the Agency, will be conducted throughout the duration of the Contract. The purpose of these meetings is to inform, discuss, and resolve issues related to the Work; the Contractor or the Contractor's agent must attend. Topics discussed include, but are not limited to, progress, schedules, safety, SWPPP, Requests for Information, Change Orders, Field Instructions, field coordination, submittals, quality control/quality assurance, testing, startup, safety, and other topics related to the Work.

7-4 WORK TO BE PROSECUTED WITH ADEQUATE SUPERVISION, LABOR FORCE, EQUIPMENT AND METHODS

The Contractor must prosecute the Work under the Contract with the materials, tools, machinery, apparatus, and labor necessary to complete the Work described, shown, or reasonably implied under the Contract, or as directed by the Agency, within the Contract Time.

7-4.01 Superintendence

The Contractor must assign a competent superintendent to the Work who has complete authority to represent and act for the Contractor. The superintendent must be capable of reading and understanding the Contract and must receive and follow all instruction given by the Agency.

If the Contractor or the Contractor's superintendent is not present, orders given by the Agency must be received and obeyed by the foreman or other representative who has charge of

the particular work in reference to which the orders are given, or the Agency can stop the work until the Contractor or the Contractor's superintendent arrives.

7-4.02 Labor

Workers, laborers, or mechanics skilled in each class of work must accomplish every part of the Work.

7-4.03 Equipment and Methods

Only equipment and methods suitable to produce the quality required by the Contract are permitted to operate on the Work. Except as specified in Section 5-7, "Contractor's Equipment," of these Specifications, equipment must be that used in general practice for the work undertaken. If any part of the Contractor's plant, equipment, or methods of executing the Work is unsafe, inefficient, or inadequate to ensure the required quality or rate of progress, the Agency can order the Contractor to modify the Contractor's equipment, facilities, or methods. The Contractor must promptly comply with the orders at the Contractor's expense. The Contractor's compliance with the orders or failure of the Agency to issue the orders does not relieve the Contractor of the obligation to secure the degree of safety, quality of the Work, and rate of progress required by the Contract. The Contractor is responsible for the safety, adequacy, and efficiency of his plant, equipment, and methods.

7-5 SCHEDULES

The Contractor must submit a schedule, in accordance with this Section that illustrates the Contractor's plans for carrying out the Work.

The Contractor must carry out the various elements of the Work concurrently, as is practicable, and must not defer construction of any portion of the Work in favor of any other portion, without the express written approval of the Agency.

Notwithstanding the submission of a baseline schedule, any monthly schedule update or proposed revised schedule, the Contractor is governed by the direction of the Agency if, in the judgment of the Agency, it becomes necessary to accelerate the Work or any part thereof, or cease work at any particular point and concentrate the Contractor's forces at another site location(s), with the intent of preventing delays.

If no separate item is provided in the Bid Form, payment for schedules must be included in payments for mobilization. If no bid item for mobilization is included in the Bid Form, conformance with the schedule specification sections and time impact analysis section is incidental to and included in the various bid items, and no additional payment will be made.

Because the Agency places a high value on the importance and use of project scheduling information as a management tool in achieving the completion of the Work as planned, the Agency will deduct 10 percent of the monthly Progress Payment, but not more than $25,000, for failure by the Contractor to submit the baseline or monthly schedule updates, as required by these specifications. Deductions also apply to any failure to submit schedule data as required by these Specifications. These deductions are cumulative and will be made for each and every month that the Contractor fails to provide the required information. The monthly updated schedule and narrative must be accurate, reflect actual events on the project, and meet all requirements of these specifications. If the contractor does not provide an acceptable baseline schedule, monthly update, required data, or correct a deficiency within 10 Working Days of the Agency's request the deduction will become permanent via a deductive change order.

7-5.01 CPM Schedule – Minor Projects

Unless otherwise approved by the Agency a Critical Path Method (CPM) schedule must be submitted for Minor Projects. Minor Projects are defined as Projects with an original contract value less than $5 million.

Unless otherwise agreed to in writing by the Agency, the latest version of MS Project or Primavera P6 must be used. The Contractor must submit three copies, plus an electronic copy, of a complete baseline schedule at the preconstruction conference (see Section 7-3," Preconstruction Conference and Progress Meetings," in this Section of these Specifications). The baseline schedule must show all major portions of the Work, the estimated dates on which the Contractor shall start each portion of the Work, and the contemplated dates for completing each portion of the Work, or the approximate percentage of the Work or portions of the Work scheduled for completion at any time, and/or the planned duration for each portion of the Work identified on the schedule.

Unless agreed to by the Agency, monthly schedule updates must be submitted to the Agency with each Progress Payment request and when requested by the Agency. The data dates must be the 20th day of each month. The Contractor must submit three copies plus an electronic copy.

Upon the occurrence of an event that impacts the project completion date (Time Impact), the Contractor must submit a separate Time Impact Analysis (TIA) per Section 7-12.03 of these Specifications for all delays for which it will be seeking a time extension. The Contractor must not incorporate any delays or change activities into a monthly schedule update without Agency review and approval of a submitted TIA. Upon review and acceptance by the Agency, the proposed TIA must be incorporated into the next monthly schedule update.

A revised or updated schedule must be submitted within 10 Working Days of an Agency request.

The Contractor must carry out the various elements of the Work concurrently, as is practicable, and must not defer construction of any portion of the Work in favor of any other portion, without the express written approval of the Agency.

7-5.02 CPM Schedule – Major Projects

All Major Projects shall require a Critical Path Method (CPM) Schedule. Major Projects are defined as Projects with an original contract value exceeding 5 million dollars. Major Projects require the Contractor to submit a Baseline CPM schedule within 30 Calendar Days of receipt of the executed Contract. The latest version of Primavera P6 software must be used. The CPM network diagram must be time-scaled and include printouts showing the mathematical analysis of the CPM network diagram. Activities must include, but not be limited to, construction activities, procurement activities, submittal review & approval, cure times, and any other activities by the Contractor, the Agency, or any other entity that could impact the Work. Submittal and procurement activities must include falsework drawings, post tensioning drawings, test procedures, mix designs, long time lead items, etc. The following information must be shown for each activity

1. Unique number(s) for each activity.
2. Activity description.
3. Activity relationships and dependencies (logic).
4. Activity duration not to exceed 10 Working Days, except for preconstruction and/or other activities as authorized by the Agency.
5. Early start, early finish, late start, late finish dates (calendar date, i.e. day, month, year).
6. Total float, free float.
7. For completed activities: actual start dates, actual finish dates, duration, and logic.
8. Interim milestone dates and completion dates.
9. Detailed list of work contained within each activity.

10. Cost loading for each item of work for lump sum contracts, which will be the "Schedule of Values" and the basis for monthly progress payments.

All activity calendars must be in Working Days. No more than 50 percent of construction schedule activities can be shown as critical or near critical. Near critical is defined as the longest path plus 15 Working Days total float. The Critical Path must be clearly shown and based upon the longest path through the network logic of necessarily related predecessor and successor activities. All activities must have a minimum of one predecessor and one successor. Schedule activity constraints cannot be used unless authorized by the Agency.

The Contractor must submit three full-size paper copies, an electronic .pdf of the paper copies, and an electronic copy of the P6 file for each CPM schedule. Schedule Updates to the CPM schedule must be submitted with each monthly Progress Payment request, when Contract events are changed, or within 10 Working Days of an Agency request for an interim update. The data date for Monthly Schedule Updates must be the 20th day of each month. The Contractor's Progress Payment request for Lump Sum Contracts (schedules that are Cost Loaded) must be generated from and correspond to the Monthly Schedule Update. A narrative describing the general status of the Work and addressing any problem areas or delays must be submitted with each revision or update, with impacts on critical path items of work highlighted. A corrective course of action must also be included when problem areas or delays are encountered.

Upon the occurrence of an event that impacts the project completion date (Time Impact), the Contractor must submit a separate Time Impact Analysis (TIA) per Section 7-12.03 of these Specifications for all delays for which it will be seeking a time extension. The Contractor must not incorporate any delays or change activities into a monthly schedule update without Agency review and approval of a submitted TIA. Upon review and acceptance by the Agency, the proposed TIA must be incorporated into the next monthly schedule update.

A resource leveled/constrained schedule will not be accepted for the determination of critical path impacts. Any schedule, or schedule data of any kind, submitted with resource leveling will not be accepted

7-5.03 Four-Week Rolling Schedule

A four-week rolling schedule must be provided by the Contractor at each weekly progress meeting. The schedule must provide an accurate representation of the work performed the previous week and work planned for the current week and subsequent 2 weeks.

The schedule may be provided in a bar chart form with information derived from and consistent with the current project schedule. The rolling schedule must include activity ID number, activity description, and start and finish dates (both scheduled and actual), total float, and any other information requested by the Agency. Each activity must be coded to note activities on the critical path and activities that are behind schedule.

7-5.04 Float

Float in any activity, milestone completion date, and/or Contract completion date is owned by the Project and is a resource available to both the Agency and the Contractor. Neither the Agency nor the Contractor owns the float time.

Unless otherwise provided, float is synonymous with total float. Total float is the period of time measured by the number of Working or Calendar Days (as specified in the Contract) each non-critical path activity can be delayed before it and its succeeding activities become part of the critical path. If a non-critical path activity is delayed beyond its float period, then that activity becomes part of the critical path and controls the end date of the work. Thus, delay of a non-critical path activity beyond its float period will cause delay to the project itself.

Acceptance of a Baseline Schedule, Monthly Schedule Update(s), or Revised Schedule that is based on less time than the maximum time allowed for milestone or Contract Completion

does not change any Contract duration, nor does it serve as a waiver of either the Contractor's or Agency's right to utilize the full amount of time specified in the Contract. Liability for delay of the Contract Completion Date rests with the party actually causing delay to the Contract Completion Date. For example, if Party A uses some, but not all, of the float time, and Party B later uses the remainder of the float time as well as additional time beyond the float time, Party B is liable for the costs associated with the time that represents a delay to the project's completion date. Party A would not be responsible for any costs, since it did not consume all of the float time and additional float time remained, and the Project or milestone completion date was unaffected.

Should the Contractor submit any schedule reflecting a Forecasted Project Completion Date earlier than the Contract Completion Date, the difference must be shown on a schedule activity titled "Project Float." Should the Contractor not show this time as Project Float, a Contract Change Order will be issued adjusting the Contract Completion Date to the new Forecasted Project Completion Date.

The Contractor must not use any method to sequester float for its exclusive use. Sequestration of float is a basis for schedule rejection.

7-5.05 Schedule Acceptance

The Agency will review the baseline schedule, monthly schedule updates or proposed schedule revisions, and any other schedule related data, for conformance to the Contract within 15 Working Days of receipt. All schedule related submittals must be resubmitted within 10 Working Days of receiving Agency comments. Agency review and acceptance of any baseline schedule, update, revision, or any other schedule-related data does not relieve the Contractor of responsibility for the feasibility of the schedule, completion of any omitted work scope, or requirements for accomplishments of milestones and completion within Contract Time. The Agency review and acceptance does not warrant or acknowledge the reasonableness of the schedule's logic, durations, labor estimates, or equipment productivity.

7-6 UNUSUAL SITE CONDITIONS

In accordance with Section 7104 of the Public Contract Code, the Contractor must promptly, and before the following conditions are disturbed, notify the Agency, in writing, of any:

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

The Contractor must follow up the prompt written notification with written documentation of the unusual site condition within 5 Working Days. The Agency will investigate the condition and arrange for any modification to the condition it deems appropriate, or issue a Contract Change Order per Section 9, "Changes and Claims," of these Specifications, if it finds that the conditions do materially differ or involve hazardous waste.

7-7 PURSUANCE OF WORK DURING INCLEMENT WEATHER

During inclement or unsuitable weather or other unfavorable conditions, the Contractor must pursue only those portions of the Work that will not be damaged by the weather or unfavorable conditions. When the weather or unfavorable conditions creates hazardous travel or working

conditions, as determined by the Agency, the Contractor can be directed to stop that portion of the Work in accordance with Section 5-21, "Temporary Suspension or Delay of Work," of these Specifications, until the weather clears or the conditions are no longer unfavorable.

The Contractor must keep roads safe and inspect and maintain stormwater pollution prevention and erosion control devices during inclement weather or unfavorable conditions. Lane and road closures might not be allowed if the Agency determines that the traffic controls will create unnecessary risk to the traveling public, the Contractor, and/or Agency employees.

7-8 PEAK HOURS, HOURS OF DARKNESS, HOLIDAYS, AND WEEKENDS

7-8.01 Allowable Times and Hours of Work

Unless otherwise noted in the Special Provisions, directed or approved by the Agency, no work can be done between the hours of 6 p.m. and 6:30 a.m., or on Saturdays, Sundays, or Legal Holidays. Unless otherwise noted in the Special Provisions, directed or approved by the Agency, no lane of traffic can be closed to the public during the peak hours of 6:30 a.m. to 8:00 a.m. and 3:30 p.m. to 6:00 p.m., except as necessary for the proper care and protection of work already performed, or in case of an emergency repair as defined below. These exceptions are allowed only with the Agency's written permission.

Unless otherwise noted in the Contract documents, no lane or road closures will be permitted between the hours of 7:00 a.m. and 9:00 p.m. at the following locations:

- Watt Avenue between Folsom Boulevard and Fair Oaks Boulevard
- Sunrise Boulevard between Folsom Boulevard and Fair Oaks Boulevard
- Hazel Avenue between Folsom Boulevard and Winding Way

Lane or road closures at these locations during the times indicated will only be allowed in emergency situations or with the express written approval of the Director of the Department of Transportation or his/her designee.

Liquidated Damages (see Section 8-10, "Liquidated Damages for Delay," of these Specifications) of $50 per minute can be assessed to Contractors who fail to comply with the prescribed lane closure hours noted above in the Special Provisions, or as otherwise directed by the Agency. These liquidated damages are based on the estimated Agency costs to enforce the Contract restrictions for allowable times and hours of work.

7-8.02 Off-Period Work

A written request to work between 6 p.m. and 6:30 a.m., or on Saturdays, Sundays, or legal holidays, or to close a lane of traffic during peak hours, must be submitted at least 2 Working Days in advance of the intended work. The Agency will evaluate the Contractor's request to determine if there is a benefit to the Agency, or a nuisance or a hazard to the public, the project, or the area surrounding the site, and if the Contractor should pay Agency overtime costs related to the off-period work. The Agency can place conditions on approval of off-period work based on this analysis.

7-8.03 Emergency Repairs

An emergency repair is a repair to the Work (including traffic controls, barricades, or temporary signs) required as a result of an unforeseen event that poses a danger to the public or jeopardizes the integrity of the Work, whether completed or not. The Contractor might be allowed to close a lane of traffic, or work at night, or on Saturdays, Sundays, or legal holidays for an emergency repair. The Contractor must notify the Agency within 1 hour of dispatch of the Contractor's repair crews and give their name, an emergency contact number, the location of the emergency repair, and a tentative completion date and time. The Contractor must notify the Agency when the emergency repair is completed and the road is clear, or, if an extension of time is required, the Contractor must provide a revised tentative completion date and time.

7-8.04 Revocation of Permission For Off-Period Work

The Agency can revoke permission for off-period work if the Contractor endangers the public, an employee, or themselves by violating a safety and health regulation, or fails to maintain an adequate work force and equipment for reasonable prosecution and inspection of the work.

7-8.05 Working Shifts

Two- or three-shift operations can be established as a regular procedure by the Contractor upon written permission from the Agency. If the multiple shift operations create or occur during off-period work as defined in Section 7-8.02, "Off-Period Work," of these Specifications, the requirements stated in Section 7-8.02 apply. Permission for off-period work can be revoked if the Contractor fails to comply with applicable safety and health regulations, fails to maintain adequate force and equipment for reasonable prosecution and inspection of the Work, or fails to provide sufficient artificial light to permit the Work to be carried out safely and appropriately and to permit proper inspection.

7-8.06 Lane and Road Closures During November/December Holiday Season

Except as provided in the Special Provisions or approved by the Agency, construction will be suspended, and no activities that interfere with public traffic can be conducted on designated streets during the holiday season (defined as the 4-day Thanksgiving weekend and December 8 through January 1, also referred to as the "Holiday Moratorium"). A current map showing streets subject to the Holiday Moratorium is available from the Department of Transportation Right-of-Way Management Section at 4100 Traffic Way, Sacramento, CA 95827 or on the Internet at http://www.sacdot.com/Documents/TrafficControlTemplates1010.pdf. All existing pits, excavations, trenches, and openings in the road surface must be backfilled and paved to produce a level and smooth surface. All barricades and barriers must be removed from all traffic lanes, unless authorized by the Agency as long-term traffic controls. Only emergency repairs as defined in Section 7-8.03, "Emergency Repairs," in this Section of these Specifications, will be permitted during the holiday season. Unless otherwise stipulated in the Special Provisions, the holiday season as described above is accounted for in the original contract duration, and Contract Time will continue to be counted during this suspension period. The baseline and progress schedules must include this suspension period if applicable.

7-9 TEMPORARY FACILITIES AND SERVICES

Unless specified otherwise in the Special Provisions, the Contractor is responsible for providing and maintaining necessary material storage facilities, utilities, field offices, temporary roads, fences, security, etc. for prosecuting the Work. The Contractor must not connect to, or draw construction water from, fire hydrants without written approval from the utility owner and the Agency.

7-10 PROTECTION OF WORK, PERSONS AND PROPERTY

The Contractor must protect the Work and materials from damage until completion and acceptance of the Work. Neither the Agency nor its agents assume responsibility for collecting funds from any person or persons that damage the Contractor's work.

The Contractor must store materials and equipment in accordance with manufacturers' recommendations and erect temporary structures to protect them from damage.

The Contractor must furnish guards, fences, warning signs, walks, and lights, and must take all necessary precautions to prevent damage or injury to persons or property.

7-11 NOT USED

7-12 DELAYS

The Contractor must provide notification to the Agency for delays in accordance with Section 7-13, "Notice of Delays," of these Specifications.

7-12.01 Avoidable Delays

The Contractor will not receive time extensions or compensation for avoidable delays. Avoidable delays include, but are not limited to, the following:

1. Delays that affect only a portion of the work but do not prevent or delay the prosecution of controlling items of work nor the completion of the whole Work within the Contract Time.
2. Delays associated with the reasonable interference of other contractors employed by the Agency that do not necessarily prevent or delay the prosecution of controlling items of work or the completion of the whole Work within the Contract Time.
3. Delays associated with loss of time resulting from the necessity of submitting plans for Agency approval or from Agency surveys, measurements, inspections, and testing.
4. Delays that could have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or Subcontractors.
5. Restriction of or impacts to the Contractor's operations due to actions of the Sacramento Metropolitan Air Quality Management District, the State Water Resources Control Board, the Regional Water Quality Control Board, or any federal, state, or local jurisdictional agency.

7-12.02 Unavoidable Delays

The Contractor will be granted an extension of Contract time for delays that are determined to be beyond the control of the Contractor, and that impact a controlling item of work at the time the delay was encountered, and that could not be prevented by the exercise of care, prudence, foresight, and diligence. Unavoidable delays include Agency acts, acts of God or of the public enemy, fire, floods, epidemics, and strikes. Material shortages and delays in utility company relocations might be classified as unavoidable if the Contractor produces satisfactory evidence of acting in a timely manner.

1. The Contractor will not receive additional compensation due to inclement or unsuitable weather or conditions resulting therefrom, acts of God or of the public enemy, fire, floods, epidemics, strikes, material or labor shortages, or utility relocations.
2. The Contractor might be entitled to additional compensation for unavoidable delays the Agency determined resulted from an Agency act or the discovery of cultural resources as specified in Section 10-12, "Archeological and Cultural Resources," of these Specifications, except as modified below:
    a. Compensation for unavoidable delays will not be granted when the Contractor could have reasonably anticipated the delay.
    b. When there are 2 or more concurrent delays and at least 1 is non-compensable, no compensation other than time extension will be provided.
    c. Compensation for unavoidable delays will be granted only if the unavoidable delay affects controlling operations that would prevent completion of the Work.

7-12.03 Time Impact Analysis

If the Contractor requests a time extension due to unavoidable delays, the Contractor must provide a Time Impact Analysis (TIA) that supports the requested time within 10 Working Days of when the Contractor knows, or should have known, of the delay. The TIA must comply with the following:

1. Describe the impacts of each unavoidable delay on the current scheduled Contract Completion Date or interim milestone.
2. Use the accepted baseline or monthly schedule that has a data date closest to and before the event. If the Agency determines that the schedule used does not appropriately represent the conditions before the event, the Contractor must update the schedule to the day before the event being analyzed.
3. Include an impact schedule (fragnet) developed from incorporating the event into the accepted schedule by adding or deleting activities. If the impact schedule shows that incorporating the event modifies the critical path and Contract Completion Date of the accepted schedule, the difference between scheduled completion dates of the 2 schedules must be equal to the adjustment of Contract time.
4. Provide a narrative describing the chronology of events, changes to the schedule, and how the Contractor met the Contract requirements for providing notice and requesting time.
5. Address concurrent delays in the same time period for which the TIA is submitted.

If the Agency accepts the TIA, the Agency will grant a time extension, and the fragnet then must be included in subsequent monthly schedule updates. If the Agency rejects the TIA, the Contractor must not include the delays in subsequent schedule updates. All s TIA related resubmittals must be returned within 10 Working Days of receiving Agency review comments.

Inclusion of any delay events not accepted by the Agency is grounds for rejection of schedule updates. Failure by the Contractor to provide notice and request time in compliance with all contract requirements waives the Contractor's right to a time extension and will result in the Contractor being responsible for all costs to mitigate said delay.

7-13 NOTICE OF DELAYS

The Contractor must immediately notify the Agency in writing if the Contractor foresees a delay in the prosecution of the Work or immediately upon the occurrence of an unavoidable delay, but in no case can the written notice be provided to the Agency later than 2 Working Days after the occurrence of the unavoidable delay. The Contractor must state the probability of the delay occurring and its cause, so the Agency can take steps to prevent the occurrence or continuance of the delay and determine whether the delay is avoidable or unavoidable, its duration, and the extent.

The Agency will assume that delays were avoidable unless the Agency was notified as indicated above and, through its investigation, found them unavoidable. No consideration for additional time or compensation will be given for a delay not called to the Agency's attention at the time of its occurrence.

The Agency reserves the right to direct the Contractor to work overtime on base contract work to mitigate the effect of an unavoidable compensable delay or when it is determined to be in the best interest of the Agency, Public or Project. If the Contractor is so directed by the Agency, the Agency will compensate the Contractor, via Contract Change Order, the premium portion of the overtime without markup. Markups for Change Work are not applicable to these premium portion costs and will not be paid.

7-14 CARELESS DESTRUCTION OF STAKES AND MARKS NO CAUSE FOR DELAY

If the Contractor or Subcontractors carelessly destroy Agency-placed stakes and marks causing a delay in the Work, the Contractor has no claim for damages or time extensions. See also Section 5-9, "Surveys," of these Specifications.

7-15 TIME OF COMPLETION

Time is of the essence on Agency contracts. The Contractor must complete all of the Work called for under the Contract within the Contract Time set forth in the Special Provisions.

The Agency will furnish the Contractor a weekly statement showing the number of days charged to the Contract for the preceding week, the number of days of time extensions approved or under consideration, the number of days originally specified for the completion of the Contract, and the extended date for completion. The extended date for completion is the revised Contract Completion Date. The Contractor will be allowed 15 Calendar Days from the issuance of the weekly statement to file a written protest stating how the Contractor's estimate of Contract days charged to the Contract differs from the Agency's. If no protest is received, it will be deemed by the Agency that the Contractor has accepted the statement as being correct.

7-16 EXTENSION OF TIME NOT A WAIVER

Time extensions granted for unavoidable delays or for the execution of extra or additional work are not waivers of the Agency's rights under the Contract.

7-17 INCLEMENT WEATHER AND CONTRACT TIME

A Contract day on either Working Day or Calendar Day contracts will not be charged if, in the opinion of the Agency, inclement or unsuitable weather or its effects prevents working on the current controlling operation for at least 50 percent of the scheduled work shift with at least 50 percent of the scheduled labor and equipment due.A current controlling operation is any feature of the Work (e.g., an operation or activity including settlement, curing periods, and submittal activities) that if delayed or prolonged will delay the Contract Completion Date. If the current accepted Baseline Schedule or Monthly Schedule Update contains float, no work item is controlling and a working day will be charged.

7-18 EXTENSION OF TIME

The Contractor will be allowed a time extension to complete the Work equal to the sum of all unavoidable delays, as determined in accordance with Section 7-12.02, "Unavoidable Delays," in this Section of these Specifications, plus adjustments in Contract Time due to Contract Change Orders, as outlined in Section 9-12, "Time Extensions for Changes," in these Specifications. During the time extension, the Contractor will not be charged for extra engineering and inspection or liquidated damages. Requests for a time extension must be submitted in writing to the Agency within 10 Working Days of when the Contractor knew, or should have known, of the event that is the reason for the request for time extension. All requests for time must be submitted before the expiration of the Contract Time. Any failure by the Contractor to provide notice or request a time extension, in compliance with all related contract provisions, is an irrevocable waiver of the Contractor's right to a time extension resulting in the Contractor being responsible for all costs to mitigate the delay.

7-19 SUBSTANTIAL COMPLETION

When the Contractor considers the entire Work, or a specific portion of the Work, substantially complete, the Contractor must certify in writing to the Agency that the Work is

substantially complete and request that the Agency grant substantial completion. Within 5 Working Days, the Agency and the Contractor must inspect the Work to determine the status of completion. If the Agency does not consider the entire Work, or a specific portion of the Work, substantially complete, the Agency will notify the Contractor in writing, giving the Agency's reasons. If the Agency considers the entire Work, or a specific portion of the Work, substantially complete, the Agency will grant substantial completion. The counting of time for liquidated damages will cease for the entire Work, or a specific portion of the Work, on the date substantial completion is granted, but substantial completion does not bind the Agency to formal acceptance or relieve the Contractor of the responsibility for completing or correcting work.

Unless otherwise specified in the Special Provisions, the entire Work, or a specific portion of the Work, will be considered substantially complete when all work depicted on the contract drawings and required by the Contract Documents has been performed, and the Work can be used for its intended purpose. Only minor corrective work will be allowed to be considered as punch list work. The Agency will provide a list of items to be completed or corrected (punch list) before Field Acceptance. The Contractor must provide the level of effort and resources necessary to complete the punch list within 30 Calendar Days. Unless otherwise agreed to by the Agency, the Agency is authorized to perform the work if the contractor fails to complete the punch list within 30 Calendar Days. Costs incurred by the Agency to correct defects or deficiencies, including loss of use, inspection and administrative costs, will be deducted from the final project payment via a deductive change order.

7-20 CLEANING UP

Throughout the construction period, the Contractor must keep the site of the Work in a presentable condition, dispose of surplus materials, keep roadways reasonably clear of dirt and debris, keep sidewalks and other pedestrian areas clear of dirt, loose gravel, debris and tripping hazards, clean out drainage ditches and structures, and repair fences or other property damaged during the progress of the Work, to the satisfaction of the Agency. The Contractor must also keep the work site cleaned of all rubbish, excess material, and equipment. All portions of the work must be left in a neat and orderly condition prior to requesting final inspection. Surplus material must be disposed of in accordance with Section 18-7, "Surplus Material Disposal," of these Specifications.

The final inspection will not be made until final cleanup has been accomplished.

7-21 FINAL INSPECTION, FIELD ACCEPTANCE, AND NOTICE OF COMPLETION

7-21.01 Final Inspection

The Contractor must notify the Agency in writing of the completion of the punch list per Section 7-19, "Substantial Completion," of these Specifications, and the Agency will promptly inspect the Work. The Contractor or the Contractor's representative must be present at the final inspection. The Contractor will be notified in writing of defects and/or deficiencies. The contractor must provide the level of effort and resources necessary to fix the defects or deficiencies within 30 Calendar Days of the notification. Unless otherwise agreed to by the Agency, the Agency is authorized to perform the work if the contractor fails to complete the defects or deficiencies as required. Costs incurred by the Agency to correct defects or deficiencies, including loss of use, and inspection and administration costs. will be deducted from the final project payment via a deductive change order. When notified that correction of the defective and/or deficient work is complete, the Agency will again inspect the Work to ascertain that the corrections have been made in accordance with the Contract.

7-21.02 Field Acceptance

The Agency will issue a field acceptance letter and will recommend to the Board final acceptance of the Work, if it finds all corrections acceptable. Field acceptance by the Agency starts the warranty periods, but does not bind the Board to final acceptance or relieve the Contractor from the responsibility of completing or correcting work.

7-21.03 Notice of Completion

The Notice of Completion will be filed within 15 Calendar Days of Field Acceptance.

7-22 FINAL ACCEPTANCE

Upon Final Completion of the Work, including training, acceptance of M&O manuals, Record Drawings, and test reports, the Agency will recommend to the Board that it accept the Work as complete. (See Section 8-11, "Final Estimate and Payment," of these Specifications.)

SECTION 8 - MEASUREMENT AND PAYMENT
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SECTION 8 MEASUREMENT AND PAYMENT

8-1 BASIS AND MEASUREMENT OF PAYMENT QUANTITIES

It is the Contractor's responsibility to measure and compute the quantities of work completed under the terms of the Contract, subject to verification by the Agency. In computing quantities, the length, area, solid contents, number, weight, or time as specified in the Contract or the Schedule of Values must be used.

8-1.01 Unit Price Contracts

Payment for work bid at a price per unit of measurement will be based upon the actual quantities of work measured upon completion. The Estimated Quantities provided in the Bid are for bidding only, and the Agency does not express or imply that the actual amount of work or materials will correspond to the Estimated Quantities. The Contractor will not receive any compensation for anticipated profits, loss of profit, damages, or any extra payment due to any difference between the amount of work actually completed, or materials or equipment furnished, and the Estimated Quantities. See also Section 9-14, "Contract Change Order (CCO)," of these Specifications.

8-1.02 Lump Sum or Job Contracts

Progress Payments will be based on the Schedule of Values prepared by the Contractor and approved by the Agency prior to acceptance of the first Progress Payment request (see Section 8-5, "Progress Payment Procedures," in this Section of these Specifications). If requested by the Agency, the Contractor must furnish full copies of Subcontracts showing actual costs. The Schedule of Values must correspond to the baseline schedule prepared by the Contractor pursuant to Section 7-5.02, "CPM Schedule – Major Projects," of these Specifications.

8-1.03 Payment for Mobilization

Mobilization consists of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the site; for the establishment of all offices, buildings, and other facilities necessary for the Work; and for all other work and operations which must be performed, or for costs incurred, prior to beginning the Work.

Payment for mobilization will be as follows:

8-1.03.A Mobilization Not a Pay Item

When the Contract does not include a separate pay item for mobilization, full compensation for mobilization will be included in the Contract lump sum price, or in the prices paid for the various items of work in a unit price contract, and no additional compensation will be paid.

8-1.03.B Mobilization a Pay Item

When the Contract or proposed Schedule of Values includes a separate item for mobilization, payment for mobilization will include full compensation for the furnishing of all labor, materials, tools, equipment, administrative costs, and incidentals for mobilization.

1. Unless otherwise noted in the Special Provisions, the Agency will pay no greater than 5 percent of the Total Contract Price as a separate pay item for mobilization. In the event the Contractor submits a mobilization pay item greater than 5 percent of the Total Contract Price, the Agency will pay any excess mobilization amount with the final Progress Payment.

2. Payment for mobilization will be prorated as follows:
   a. When the Progress Payment request is 5 percent or more of the original Total Contract Price (excluding mobilization), 50 percent of the contract item price for mobilization or 2.5 percent of the Total Contract Price, whichever is less, will be paid for mobilization.
   b. When the Progress Payment request is 10 percent or more of the original Total Contract Price (excluding mobilization), 70 percent of the contract item price for mobilization or 3.5 percent of the Total Contract Price, whichever is less, will be paid for mobilization.
   c. When the Progress Payment request is 20 percent or more of the original Total Contract Price (excluding mobilization), 90 percent of the contract item price for mobilization or 4.5 percent of the Total Contract Price, whichever is less, will be paid for mobilization.
   d. When the Progress Payment request is 50 percent or more of the original Total Contract Price (excluding mobilization), 100 percent of the contract item price for mobilization or 5 percent of the Total Contract Price, whichever is less, will be paid for mobilization.
   e. After final acceptance of the Contract, the amount, if any, of the Contract item price for mobilization in excess of 5 percent of the original Total Contract Price will be included for payment in the final estimate made in accordance with Section 8-11, "Final Estimate and Payment," in this Section of these Specifications.
3. The Agency will not pay additional mobilization compensation for work under a Contract Change Order unless necessary solely for the performance of Contract Change Order work and prior written approval is obtained from the Agency. Payment for mobilization is subject to retention per Section 8-7, "Retention," of these Specifications.

8-2 SCOPE OF PAYMENT

8-2.01 General

Compensation under the terms of the Contract is full payment for the Work, including loss or damage arising from the nature of the Work, action of the elements, or unforeseen difficulties encountered during the prosecution of the Work until its final acceptance; and all risks connected with the prosecution of the Work.

8-2.02 Unit Price Contract

Progress Payments will be made based on the unit price bid and measured quantities for work completed, plus work completed on approved Change Orders. For compensation for alterations in quantities of work, including deviations greater than 25 percent, see Section 2-1.02, ""Unit Price Bid," in these Specifications.

8-2.03 Lump Sum or Job Contract

Progress Payments will be based on the approved Schedule of Values for work completed, plus work completed on approved Change Orders.

8-2.04 Final Pay Items

An item designated as a Final Pay Item in the Contract will be paid for as specified in the State Specifications.

8-2.05 Allowances

Allowances may be included in the Bid for materials and/or work that cannot be accurately quantified at bid time or may be added during the course of the Contract. The Allowance may be used in whole, in part, or not at all as determined by the Agency. Payment under an allowance item will only be made upon acceptance and approval of quantities of work, invoices

or other appropriate documentation as determined by the Agency. Whenever costs of the Work included in the Allowance item are more or less than the specified Allowance amount, the Total Contract Price will be adjusted accordingly by Contract Change Order. The Contractor will not receive any compensation for anticipated profits, loss of profit, damages, or any extra payment due to any difference between the amount of work actually completed, or materials or equipment furnished, and the Estimated Quantities for the Allowances.

8-2.06 Payment for Material Not Incorporated into the Work

Unless set forth in the Special Provisions or authorized by the Agency, Progress Payments will not be made for materials and equipment not incorporated into the Work. The Agency may impose additional requirements for insurance, storage, handling, security, etc., that the Contractor must comply with if payment is to be made for materials not incorporated into the Work.

8-3 WORK TO BE DONE WITHOUT DIRECT PAYMENT

Unless otherwise specified in the Special Provisions, compensation for any portion of the Work not specifically identified in the Bid Form or Schedule of Values is understood to be included in the price paid for other reasonably related items. No additional compensation is allowed for additional shifts or premium pay necessary to ensure that the Work is completed within the time limits specified in the Contract.

8-4 PAYMENT FOR USE OF COMPLETED PORTIONS OF WORK

If the Agency accepts a completed or partially completed portion of the Work under Section 4-10, “Use of Completed Portions,” of these Specifications, the Contractor will be compensated in accordance with Sections 8-11, “Final Estimate and Payment,” and 8-12, “Final Payment to Terminate Liability of Agency,” of these Specifications. When the Agency accepts a completed or partially completed portion of the Work, the warranty period for that portion commences, and the Contractor will be relieved of any further maintenance and protection of that portion. The Contractor will not be relieved of the Contract requirements for repairing or replacing defective work and materials.

8-5 PROGRESS PAYMENT PROCEDURES

No Progress Payment will be made when, in the judgment of the Agency, the Work is not proceeding in accordance with the provisions of the Contract, or when the total work done since the last Progress Payment amounts to less than one thousand dollars ($1,000). Unless otherwise agreed to at the preconstruction meeting or identified in the Special Provisions, on the 20th of each month, the Contractor must submit in writing for Agency review an estimate of the total amount and value of work done, including that done under approved Change Orders, and the acceptable materials furnished and incorporated in the work through the 20th day of the month. The Bid Form or Schedule of Values will be used to prepare a Progress Payment request for the items, or portions of items, of the Work completed during the monthly progress period. After deducting all previous payments, the retention, as described in Section 8-7, “Retention,” of these Specifications, and other withholdings (see Section 8-8 of these Specifications) or deductions specified in the Contract, the Agency will pay the Contractor the balance.

The payment of a Progress Payment or the acceptance of payment by the Contractor does not constitute acceptance of any portion of the Work, and does not reduce the Contractor’s liability to replace unsatisfactory work, material, or equipment. An inadvertence or error in an approved Progress Payment request will not release the Contractor or the Contractor's surety from damages arising from the work covered by the approved payment request or from

enforcement of every provision of the Contract. The Agency has the right to correct any error made in any Progress Payment.

8-6 INSPECTION AND PROGRESS PAYMENTS NOT A WAIVER OF CONTRACT PROVISIONS

Inspection, measurement, payment, acceptance of work or material (including, but not limited to, acceptance of the entire Work), time extension, or possession of the Work or any part of the Work does not waive any of the terms and conditions of the Contract, the powers reserved by the Agency, or any right of the Agency to damages or to reject the Work in whole or part. No breach of this Contract is a waiver of any other or subsequent breach. All remedies provided in the Contract are cumulative and in addition to all other rights and remedies that exist at law or in equity.

8-7 RETENTION

8-7.01 Retention to Ensure Performance

Unless noted otherwise in the Special Provisions, 5 percent of each progress payment will be retained until the Work has been completed and Field Accepted. In accordance with Section 7107 of the Public Contract Code, retention will be released within 60 days of Field Acceptance. (See Section 7-21, "Final Inspection and Field Acceptance," of these Specifications.)

8-7.02 Non-Compliance

The Agency may also retain portions of a Progress or Final Payment for Contract non-compliance in an amount deemed appropriate by the Agency.

8-7.03 Substitution Of Securities

At the request and expense of the Contractor, in accordance with California Public Contract Code Section 22300, in lieu of the Agency withholding the 5 percent retention defined in Section 8-7.01, "Retention to Ensure Performance," in these Specifications, the Contractor may: 1) substitute a deposit of securities at least equivalent to the retention to be paid, or 2) request the Agency pay retention directly to an escrow agent.

The Contractor and Agency shall enter an escrow agreement in the exact form set forth in Public Contract Code Section 22300. Sample Forms are included in Appendix A of these Specifications. All forms or correspondence pertaining to Security Deposit in Lieu of Withhold shall be addressed to:

Department of General Services
Contract and Purchasing Services Division
9660 Ecology Lane
Sacramento, CA 95827

8-7.04 Earnest Deposit

An Earnest Deposit may be held from the final release of retention as described in Section 8-7.01 above for any of the reasons included in Section 8-8, "Withholdings/Denial of Progress Payment Request," of these Specifications. In the event of a dispute between the Agency and the Contractor, the Agency may hold in Earnest Deposit an amount equal to 150 percent of the disputed amount. All or a portion of the monies held in Earnest Deposit will be released upon satisfactory resolution.

8-8 WITHHOLDINGS/DENIAL OF PROGRESS PAYMENT REQUEST

The Agency may deny a Progress Payment request and/or withhold money from any Progress Payment to:

- cover any unpaid claims filed pursuant to Civil Code Sections 3179 et seq.;
- protect the Agency's interest; and/or
- pay any fines levied against the Work by the Agency or other entities.

The Agency may also deny a Progress Payment request and/or withhold money or modify any previous Progress Payment as necessary to protect the Agency from loss due to or resulting from:

- Defective work not remedied.
- Stop notices filed. The County may at its discretion accept a bond in lieu of withholding funds for properly filed Stop notices. However, the bond must be issued by a different surety than the one that issued the Contractor's Payment Bond for the project. The amount withheld for Stop notices will be 125 percent of the stop notice amount.
- Failure of the Contractor to make prompt payments properly to Subcontractors for labor, materials, or equipment as required by Business and Professions Code Section 7108.5.
- Evidence that the Work cannot be completed for the unpaid balance of the Contract sum.
- Evidence that the Work will not be completed within the Contract time.
- Damage to the Agency or another contractor.
- Failure to carry out the Work in accordance with the Contract.
- Any violation or non-compliance with Contractor's legal responsibilities (see Section 6, "Legal Relations and Responsibilities," of these Specifications), including withholds for wages adjustments in accordance with California Labor Code Section 1727 and any fines incurred by the Agency as a result of the Contractor's actions.

When, under the provisions of the Contract, the Agency charges any sum of money against the Contractor, the Agency will deduct and retain the amount of such charge from a Progress or Final Payment. If, on completion or termination of the Contract, sums due the Contractor are insufficient to pay the Agency charges against the Contractor, the Agency has the right to recover the balance from the Contractor or the Contractor's surety.

8-9 DEDUCTIONS FOR IMPERFECT WORK

For any portion of the Work retained in accordance with Section 5-19, "Right to Retain Imperfect Work," of these Specifications, the Agency will deduct from a Progress Payment a just and reasonable amount, to cover Agency costs for additional maintenance, replacement or repair before the end of the anticipated useful life, or other unanticipated Agency costs. A deductive Contract Change Order for the defective work will be issued in accordance with Section 9-14, "Contract Change Order (CCO)," of these Specifications.

8-10 LIQUIDATED DAMAGES FOR DELAY

All parties to the Contract agree that time is of the essence, and that the Work must be completed within the time stated in the Special Provisions, plus any time extensions as provided in Section 7-18, "Extension of Time," of these Specifications. The Contractor's failure to complete the Work within the time allowed will result in damages to the Agency. Because it is impracticable to determine the actual amount of damage by reason of such delay, the Contractor agrees that the sum(s) set forth in the Special Provisions is (are) a reasonable amount to be charged for liquidated damages. It is agreed that the Contractor will pay to the

Agency the sum set forth in the Special Provisions for each and every day's delay beyond the time prescribed in the Contract, and the Contractor further agrees that the Agency may deduct and retain the amount thereof from any monies due or to become due the Contractor under the Contract.

8-11 FINAL ESTIMATE AND PAYMENT

Subsequent to Field Acceptance as detailed in Section 7-21.02, "Field Acceptance," of these Specifications, the Contractor must provide a proposed Final Payment request, segregated as to Contract item and Contract Change Order work.

The Agency will review the proposed Final Payment request and, after deducting all previous payments and all amounts to be deducted, withheld, and/or retained under the provisions of the Contract and Public Contract Code Section 7107, will create the Final Payment request. All Progress Payments shall be subject to correction in the Final Payment.

Within 15 Calendar Days after the proposed Final Payment request is returned to the Contractor, the Contractor must submit to the Agency a written approval of said request or a written statement of exceptions. The Contractor's statement of exceptions must be in sufficient detail for the Agency to ascertain the basis and amount of the exceptions; failure to provide the detail is sufficient cause for denial of the exceptions. Any claim of the Contractor or the Contractor's Subcontractors or suppliers with respect to the performance or breach of the Contract or any alterations thereof (except for payment of the balance of the Contract price as set forth in the Final Payment request) not specifically set forth in the statement of exceptions, is waived by the Contractor. If the Contractor fails to file a statement of exceptions within the time allowed, the Agency will infer acceptance of the final Progress Payment request as submitted to the Contractor.

If no liens or claims have been filed against the Contractor after thirty-five (35) days from the filing of Notice of Completion, the Agency will approve and process for payment the entire sum due, including the release of any retention.

8-12 FINAL PAYMENT TO TERMINATE LIABILITY OF AGENCY

Payment of the final amount due under the Contract releases the Agency, and the Agency's officers, officials, agents, employees, members, volunteers, affiliates, and their duly authorized representatives, from all claims or liability on account of work performed under the Contract. Tender of this payment constitutes denial by the Agency of any unresolved claim of the Contractor not specifically excepted in writing by the Contractor. The Contractor's acceptance of the Final Payment releases the Agency and the Agency's officers, officials, agents, employees, members, volunteers, affiliates, and their duly authorized representatives, from all claims or liability on account of work performed under the Contract or any alterations thereof, except unresolved items set forth in the statement of exceptions.

8-13 DISPUTED PAYMENTS

The Agency will decide disputes regarding payments under the Contract according to the procedures set forth in Section 9, "Changes and Claims," of these Specifications. The decision of the Agency will be final.

SECTION 9 - CHANGES AND CLAIMS

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SECTION 9 CHANGES AND CLAIMS

9-1 AUTHORITY FOR CHANGES

The Agency reserves the right to order corrections, alterations, additions, modifications, deletions or other changes required for the proper completion of the Work. The order may be made prior to the final acceptance of the Contract without voiding the Contract, without notice to the Contractor's sureties, and in accordance with the provisions of 9-2, "Ordering of Changes", of these Specifications.

The Contractor must not perform corrections, alterations, additions, modifications, deletions, or other changes to the Work without a written order from the Agency, in accordance with Section 9-2, "Ordering of Changes", of these Specifications.

Payment for changed or extra work will not be made without the Agency's written authorization for the changed or extra work.

9-2 ORDERING OF CHANGES

The Agency may order a change, in writing, during the course of the Work, and the Contractor must comply with the order. Changes to the Work do not affect, vitiate, or make void the Contract or any part thereof, except that which is necessarily affected by the changes and is clearly the evident intention of the parties to the Contract.

Changes to the Work can be initiated as described in Section 4-5, "Field Instructions or Other Written Directives", of these Specifications. Changes that require an adjustment to the total Contract Price or the Contract Time will be formalized in a Contract Change Order, in accordance with Section 9-14, "Contract Change Order (CCO)", of these Specifications. Failure of the Agency and Contractor to agree to terms of an order for change does not relieve the Contractor of his obligation to complete all work specified in the order.

9-3 CONSTRUCTION INCENTIVE CHANGE PROPOSAL (CICP)

9-3.01 General

The Construction Incentive Change Proposal (CICP) Program provides a means for the Contractor to use his expertise to improve Contract performance to create an overall reduction in the Total Contract Price. Proposing to delete work is not a CICP. Deleted work is addressed in Section 4-8, "Deleted Items", in these Specifications. The CICP Program does not apply to Agency contracts of less than $100,000. The Contractor and Subcontractors may participate in the CICP Program. Participation of Subcontractors is through the Contractor and the Contractor and his Subcontractor must agree on the sharing arrangement; written evidence of the arrangement must be submitted with the CICP.

While a CICP is being considered or processed, the Contractor must proceed with the Work as scheduled.

9-3.02 Description

A CICP is a formally written proposal for a Contract Change Order. A CICP must be initiated, developed, and identified as a CICP by the Contractor or his Subcontractor. A CICP must result in a net capital cost reduction while causing no increase in the total life cycle cost of the project and must comply with the following conditions:

- Required function, reliability, and safety of the project must be maintained without detracting from the life expectancy or increasing maintenance requirements.

- The proposed change must not cause undue interruption of the Work or extend the Contract Time.
- The proposed change must comply with all applicable permits, regulations, code requirements, and all requirements set forth in the Contract. The proposed change cannot involve payment of royalties by the Agency to the Contractor.

9-3.03 Submittal

9-3.03.A Pre-Submittal

Before preparing a CICP, meet with the Agency to discuss:

1. Proposal concept
2. Permit issues
3. Impact on other projects
4. Project impacts, including traffic, schedule, and later stages
5. Peer reviews
6. Overall proposal merits
7. Review times required by the Department and other agencies

9-3.03.B CICP Submittal

A CICP submittal must contain adequate information and supporting documentation for Agency evaluation. At a minimum, the following information must be submitted:

1. Name of individuals associated with the development and preparation of the CICP.
2. A detailed description and plans and specifications showing work as presently designed and
   the proposed changes. The plans and specifications must be stamped and signed by a California Registered Civil Engineer**.**
3. A clear explanation of all advantages and disadvantages for each proposed change.
4. A detailed procedure and schedule for implementing the proposed change. This detailed procedure and schedule must include all necessary Contract amendments. Also indicated must be the latest date that the CICP can be approved for implementation.
5. A summary of costs, including:
   a. Project construction costs before and after the CICP. This must be a detailed estimate identifying the following items for each trade involved in the CICP:
      - Quantities of material and equipment
      - Unit prices of materials and equipment
      - Labor hours and rates for installation
      - Subcontractor and prime Contractor mark ups
      - Operation and maintenance costs before and after the CICP
      - Cost for implementing the CICP not included elsewhere

   b. Contractor's share of the savings based on the sharing provision in Section 9-3.05, “Sharing Provisions and Formula”, of these Specifications.
   c. Other data as required by local permits and regulations and code requirements as set forth in the Contract.
6. Time required for execution of the proposed change.

To the extent indicated herein, the Contractor may restrict the Agency's use of a CICP or the supporting data submitted pursuant to this program. Suggested wording for inclusion in CICP's is as follows:

"This data furnished pursuant to the construction incentive clause of the Contract must not be disclosed or duplicated in whole or in part beyond what is necessary to accomplish the review. This restriction does not limit the Agency's right to use the

information if it is available from any source without limitations. The Agency has the right to duplicate, use and disclose any information if the CICP is accepted."

The Agency may modify, accept, or reject the CICP. If the CICP is modified or not acted upon within the time allotted in the proposal, the Agency will not be liable for the Contractor's cost of developing the CICP if it is withdrawn or rejected.

9-3.04 Acceptance

The Agency will use the processing procedure specified for Change Orders in Section 9-14, "Contract Change Order (CCO)", of these Specifications, if a CICP is accepted. The Agency's written approval of the CICP is required. If the CICP is rejected, the Contractor cannot appeal the decision.

9-3.05 Sharing Provisions and Formula

Upon acceptance of the CICP, the Contractor will receive 50% of the Net Capital Savings based on the following formula:

> Net Capital Savings = Contract Cost Prior to CICP - (Revised Contract Cost After CICP + Contractor's CICP Development Cost + Agency's CICP Implementation Cost)

The Contractor's CICP development cost is limited to those costs directly associated with the preparation of the CICP package. Development costs will be reimbursed after approval. The Agency will reject costs that cannot be satisfactorily substantiated.

The Agency's CICP implementation costs include engineering costs for reviewing and redesigning the changes plus any additional inspection and testing costs. Agency costs for processing the CICP are excluded.

9-4 CHANGES TO THE CONTRACT

Within 14 Calendar Days of a Notice of Potential Claim from the Contractor or issuance of an order or a request for proposal from the Agency for a change to the Contract, the Contractor must provide a cost and time proposal prepared in accordance with Sections 9-8, "Payment for Changes", and 9-12, "Time Extensions for Changes", of these Specifications. The Contractor's proposal must indicate the amount to be added or deducted from the Total Contract Price, supported by complete details of all Contractor, Subcontractor, vendor or supplier costs per Section 9-6, "Cost and Pricing Data", of these Specifications. If the Agency opts to not proceed with the change, the Agency will reimburse the Contractor for the actual costs associated with the preparation of the proposal. The Contractor must submit an invoice prepared in accordance with Section 9-8.03 of these Specifications.

If the Contractor does not submit a proposal within 14 Calendar Days, the Contractor agrees to perform the work described in the order for change with no additional compensation or contract time. If the order for change is issued on a force account basis, the Contractor must immediately begin keeping records in accordance with Section 9-8.03, "Force Account", of these Specifications.

9-5 PROSECUTION OF CHANGES TO THE CONTRACT

The Contractor must comply with and prosecute all portions of the order for change with the same diligence and manner as if the changes were originally included in the Contract, except as otherwise provided in the order.

If agreement is reached regarding payment, but not a time adjustment, the Agency has the right to direct the Contractor to proceed with the change at the agreed price. The impact of the

changed work on the project schedule will be considered by the Agency in accordance with Section 9-12, "Time Extensions for Changes", of these Specifications.

When the Agency and Contractor cannot agree on the credit for deleted work (see Section 4-8 of these Specifications), the Agency's estimate will be deducted from the Total Contract Price, unless the Contractor presents proof prior to the Final Payment that the Agency's estimate is in error.

9-6 COST AND PRICING DATA

Cost and pricing data submitted by the Contractor must be true, complete, accurate, and current. The Agency may require a formal certification by a corporate officer to verify Contractor-submitted cost and pricing data. Additional requirements for cost and pricing data may be included in the Special Provisions. The Agency must have access to the records supporting the cost and pricing data in accordance with Section 9-7, "Access to Records", of these Specifications.

9-7 ACCESS TO RECORDS

Upon reasonable notice and during normal business hours, the Agency must be given access to the Contractor's and Subcontractors' records for the purpose of verifying and evaluating the Agreement and the Work, including the accuracy of cost and pricing data submitted by the Contractor. "Records" as used in this Section includes: original estimates, subcontract agreements, purchase orders, books, documents, accounting records, papers, project correspondence, project files, and scheduling information necessary to determine the direct and indirect costs, job site, area and home office overhead, delay and impact costs. Records must include the original Bid and all documents related to the Bid and its preparation, the as-planned construction schedule and all related documents. Access includes the right to examine and audit records and make excerpts, transcriptions, and photocopies at the Agency's expense.

9-8 PAYMENT FOR CHANGES

The method of payment agreed upon by the Contractor and the Agency, or selected by the Agency in the absence of agreement, will be set forth in the order for change.

Methods of payment are:

9-8.01 Lump Sum Price

The Contractor submits a lump sum price proposal that includes all labor, material, equipment, Subcontractor, and material supplier costs, and all labor surcharges, sales tax, and markups as stipulated in Section 9-9, "Markups for Changed Work", these Specifications.

If the Agency and the Contractor agree to a Lump Sum payment, no additional payment or adjustment will be made.

9-8.02 Unit Prices

If payment for Contract work is based on unit prices, payment for changed work will be made based on actual quantities of work done at the unit prices contained in the Contract or unit prices otherwise agreed to by the Agency and Contractor if none are contained in the Contract. Payment for changed work based on Contract or agreed upon unit prices includes the full cost of the item of work including profit and overhead; and no additional payment or adjustment will be made.

If an ordered change materially changes the character of the work of a Contract item from that on which the Contractor based the bid unit price, and if the change increases or decreases the actual unit cost of the changed item compared to the actual or estimated actual unit cost of

performing the work of that 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 may be made in accordance with the following:

Unit price adjustments for material changes will be the difference between the actual costs to perform the work as originally planned and the actual unit cost of performing the work of the item or portion thereof involved in the change, or as agreed to by the Contractor and the Agency. Actual unit costs will be determined by the Agency in accordance with Section 9-8.03, "Force Account", of these Specifications. The adjustment will apply only to the portion of the work actually materially changed in character. At the option of the Agency, the materially changed work will be paid for by force account per Section 9-8.03, "Force Account", of these Specifications.

9-8.03 Force Account

In the absence of either an agreed lump sum price or unit prices for a change, the Agency may direct the Contractor to proceed with the changed work on a force account basis. The Contractor must keep and present, in a form acceptable to the Agency, a complete and correct accounting of all costs associated with the change, including all pay records, vouchers, invoices, etc. The Contractor will be paid for labor, materials, and equipment actually used during the performance of the changed work as specified in these Specifications in Sections 9-8.03.A, "Labor", 9-8.03.B, "Materials", and 9-8.03.C, "Equipment"; plus the percentages stipulated in Section 9-9, "Markups for Changed Work".

To facilitate agreement on direct craft labor hours, construction equipment hours, and material quantities, the Contractor must notify the Agency not less than 4 hours prior to starting force account work. The Contractor must submit Daily Extra Work Reports (DEWR's) for signature no later than 9:00 a.m. the day following performance of force account work. DEWR's must list names of all Contractor's staff, the staff person's craft or trade, all craft or trade labor hours, and all material and construction equipment used to perform the changed work. The Contractor must use the Agency's DEWR's in preparing billings for force account work.

All documentation supporting Force Account work must be priced out and turned in to the Agency no later than 30 Calendar Days after the work is completed. Failure by the Contractor to notify the Agency of the beginning of the extra work, submit the DEWR's as required, or turn in the support documentation can result in the Agency denying the costs of the extra work.

9-8.03.A Labor

The Contractor will be paid the cost of direct labor (foreperson and below) used in the actual and direct performance of the changed work including working foreman when authorized by the Agency. The Contractor will receive no additional compensation for overtime work without prior written authorization from the Agency. The cost of labor will be the sum of the following:

9-8.03.A.(1) Actual Wages

Charges for labor will be the Contractor's actual payroll costs for labor, including employer payments to or on behalf of the workers for health and welfare, pension, vacation, and similar purposes.

9-8.03.A.(2) Labor Surcharge

A 26% surcharge for taxes, insurance, and all other payments made to or on the behalf of the employee may be added to the actual wages.

9-8.03.A.(3) Subsistence and Travel

The Agency will pay the Contractor for actual subsistence and travel allowance costs associated with the changed work required by labor agreements or acceptable to the Agency. Documentation must be provided to the Agency.

9-8.03.B Materials

Payment will be for the purchaser's actual cost of supplier or vendor furnished materials. If the Contractor does not furnish satisfactory evidence of the cost of the materials, the cost will be the lowest current wholesale price at which required quantities of materials are available and delivered to the job site. The Agency reserves the right to purchase materials for the changed work; the Contractor has no claim for costs or profit on the materials.

9-8.03.C Equipment

The prices paid for equipment directly and solely required for performance of the changed work will be those listed in the current edition of the Caltrans publication, "Labor Surcharge and Equipment Rental Rates". If the equipment is not shown in this publication, the Contractor will be paid hourly rental rates agreed upon by the Contractor and the Agency prior to use of the equipment, plus 33-1/3% for the cost of fuel, oil, lubrication, field repairs, and maintenance if not included in the rental rate. The hourly rental rates cannot exceed those of established distributors or equipment rental agencies serving the area.

The rate paid for the use of equipment constitutes full compensation to the Contractor for all costs, including fuel, power, oil, lubrication, supplies, small tools, small equipment, necessary attachments, repairs and maintenance, depreciation, storage, insurance, labor (except for equipment operators), and costs to the Contractor incidental to the use of the equipment for the changed work.

Payment will not be made for the equipment while it is inoperative due to breakdowns or for time in which no changed work was performed. Payment for rentals will include time required to move equipment to the changed work from the nearest available rental source and to return it to the source. However, no moving, loading, or transportation costs will be paid if the equipment is used for any other portion of the Work.

Individual pieces of equipment having replacement value of $500 or less are considered tools or small equipment and no payment will be made for those pieces of equipment.

9-8.03.D Subcontracts

Subcontract costs are the actual cost to the Contractor for work performed by a Subcontractor. The provisions of Section 9-8.03, "Force Account", of these Specifications, apply to the computation of subcontract costs. Subcontractors must compute markups per Section 9-9, "Markups for Changed Work", of these Specifications.

9-9 MARKUPS FOR CHANGED WORK

Only direct costs directly attributable to the performance of the changed work are allowed. All other costs are included in the allowed markups, including, but not limited to, profit, home office overhead, jobsite indirect costs, jobsite office personnel, general field superintendence, general engineering, supervision of labor, bond and insurance premiums, and general field expense, and constitutes full compensation for all costs not included as actual labor, materials, equipment, or Subcontractor costs. Markups for changed work must not exceed the following:

Labor	25%
Materials	15%
Equipment Rental	15%

The Contractor or Subcontractor, whoever actually performs the changed work, may add the markups to the total of allowable costs. When a Subcontractor performs work, the Contractor and higher tiered Subcontractors may add as mark-up to the total of allowable costs an aggregate amount not to exceed 5%, subject to the limitations of this Section. When the

Agency is entitled to credit for deleted work, a 10% credit for deleted overhead of the Contractor or Subcontractor, as applicable, will be added to the credit.

9-10 COMPENSABLE UNAVOIDABLE DELAYS

Payments will be made as follows for compensable unavoidable delays, as defined in Section 7-12.02, "Unavoidable Delays", in these Specifications.

9-10.01 Construction Equipment

Compensation will be paid for construction equipment idle as a result of a compensable unavoidable delay to the extent costs are incurred. The prices paid for equipment will be those in the current edition of the Caltrans publication, "Labor Surcharge and Equipment Rental Rates", with the following modifications:

- The right-of-way delay factor for each classification of equipment will be applied to the rental rate.
- Compensation will be provided for the actual time of the delay, but not more than 8 hours per day.
- Compensation will only be paid for equipment that was actually idle; Agency will not compensate for equipment that was removed from the jobsite during the idle period.
- Compensation will be provided for each day or portion of a day, excluding Saturdays, Sundays and holidays, for the duration of the delay.

9-10.02 Jobsite Indirect Costs

Indirect costs are limited to the following:

1. Actual payroll costs for field office staff incurred as a result of the delay, including management, supervision, safety, estimating, engineering, drafting, clerical, secretarial and accounting. A 26% surcharge for taxes, insurance, and all other payments made to or on the behalf of the employee may be added to the payroll costs.
2. Actual cost for third-party services provided for the field office, such as management, supervision, safety, estimating, engineering, drafting, clerical, secretarial, and accounting utilized in lieu of employees.
3. Applicable field office expenses for rent and utilities that are substantiated by invoices. Compensation for on-site plant, incidentals, and facilities for non-field office personnel including branch office and home office personnel will not be provided. Compensation for these items and other incidentals is included in the following Section 9-10.03, "Markup for Compensable Unavoidable Delays", of these Specifications.

9-10.03 Markup for Compensable Unavoidable Delays

Except for compensable unavoidable delays associated with archeological and cultural resources as described in Section 10-12, "Archeological and Cultural Resources", of these Specifications and right-of-way delays, 15% can be added to job-site indirect costs for onsite plant, incidentals, overhead, home and branch office costs, bonds, insurance, and profit. The Contractor must determine the distribution of the markup among the Contractor, Subcontractors, and suppliers.

9-10.04 Duplicated Overhead Costs

If the Contractor is compensated for delays in accordance with this Section, and the delay is attributable to direct cost changes to which markups were added, in accordance with Section 9-9, "Markups For Changed Work", of these Specifications, those markups will be adjusted to 5%

for profit only as all overhead costs are compensated in accordance with Sections 9-10.02 and 9-10.03 of these Specifications.

9-11 LIMITATIONS ON PAYMENTS FOR CHANGED WORK

The Agency will not pay the Contractor for costs in excess of prevailing market values, unless the Contractor can establish, to the satisfaction of the Agency, that the Contractor has investigated all possible means of providing the work and that the excess costs could not be avoided. The Agency will be the sole judge of the necessity of incurring costs in excess of market value and whether the excess costs are directly required for performance of changed work. The Agency's determination will be final.

9-12 TIME EXTENSIONS FOR CHANGES

The Contractor is entitled only to adjustment in Contract Time if completion of the entire Work is extended due to the change impacting the controlling item of work. Each proposal submitted by the Contractor in accordance with Section 9-4, "Changes to the Contract", of these Specifications must state the amount of extra time the Contractor believes the change added to the overall project schedule. Failure to request a time extension within the time allowed constitutes a waiver of the Contractor's right to subsequently claim an adjustment in Contract Time.

9-13 EFFECT ON SURETIES OF CHANGES TO THE WORK

Alterations, time extensions, extra or additional work, or other changes authorized by these conditions or any part of the Contract do not affect or change the sureties' obligations under the Contract.

9-14 CONTRACT CHANGE ORDER (CCO)

The Agency will issue a Contract Change Order (CCO) for approval if a change to the Total Contract Price or Contract Time is necessary. The Contractor is not entitled to adjustments in either Contract Time or Total Contract Price for changes performed without written direction from the Agency. Adjustments in Contract Time or Total Contract Price for changes performed will not be made until a Contract Change Order is approved. A Contract Change Order is comprised of one or more Field Instructions or other written directives, and contains a summary of each change and changes to the Contract Time or Total Contract Price.

Certain Contract Change Orders will require the approval of the Board of Supervisors if authority is not otherwise delegated to Agency officers pursuant to Public Contract Code sections 20135 -20142 and County Code section 2.61.057.

9-15 ACCEPTANCE OF ORDERS FOR CHANGES

The Contractor's written agreement of a Contract Change Order, Field Instruction, or other written directive constitutes final and binding agreement to the provisions of the Contract Change Order, Field Instruction, or other written directive, and a waiver of all claims in connection therewith, whether direct or consequential in nature, including those of Subcontractors or suppliers. If the Contractor disagrees with a Contract Change Order, Field Instruction, or other written directive, the Contractor may submit a Notice of Potential Claim to the Agency in accordance with Section 9-17, "Notice and Mitigation of Potential Claim", of these Specifications. Disagreement with the provisions of a Change Order, Field Instruction, or other written directive does not relieve the Contractor of the Contractor's obligations under the Contract.

9-16 DISPUTE REGARDING CONTRACT REQUIREMENTS

If the Contractor and Agency fail to agree whether or not any work or other matter is within the scope of the Contract, the Contractor must nevertheless immediately perform the work upon receipt of a written Field Instruction or other written directive. Within 14 Calendar Days after receipt of the Field Instruction or other written directive, the Contractor may submit a written protest detailing the Contract requirements exceeded and the approximate cost and/or time change. Failure to submit a protest within the specified period constitutes a waiver of the Contractor's rights to adjustments in the Total Contract Price or Contract Time for the disputed Contract requirement.

The Contractor must not stop performing the Work pending resolution of a dispute, unless ordered in writing by the Agency.

If the Agency agrees with the Contractor's written protest, the Total Contract Price and/or Contract Time will be adjusted through a Contract Change Order. The Agency will provide written notification of protests and claims denied by the Agency.

9-17 NOTICE AND MITIGATION OF POTENTIAL CLAIM

9-17.01 Notice of Potential Claim (NOPC)

The Contractor is not entitled to additional compensation for any cause, including a disagreement, protest, or change, an act or failure to act by the Agency, or the happening of an event, thing or occurrence, unless the Contractor has given the Agency advance written notice of potential claim (NOPC). The NOPC must clearly describe the nature, circumstances, and basis of the potential claim, and must explain the reasons that the Contractor believes additional compensation and/or time will or may be due, the nature of the costs and/or time involved, the amount of the potential claim, a request for equitable adjustment, and written and verifiable documentation and support. The nature, circumstances, basis, and reasons must remain consistent.

Except as required in Section 9-18, "Submission of Construction Claims", of these Specifications, the Contractor must promptly provide an NOPC to the Agency upon discovery of concealed or unknown conditions or a disagreement, protest, situation, event, or occurrence that may result in a claim. This notice must be submitted no more than 7 Calendar Days after the discovery or occurrence of an event that may be the basis for a claim for additional compensation or time; failure to do so waives the claim.

If costs or time cannot be reasonably determined at the time the NOPC is provided, the NOPC must be amended to include quantified cost and time impacts within 30 Calendar Days after work has ceased on the event that prompted the NOPC; failure to do so waives the claim. For NOPC events that extend more than 30 Calendar Days the Contractor must provide a monthly accounting of ongoing costs and time impacts by the 5th day of the succeeding month; failure to do so waives the claim.

9-17.02 Duty to Mitigate Damages

The Contractor is required to take all reasonable and practical efforts to mitigate the damaging effects of a potential current or future claim it perceives as a result of an act or failure to act on the part of the Agency, or as a result of an event, thing or occurrence. Written notice by the Contractor of a potential claim does not excuse the Contractor from pursuing the mitigation of a claim in good faith and with due diligence. Where possible, or if directed by the Agency, the Contractor must be prepared to discuss various methods of mitigation with the Agency prior to actual mitigation.

The obligation to minimize foreseeable damages requires that the Contractor use reasonable care and diligence to prevent an unwarranted incurrence of damages from a delay

caused by the other party or an unforeseen event. In evaluating a delay, if, in the opinion of the Agency, the delay could have been avoided by due care of the Contractor, the Contractor is responsible for the additional costs attributed to the failure to mitigate

9-18 SUBMISSION OF CONSTRUCTION CLAIMS

9-18.01 In General

Claims procedures shall be in accordance with Section 9204 of the Public Contract Code as restated and supplemented herein. Claims must be filed with the Construction Management and Inspection Division ("CMID") of the County's Department of General Services.

For the purposes of this Section 9-18, a "claim" is as defined in Public Contract Code Section 9204 and includes a collection of separate demands on the same project.

9-18.02 Purpose

The purpose of this Section shall be to provide a process for the resolution of construction contract disputes at the Department level prior to initiating any other claims process or legal action against the Agency. Where a claim seeks payment by the Agency of money or damages, compliance with this Section 9-18 shall be a prerequisite to, but not a substitute for, compliance with the government claims process set forth in Title, 1, Division 3.6 (beginning at Section 810) of the California Government Code.

9-18.03 Claim Documentation

For any claim the Contractor must furnish claim documentation as specified herein.

Contractor must submit 3 complete certified copies of all claim documentation. The evaluation of the Contractor's claim will be based on Agency's records and the claim documentation submitted by Contractor.

Claim documentation must conform to generally accepted auditing standards and must be in the following format:

1. Introduction and background
2. Issues
   a. Index of issues
   b. For each issue:
      - Background
      - Chronology
      - Contractor's position (reason for County's potential liability)
      - Supporting documentation of merit
      - Supporting documentation of damages
3. Critical path method schedules, as-planned versus as-built, and delay (time impact) analysis
4. Productivity and damages exhibits
5. Summary of issues and damages

Supporting documentation of merit for each issue must be cited by reference, photocopies, or explained. Supporting documentation may include, but not be limited to, general conditions, technical specifications, drawings, correspondence, conference notes, shop drawing logs, survey books, inspection reports, delivery schedules, test reports, daily reports, subcontracts, fragmentary critical path method schedules, photographs, technical reports, requests for information, field instructions, and other related records.

Supporting documentation of damages for each issue must be cited, photocopied, or explained. Supporting documentation may include, but not be limited to, certified detailed labor, materials, equipment, and construction equipment and services costs; purchase orders;

invoices; project as-planned and as-built costs; subcontractor payment releases; quantity reports; other related records; general ledger and all other accounting materials.

Each copy of claim documentation must include the following certification, signed in the same manner as the Contract was signed:

> "I, _____, being the *(must be an officer)* of *(general contractor)*, declare under penalty of perjury under the laws of the State of California, and do personally certify and attest that: I have thoroughly reviewed the attached claim for additional compensation and/or extension of time, and know its contents, and said claim is made in good faith; the supporting data is truthful and accurate; that the amount requested accurately reflects the Contract adjustment for which the Contractor believes the Agency is liable; and, further, that I am familiar with California Penal Code Section 72 and California Government Code Section 12650, et seq., pertaining to false claims, and further know and understand that submission or certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.
>
> (Signature of officer) (Date) "

If the Contractor is unable to support any part of a claim and it is determined that the inability is attributable to falsity of the certification or misrepresentation of fact or fraud by the Contractor**,** the Contractor is liable to the Agency for 3 times the amount of damages sustained by the Agency, plus the cost of civil action. The Contractor may also be liable to the Agency for a civil penalty of up to $10,000 for each false claim.

9-18.04 Claim Resolution Process.

A. Claims must be mailed on or before the date of final payment. Claims must be sent by registered mail or certified mail with return receipt requested.

B. Upon receipt of a claim pursuant to this Section, the Agency shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, the Agency and Contractor may, by mutual agreement, extend the time period provided in this subdivision.

C. If the Agency requires approval from the Board of Supervisors to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the claim, and the Board of Supervisors does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the Agency shall have up to three days following the next duly publicly noticed meeting of the Board after the 45-day period, or extension, expires to provide the Contractor a written statement identifying the disputed portion and the undisputed portion.

D. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the Agency issues its written statement. If the Agency fails to issue a written statement, paragraph (I), below, shall apply.

E. If the Contractor disputes the Agency's written response, or if the Agency fails to respond to a claim issued pursuant to this Section within the time prescribed, the Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. A demand by the Contractor for a meet and confer conference shall be sent within fifteen (15) days of issuance or deadline for issuance of the Agency's written statement on the claim. Upon receipt of a demand in writing sent by registered mail or certified mail, return

receipt requested, the Agency shall schedule a meet and confer conference to be held within 30 days for settlement of the dispute.

F. If Contractor does not request a meet-and-confer conference within the required time period, the parts of the claim remaining in dispute shall be subject to the government claims process set forth in Title 1, Division 3.6 (beginning at Section 810) of the California Government Code.

G. Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the Agency shall provide the Contractor a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the Agency issues its written statement. Any disputed portion of the claim, as identified by the Contractor in writing, shall be submitted to nonbinding mediation, with the Agency and the Contractor sharing the associated costs equally. The Agency and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to the government claims process set forth in Title 1, Division 3.6 (beginning at Section 810) of the California Government Code.

H. For purposes of this Section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this Section.

I. Failure by the Agency to respond to a claim from the Contractor within the time periods described in this Section or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim filed pursuant to this Section 9-18 that is denied by reason of the public entity's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this Section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the claimant.

J. If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a public entity because privity of contract does not exist, the contractor may present to the public entity a claim on behalf of a subcontractor or lower tier subcontractor.

9-18.05 Qualifications Of A Mediator

The Mediator selected must have expertise in the area of the dispute and be knowledgeable in the Mediation process. No person can serve as a Mediator in a dispute in which that person has a financial or personal interest in the result of the Mediation. Before accepting an appointment, the prospective Mediator must disclose any circumstances likely to create a presumption of bias or prevent a prompt meeting with the parties. Upon receipt of the information, the parties must meet and confer and decide whether to select another Mediator.

9-18.06 Vacancies

If a Mediator becomes unwilling or unable to serve, another Mediator can be selected unless the parties agree otherwise.

9-18.07 Representation

Any party may be represented by persons of their choice who has full authority to negotiate. The names and addresses of those persons must be communicated in writing to all parties and to the Mediator.

9-18.08 Time and Place Of Mediation

The Mediator will set the time of each Mediation session. The Mediation will be held at a convenient location agreeable to the Mediator and the parties, as the Mediator determines. All reasonable efforts will be made by the parties and the Mediator to schedule the first session within 30 Calendar Days after selection of the Mediator.

9-18.09 Identification Of Matters In Dispute

At least 10 Working Days before the first scheduled Mediation session, each party must provide the Mediator with a brief memorandum setting forth its position with regard to the issues that need to be resolved. The memoranda will be mutually exchanged by the parties. At the first session, the parties will be expected to produce all information reasonably required for the Mediator to understand the issue presented. The Mediator may require each party to supplement the information.

9-18.10 Authority Of Mediator

The Mediator does not have authority to impose a settlement upon the parties but will attempt to help the parties reach a satisfactory resolution of their dispute. The Mediator is authorized to conduct joint and separate meetings with the parties and to make oral and written recommendations for settlement. Whenever necessary, the Mediator can obtain expert advice concerning technical aspects of the dispute, provided the parties agree and assume the expenses of obtaining advice. Arrangements for obtaining advice will be made by the Mediator or the parties, as the Mediator determines. The Mediator is authorized to end the Mediation whenever, in the Mediator's judgment, further efforts at Mediation will not contribute to a resolution of the dispute between the parties.

9-18.11 Privacy

Mediation sessions are private. The parties and their representatives may attend Mediation sessions. Other persons may attend only with the permission of the parties and with the consent of the Mediator.

9-18.12 Confidentiality

Confidential information disclosed to a Mediator by the parties or by witnesses in the course of the Mediation will not be divulged by the Mediator. All records, reports, or other documents received by a Mediator while serving as Mediator will be confidential. The Mediator cannot be compelled to divulge the records or to testify in regard to the Mediation in any adversary proceeding or judicial forum. The parties must maintain the confidentiality of the Mediation and cannot rely on, or introduce as evidence in an arbitration, judicial or other proceedings or any of the following: (a) Views expressed or suggestions made by the other party with respect to a possible settlement of the dispute; (b) Statements made by the other party in the course of the Mediation proceedings; (c) Proposals made or views expressed by the Mediator; or (d) Whether the other party had or had not indicated willingness to accept a proposal for settlement made by the Mediator.

9-18.13 No Stenographic Record

There will be no stenographic record of the Mediation.

9-18.14 Termination Of Mediation

The Mediation will be terminated (a) by the execution of a settlement agreement by the parties; (b) by a written declaration of the Mediator to the effect that further efforts at Mediation

are no longer worthwhile; or (c) by a written declaration of a party or parties to the effect that the Mediation proceedings are terminated.

9-18.15 Exclusion Of Liability

No Mediator will be a necessary party in judicial proceedings related to the Mediation. No Mediator is liable to any party for any act or omission in connection with a Mediation conducted hereunder.

9-18.16 Interpretation and Application Of These Mediation Provisions

The Mediator will interpret and apply these Mediation provisions insofar as they relate to the Mediator's duties and responsibility.

9-18.17 Expenses

The expenses of witnesses for either side must be paid by the party producing the witnesses. All other expenses of the Mediation, including required traveling and other expenses of the Mediator, the expenses of witnesses called by the Mediator, and the cost of any proofs or expert advice produced at the request of the Mediator, will be split equally between the parties.

9-19 Reserved.

9-20 Reserved.

9-21 NO ALTERNATIVE CLAIMS PROCEDURE

Nothing in the Contract constitutes an agreement for an alternative claim procedure under the provisions of Government Code Section 930.2, nor relieves the Contractor of the requirements of Government Code, Part 3, Chapters 1 and 2 and Title 1, Division 3.6, Chapters 1, 2, 3, and 4.

9-22 ASSIGNMENT OF CLAIMS

The Contractor cannot assign any portion of the moneys due the Contractor without written Agency approval. No person other than the party signing the Contract has any claim under the Contract, except as provided in the Contract.

9-23 NO WAIVER OF GOVERNMENT CLAIM PROCESS

No statement in the County of Sacramento Standard Construction Specifications or Special Provisions for a Contract constitutes a waiver of government claim filing requirements pursuant to Title 1, Division 3.6 of the California Government Code or as otherwise set forth in local, state and federal law."

SECTION 10 - ENVIRONMENTAL CONTROLS AT WORK SITE

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SECTION 10 - ENVIRONMENTAL CONTROLS AT WORK SITE

10-1 DUST CONTROL

Dust control must conform to Section 17, "Dust Control," of these Specifications.

10-2 AIR POLLUTION CONTROL

The Contractor must comply with all Federal, State, Agency, and local air pollution control rules, regulations, ordinances, and statutes that apply to the Work and the Contractor's operations. The Contractor must also comply with the requirements of permits issued to the Agency noted or included in the Special Provisions.

10-3 BURNING

Unless otherwise provided in the Special Provisions or approved by the Agency in writing, material cannot be burned on site.

10-4 EROSION, SEDIMENT, AND WATER POLLUTION CONTROL

10-4.01 General

The Federal Clean Water Act provides for the regulation and reduction of pollutants discharged into the Waters of the United States by extending National Pollutant Discharge Elimination System (NPDES) requirements to construction sites to prevent pollutants from construction activities or construction sites from entering storm drain systems. Storm drain systems consist of both constructed and natural facilities. The Contractor is responsible for protecting the local storm drain system from pollution by organizing, scheduling, and conducting operations to prevent, control, and abate water pollution from the Contractor's operations.

The required plan to control erosion, sediment and water pollution must be reviewed and accepted by the Agency before work begins. If the Contractor's methods fail to prevent erosion or sedimentation, the Contractor must revise and adjust the control measures to provide effective control and restore damage resulting from erosion or sedimentation originating from the Work and other sites the Contractor controls or passes through.

The Contractor's responsibility to provide erosion, sediment, and water pollution control ends at Field Acceptance (see Section 7-21.02, "Field Acceptance," of these specifications.)

The Contractor must designate a Water Pollution Control Manager (WPCM) whose duties include:

- Being responsible for water pollution control work.
- Being the primary contact for water pollution control work.
- Overseeing the implementation of the plan or program.
- Preparation and submittal of plans, amendments, and reports.
- Mobilization of crews to make immediate repairs to water pollution control.
- Ensuring that all employees have current water pollution control training.
- Being at the job site within 2 hours of being contacted.
- Stopping construction activities that are damaging water pollution control or causing water pollution.

The name of and contact information for the WPCM must be provided to the Agency at the pre-construction meeting.

10-4.02 Regulations, Ordinances, Permits, and Specifications

The Contractor must comply with all Federal, State, Agency and local permits, rules, regulations, ordinances, statutes, and Agency directions that apply to erosion, sediment, and water pollution control. The Contractor must comply with the most stringent regulation, ordinance, permit, or specification of the following applicable to the Work:

- This Section
- The Contract Special Provisions
- The County of Sacramento Land Grading and Erosion Control Ordinance (Chapter 16.44 of the Sacramento County Code)
- The County of Sacramento Stormwater Management and Discharge Control Ordinance (Chapter 15.12 of the Sacramento County Code)
- The County of Sacramento Municipal Separate Storm Sewer System (MS4) Permit
- The State of California General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ and successor permits (Construction General Permit, CGP)

10-4.03 Agency Requirements

Contractors performing construction in the County of Sacramento are required to develop and implement one of the following plans to control erosion, sediment and water pollution. The required plan will be identified in the Special Provisions

1. A Stormwater Pollution Prevention Plan (SWPPP). (See Section 10-4.04, "Stormwater Pollution Prevention Plan (SWPPP)," of these Specifications.) The Contractor is responsible for knowing the CGP requirements for the specified Risk Level and how those requirements apply to the Work. The Risk Level will be identified in the Special Provisions.
2. An Erosion and Sediment Control Plan (ESCP). (See Section 10-4.05, "Erosion and Sediment Control Plan (ESCP)," of these Specifications.).
3. A Water Pollution Control Program. (See Section 10-4.06, "Water Pollution Control Program (WPCP)," of these Specifications.)

The Contractor must submit the required plan for review and acceptance prior to performing work. Unless specifically authorized in writing by the Agency, activities that could create water pollution (like potholing, clearing, grubbing, or similar ground-disturbing activities) must not be performed without a written plan to control water pollution.

The plan must indicate how the Contractor proposes to effectively control water pollution during the Work. The plan must show all water pollution control Best Management Practices (BMP's) the Contractor will implement in connection with the Work, including inactive areas and completed work, and must describe how the Contractor will monitor the effectiveness of the plan. Standard Drawings 11-1 through 11-10 must be adhered to as applicable.

The Contractor must update the plan as frequently as required, or as directed by the Agency, to address the current stage of construction or whenever there is a change in construction activities or operations that affects the discharge of pollutants. The plan must be adjusted if the objective of reducing pollutants in discharges is not effectively achieved, or at the

direction of the Agency. Updates and adjustments to the plan must show additional control measures or revised operations, including those in areas not shown in the initially approved program, which are required on the project to control water pollution effectively. Amendments to the plan must be submitted to the Agency for review and acceptance. Upon approval of the amendment, the Contractor must implement the additional control measures or revised operations.

The Agency is not responsible for the Contractor's water pollution control plan, delays to the Work due to the Contractor's failure to prepare and implement a plan, or impacts resulting from the Agency's standard submittal review process.

10-4.04 Stormwater Pollution Prevention Plan (SWPPP)

10-4.04.A General

Construction projects disturbing 1 acre or more, or less than 1 acre if part of a larger development, and linear projects are covered under the State of California General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ (CGP). The State Water Resources Control Board (State Board or SWRCB) will issue a Waste Discharge Identification Number (WDID) for the project. Work can not start until the WDID is issued and the SWPPP has been accepted by the Agency.

10-4.04.B Contents

At a minimum, the SWPPP must contain the following:

1. An ESCP as described in Section 10-4.05 including:
    a. Discharge locations
    b. Sampling locations
    c. ATS location (if applicable)
2. A sampling and analysis plan that identifies and addresses all sampling and analysis required by the CGP for the specified Risk level
3. Sample Rain Event Action Plan (if applicable)
4. Copies of permits obtained by the Agency, including:
    a. Fish & Wildlife permits
    b. US Army Corps of Engineers permits
    c. RWQCB 401 water quality certifications
    d. Aerially deposited lead variance from the Department of Toxic Substance Control, aerially deposited lead variance notification, and RWQCB waste discharge requirements for aerially deposited lead reuse.

10-4.04.C Preparation, Review, Acceptance

Unless noted otherwise in the Special Provisions, the SWPPP must be prepared in accordance with the CGP. The SWPPP must be written, certified, and amended by a Qualified SWPPP Developer (QSD) as defined in the CGP. The SWPPP must be submitted to the Agency for review and acceptance, and implemented by the Contractor before Work starts. Unless otherwise stated in the Special Provisions, the Contractor must submit 3 hard copies for review and approval. Upon approval by the Agency, the Contractor must provide an electronic copy in MS Word, PDF, or another format acceptable for uploading to the SWRCB Storm Water Multi Application and Report Tracking System (SMARTS). A current, hard copy of the SWPPP must be kept onsite at all times and must immediately be presented to Agency and Regional

Water Quality Control Board (RWQCB or Regional Board) Inspectors, or personnel from other jurisdictional agencies, upon request. Failure to maintain and update the SWPPP or have the SWPPP readily available for review can result in a directive to stop work. (See Section 10-4.07, "Compliance," of these Specifications.)

10-4.04.D Implementation

The individual responsible for the implementation of the SWPPP must be a Qualified SWPPP Practitioner (QSP) as defined in the CGP. All project personnel, inspectors, consultants. and contractors responsible for the use, installation, inspection, maintenance, and repair of Best Management Practices (BMP's) on all County projects are required to attend a project-specific stormwater compliance meeting. (See Section 10-4.08, "Required Stormwater Regulatory Compliance ," of these Specifications.)

10-4.04.E Reporting

If at any time the project is not in compliance, the Contractor must make a written report to the Agency within 2 Working Days of the event that caused the project to be out of compliance. By August 1st of each year, the Contractor must submit to the Agency all required information for the Annual Report required by the CGP.

10-4.05 Erosion and Sediment Control Plan (ESCP)

The Contractor must prepare an Erosion and Sediment Control Plan (ESCP) for a project that involves the grading, filling, excavating, storage, or disposal of 350 cubic yards or more of soil, or the clearing and grubbing of 1 acre or more. At a minimum, the ESCP must include the following information:

1. A site map showing:
    a. A vicinity map.
    b. Boundary lines of the property and each lot or parcel into which the site is proposed to be divided.
    c. Construction site boundaries.
    d. A delineation of the area to be cleared and grubbed.
    e. On-site and surrounding watercourses, wetlands, sensitive habitats, and other features that are not to be disturbed.
    f. Existing and proposed drainage systems.
    g. Drainage area boundaries and acreages.
    h. Existing roads and structures on the site, and on adjacent property.
    i. Proposed roads and structures on the site, and on adjacent property.
    j. Topography of existing ground including accurate contours at two foot intervals for slopes up to ten percent and five foot intervals for slopes over ten percent. Spot elevations are required where relatively flat conditions exist. The spot elevations or contour lines must be extended off-site for a minimum distance of 50 feet, or 100 feet in flat terrain.
    k. Locations of existing vegetation, including oak trees, other trees over six inches in diameter measured at 4.5 feet above the ground, groves of trees
    l. Elevations, location, extent and slope of proposed grading shown by contours, cross-sections or other means, including fills or other special features to be included in the work.
    m. Locations of:
        i. Storage areas for materials.
        ii. Storage areas for waste.

iii. Vehicle service and fueling areas.
iv. Loading/unloading of materials.
v. Vehicle access points.
vi. Water storage and water transfer for dust control and compaction.

n. Location of erosion and sediment control measures to be implemented or constructed prior to, during or after each proposed activity.

2. A statement of the quantity of material to be excavated, the quantity of material to be filled, whether the excavation or fill is permanent or temporary, and the amount of material to be imported to or exported from the site.
3. A schedule showing when:
    a. Work activities will be performed that could cause the discharge of pollutants into stormwater.
    b. Water pollution control practices associated with each construction phase will be implemented.
    c. Soil stabilization and sediment control practices for disturbed soil areas will be implemented.
4. A description of and details for:
    a. Erosion control measures and sediment control measures to be implemented or constructed prior to, during or after each proposed activity.
    b. Dust control and construction site road and entrance stabilization measures.
    c. Storage and disposal of construction materials.
5. A maintenance schedule and log for all erosion and sediment control measures.
6. Additional plans required by the Agency.
   The Special Provisions will identify information, if any, to be provided by the Agency.

10-4.06 Water Pollution Control Program (WPCP)

If the Work does not fall under Sections 10-4.04 or 10-4.05 of these Specifications, the Contractor must prepare a Water Pollution Control Program (WPCP) detailing the following:

1. A map showing:
    a. Location of soil stockpiles and solid waste containers.
    b. Vehicle and equipment fueling, servicing, cleaning and storage areas.
    c. Material storage areas.
    d. Locations of erosion and sediment control BMPs.
    e. Site drainage during execution of the Work.
    f. Stabilized vehicle accesses
    g. Concrete clean out areas.
2. Chemicals, potential pollutants and hazardous materials to be used.
3. Methods for (include copies of drawings, details, and/or descriptions):
    a. Dewatering.
    b. Street cleaning.
    c. Managing run-on and run off.
    d. Spill prevention and control.
    e. Handling and disposal of solid waste.
    f. Methods for safekeeping and secondary containment of chemicals, potential pollutants, and hazardous materials.
    g. Storage and dispensing of fuel and lubricants.
    h. Clean out and disposal of concrete.
    i. Construction BMP maintenance, inspection, and repair.
    j. Sanitation provisions
4. Site stabilization after completion of the work

5. Construction BMP implementation and removal schedule

The WPCP must be submitted to the Agency for review and acceptance prior to the beginning of work.

10-4.07 Compliance

If the Contractor fails to comply with requirements of this Section 10-4, "Erosion, Sedimentation, and Water Pollution Control," the Agency can stop all or a portion of the Contractor's operations and direct the installation of erosion, sedimentation, or water pollution control, the organizing and scheduling of work, the preparation of required reports or documentation, or other work required to achieve compliance. In accordance with Section 5-21, "Temporary Suspension or Delay of Work," of these Specifications, the Contractor cannot resume work until the Agency's directive has been complied with to the satisfaction of the Agency. Temporary suspensions or delays caused by the Contractor's failure to comply with the requirements of this Section are considered avoidable delays. See Section 7-12.01, "Avoidable Delays," of these Specifications. Compliance with the provisions in this Section does not relieve the Contractor of the responsibility for compliance with other Contract provisions.

The Contractor must install BMPs, maintain BMPs, perform inspections, remove BMPs, and prepare documentation required by the SWPPP, ESCP, or WPCP applicable to the Work. At a minimum, inspections must be done weekly and 24 hours prior to, during, and after each rain event, and every 24 hours during extended rain events. The Contractor is solely responsible for preparing and maintaining inspection and monitoring records; and for including those records in the SWPPP, ESCP or WPCP, copies of which must be made available to the Agency upon request.

The Contractor must immediately correct or replace a BMP deemed ineffective by the Contractor or Engineer. If the measures taken by the Contractor are inadequate to effectively control water pollution, the Agency can direct the Contractor to revise operations and/or water pollution control efforts. The Agency reserves the right to take corrective action and withhold Agency costs for corrective action from progress payments or final payment in accordance with Section 8-8, "Withholdings/Denial of Progress Payment Request," of these Specifications.

All fines, including third-party claims, levied against the Agency as a result of Contractor's non-compliance are the Contractor's sole responsibility and will be withheld from progress payments or final payment in accordance with Section 8-8, "Withholdings/Denial of Progress Payment Request," of these Specifications.

10-4.08 Required Stormwater Regulatory Compliance Meeting

The Contractor and all Subcontractors are required to attend a Stormwater Regulatory Compliance Meeting conducted by the County before construction activities begin. This meeting is mandatory for all construction personnel, including subcontractors and vendors, involved in construction activities that could have an impact on stormwater management.

The meeting will be provided at no cost to the Contractor or Subcontractors.

The meeting could last up to three hours depending on the complexity of the project and the potential for pollutants originating from the project. Full compensation for attending this meeting must be included in the prices paid for the various items of work and no separate payment will be made.

10-4.09 Payment

Unless noted otherwise in the Special Provisions, full compensation for preparing SWPPP, ESCP and WPCP plans, implementing, monitoring, inspecting and ensuring

compliance with erosion and sediment control and storm water pollution and prevention requirements is included in the prices paid for the various Contract items of work and no additional compensation will be paid.

10-5 CONTROL OF WATER IN THE WORK

Water encountered during construction must be disposed of by the Contractor in a manner that does not damage public or private property or create a nuisance or health hazard. The Contractor must apply for and obtain any permits required to dispose of the water. Unless otherwise authorized or directed by the Agency, the Contractor must furnish, install, and operate pumps, pipes, appliances, and equipment of sufficient capacity to keep excavations and accesses free from water until the excavation is backfilled to subgrade. Water must be discharged in a manner approved by the Agency and in compliance with all NPDES requirements. The Contractor is not allowed to dispose of water that contains sediment or other contaminants. The Contractor is responsible for providing filtration, settlement, or disposal facilities required to comply with the requirements of Section 10-4, "Erosion, Sediment, and Water Pollution Control," in this Section of these Specifications.

10-6 NOT USED

10-7 CONTAMINATED OR HAZARDOUS MATERIALS

The Contractor must comply with all Federal, State and local rules, regulations, ordinances, and statutes that apply to the handling, storage, and disposal of contaminated and hazardous materials. In the event hazardous or contaminated materials are encountered, the Contractor must stop work in the affected area and notify the Engineer immediately. The Agency will provide direction on how the contractor is to proceed. Unless otherwise directed in the Special Provisions, no work is to be done in the area of the contaminated or hazardous materials without written direction from the Agency.

Unless otherwise provided for in the Special Provisions, payment for handling, removal and disposal of hazardous or contaminated materials will be in accordance with Section 9 of these Specifications.

10-8 USE OF EXPLOSIVES

Explosives will not be allowed on the Work unless the Agency grants permission in writing or the use of explosives is specified in the Contract Documents, and then only under conditions as the Agency prescribes.

10-9 SANITARY REGULATIONS

The Contractor must comply with all Federal, State and local rules, regulations, ordinances, and statutes with respect to sanitation. The Contractor must obey and enforce sanitary requirements, and must take precautions against contagious or infectious diseases.

Sanitary conveniences for the use of the workers must be obscured from the public and constructed or installed and maintained by the Contractor. The Contractor must strictly enforce use of the facilities.

10-10 NOT USED

10-11 CLEANING UP

The Contractor must keep the site in a neat, sanitary, and presentable condition. The Contractor must dispose of surplus materials, clean out drainage ditches and structures, and repair fences or other property damaged during the progress of the Work. When material is disposed of outside of an easement, street, or highway right-of-way, or other Agency-owned properties, the Contractor must do so in accordance with the Contract.

10-12 ARCHEOLOGICAL AND CULTURAL RESOURCES

If archeological or cultural resources are discovered during the Work, the Contractor must cease all construction operations in the vicinity of the discovery until a qualified archeologist can assess the value of these resources and make recommendations to the State Historic Preservation Officer. Archeological and cultural resources include artifacts, large amounts of bone, shell, or flaked stone, and other evidence of human activity. If the State Historic Preservation Officer or the Agency directs that work be temporarily ceased at the location of an archeological or cultural find, the Contractor must temporarily suspend work at the location.

If the Agency or the State Historic Preservation Officer temporarily suspends a portion of the Work for cultural purposes, associated delays are considered unavoidable in accordance with Section 7-12.02, "Unavoidable Delays," of these Specifications.

10-13 PROTECTION OF EXISTING TREES

Special attention must be given to protection of certain native and ornamental trees or shrubs, landmark trees, and native oak trees in the County of Sacramento. Additional requirements for specific trees may be shown on the Plans, or designated in the Special Provisions or by the Agency. No native oak trees are to be removed or disturbed unless specifically designated for removal on the Plans or by the Agency. Every reasonable effort must be made to avoid creating conditions adverse to the tree's health. The natural ground within the dripline of protected trees must remain as undisturbed as possible. The dripline area must be identified on the ground by a circle with a radius measurement from the trunk of the tree to the tip of its longest limb. The limb cannot be cut back in order to change the dripline. The area within the dripline is a critical portion of the root zone and defines the minimum protected area of each tree. Removing limbs within the dripline does not change the originally protected root zone. Measures required for protection of existing trees includes, but are not limited to, the following:

- Temporary protective barrier fencing, with a minimum height of 4 feet must be installed continuously around the dripline perimeter of the protected trees prior to beginning the Work.
- Signs, ropes, cables, or other items are not to be attached to a protected tree, except those cables recommended by a Certified Arborist for limb support.
- Vehicles, construction equipment, temporary or mobile buildings, supplies, materials, or facilities are not to be driven, parked, stockpiled, or located within the dripline of protected trees.
- Unauthorized grade cuts or fills are not permitted within the dripline of protected trees. Cuts or fills necessary beyond the dripline but near the protected trees must be contoured to drain away from the protected tree's dripline.

- Utility line trenching is not permitted within the driplines of protected trees. If it is necessary to install underground utilities within the dripline of a protected tree, the utility line must either be bored or drilled to avoid damaging roots. If the Agency determines boring or drilling is inappropriate, the utility line trench may be hand dug under the direct supervision of a Certified Arborist to avoid damaging roots.
- Roots approved by a Certified Arborist to be severed or that fall within the structural section of the facility to be constructed, including building foundations or wall footings, must be pruned cleanly and covered with moist earth as soon as possible. If, due to the construction, the roots must be unearthed for more than 2 hours, they must be kept moist and covered with wet burlap or an approved equal until they are covered by moist earth. Supporting structural buttress roots that provide stability to the tree or keep it from toppling must be protected in place. The Contractor must hand-dig in the dripline of protected trees to prevent root cutting and mangling. Roots one 1 inch or greater in diameter encountered within the tree's dripline must not be cut without the Agency's approval, and must be kept moist, as approved by the Agency, and covered with earth within 48 hours.
- Where required by the Agency, a piped aeration system and/or a post and grade beam foundation must be installed beneath that portion of the paving, foundation, or concrete slab that encroaches into the dripline of a protected tree. The piped aeration system must be installed under the direct supervision of a Certified Arborist.
- Only drought resistant plant species, tolerant of the natural and semi-arid environment of the native oak understory, are to be planted within the driplines of native oak trees.
- Sprinkler systems that irrigate or require trenching within the dripline of a native oak tree are not permitted. An above ground drip irrigation system that allows for controlled application rates may be installed to irrigate native or semi-arid plants within the dripline of a native oak tree.
- Protected trees within the Work area that require pruning for construction clearance must be pruned prior to beginning of construction. Native oak trees that require pruning of branches larger than 2 inches in diameter must be pruned by a Certified Arborist.

TECHNICAL PROVISIONS

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SECTION 11 PRECONSTRUCTION PHOTOGRAPHS AND RECORD DRAWINGS

11-1 GENERAL

Preconstruction photographs will only be required when specified in the Special Provisions. Record Drawings are required on all Agency Work, unless directed otherwise in writing by the Agency.

11-2 PRECONSTRUCTION PHOTOGRAPHS

Preconstruction photographs must be taken by the Contractor at 100' intervals along the route of the Work before any construction begins. The view in each photograph must include a sign showing the date, name of the Project, lateral or street, and station designation. The sign must not block the important areas of the view and must be legible in a 3-1/2" x 5" print. Each photograph must be taken from a point between 4' and 8' above the ground. Prints must show good details in both shadow and sunlit areas. The minimum required resolution for .TIF or uncompressed .JPEG raster files is 5 megapixels.

The views in preconstruction photographs must include the entire construction zone and, in particular, show the interface between the right-of-way and construction zone, and abutting property features such as, but not limited to, condition of existing streets, sidewalks, driveways, fences, landscaping, buildings abutting work site, and existing surface utility facilities on and close to the Work.

All essential features of the project area must be shown accurately. The Agency may order additional photographs showing additional features or orientations, if the Agency determines that all essential features are not accurately or adequately shown.

A sample of 24 photographs must be submitted to the Agency for approval before proceeding with the remaining photographs. Photographs that the Agency determines do not conform to these Specifications must be retaken.

The Contractor must submit to the Agency 1 3-1/2" x 5" color glossy print and the image file, of each photograph taken. The image files for digital photographs must be submitted on a read-only memory compact disk (CD-ROM).

Prints must be submitted in a three-ring photo album binder with clear plastic covered fillers, 4 photos each side, grouped according to street, lateral or line, and in sequence. The name and number of the Contract and Contractor's name must appear on the binder cover. Each group of prints must be identified by a label which projects beyond the edge of filler and is easily recognized.

At the Contractor's option, an AVI or Quick Time video file can be provided on a CD-ROM. The content and quality requirements for the photographs apply to the video.

11-3 RECORD DRAWINGS

The Contractor must maintain a neat and accurately marked set of Record Drawings, which must be provided to the Agency for review and approval prior to Final Acceptance of the Work. The Record Drawings must represent the Work as constructed and document changes to the Work shown on the Project Plans, and must show the actual as-constructed conditions of installed or modified systems, equipment, and material.

Record Drawings must be produced by marking a full size copy of the Project Plans as follows:

Red - Additions including notes and dimensions.
Green - Deletions (by hash marks or appropriate lines through the deletion.)

Graphite (gray) - General comments and notes used by Contractor or Agency and not required on the as-built.

Yellow - Work completed as shown and used by Agency in field review of the as-built, during the submittal phase.

Blue - Agency verification and notes required to be added and noted by Agency in review of the as-built, during submittal phase.

The Record Drawings must show, by field measured dimensions, the exact locations of all underground work, including all sprinkler system piping and components, and the final elevations and locations of all improvements constructed, modified or adjusted. The Record Drawings must show on the plan and profile drawings the type and class of all underground water, sewer, and drainage pipe installed and the station or location of transitions between pipe materials. Record Drawings must be available for inspection by the Agency at all times and must be updated at least weekly with all Field Instructions and other written directives, Contract Change Orders, and Contract adjustments shown thereon and initialed by the Agency. Progress payments or portions thereof might be withheld if Record Drawings are not kept up to date.

Unless otherwise specified in the Special Provisions, or directed by the Agency, the Contractor must submit a minimum of 2 sets of Record Drawings to the Agency at the final inspection. These Record Drawings must include certification by the Contractor that the Record Drawings are a true representation of the Work as actually constructed. The Work will not be formally accepted until the Record Drawings are provided to and approved by the Agency. Final payment or a portion thereof might be withheld if final Record Drawings are not provided.

11-4 MEASUREMENT AND PAYMENT

When the Contract includes an item for preconstruction photographs, preconstruction photographs will be paid for at a lump sum price.

The lump sum price paid for preconstruction photographs includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in taking and submitting preconstruction photographs, or optional video tape, as specified in these Specifications and the Special Provisions, and as directed by the Agency.

When the Contract does not include an item for preconstruction photographs, full compensation for preconstruction photographs is included in the prices paid for the various items of work and no separate payment will be made.

Full compensation for Record Drawings is included in the prices paid for the various items of work and no separate payment will be made.

SECTION 12 – SAFETY, PUBLIC CONVENIENCE, AND TRAFFIC CONTROL

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SECTION 12-SAFETY, PUBLIC CONVENIENCE, AND TRAFFIC CONTROL

12-1 SAFETY

12-1.01 Safety Regulations, Programs, and Plans

Safety is a prime consideration in Agency contracts. The Contractor and all subcontractors must fully comply with all applicable Cal/OSHA, Title 8 Regulations. The Contractor, and all Subcontractors, must, upon request, submit to the Agency a copy of their Injury and Illness Prevention Program (IIPP), Code of Safe Work Practices (CSWP), Contract Specific Safety Plan (CSSP), and Task Specific Safety Plan (TSSP) for review by the Agency. The Contractor and all Subcontractors are required to fulfill the requirements of these programs or plans during the prosecution of the Work. No work must be started unless otherwise authorized by the Agency until the Agency has completed its review of required safety documents and provided written authorization to proceed.

The agency has full authority to enforce, make exceptions to, or waive requirements of any of the requested safety programs or plans on a case-by-case basis. Exceptions and or waivers will be provided in writing to the Contractor. Use of all or part of any safety and health program or plan does not relieve the Contractor of the responsibility to comply with prevailing local, state, and federal laws and regulations.

Plans must be formatted in a logical and orderly fashion, including tabs and section dividers for ease of navigation and review.

12-1.01.A Injury and Illness Prevention Program (IIPP) and Code of Safe Work Practices (CSWP)

The IIPP and CSWP must be prepared in accordance with Cal/OSHA, Title 8, Section §1509.

12-1.01.B Contract Specific Safety Plan (CSSP)

The CSSP must state the nature of the Work and the anticipated hazards, and must describe how those hazards will be mitigated to protect workers and the public. The CSSP must cover the notification of employees, subcontractors, and others working on or visiting the jobsite of foreseeable hazards and provisions for Personal Protective Equipment (PPE). The CSSP must certify that all employees have received or will receive appropriate site-specific safety and health training particular to the unique hazards of the Work. Note: Employees must be trained before starting any work activity where such training is explicitly required in the Cal/OSHA, Title 8 Regulations.

12-1.01.C Task Specific Safety Plan (TSSP)

A TSSP must be prepared for high-hazard activities including, but not limited to, excavations greater than 5 feet in depth into which an employee will descend, permit-required confined spaces, activities involving the public right-of-way, tunneling, control of hazardous energy including electrical, thermal, kinetic, and potential, critical crane lifts, erection of falsework or precast panels, work requiring the use of respiratory protection equipment (e.g., lead or asbestos work), and the use of radioactive materials or radiation generating devices. Specific requirements for TSSP's may be indicated in the Special Provisions. At a minimum, the TSSP must include the following elements as applicable to the activity:

1. A detailed description of the activity;
2. Step-by-step procedures for controlling all serious health safety hazards including Illustrations and calculations;
3. List of all Personal Protective Equipment (PPE) to be used;
4. Designation of health and safety responsibilities and authority for all key personnel;

5. Names of, and training records for, all Competent Persons, Qualified Persons, and for all other employees performing critical tasks that require training by Cal/OSHA, Title 8 Regulations;
6. Employee medical and equipment test records pertinent to the specific task, such as respirator fit test records and medical evaluations;
7. Copies of all health and safety forms and checklists to be used in relation to the task;
8. Copies of Safety Data Sheets (SDSs) required for substances to be used; and
9. Emergency response and rescue procedures related to the task.

12-1.02 24-Hour Contact Information

The Contractor must have on record with the Agency the following 24-hour emergency contact names and numbers:

- Temporary Traffic Control Device Supplier: Supplier of all temporary traffic control devices to be used during construction.
- Contractor Representative: An employee of the Contractor having the authority to make decisions and the ability to respond to an emergency on the project at any time.
- Safety Representative: An employee of the Contractor properly trained in all workplace hazards and having the authority to make decisions regarding safety and health matters on the project and to direct the Contractor's personnel to abate any hazard identified by the Agency.

12-1.03 Illumination

Work by the Contractor during the hours of darkness or in locations where natural light is inadequate must be illuminated to conform to the applicable minimum illumination intensities established by, Cal/OSHA, Title 8, Sections §1523, §3317, §8415, the National Cooperative Highway Research Program (NCHRP) Report 476, and the approved Traffic Control Plan (TCP).

12-1.04 Personal Protective Equipment (PPE).

Cal/OSHA Title 8 Regulations for PPE must be adhered to. The Contractor must provide the required PPE to employees and must ensure that it is used and maintained in a sanitary and reliable condition.

12-1.05 Confined Spaces

12-1.05.A Contractor Responsibilities and Qualifications

Prior to any permit-required confined space entry, as defined by Cal/OSHA, Title 8, Section §5157, the Contractor must submit the following for Agency review and acceptance per Section 12-1.01.C, "Task Specific Safety Plan (TSSP)," of these Specifications:

1. The Contractor's general procedures for confined space entry;
2. A detailed description of and step-by-step procedure for the proposed work;
3. A list of names of all employees involved in the permit-required entry and each person's responsibilities and authority in connection with the entry;
4. A list of all equipment to be used including, but not limited to, respiratory, atmospheric monitoring, chemical analysis, communication, entry and retrieval, , ventilation, lighting, and power tools;
5. Copies of all forms and checklists to be used;
6. Rescue procedures, including notification, name and contact information of the emergency response agency, and method of communication;
7. Employee training records pertaining to confined spaces;
8. Employee records pertaining to the use of respiratory equipment;
9. Safety Data Sheets (SDS) for all applicable chemicals and products;
10. Hot work procedures (if applicable);

11. Lock-out/tag-out procedures (if applicable).

The Contractor's submittal must be made a minimum of 30 Calendar Days prior to any permit-required confined space entry in accordance with Section 5-8, "Contractor's Submittals," of these Specifications.

The Contractor will not be allowed to make a permit-required confined space entry until the Agency has reviewed and accepted the Contractor's qualifications and proposed methods.

The Contractor must conform to the procedures established by the Contractor's submittal during confined space operations.

Mechanical ventilation must be used to augment natural air circulation where necessary. Mechanical ventilation and its use must meet the following minimum requirements:

- Before ventilation is initiated, information such as restricted areas within the confined space, voids, the nature of the contaminants present, the size of the space, the capacity needs of the blower(s), the type of work to be performed, and the number of people involved, must be considered. This information, together with ventilation calculations, must be submitted with the TSSP.
- Blowers must function continuously and correctly throughout all entry activities. If a blower fails, all employees must leave the space immediately.
- The space must be purged in a manner sufficient to achieve a minimum of 6 air exchanges per hour. The Contractor must increase this air exchange rate as necessary to safeguard entrants.
- Motor vehicles and other gasoline powered equipment must not be allowed to operate near the blower air intake.
- Use of mechanical ventilation must be noted on the entry permit.

Note: Atmospheric testing must be conducted following purging, before entry, and continuously during entry. Entry may not begin until testing has demonstrated that the hazardous atmosphere has been effectively eliminated or controlled.

12-1.06 Respiratory Protection

The Contractor is required to evaluate job tasks to determine if they could result in exposure to gases, vapors, fumes, dust, mists, or other regulated substances (e.g., asbestos, lead) above legally established limits. In these situations, the Contractor must institute appropriate control measures to achieve regulatory compliance and maintain levels below the Permissible Exposure Limit (PEL). When these controls are unfeasible, respiratory protection may be necessary. If the Contractor intends to use respiratory protective equipment, such equipment must be in full compliance with Cal/OSHA, Title 8, Section §5144 "Respiratory Protection" and any other applicable regulation(s). The Contractor must submit a "Task Specific Safety Plan (TSSP)," per Section 12-1.01.C of these Specifications, for Agency review and acceptance.

12-1.07 Hazard Communication

The Contractor is required to develop, implement, and maintain a written Hazard Communication Program in order to protect employees who may use or be exposed to hazardous chemicals during the course of construction. The Contractor's Hazard Communication Program must be in compliance with Cal/OSHA, Title 8, Section §5194.
The Contractor must provide copies of SDS's to the Agency upon request.

12-1.08 Control Of Hazardous Energy (Lockout/Tagout)

Before a Contractor or any Subcontractor performs work on a system where the unexpected energizing, start up, or release of energy could occur and cause injury or damage, the energy source must be isolated in accordance with the requirements of Cal/OSHA, Title 8, Section §3314 and of these Specifications.

When the Work requires the use of hazardous energy control procedures, the Contractor must submit a Hazardous Energy Control Plan (HECP) to the Agency for review and

acceptance per Section 12-1.01.C, "Task Specific Safety Plan (TSSP)," of these Specifications. Implementation of hazardous energy control procedures must not be initiated until the HECP has been accepted by the Agency. The HECP must outline the scope, purpose, authorization, rules, and techniques to be used for the control of hazardous energy, including, but not limited to, the following:

1. A statement of the intended use of the procedures;
2. Means of coordinating and communicating hazardous energy control activities including coordination with the facility owner and maintenance personnel;
3. Procedural steps and responsibilities for shutting down, isolating, blocking, and securing systems to control hazardous energy;
4. Procedural steps and responsibilities for the placement, removal, and transfer of lockout and tagout devices;
5. Procedural steps and responsibilities for placing and tagging, and moving or removing tags;
6. Requirements for testing the system to verify the effectiveness of isolation and lockout and tagout devices;
7. Procedures for safely responding to emergencies;
8. Requirements for transfer of authority and removal of hazardous energy control devices from the authorized employee to another individual

The Contractor must fully coordinate hazardous energy control activities with the facility owner and maintenance personnel throughout planning and implementation. Each must inform the other of their energy control procedures, ensure that their own personnel understand and comply with the procedures, and ensure that all employees affected by the hazardous energy control activity are notified when the steps outlined in the HECP are to be initiated.

A preparatory inspection must be conducted to ensure that affected personnel understand the hazards and procedures for their control.

Daily inspections must be conducted by a qualified person to ensure that all requirements of the hazardous energy control procedures are being followed.

Training must be provided to ensure that the purpose and function of the hazardous energy control procedures are understood by employees and that employees possess the knowledge and skills required for the safe application, usage, and removal of energy control devices.

12-1.09 Control Of Fugitive Emissions

The Contractor must take precautions necessary to control fugitive emissions from the job site. Fugitive emissions include, but are not limited to: products and chemicals, noise, and hazardous materials (such as lead or asbestos).

12-1.09.A Products and Chemicals

Where a product or chemical to be used by the Contractor has a Permissible Exposure Limit (PEL) established by Cal/OSHA, the Contractor must maintain exposure levels below the PEL. The Contractor must monitor the work area for changing conditions and the potential for exposure above the PEL. Monitoring must occur, at a minimum, during the start of work and whenever there is a change in procedure, process, or chemicals or materials used. When requested, copies of air monitoring data must be provided to the Agency and to the building owner (where applicable) and shared with building occupants. If it is unfeasible to maintain exposure levels below the PEL, the Contractor must restrict access to authorized personnel only.

12-1.09.B Noise

The Contractor must comply with applicable regulatory requirements for noise and Sacramento County Code (SCC), Title 6, Chapter 6.68 for the control of noise affecting the general public. The Special Provisions may contain specific or additional requirements. The

Contractor must provide appropriate hearing protection to employees exposed to a time weighted average noise level of 90 decibels (dBA) or more and train the employees in their proper care and use.

12-1.09.C Asbestos Containing Material (ACM)

All work must be performed in compliance with current federal and state regulations, including U.S. EPA and, Cal/OSHA, Title 8, Sections §1529 and §5208, "Asbestos," the Special Provisions, Section 10-7.01 "Contaminated or Hazardous Materials," of these Specifications, and the requirements contained herein.

When the work involves the potential for exposure to ACM as defined by Cal/OSHA, Title 8, Section §1529(a), the Contractor must provide a detailed Asbestos Abatement Plan (AAP) per

Section 12-1.01.C, "Task Specific Safety Plan (TSSP)," of these Specifications. The plan must include the location and layout of decontamination areas, the sequencing of asbestos work and methods to be used to assure the safety of building occupants, workers, and visitors to the site, methods for controlling emissions in the work area and the containerization and disposal of asbestos debris, and the following:

1. Current medical examination reports for each employee of the Contractor who will be on site;
2. Documentation stating that the Contractor is currently licensed by the State of California to perform asbestos abatement work;
3. Documentation indicating timely notification to the State Department of Industrial Relations (DIR) and of project fees paid;
4. Current certificates of asbestos training for each employee of the Contractor who will be on site;
5. Current documentation of respirator training and fit testing for each employee of the contractor who will be on the site;
6. A letter from the EPA indicating an approved disposal site for ACM;
7. A list of authorized personnel to be granted access to the work area;
8. All required permits, licenses, and insurance;
9. Documentation of the Contractor's notifications to businesses and residents regarding the abatement project schedule;
10. The names and numbers of person(s) to be contacted on behalf of the Contractor in cases of an emergency.
11. Safety Data Sheets (SDSs) for chemicals that will be used or that will be present at the job site. SDSs must be provided to building occupants if chemicals or other hazardous substances are to be used in a facility or in areas where vapors or fumes could enter air intakes.

    Note: A copy of all Asbestos Waste Manifests must be submitted to the Agency.

12-1.09.D Removal and Disposal of Asbestos Concrete Pipe (ACP)

The disturbance of ACP is regulated under Cal/OSHA, Title 8, Section §1529. In addition, the following applies:

1. No ACP is to be disturbed unless first authorized by the Agency.
2. The Contractor is responsible to employ the means, methods, and techniques required to ensure that all ACP is removed in a manner such that it remains intact (indurated). When it is unfeasible to remove ACP without making the material friable, the Contractor must submit an AAP for review and approval by the Agency.
3. Any disturbance of greater than 100 sq. ft. of ACP requires the Contractor to be registered for asbestos-related work. Exception: Contractors with employees and supervisors who have received the prescribed 4-hour ACP training by a Cal-OSHA certified training provider may non-destructively remove greater than 100 sq. ft. of ACP

without the asbestos-related work registration. Employees must have a current certificate of training from an accredited training provider.

4. Wet-cutting, snap-cutting, or a “clean break” of the pipe by an excavator is considered non-destructive. Abrasive (dry) sawing of ACP is a specifically "prohibited activity.”
5. Any operation that crushes or otherwise renders ACP friable requires that the work be done by a registered contractor.
6. If more than 260 linear feet of ACP is to be removed, and upon removal will become friable, a National Emission Standards for Hazardous Air Pollutants (NESHAPS) notification must be filed.
7. Non-friable ACP waste must be packaged (6-mil waste bags or wrapped in 6-mil poly sheeting and taped to be leak proof) and disposed of at a classified landfill that accepts asbestos waste. The Contractor must submit to the Agency a certificate of disposal to verify that the waste was legally disposed of. If underground sections of ACP are to be abandoned in place, they must be left intact and non-friable (indurated).

12-1.09.E Lead

The Contractor is responsible for complying with all applicable federal, state, and local regulations and standards for lead-related work. This includes, Cal/OSHA, Title 8, Section §1532.1). The Contractor must provide a detailed Lead Abatement Plan (LAP) per Section 12-1.01.C, “Task Specific Safety Plan (TSSP),” of these Specifications for Agency review and approval.

12-1.10 Tunnel Safety

The Contractor must be aware of any Work that may be under the jurisdiction of the Tunneling Safety Orders (TSO), Title 8, Sections §§8400 – 8568. It is the Contractor’s responsibility to apply for and obtain any permits and licenses and to comply with all applicable laws and regulations. When the work involves tunneling under the jurisdiction of the TSO’s, the Contractor must provide a detailed Tunnel Safety Plan (TSP), in compliance with Section 12-1.01.C (TSSP) of these Specifications. As required by TSO Section §8406, a Certified Safety Representative and Certified Gas Tester must be designated by the Contractor and identified in the TSSP.

12-2 PUBLIC CONVENIENCE AND SAFETY

12-2.01 Public Convenience

Work within public streets and/or roadway rights-of-way must be done in an expeditious manner and cause as little inconvenience to the traveling public as possible. Vehicles, bicycles, and pedestrians must be allowed to pass at all times except during an emergency closure. See Section 7-8, “Peak Hours, Hours of Darkness, Holidays and Weekends,” of these Specifications for time limitations. The surface of roadways open to the public must be kept in a smooth, even condition, free of humps and depressions, satisfactory for the use of public traffic at all times as determined by the Agency.

Temporary facilities used by the Contractor to perform the Work or store or stage material or equipment must not be installed or placed where they will interfere with the free and safe passage of public vehicular, bicycle, or pedestrian traffic.

12-2.02 Pedestrian and Bicyclist Access

The Contractor must not block the movement of pedestrian or bicyclist traffic. The Contractor must provide for pedestrian and bicycle traffic by phasing construction operations and/or by providing alternative pedestrian and bicyclist access through or adjacent to construction areas. Proper advance notice signage with reasonable detours must be installed and maintained through all phases of construction. Access to pedestrian and bicycle devices at

traffic signals must be maintained at all times. Pedestrians must never be diverted into a portion of the street used for vehicular traffic or on to private property unless proper barriers, delineation, and adequate signage are in place. Pedestrian and bicycle access must consist of 4 foot wide bridges across trenches and 4 foot wide passageways through construction areas. Hand railings for pedestrians must be provided when required by the Americans with Disabilities Act (ADA) on each side of each bridge or passageway to protect pedestrians from hazards caused by construction operations or adjacent vehicular traffic.

12-2.02.A Pedestrians (Temporary Alternate Circulation Path)

When crosswalk or other pedestrian facilities are temporarily closed or relocated, temporary alternate circulation paths are required to be provided by the Contractor to achieve the maximum accessibility feasible under existing conditions. The alternate paths are to be accessible to all pedestrians, including those with visual impairments.

12-2.02.A(1) Components

A Temporary Alternate Circulation Path (hereafter referred to as "path" or "pathway") must consist of one or more of the following components: walkways, ramps, and landings, blended transitions, crosswalks, and pedestrian overpasses and underpasses. Elevators, platform lifts, stairways, and escalators must not be part of a path. Components of a path must comply with the applicable portions of these Specifications.

12-2.02.A(2) Continuous Width

Unless otherwise approved by the Agency, the minimum continuous and unobstructed clear width of a path must be 4 feet, exclusive of the width of the pedestrian barricades and channelizing devices. If the alignment of the temporary path does not allow for a minimum continuous and unobstructed clear width of 4 feet, the width may be reduced upon written approval of the Agency. Where a path turns or changes direction, it must accommodate the continuous passage of a wheelchair or scooter. As with street or highway design for vehicles, additional maneuvering width or length may be needed along curved or angled routings, particularly where the grade exceeds 5 percent. Individual segments of paths must have a minimum straight length of 4 feet.

The Americans with Disabilities Act Accessibility Guidelines (ADAAG) Section 4.4 "Provisions for Protruding Objects" apply across the entire width of the path.

12-2.02.A(3) Width at Passing Spaces

Paths that are less than 4 feet in clear width must provide passing spaces at maximum intervals of 200 feet. Paths at passing spaces must be 4 feet wide for a distance of 5 feet.

12-2.02.A(4) Walkway Grade and Cross Slope

Unless otherwise approved by the Agency, the pathway surface must be level and navigable and must not have a slope greater than 12 to 1 or a cross slope greater than 2 percent.

12-2.02.A(5) Surface

All slip-resistant surfaces must have a surface static coefficient of friction of 0.50 per ASTM C 1028.

The surface of the path must be firm, stable, slip resistant, and detectable as defined by the CA/MUTCD. The pathway must be constructed of portland cement concrete, asphalt concrete, slip-resistant plywood, slip-resistant steel plates or other materials acceptable to the Agency. Dirt is not an acceptable surface. Slip-resistant plywood used for a walkway must have a minimum thickness of 1-1/8 inches and must be thoroughly supported to provide a firm stable surface.

Surface discontinuities must not exceed 1/2 inch maximum. Changes in level up to 1/4 inch may be vertical and without edge treatment. Vertical discontinuities between 1/4 and 1/2 inch maximum must be beveled at 1 to 2 minimum. The bevel must be applied across the entire

level change. Changes in level greater than 1/2 inch must be accomplished by means of a ramp that complies with California Code of Regulations, Title 24, Part 2, Chapter 11B, Section 1127B.5, and ADAAG 4.7.

12-2.02.A(6) Location

Sidewalks at the construction location may be closed with adequate detours. Detour routes must be limited to existing sidewalks, private properties, crossings at roadway intersections, and sections of the roadway isolated from vehicular and bicyclist traffic by means of a barrier, and specifically designated for pedestrian traffic as approved by the Agency. To the maximum extent feasible, the alternate circulation path must be provided on the same side of the street as the disrupted route.

Pedestrians may be detoured onto private property only if written permission from the property owner, which includes indemnification of the County for any liability arising from the use of the pedestrian detour, is first obtained. The documentation must be provided to the Agency upon request.

12-2.02.A(7) Protection

Where the temporary alternate circulation path is exposed to adjacent construction, excavation drop-offs, traffic, or other hazards, it must be demarcated with barricades, channelizing devices, concrete barriers, or other temporary traffic control devices necessary to provide clear guidance, separation and a safe path for pedestrians.

When it is necessary to block pedestrian travel at the departure curb to close a crosswalk due to construction activities, curb ramp access to the perpendicular crosswalk must be maintained at all times. This may require additional pedestrian channelization if only a single diagonal curb ramp serves the corner.

During working hours, at least one Contractor employee must be assigned the responsibility to escort pedestrians in need of assistance through and/or around the construction site. The assigned pedestrian escort must be appropriately trained and equipped. The employee assigned this responsibility may also participate in other construction activities; however, they must be aware that acting as a pedestrian escort is their primary responsibility.

12-2.02.A(8) Lighting

The pathway must be provided with lighting with sufficient wattage to provide adequate illumination and a safe and secure environment for pedestrians. When existing artificial lighting does not sufficiently illuminate the path or there is no artificial lighting, temporary lighting must be installed.

12-2.03 Written Notification To Residences and Businesses

The Contractor must notify, in writing, residents and business establishments along the route of the Work at least 10 Working Days prior to road closures and at least 3 Working Days prior to placing parking restrictions or planned disruption of any ingress and/or egress. The notice provided to the residences or businesses must include, at a minimum, a schedule of closures with estimated closure times, the closure location, an alternate route or detour, and the name and 24-hour phone number of a contact person employed by the Contractor.

12-2.04 Access To Driveways, Houses, and Buildings

Safe and passable pedestrian, bicyclist, and vehicular access must be provided and maintained to fire hydrants, homes, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, hospitals, and all similar facilities and establishments. Access must be navigable, continuous, and unobstructed unless otherwise approved by the agency.

When abutting property owner's mutual access is to be eliminated, repaired, or replaced under the Contract, the existing access must not be closed until the replacement access facilities are completed and functional.

12-2.05 Property Damage

Any property damage caused by the Contractor must be repaired immediately at the Contractor's expense to the satisfaction of the Agency.

12-2.06 Erection of Signs To Facilitate Passage of Vehicles

The Contractor must erect such warning and directional signs as necessary, or as directed by the Agency, for facilitating the passage of public traffic through or around the Work and the approaches. Warning and directional signs must comply with these Specifications and the California Manual on Uniform Traffic Control Devices (CA/MUTCD).

12-2.07 Traffic Obstructions, Delays, and Inconveniences

Public traffic must be permitted to pass through the Work, and the Contractor must conduct operations that offer the least possible obstruction, delay, and inconvenience to the public, except where authorized by the Agency or in an emergency situation where access may endanger the public. See Section 7-8, "Emergency Repairs," of these Specifications for criteria on what constitutes an emergency.

12-2.08 Work On Private Property

The Contractor must obtain written permission from the owner of any privately owned property prior to beginning any work, storing materials, or otherwise conducting any operations on the property. Written approval from the property owner must be on file with the Agency before any operations are permitted on the property.

12-2.09 Hazardous Conditions Created

Whenever the Contractor's operations create a condition hazardous to pedestrians, bicyclists, or the traveling public, the Contractor must, at the Contractor's own expense, furnish, erect, and maintain any fences, covers, temporary traffic barriers, barricades, lights, signs, and other temporary traffic control devices necessary, or as directed by the Agency, to prevent accidents or damage or injury to the public or property.

12-3 PUBLIC SAFETY AND TRAFFIC CONTROL

12-3.01 General

Traffic controls must be installed in accordance with the latest edition of the "California Manual on Uniform Traffic Control Devices" (CA/MUTCD), the National Cooperative Highway Research Program (NCHRP) Report 476 (nighttime traffic controls), the approved Traffic Control Plan (TCP), the project special provisions, these Specifications, and all other supporting, applicable, and referenced standards, documents, or manuals.

12-3.02 Responsibility For Safety

It is the Contractor's responsibility to provide for public safety and traffic control. The Agency may review the Contractor's operations and inform the Contractor if an unsafe or hazardous condition is observed. The Contractor may be directed verbally or via Field Instruction, letter, or other means to abate the hazard. The Contractor must comply with directives for hazard abatement immediately or within the timeframe imposed by the Agency.

12-3.03 Passage of Emergency Vehicles

The Contractor must provide for the uninterrupted passage of emergency vehicles through or around the Work zone at all times regardless of the controlled traffic conditions in place at the

time. Exception: The roadway was previously approved for complete closure (e.g., bridge replacement) and where required and advance notification has been provided.

12-3.04 Furnishing, Installing, and Maintaining Temporary Traffic Controls

Signs, lights, barriers, fences, barricades, and other facilities must be furnished, erected and maintained by the Contractor to provide adequate warning and guidance to the public of conditions to be encountered during road construction at all hours of the day or night. Traffic control devices must be placed before beginning work and must be removed from the right-of-way at the end of each day or shift, or, for long-term closures, when no longer needed, and must be placed so as to not obstruct bicycle lanes and pedestrian facilities.

Traffic control devices furnished and erected by the Contractor must not obscure the visibility of, nor conflict in intent, meaning, and/or function with, existing signs, lights, or traffic control devices.

Used Temporary Traffic Control Devices will be considered satisfactory if approved by the Agency before placement. ATSSA's Quality Guidelines for Temporary Traffic Control Devices and Features must be used as a guide.

12-3.04.A Temporary Traffic Barriers (TTB)

The four (4) primary functions of TTBs are:

1. To keep vehicular traffic from entering work areas, such as excavations or material storage sites;
2. To separate workers, bicyclists, and pedestrians from motor vehicle traffic;
3. To separate opposing directions of vehicular traffic; and
4. To separate vehicular traffic, bicyclists, and pedestrians from work and/or structures such as falsework for bridges and other exposed unyielding objects.

TTB is required where any of the following conditions exist:

A. Excavations – When the near edge of an excavation is 15 feet or less from the edge of the traveled way, except when:
    1. Excavations are covered with steel plates or concrete covers of adequate thickness to prevent accidental entry by traffic or the public;
    2. Excavations are less than 1 foot deep;
    3. Excavations have side slopes, where the slope is 4 to1 (horizontal: vertical) or less (excluding existing roadside ditches);
    4. Excavations are protected by an existing barrier or railing.
B. Unprotected Unyielding Obstacles – Whenever the work includes installation of a substantial fixed object such as bridge falsework, or whenever the Contractor removes a portion of an existing protective railing and does not replace the railing during the same day, or whenever the roadway alignment changes and subsequently encroaches onto an existing fixed obstacle in such that it creates a significant hazard to the traveling public.
C. Material and Equipment Storage - Whenever unyielding material or heavy equipment is allowed to be stored within 15 feet of the traveled way.

TTBs are approved for use by the Agency through the Traffic Control Plan (TCP) submittal process. Where approved, TTBs must be installed in full compliance with the following:

1. TTB's must be approved by the Agency through a Certificate of Compliance before being placed in the public right-of-way.
2. TTB's must meet the requirements of NCHRP Report 350, Test Level 3 (TL-3) criteria, unless otherwise approved by the Agency.
3. The TTB System must be of sufficient length to completely shield the entire drop-off area or obstacle
4. Exposed surfaces of new and used TTB segments must be freshly coated with white paint prior to their first use on the project and periodically repainted to remove marks from vehicle strikes and graffiti when requested by the agency.

5. TTB segments must be in new or like-new condition free of chips, cracks, or structural steel deformation or loss that may compromise the designed characteristics of the segment. Connecting eyes must be straight and undamaged. Rejection of TTB segments is at the sole discretion of the Agency.
6. Maintain a minimum 2-foot offset between the traveled lane and the TTB and between the excavation and the TTB . If the excavation/barrier minimum separation is not possible, and lateral movement cannot be tolerated, the TTB must be anchored to the road surface as indicated in Detail T3 of the Caltrans Standard Plans. Note: Placing the TTB on a grout bed can provide a mechanical interlock to prevent movement and may be used as an alternative method for anchoring if approved by the Agency.
7. TTB's must be set on a firm, stable foundation graded to provide a uniform bearing throughout the entire length of each segment.
8. Abutting TTB ends must be placed and maintained in alignment without substantial offset to one another.
9. Adjacent TTB segments must be properly connected as indicated on Detail T3 of the Caltrans Standard Plans.
10. Where the TTB system is placed on a curve and the radius is too severe to properly connect the segments, the Barrier must be backed continuously with earth fill as indicated on Detail T3 of the Caltrans Standard Plans.
11. The approach end of the Barrier must be tapered away from the road at a 8 to1 or flatter angle and must be shielded from traffic through one of the following methods:
    I. Bury the end of the TTB in an earthen slope so no abrupt end exists.
    II. Extend the end of the TTB to a point 15 feet or more beyond the edge of the traveled way (ETW).
    III. Install a crash cushion array at the approach end of the TTB system meeting the requirements of Section 12-3.04.B of these Specifications.
12. If a TTB system is to be placed within 10 feet of the traveled way, the Contractor must provide Barrier reflectors fastened to each segment and evenly spaced using one of the following methods:
    I. High strength, two component, quick-set bonding epoxy.
    II. A mechanical system (stainless steel, galvanized or zinc plated) consisting of an internal thread flush anchor, hex bolt, lock and flat washers.

    The retro-reflective sheeting must be white (silver) or yellow (amber) in color and applied to one or both sides of the reflector as necessary based on TTB application (traffic separation). The number and placement of reflectors may vary depending on site conditions.
13. The approach end of a TTB system must have a Caltrans P-marker or Caltrans R-Marker installed as appropriate for conditions. If the TTB is placed on a skew, a Type P Marker must also be installed at the skew point nearest the traveled way.
14. The Barrier System must be removed from the right-of-way when no longer required on the project or when directed by the Agency.

12-3.04.B Crash Cushions

Crash Cushions must meet the requirements of NCHRP Report 350, Test Level 3 criteria as crashworthy devices.

The appropriate Crash Cushion array from Caltrans Standard Plans T1A, T1B, or T2 must be used based on the posted speed and location of the barrier or fixed object to be attenuated. A manufacturer-designed Crash Cushion array may be used if approved in advance by the Agency.

A crash cushion array must be furnished, installed, and maintained as shown on the project plans and/or TCP, the Caltrans Standard Plans, and in conformance with the manufacturer's recommendations and the following:

1. If a fixed object or the approach end of a TTB is less than 15 feet from the traveled way, a temporary crash cushion array is required unless otherwise approved by the Agency.
2. Crash Cushions must be in new or like new condition when installed.
3. Any Crash Cushion that is damaged to the extent that it cannot perform as intended and as specified by the manufacturer must be immediately (within 24 hours) repaired or replaced by the Contractor.
4. Crash Cushion Modules must be filled to the proper level (based on placement within the array) and with the appropriate material (generally ASTM C-33 Concrete Sand). Any module found to be improperly filled or filled with unacceptable material (e.g., cobbles, aggregate base, dirt, trash or other non-approved materials) must be immediately removed from the roadway and replaced with a properly-filled Module.
5. Cone inserts, where required, must be placed in each module and in the proper orientation as indicated by the manufacturers' specifications.
6. Lids must be correctly fastened and maintained in place at all times. Water must not be allowed to enter the module and mix with the sand.
7. When a Crash Cushion array is no longer required, all modules must be removed from the right-of-way by the Contractor.
8. The surface on which a Crash Cushion array is installed must be smooth, flat, and compacted (usually asphalt).
9. The module at the approach end of a temporary Crash Cushion array must have a Caltrans P-marker or Caltrans R-Marker installed as appropriate for conditions.
10. Temporary Crash Cushion arrays must not encroach into the traveled way.
11. The Contractor must repair any pavement damaged by the installation or removal of a Crash Cushion array.

12-3.05 Inadequate Traffic Controls and After-Hour Maintenance and Repairs

Should the Contractor appear negligent in furnishing and maintaining sufficient traffic control devices or protective measures or fail to provide flaggers as necessary to control traffic, the Agency may direct the Contractor, at the Contractor's expense, to abate the hazard. See Section 4-5, "Field Instructions or Other Written Directives," of these Specifications, regarding requirements for compliance with directives.

Should the Agency point out the inadequacy of warning devices and protective measures, that action does not relieve the Contractor from responsibility for public safety or abrogate the obligation to furnish and pay for these devices and measures.

Should the Contractor fail to properly furnish or maintain traffic controls or correct a hazard caused by inadequate or inappropriate traffic control, the Agency will abate the hazard. Expenses to abate the hazard will be deducted from a progress payment. If the Contractor is unavailable to perform after-hour maintenance and repair to traffic control devices, the Agency will make all necessary repairs to safeguard motorists, bicyclists, and pedestrians, and deduct all costs from a progress payment.

12-3.06 Competent Flaggers

The Contractor must provide flaggers to control traffic when necessary or requested by the Agency. Flaggers must be trained as required by Cal/OSHA, Title 8, Section §1599. The Contractor must be prepared to provide verification of such training to the Agency when requested. If in the opinion of the Agency a flagger is not performing in a manner that is conducive to the safe passage of vehicles, bicyclists, and/or pedestrians, the Contractor will be directed to immediately find a replacement flagger.

12-3.07 Construction Signs

The Contractor is responsible for supplying, installing, and maintaining all construction signs and posts. Regulatory signs or guide signs will be supplied, erected, and maintained by the Agency, but must be protected from damage from construction activities by the Contractor through the duration of the project.

12-3.08 Temporary Bridging of Excavations and Trenches

1. The use of steel plates must be approved by the Agency prior to installation.
2. Steel plates, in the roadway, must have the name and 24-hour emergency telephone number of the contractor responsible for maintaining the plates stenciled on the roadway pavement adjacent to the plates. Painted text must be in white lettering using chalk-based paint. The text must be neatly stenciled lettering, a minimum 3 inches in height, and must be maintained in legible condition for the duration of plate placement.
3. Steel plate width and thickness requirements:
    a. 18 inches or less in width - minimum thickness of 3/4 inch.
    b. Greater than 18 to 72 inches in width - minimum thickness of 1 inch.
    c. The thickness of steel plates for trench widths exceeding 72 inches must be established through an analysis completed by a licensed professional engineer.
4. Whenever steel plates are used to cover an excavation where the related work is to take place for longer than 2 weeks, the steel plates must be inlayed or recessed into the existing pavement, milling out the pavement surface to ensure that the top of the plate matches existing elevations of the adjacent pavement surface. Steel plates must be large enough to allow a minimum of 1 foot of bearing on all sides of the trench.
5. Whenever steel plates are used to cover an excavation where the related work is to take place for less than 2 weeks, they may be placed on top of the asphalt with transitional ramps of MC250 asphalt mix against vertical edges of the plates. Ramping must be accomplished to provide a minimum angle of approach of 12 to 1, providing a smooth, gradual transition between the pavement and the plate. Steel plates must be anchored to the roadway surface with pins or spikes on the 4 outermost corners. Additional pins must be placed as necessary to assure the steel plates are secured. Pins must be installed such that they do not protrude above the plate surface any more than is necessary to anchor the plate and must not create a hazard for the motoring or pedestrian public. Steel plates must be welded together (when necessary) to prevent shifting/bouncing. The steel plates must extend beyond the edge of the trench at least 18 inches, but no more than 30 inches, on all sides. Corners of steel plates must not protrude into the traveled way creating a hazard to motorists, bicyclists, or pedestrians.
6. Steel plates must have a nonskid surface static coefficient of friction of 0.35 per California Test 342 for all steel plates within traveled roadway, and 0.50 per ASTM C1028 for steel plates in pedestrian pathways or crossings. When required by the Agency, the Contractor must certify in writing to the Agency that steel plates used in the Work meet the required static coefficient of friction.
7. The length of a series of plates running parallel to traffic wheel paths must not exceed 30 feet unless approved in writing by the Agency or noted in the TCP or contract drawings.
8. Trench walls and adjacent soils must be sufficiently stabilized prior to the use of steel plates for bridging.
9. For conditions that require a support structure (e.g., wide excavation with multiple steel plates, I-Beams, sheet piles, etc.), the system must be designed by a registered professional engineer and submitted to the Agency for approval before use.
10. Where the Street surface is uneven, plates must be bedded on MC250 asphalt mix.
11. Steel plates must be installed to operate within minimum noise levels as indicated in Sacramento County Code, Section 6.68, “Noise Control.”

12. Steel plates cannot remain on the roadway for longer than 7 Calendar Days unless approved in writing by the Agency.
13. BUMP (W8-1) warning signs must be properly posted and maintained in advance of all roadway plates placed on the surface of the pavement.
14. The Contractor is responsible for maintaining the steel plates to allow for the safe passage of vehicles until the roadway is properly back-filled and patched.
15. The Contractor is responsible for damages or injuries that occur as a result of the plates being placed in the roadway. The Contractor must reimburse the Agency any costs for emergency repairs.

In sidewalk areas, one and 1-1/8 inches plywood with a skid-resistant surface and a static coefficient of friction of 0.50 per ASTM C 1028 may be substituted for steel plating where the excavation is less than 2 feet deep and when authorized by the Agency. Transitional ramps of MC250 asphalt mix must be installed against vertical edges in the direction of pedestrian traffic (both up and down-stream). Ramping must be accomplished to provide a minimum angle of approach of 12 to 1, providing a smooth, gradual transition between the sidewalk and the plate. Plywood must extend beyond the edge of the trench. Any overlap (where multiple sheets are used) must be a minimum of 12 inches. The plywood must not protrude past the sidewalk edge into the traveled lane.

Vehicular travel over backfilled but unpaved excavations is not allowed. The Contractor must provide a temporary surface suitable for driving consisting of at least 2 inches of plant mix asphalt over 6 inches of aggregate base, concrete slurry (completely cured), or traffic plates placed over the excavated area of sufficient width and thickness as indicated in this Section.

12-3.09 Entering and Leaving the Construction Zone

Construction equipment must enter and leave the roadway by moving in the direction of public traffic. All movements of workmen and construction equipment on or across lanes open to public traffic must be performed in a safe manner that will not endanger the workmen or the public.

12-3.10 Existing Traffic Signal and Lighting Systems, Signs and Pavement Markings

Existing traffic signal and lighting systems must be kept in operation. When traffic signal shutdown is permitted by the Agency, the Contractor must notify the Agency at least 5 Working Days prior to shut down. Traffic signal detectors accidentally cut or damaged must be repaired or replaced by the Contractor at the Contractor's expense and be operational within 72 hours. When traffic signals are approved for shutdown, the Contractor must control traffic by use of flaggers as directed by the Agency.

Existing signs and pavement markings must be maintained by the Contractor and must not be removed or altered without Agency approval.

12-3.11 Bus Stops

If construction operations will obstruct a bus stop, the Contractor must notify Sacramento Regional Transit (RT) 48 hours in advance of beginning that portion of the Work and make arrangements agreeable with RT to provide an alternate location where people can safely board the bus.

12-3.12 Removal of Spillage From Roadway

The Contractor must immediately remove any spillage resulting from their operations along or across any public traveled way.

12-3.13 Road Edge Drop-off

A road edge drop-off is defined as an elevation difference between lanes or the edge of the traveled lane and shoulder as traversed by the wheel of a motor vehicle.

Although not always feasible, a transitional ramp with appropriate signs and delineation is preferred over other methods (barrier or open drop-off with warning signs and delineation).

Where the drop-off is between lanes and overlay or paving operations cannot be completed within the allowable lane closure time, a transitional ramp is required if the drop-off is greater than 0.08 foot. Taper edges that are transverse to the direction of traffic at a 20:1 (horizontal:vertical) slope or flatter. Taper edges that are longitudinal to the direction of traffic at a 4:1 (horizontal:vertical) slope or flatter.

For drop-offs between the edge of the traveled lane and the shoulder that are greater than 0.15 foot, the ramp must be constructed at a 4:1 (horizontal:vertical) or flatter slope. Ramp material must be fully compacted and compatible with the material in the excavated area. This applies only to drop-offs created by construction or permit and utility operations. Drainage ditches are not to be considered as drop-offs.

Placement of all signs and channelizing devices must be as indicated in Part 6 Temporary Traffic Control of the California MUTCD. Install portable delineators or tubular markers throughout the drop-off condition spaced at intervals indicated in Table 6F-102, or closer as directed by the Agency. Channelizing devices must be "glue-down" type when requested by the Agency Channelizing devices used to separate opposing directions of traffic must be yellow with retro-reflective banding. Where the drop-off condition is greater than 0.15 foot and up to 0.25 foot install Low Shoulder (W8-11) signs. Where the drop-off condition is greater than 0.25 foot but less than 1.0 foot place No Shoulder (C-31A) signs. Sign spacing must be as indicated in Table 6C-1. Whenever a drop-off is 1.0 foot or greater in depth, barrier protection is required in compliance with Section 12-3.04.A of these Specifications unless otherwise approved by the Agency.

12-4 TRAFFIC CONTROL PLANS (TCP)

12-4.01 Traffic Pattern Changes

The Contractor must notify the Agency in advance of the Contractor's desire to change any existing traffic patterns. Traffic lanes for public use must be at least 10 feet in width. Whenever feasible, an additional 4 feet must be provided for a bicycle lane. If it is not feasible to provide a separate bicycle lane, the Contractor must post signage before the construction area stating, "SHARE the Road with Bicyclists." Additionally, when the lane is shared, the Contractor must post signage for a maximum speed limit of 25 MPH in the shared lane. For traffic pattern changes that do not require a road closure, the Contractor must provide the Agency with a minimum of 5 Working Days advance notification, unless otherwise approved or deemed an emergency lane closure by the Agency. For all road closures, the Contractor must provide the Agency with a minimum of 20 Working Days' notice prior to the desired closure date, unless otherwise approved or deemed an emergency road closure by the Agency.

12-4.02 Traffic Control Plans (TCP)

A TCP is required for all work performed within the public right-of-way which modifies vehicular, bicycle and/or pedestrian traffic patterns. Each TCP must be developed in accordance with the latest version of the California Manual on Uniform Traffic Control Devices (CA/MUTCD). The basic objective of the TCP is to permit the Contractor to work within the public right-of-way efficiently and effectively, while maintaining a safe, uniform flow of traffic. Both construction work and public interest must be given consideration when developing the TCP.

TCP Templates can be located at the County of Sacramento Department of Transportation website. These templates satisfy many of the locations/situations typically encountered, but not

all. If the Contractor chooses to use a TCP template they should become familiar with the General Conditions and must first confirm its applicability to the location/situation and its use with the Agency. The use of any other TCP requires review and approval prior to proceeding with work within the public right-of-way.

The TCP must be provided to the Agency for review and approval at least 5 Working Days in advance of rudimentary lane closures and at least 20 Working Days in advance of complex lane closures and road closures. The Contractor is solely responsible for submitting any proposed TCP or modification and obtaining the Agency's approval. Copies of the approved TCP must be onsite at all times.

Unless the Contractor uses a provided template or unless otherwise approved by the Agency, the TCP must:

1. Be on 24 by 36 inch or 11 by 17 inch sheets.
2. Be legible and standardized, using computer generated graphics.
3. Show all proposed construction signs, barricades, flaggers, delineation and other traffic control devices required to provide appropriate temporary traffic control for the Work.
4. Indicate the name, address, and telephone number of the person responsible for designing the TCP.
5. Be signed and stamped by a Registered Civil Engineer, Registered Traffic Engineer, ATSSA certified Traffic ControlDesign Specialist , or C-31 Licensed Contractor.
6. Include the name and telephone number of the 24-hour contact person representing the Contractor for implementation of temporary traffic controls.
7. Indicate the Contract number, encroachment permit number, or the name of the improvement project.
8. Indicate the duration of the construction work (Calendar Days) and the requested work hours (example -- 8:00am to 3:30pm).
9. Indicate a north arrow.
10. Show and label all streets in the vicinity.
11. Show all existing traffic signals and traffic control signs and indicate any proposed operational changes (e.g., placing signal lights on flash, or covering signal lights temporarily).
12. Show existing striping, pavement markings, painted crosswalks and bike lanes. Include total roadway widths, individual lane widths, bike lane widths, median dimensions, etc.
13. Show existing curbs, gutters, sidewalks, driveways and intersections in the construction work zone.
14. Indicate posted speed limits.
15. Show location and dimensions of the construction work zone.
16. Show work area and materials storage area (if applicable).
17. Label all taper lengths and widths, delineator spacing, and sign spacing.
18. Include a legend to define all symbols and designate them with current CALTRANS nomenclature.
19. Show all parking restriction zones and signs.
20. Show signs and barricades to be used to direct pedestrians or bicyclists through or around the Work.

12-5 BARRICADING OPEN TRENCHES

Any excavation permitted by the Agency to be left open must be barricaded with Type I, Type II, or Type III barricades with retro-reflective tape and flashers, as approved or directed by the Agency. Signs stating "OPEN TRENCH" must be posted when directed by the Agency. Open excavated areas must be barricaded with at least 2 Type III barricades at the end of the excavation that faces oncoming traffic. Any excavation within 8 feet of the traveled way, not

protected by a barrier approved by the Agency as indicated in Section 12-3.13, “Road Edge Drop-off,” of these Standard Specifications, must be backfilled at the end of the work shift provided with a transitional ramp, or plated in accordance with Section 12-3.08, "Temporary Bridging of Excavations and Trenches,” of these Specifications.

12-6 EXCAVATION AND TRENCH SAFETY

Contractors that plan to excavate must follow the requirements of the California Code of Regulations(Cal/OSHA), Title 8, California Code of Regulations, Section 1541 Article 6 “Excavations” as applicable to the work.

12-6.01 Permit

The Contractor must obtain a permit from the Division of Industrial Relations per Labor Code Section 6500, as specified in Cal/OSHA, Title 8, Article 2 , Sections §§341 – 341.5, for all excavations 5 feet or deeper into which an employee is required to descend. The permit must be kept at the construction site at all times.

12-6.02 Shoring, Bracing, Shielding, and Sheeting

In accordance with Labor Code Section 6705, in advance of excavation of any trench or trenches 5 feet or more in depth, with a total value of $25,000 or more, the Contractor must submit to the Agency a detailed plan showing the design of shoring, bracing, sloping, or other provisions for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If the plan varies from the shoring system standards, the plan must be prepared by a California registered civil or structural engineer. A signed copy of the detailed plan must be on site at all times during excavation work. The Contractor's submittal must be made a minimum of 5 Calendar Days prior to any excavation work in accordance with Section 5-8, “Contractor’s Submittals,” of these Specifications.

Nothing in this Section can be deemed to allow the use of a shoring, sloping, or protective system less effective than that required by Cal/OSHA, Title 8, Article 6 “Excavations.” Nothing in this Section can be construed to impose tort liability on the Agency or any of its employees. These systems must support the sides of the excavation and prevent soil movement that could cause injury to persons or structures. Any damage resulting from a lack of adequate shoring, bracing, shielding or sheeting must be repaired at the Contractor's expense.

A Competent Person, as defined in Cal/OSHA, Title 8, Section §1504, “Definitions,” must be on site at all times when the Contractor's employees are working within the excavation.

The price bid for work that requires an excavation of 5 feet or deeper (or less if conditions warrant) must include the cost of adequate sheeting, shoring and bracing, or equivalent method conforming to applicable safety orders, unless a separate bid item is included in the bid form.

12-6.03 Contaminated Soil Management

If the Contractor is performing excavation work at a site where there is evidence, or historical data to indicate, that the soil is contaminated with oil, fuel, or other such hazardous materials, the Contractor is required to adhere to the regulatory requirements that govern the excavation and disposal of contaminated soil. These requirements include provisions for work zone delineation and control, handling of contaminated debris, storage of excavated soil, personal protective equipment, equipment decontamination, and air monitoring. See Section 10-7 Contaminated and Hazardous Materials or Environments of these Specifications for additional information.

The Contractor is required to stop work and implement the appropriate emergency response procedures in the event that field observation (e.g. odor, discoloration/staining, oily sheen) indicates that contaminated soil has been encountered. If the Contractor fails to stop work and implement appropriate emergency response procedures, the Agency may stop the workWork, and the Contractor is responsible for impacts to the Work due to the Agency stoppage.

When requested by the Agency, the Contractor must develop and implement a Spill Prevention Control and Countermeasure (SPCC) Plan. The Contractor's SPCC Plan will describe the procedures and equipment used to minimize spills, leaks, or releases of oil or hazardous materials. In addition, the Plan must address the reporting and response procedures in the event of an incident.

SECTION 13 - EXISTING FACILITIES
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SECTION 13 EXISTING FACILITIES

13-1 GENERAL

This work must conform to the State Specifications and these Specifications. Attention is directed to Section 14, "Restoration of Surfaces," and Section 15, "Clearing and Grubbing," of these Specifications for additional requirements.

Facilities subject to these Specifications include existing facilities that interfere with planned construction as shown or specified in the Contract. The removal of existing utilities must be by the utility owner, unless otherwise shown or specified in the Contract.

13-1.01 Preservation of Property

Roadside trees and shrubbery that are to remain, pole lines, fences, signs, traffic control devices, striping, survey markers and monuments, buildings and structures, conduits, under- or above-ground pipelines, and any other existing improvements and facilities, must be protected from injury or damage. If ordered by the Agency, the Contractor must provide and install suitable safeguards for protection from injury or damage. Existing improvements and facilities that are injured or damaged as a result of the Contractor's operations must be replaced or restored at the Contractor's expense to a condition as good as when the Contractor entered upon the Work. The Contractor must receive Agency approval before the removal of any road sign or permanent traffic control device that interferes with the Work.

Existing facilities within the rights-of-way and construction areas that do not interfere with the Work must be protected from damage. Unless otherwise shown or specified in the Contract, the minimum cover requirements during construction for temporary construction vehicle loading are as follows:

- For metal and plastic pipes, place at least 4 feet of cover over the top of the pipe at construction crossings.
- For reinforced concrete pipe, place at least 3 feet of cover over the top of the pipe at construction crossings.

13-1.02 Overloading, Pavement Protection & Repair

The Contractor must determine safe loading capacities and must not overload any structure, equipment, pavement, or material beyond its safe capacity, or deteriorate any further the preconstruction condition of pavement during construction. Protection of pavement to prevent damage, cracking, or scarring is the responsibility of the Contractor. The Contractor assumes full responsibility for any damage resulting from any such overloading or failure to adequately protect the existing pavement.

The Contractor must request a pre-construction inspection prior to performing any work to validate the condition of all existing public facilities, including, but not limited to, pavement, striping, curb and gutters, median curbing, sidewalks, median pavement, plantings, channelization islands, and traffic signal facilities. Following construction, and prior to field acceptance, a post-construction inspection must be conducted to identify damage resulting from the Contractor's activities. Pre- and post- construction inspections must include representatives from the Contractor and the Agency. Damage identified as a result of the pre- and post-construction inspections that was caused by the Contractor's activities must be repaired by the Contractor to the Agency's satisfaction at no additional cost to the Agency.

13-2 REMOVING EXISTING FACILITIES

Existing facilities that interfere with the Work must be removed, reset, relocated, adjusted, or otherwise modified as shown on the Plans, specified in the Special Provisions, or directed by the Agency. Work on an existing utility must be coordinated with and approved by the facility owner and must comply with the requirements of the facility owner.

Trenches, holes, depressions and pits resulting from the removal of existing facilities must be backfilled with embankment material per Section 18, "Earthwork," of these Specifications. Trenches, holes, depressions and pits that are in surfaced areas, otherwise to remain undisturbed, must be backfilled with materials equal to or better in quality and to the same thicknesses as the surrounding materials.

13-2.01 Mailboxes

Existing mailboxes and newspaper tubes must be removed and reset where shown on the Plans or as directed by the Agency. Mailboxes must be maintained in an upright position adjacent to the construction area between the time the mailbox is removed and reset in its final location.

Mailboxes must be reset on 4 by 4 inches Douglas fir or redwood posts S4S, conforming to provisions of the State Specifications, unless otherwise noted on the Plans. Posts must be set a minimum of 24 inches in concrete bases. Concrete must be Class "C" Portland Cement Concrete as defined in Section 50-5, "Portland Cement Concrete," of these Specifications. Mailboxes that can be salvaged intact, including ornamental or iron supports, must be salvaged and reset. The bottom of mailboxes must be set at a height of 3'-6" above the back of curb or edge of shoulder.

For projects in the County of Sacramento, the face of the mailbox must be set 1 foot behind the back of sidewalk on Class "A" streets, 1 foot behind the back of curb on Class "B" streets, and 1 foot behind the outside shoulder line on Class "C" streets, or as shown on the Plans or directed by the Agency. The classes of streets are as defined in the Improvement Standards of the County of Sacramento, Public Works Agency.

13-2.02 Signs

Attention is directed to Section 12, "Safety, Public Convenience, and Traffic Control," of these Specifications regarding the maintenance of existing traffic control signs.

13-2.03 Survey Monuments

Existing survey monuments and markers shown on the Plans or found during progress of the Work must be preserved. (See Section 5-9.02, "Survey Monuments," of these Specifications.) Survey monuments and markers are hereinafter referred to as "monuments." The Contractor must notify the Agency of any monument encountered and must not remove, disturb or damage the monument until the monument can be cross-referenced and surveyed by the Agency. The Contractor must allow a minimum of 5 Working Days for referencing to be accomplished. When notified by the Agency that the cross-referencing has been completed, the monument may then be removed. The Contractor is not responsible for the replacement of monuments that have been cross-referenced and surveyed by the Agency as specified above.

If the Contractor fails to notify the Agency as specified above, or removes. disturbs or damages a monument that is not in direct conflict with the Work or due to the Contractor's carelessness or failure to notify the Agency of the presence of an existing monument, referencing, resurvey, and replacement of the monument is at the Contractor's expense and must be performed by or under the direction of California Licensed Land Surveyor or a California Registered Civil Engineer authorized to practice Land Surveying.

13-2.04 Landscaping Improvements

Existing landscape improvements and appurtenances including irrigation pipes, gate valves, remote control valves, sprinkler heads, hose bibs, automatic irrigation controllers, and yard

lighting systems that interfere with the Work must be removed. Irrigation pipes must be capped at the right-of-way line or easement line, unless otherwise shown or specified in the Contract. Irrigation systems that are affected by the Work which provide irrigation to existing landscaping that is not to be removed as part of the Work must be replumbed and rewired, when necessary, to be operational within 5 Working Days of being affected by the Work. Care must be taken to guarantee that the system is plumbed in a manner consistent with appropriate design pressure and flow. Irrigation lines must be flushed and free of dirt and debris prior to re-plumbing. The Contractor must make arrangements with the abutting property owner to salvage and stockpile materials removed during the Contractor's operations. On projects for underground construction of sewer, drainage, or water facilities in public utility easements or other easements, existing landscape improvements and appurtenances must be reconstructed to their original location and condition, unless otherwise shown or specified in the Contract.

Existing plant material (i.e. trees, shrubs, ground cover and lawn) within the area affected by the Work and designated for removal must be removed per Section 15, "Clearing and Grubbing," of these Specifications.

13-2.05 Abandoned Underground Facilities

Abandoned pipes, conduits, and other abandoned structures and facilities within 2 feet below the roadway subgrade must be removed and disposed of. Pipes that are lower than 2 feet below the roadway subgrade must either be removed or the ends plugged with concrete, at the option of the Contractor, unless specified otherwise in the Contract. Pipe ends must be plugged and structures must be abandoned in accordance with Section 15-1.04, "Abandonment of Pipes, Conduits and Structures," of these Specifications.

13-2.06 Drainage Facilities

The Contractor must maintain existing drainage facilities, including ditches, during the Work. Except where otherwise shown on the Plans, the Contractor must re-establish the drainage facilities to their original locations and in working condition as soon as possible after completing work in the area. For remedial maintenance projects or improvement projects in established areas, the Contractor must coordinate the work so that storm drain systems are fully operational at the end of each Working Day. No runoff is allowed to flow unconfined through trenches or excavations without approval of the Agency.

13-2.07 Fences

Fence material and gates to be relocated or reset must be removed with care to prevent damage to the material. Adhering concrete footings must be removed from fence posts and braces that are to be relocated or reset.

Relocated or reset fences must be placed a minimum of 2 feet from fire hydrants. For security of property or containment, temporary fencing must be furnished and erected where the removed existing fencing was, as shown on the Plans and as directed by the Agency.

Materials removed from existing fences that, in the opinion of the Agency, are unsuitable for reuse become the property of the Contractor and must be disposed of. The unsuitable material must be replaced with material of a type and quality equal to the best of the material in the existing facility. Furnishing of material to replace the unsuitable material will be paid for as extra work as provided in Section 9, "Changes and Claims," of these Specifications. Furnishing of material to replace material that has been damaged by the Contractor's operations will be at the Contractor's expense.

13-2.08 Concrete

Where a portion of a concrete structure, slab, or curb is to be removed, the concrete must be cut with a concrete saw so that the visible edge of the remaining concrete forms a neat, straight line. Where concrete slabs, curbs, ornamental walls, brick work, or similar items are encountered in the course of the construction of underground facilities, except drainage facilities

within road right-of-way, the structure or facility must be reconstructed to match the existing portion of the facility. On roadway projects and drainage construction in highway rights-of-way, the facility must be removed to the right-of-way line, and the end of the facility must be reconstructed to provide a neat appearance.

13-2.09 Removal of Traffic Stripes and Pavement Markings

Pavement surfaces where striping and markings have been removed and are not scheduled to be resurfaced must be slurry sealed. Limits of slurry seal are the full width of affected lanes and extend a minimum of 2 feet beyond the limits of the striping marking removal.

Removal of traffic stripes and pavement markings is required for areas of slurry seal and other areas specifically indicated for stripe removal as shown on the Plans. Removal of painted traffic stripes and pavement markings must comply with the requirements of the State Specifications. Traffic stripe removal must be completed no more than 2 Calendar Days prior to placement of slurry seal.

Traffic stripes and pavement markings must be removed by sandblasting or approved grinding method. To protect the public when sandblasting is performed within 10 feet of a lane occupied by vehicular traffic, the sandblast equipment must be equipped with a shield and a vacuum attachment operating concurrently with the pressure equipment to immediately remove grindings and sand from the surface of the roadway. The Contractor must immediately remove all remaining sand and grindings from the roadway.

Handling and disposal of hazardous materials associated with the removal of traffic stripes and pavement markings must comply with all applicable Federal, State, and local laws, rules, regulations, ordinances and statutes. The Contractor is responsible for all costs associated with non-compliance, including any fines levied.

Placement of permanent or temporary pavement striping, as detailed in Section 48-5 "Placement," of these Specifications, is required prior to opening the subject portion of roadway to traffic.

13-3 MEASUREMENT AND PAYMENT

Full compensation for protecting existing facilities is included in the prices paid for the various items of work, and no additional compensation will be allowed.

Payment for removing, resetting, relocating, adjusting, or otherwise working on existing facilities, will be made at the prices for the various items of work in the Contract, and will be payment for all work involved including disposal and salvaging.

Full compensation for conforming to the provisions in this Section not otherwise provided for is included in the prices paid for the various items of work involved, and no additional compensation will be allowed.

The Contract price paid per linear foot for relocating or resetting existing fence, includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and doing all the work involved in removing existing fence materials and gates, and relocating or resetting existing fences, complete in place, as specified in these Specifications, as shown or specified in the Contract, and as directed by the Agency.

Full compensation for clearing fence lines and disposing of the resulting material, excavating high points in the existing ground between posts, excavating holes, disposing of surplus excavated material, furnishing and placing Portland Cement Concrete footings, connecting the fences to structures and existing cross fences, and constructing temporary fences, is included in the price paid for relocating or resetting existing fences, and no additional compensation will be paid.

If there is no item in the Contract for relocating or resetting fences, full compensation for conforming to the provisions in this Section not otherwise provided for is included in the prices paid for the various items of work involved, and no separate payment will be made.

Removal of traffic stripes and pavement markings will be measured by the linear foot for removal of four-inch traffic stripes. Stripes of widths other than four inches will be converted to an equivalent length of four-inch stripe for determination of quantities. Traffic stripes with gaps or skipped striping will only be measured along portions with traffic striping; gaps without striping will not be measured for payment. Traffic stripe is defined as paint, thermoplastic, or other stripe material. The unit price bid for stripe removal includes full compensation for all material, tools, labor, and equipment to remove the traffic stripes and pavement markings, remove all debris from the roadway, and disposal of all waste as specified herein.

SECTION 14 - RESTORATION OF SURFACES
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SECTION 14 RESTORATION OF SURFACES

14-1 GENERAL

All existing curbs, gutters, sidewalks, driveways, road shoulders, pavement, and similar items removed, damaged or displaced during the Work must be restored by the Contractor. Restoration must be done using the same types of materials as in the original construction, and to not less than the original dimensions, subject to minimum requirements specified herein, as shown or as specified in the Contract, or as directed by Agency. All work must be constructed to match current standards and must match the appearance of the existing improvements.

14-2 PRIVATE ROADS

Trench compaction must conform to the requirements in Section 19, "Trench Excavation, Bedding and Backfill," of these Specifications. Where asphalt surfacing exists, the surface restoration must match the corresponding portions of the existing private road but not be less than 2 inches of asphalt concrete over 4 inches of Class 2 aggregate base. Aggregate base and asphalt concrete must be as specified in Section 14-3, "Streets and Parking Lots," in this Section of these Specifications. Where gravel, stone, or crushed rock surfacing exists, surface restoration must match the existing surface of the private road but not be less than 4 inches of Class 2 aggregate base. The remaining gravel or stone roadway must be reshaped to preconstruction cross sections and given an application of a minimum of 2 inches of 3/4 inch maximum size gravel or crushed rock compacted into place. The restored surface of a private road must be at least equivalent to the preconstruction surface condition.

14-3 STREETS AND PARKING LOTS

Attention is directed to the requirements in Section 12, "Safety and Construction Area Traffic Control," of these Specifications.

Subgrade preparation must be performed in accordance with Section 18, "Earthwork," and the aggregate base materials and placement must meet the requirements of Section 22, "Base Material," of these Specifications.

Repaving of trenched areas must be in accordance with Section 23, "Asphalt Concrete," and Standard Drawing 4-64, of these Specifications.

14-3.01 Trench Restoration

Edges of trench restoration must be cut/ground so that edges are parallel or perpendicular to the centerline of the roadway. Sand/slurry/fog seal must be placed so that edges are parallel to or perpendicular to the centerline of the roadway. Edges of existing pavement that are broken or damaged must be removed and neatly trimmed back to stable and undisturbed base and surface materials. For locations where the existing pavement is severely fractured, remove loose asphalt to the nearest crack beyond the specified restoration limits, as directed by the Agency.

Intermediate trench backfill, per Standard Drawing 4-64, must be in accordance with Section 19-2.03, "Trench Backfill," of these Specifications. Repaving of trenched areas must be in accordance with Standard Drawing 4-64, including shallow, trench, deep trench, and earth saw trench details, with the following exceptions:

14-3.01.A Roadways with pavement less than 3 years old

County Code Section 12.09.120 prohibits excavations in newly constructed or overlaid roadways for a period of 3 years. In circumstances such as emergency repair work where no other feasible options exist, the Sacramento County Dept. of Transportation may grant a waiver

to this restriction. If a waiver is granted, the applicant must be prepared to meet more stringent restoration requirements than those in these Specifications.

14-3.01.B Roadways with 3 to 5 year old pavement

For cuts in pavement that have been constructed or overlaid within 3 to 5 years, grind a minimum of 1-1/2 inches from lane line to lane line or edge of pavement/lip of gutter and overlay with asphalt concrete. The 1-1/2 inch grind depth is a minimum. The grinding must produce a stable surface for new pavement material. A seal coat is not required.

14-3.01.C Roadways with pavement greater than 5 years old

14-3.01.A(1) Minor Roadways

Alternate 1 – Eliminate the tee portion of asphalt restoration shown on Drawing 4-64, and limit the extent of paving to the projected area above the trench. Follow the trench paving with a minimum 1-1/2 inch grind and overlay from center of roadway to edge of pavement/lip of gutter. The 1-1/2 inch grind depth is a minimum. The grinding must produce a stable surface for new pavement material.

Alternate 2 – Slurry or sand seal from edge of pavement/lip of gutter to centerline of roadway and a minimum of 2 feet beyond the trench paving limits. Limit sand seal applications to 250 square feet or less or as directed by the Agency.

14-3.01.A(2) Roadways With 2 or More Lanes in Each Direction or 45 MPH or Greater Posted Speed

The 1-1/2 inch deep grind must be from lane line to lane line or edge of pavement/lip of gutter. The 1-1/2 inch grind depth is a minimum. The grinding must produce a stable surface for new pavement material. A seal coat will not be required.

14-3.02 Repair to areas damaged by Contractor's Operations

Areas of existing asphalt surfaces damaged during construction must be removed and replaced to a depth equal to the existing asphalt but not less than 4 inches on collector and minor roadways and 6 inches on major roadways. The top 4 inches of base material below the damaged asphalt must be re-compacted to a minimum relative compaction of 95 percent. Base or underlying material that is wet, loose, or otherwise unsuitable for supporting new paving must be removed to a maximum depth of 12 inches below the bottom surface of the new asphalt pavement section and replaced with aggregate base material per the requirements of Section 22, "Base Material," of these Specifications. Aggregate base material must be compacted in layers not exceeding 6 inches in depth to a minimum relative compaction of 95 percent. If unsuitable materials exist below this depth, an approved geotextile fabric must be installed prior to placing the aggregate base.

14-3.03 Asphalt Concrete

The asphalt concrete must conform to requirements specified in Section 23, "Asphalt Concrete," of these Specifications. If the existing pavement surfacing is rubberized asphalt, the top layer of new asphalt surfacing must also be rubberized. Special attention should be given to section 23-3.02, "Binders,"of these Specifications, which specifies that "Conventional dense graded asphalt used on on-ramps, off-ramps, arterial streets and thoroughfare streets must use PG64-10 binder."

An asphalt paving machine must be used for placing the finish lift of asphalt concrete paving on all trench restorations. Limited areas inaccessible to mechanical spreading and compaction equipment or where irregularities or unavoidable obstacles exist may be spread, raked and luted by hand tools or other methods approved by the Agency.

Final pavement surface for trenches greater than 3 feet in width and mostly parallel to the centerline of the street must not vary from the edge of a 10 foot straight edge (placed parallel and perpendicular to the trench) by more than 3/8 inch, except at intersections or changes in

grade.

Final pavement surface for trenches 3 feet or less in width, bore holes having an area less than 50 square feet, and trenches of any width not mostly parallel to the centerline of the street must match the smoothness of the existing pavement and the final pavement surface grade must not be greater than 3/8 inch above a line between the existing pavement surface at each edge of the excavation. Final pavement below this line is not acceptable.

Pavement not meeting the above requirements must be removed to a minimum depth of 1-1/2 inch for the full width of the trench and replaced. The minimum length of removal along the trench is 4 feet beyond the ends of the non-conforming areas but must not exceed the limits of the original pavement repair.

14-3.03.A Density requirements

The density of the asphalt pavement must be between 92 and 97 percent. Densities between 90 and 92 percent may be considered acceptable on a case-by-case basis at the descretion of the County Department of Transportation. The Agency may require testing of the asphalt concrete used in pavement restoration to verify that the materials being placed conform to these specifications. Density of asphalt concrete for quality control purposes may be determined in accordance with Section 23-8.05.A, "Density Requirements," of these Specifications. At the Agency's request, the Contractor must provide quality assurance testing per Section 23-9, "Asphalt Concrete Placement Acceptance Testing," of these Specifications. Asphalt not meeting the above-specified compaction requirements will be rejected on a lot basis.

14-3.04 Seal Coats

14-3.04.A Slurry Seal (Type 2)

Slurry seal must be furnished and placed as specified in the State Specifications, except that the requirement for a tack coat is waived. The final product must be 1 layer between 1/8 and 1/4 inch thick.

14-3.04.B Sand Seal

Sand seal must be furnished and placed as specified in the State Specifications, except that the asphaltic emulsion and aggregate must be as follows:

- The asphaltic emulsion for sand seal must conform to the requirements in Section 50-17, "Asphalt, Liquid Asphalt, and Asphaltic Emulsion," of these Specifications. The asphaltic materials must be CRS 1. The rate of application of CRS 1 must be between 0.08 and 0.15 gallons per square yard as directed by the Agency, depending upon the surface condition and weather.
- Aggregate for sand seal must conform to the State Specifications, and must be spread at the rate of 6 to 10 pounds per square yard or as directed by the Agency. Preparation of seal coat, applying bituminous binder, spreading, and finishing must be in accordance with the State Specifications, with the exception that steel wheeled rollers for sand seal may be eliminated and the pneumatic roller used for all seal operations. Asphaltic emulsion must be applied by a distributor truck.

14-3.05 Shoulders

Surface restoration of trenches located in a shoulder within 6 feet of the traveled way must consist of a structural section equal to the original, or as shown on the Plans, but having a minimum of 6 inches of aggregate base compacted to a relative compaction of 95 percent of ASTM D-1557.

14-4 CONCRETE

Repairs to concrete curbs, gutters, sidewalks, driveways, and other concrete surfaces must be made by removing and replacing the entire portions between joints or scores, except as follows:

- Curb and gutter must be replaced between saw cuts so that the remaining or new curb and gutter will not be less than 4 feet in length, measured from the saw cut to the nearest score mark, expansion joint, construction joint, or weakened plane joint.
- The entire width of sidewalk must be replaced between saw cuts for a length of not less than 4 feet providing the remaining sidewalk is not less than 4 feet in length, measured from the saw cut to the nearest score mark, expansion joint, construction joint, or weakened plane joint.
- Driveways must be replaced as directed by the Agency, either completely or partially, by saw cutting in the middle of the driveway. Existing driveways not in conformance with current ADA requirements must be completely removed and replaced to conform to current requirements.
- In accordance with section 4-18 of the County of Sacramento Improvement Standards and the American with Disabilities Act (ADA), California Code of Regulations, Title 24, and the California Manual on Uniform Traffic Control Devices, any modification of any portion of an intersection requires access improvements to all corners of that intersection. Re-construction of existing sidewalk ramps as a result of damage to the sidewalk ramp is considered a modification to a portion of the intersection. All existing corners of an intersection where sidewalk ramps are not in conformance with current ADA requirements must be completely removed and replaced to conform to current requirements.
- Curb dowels and reinforcing must be provided in accordance with Section 27-6 of these Specifications

Replacement must be in accordance with the applicable requirements, including the placement of Aggregate Base Class 2 under the new concrete as specified in Section 27, "Curbs, Gutters, Sidewalks, and Drainage Structures," of these Specifications, except provisions for payment, for the type and classification of work set forth in other Sections of these Specifications. Pedestrian access must be maintained in accordance with Section 12-2.02, "Pedestrian and Bicyclist Access," of these Specifications.

14-5 PAVEMENT MARKINGS

Except where specified otherwise in these Specifications or the Special Provisions, the Contractor must replace all crosswalks, legends, and other permanent pavement markings and raised markers that have been disturbed, destroyed, or covered by the Work. Damaged pavement legends must be completely removed, and crosswalks must be removed from edge of road to edge of road for minor streets or from edge of road to median or centerline for roadways with 2 or more lanes in each direction or 45 mph or greater posted speed in accordance with Section 13-2.09, "Removal of Traffic Stripes and Pavement Markings," of these Specifications, and a sand seal or slurry seal conforming to section 14-3.04, "Seal Coat," of these Specifications, must be applied. Seal coat must cover the entire pavement surface and extend a minimum of 6 inches past the areas where the legend has been removed. All edges of seal coat must be perpendicular or parallel to the centerline of the roadway. Pavement markings must then be replaced in accordance with Section 48-2, "Thermoplastic Traffic Stripes and Pavement Markings," of these Specifications.

14-6 TEMPORARY PAVING

Temporary paving must be placed and maintained at locations wherever excavation is made through pavement, sidewalk, or driveways, and as shown on the Plans or as directed by the

Agency. Temporary paving must be placed as soon as the condition of the backfill is suitable to receive it and must remain in place until the condition of the backfill is suitable for permanent resurfacing. Asphalt concrete Type "A," conforming to Section 23, "Asphalt Concrete," of these Specifications, must be used as temporary paving on all roadways with 2 or more lanes in each direction or 45 MPH or greater posted speed. Temporary paving in all other paved areas may be asphalt plant-mix cutback, unless otherwise directed by the Agency. Thickness of temporary paving must be 1-1/2 inch unless otherwise shown on the Plans. In sidewalk areas, temporary paving must be at least 1 inch thick. Temporary paving must be maintained at the same level as the existing pavement until the permanent surfacing is placed. Temporary pavement must be replaced with permanent pavement within 30 Calendar Days of when it was first placed, unless approved in writing by the Agency.

All temporary paving must be identified by painting the words "TEMPORARY PAVEMENT" along with the name of the contractor responsible for maintaining the temporary paving material and the date on which the material was placed. Painted text must be in white lettering at the beginning, ending, and along the length of the temporary paving at maximum intervals of 500 feet. The text must be neatly stenciled a minimum 5 inches in height and must be maintained in a neat and legible condition.

Temporary pavement and/or portions of temporary pavement totaling 1000 feet or greater in length must also be identified with a construction sign placed along the edge of the roadway and constructed in accordance with Section 23 Asphalt Concrete of these Specifications. Temporary pavement signs must be 30 by 30 inches in a diamond configuration and must be orange with 5 inch black lettering. Signs must be installed at the beginning, ending, and at maximum intervals of 1000 feet and within the road right of way whenever possible. Signs must not be installed in a location that would obstruct visibility or create an obstacle for pedestrians. The property owner's permission must be obtained if signs are placed on private property.

14-7 MEASUREMENT AND PAYMENT

The lump sum price paid for items of work included in the Contract for restoration of surfaces removed, damaged, or displaced by the Work includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved, complete in place, as shown or as specified in the Contract, specified in these Specifications, and as directed by the Agency.

If no item is included in the Contract for restoration of surfaces, full compensation for conforming to the provisions in this Section, not otherwise provided for, is included in the prices paid for the various items of work involved, and no separate payment will be made.

Temporary paving will be measured for payment by weight of asphalt concrete placed in the Work, in accordance with Section 23-11, "Measurement and Payment," of these Specifications.

The price paid per ton for temporary paving includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in temporary paving, complete in place, as shown or specified in the Contract, as specified in these Specifications, and as directed by the Agency.

If there is no item in the Contract for temporary paving, full compensation for conforming to the provisions in this Section, not otherwise provided for, is included in the prices paid for the various items of work involved, and no separate payment will be made.

SECTION 15 – CLEARING AND GRUBBING
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SECTION 15 CLEARING AND GRUBBING

15-1 GENERAL

Clearing and grubbing consists of removing all objectionable material, and material as designated in these Specifications, from within the work site or other areas as shown on the Plans or specified in the Special Provisions.

The methods of removing existing facilities must conform to Section 13, "Existing Facilities", of these Specifications.

Attention is directed to Section 10, "Environmental Controls at Work Site", of these Specifications for additional requirements.

Removal of existing trees includes removal of tree stumps and tree roots 2" or larger in diameter to a minimum depth of twelve inches below the grading plane. Removed trees, stumps and roots are the property of the Contractor and must be removed from the project site. All debris resulting from tree removal work, including broken branches, fallen leaves, wood chips, and sawdust produced from stump and root removal work, must be promptly removed from the work site. If the tree to be removed is within the drip line of another tree that is to remain, the tree removal work must be done under the direction of a Certified Arborist. The holes resulting from tree stump and tree root removal activities must be backfilled as specified in Section 18, "Earthwork", of these Specifications. If the tree removal work is in a lawn area that is to remain, the area of tree removal must be repaired and replanted with turf sod as specified in Section 20, "Landscaping", of these Specifications.

Clearing and grubbing operations must not cause more than minimal damage to public and private property and improvements, including existing trees, shrubbery and lawns, outside of the work site, or other areas shown or specified in the Contract.

15-1.01 Vegetation and Debris

Vegetation designated for removal, such as weeds, grass, shrubbery, roots, and stumps, and debris, such as broken concrete and trash, must be removed from the right-of-way or construction areas and disposed of by the Contractor. Vegetation to remain must be protected in place.

15-1.02 Trees, Shrubs, Ground Cover, and Lawns

For the purpose of these Specifications, trees are defined as having a trunk diameter at breast height of 3 inches and greater measured at a height of 4-1/2 feet above the ground. Shrubs are defined as single or multi-stem individual plants, not of tree size. Ground cover is defined as multiple spreading and matting plant material of a density to cover bare ground, including turf lawn.

Only plant material shown on the Plans to be removed and disposed of must be removed and disposed of. Prior to the clearing and grubbing operations on a particular property or portion of the work site, the Agency will mark and designate the trees, shrubs, and ground cover areas to be removed and disposed of.

Trees, shrubs and ground cover that are not to be removed must be protected from injury or damage. Attention is directed to Section 10-13, "Protection of Existing Trees", of these Specifications for protection of certain existing trees within the County of Sacramento.

Trees, shrubs and ground cover designated to be relocated, and not specifically designated for disposal, must be preserved by removing an adequate and substantial root mass of native soil and roots with the rootball wrapped in burlap and kept moist until the Work has progressed to permit the replanting. The removal and replanting must be performed in a careful and professional manner at the direction of an Arborist certified by the International Society of Arborists, hereinafter designated as a "Certified Arborist". The tree trimming must be limited to

tree limbs required to be removed to allow for minimum required vehicular clearance. Tree root cutting must be limited to only what required for earthwork operations. Roots 1/2 inch or greater in diameter must be cut cleanly and sealed as directed by the Certified Arborist or by the Certified Arborist's staff. Root cutting on trees to remain, which in the opinion of the Certified Arborist will jeopardize the health or stability of the tree, must be brought to the attention of the Agency for specific instructions prior to the cutting of the roots.

The Contractor must submit the name of the Certified Arborist to the Agency, in writing, a minimum of 4 Working Days prior to the start of clearing and grubbing operations.

Tree branches or portions of shrubs which extend over a roadway must be trimmed to provide a minimum clearance of 14 feet above the shoulder point of the roadbed, unless specifically permitted otherwise in writing by the Agency. The tree or shrub branches to be removed must be removed by a tree trimmer certified by the International Society of Arborists.

Lawns which are disrupted during the Work must be regraded and replaced or repaired to match the existing lawn. Unless shown or specified otherwise in the Contract or directed otherwise by the Agency, lawns that are damaged must be replanted with new sod. The resulting lawn must be left in a condition equal to or better than the condition of the lawn prior to the start of the work.

15-1.03 Disposal and Salvage

All materials removed become the property of the Contractor and must be disposed of off the rights-of-way or easement, unless otherwise shown or specified in the Contract. Existing public or private improvements that are designated in the Contract to be salvaged must be carefully removed and stockpiled in the right-of-way or easement for later removal by the Agency or the adjacent property owner.

15-1.04 Abandonment of Pipes, Conduits, and Structures

When a pipe, conduit, structure, or other facility is to be abandoned within specified limits, all structures and appurtenances within the limits must also be abandoned. All abandoned pipes, conduits, structures, and other abandoned facilities within 2 feet below the roadway subgrade must be removed and disposed of. Pipes that are lower than 2 feet below the roadway subgrade must either be removed or the ends plugged with concrete, at the option of the Contractor, unless specified otherwise in the Contract.

When pipes, conduits, structures, or other facility have been or are to be abandoned and are not otherwise specified to be removed, if, in the opinion of the Agency, the items are found to interfere with construction, the interfering portion must be removed and the remaining open portion securely sealed. Where the greatest internal dimension of the pipe or conduit is 3 feet or less, the seal must consist of a wall of concrete not less than 6” thick or an 8” thick wall of brick and mortar. For larger openings, details of the seal will be shown on the Plans or directed by the Agency.

When catch basins, drain inlets, or manholes are to be abandoned, the upper portion must be removed to a depth of at least 1 foot below street subgrade and the conduits connected to the structure must be sealed as specified in this Specification. The bottom of the structures must be perforated or broken to prevent the entrapment of water.

Structures designated on the Plans to be removed must be removed to the full depth of the structure, including its foundation. Voids resulting from abandoned or removed structures must be filled with suitable material, in accordance with Section 18-5.02, “Backfill”, of these Specifications, and compacted to a relative compaction of 90 percent. If the voids are in surfaced areas otherwise to remain undisturbed, they must be backfilled with materials equal to or better in quality and to the same thicknesses as the surrounding materials, as directed by the Agency.

All costs for this work are included in the prices bid for the items involved.

15-1.05 Silt Control

The Contractor must comply with Section 10-4, “Erosion, Sediment, and Water Pollution Control”, of these Specifications during clearing and grubbing operations.

15-1.06 Miscellaneous

Clearing and grubbing includes the removal and proper disposal of existing barricades as shown on the Plans for removal, and removal of pavement markers prior to asphalt overlays and application of slurry seal as directed by the Agency. Unless otherwise provided for in the Special Provisions, all concrete removal shown on the Plans, or otherwise directed by the Agency, must be in accordance with Section 13, “Existing Facilities”, of these Specifications and included in the price paid for clearing and grubbing with no additional payment allowed. Actual limit of concrete removal must extend to nearest score mark or joint, if nearest score mark or joint is within 3 feet of limit of removal as indicated on the Plans. Along the entire length of curb and gutter removal, saw cut and remove the existing roadway pavement a minimum of 2 feet wide by 6 inches deep. Unless otherwise provided for in the Special Provisions, clearing and grubbing includes removal of existing storm drainage facilities as shown on the Plans. Removal must be in accordance with Section 13, “Existing Facilities”, of these Specifications and included in the price paid for clearing and grubbing and no additional payment will be made.

15-2 PAYMENT

All work associated with the removal of trees will be paid for per each of the categories of tree trunk diameters listed in the Proposal. The tree trunk diameters are measured at a height of 4-1/2 feet above ground. Payment for tree removal includes all labor, tools and equipment required for the removal and disposal of the tree, stump, roots and all debris, all required services of a Certified Arborist, backfilling of all resulting removals and the repair and replanting of all disturbed landscaping, and all incidentals.

If there are no bid items for tree removals, all tree removal work including removals, disposals, required services of a Certified Arborist, earthwork and landscaping is included in the lump sum price paid for Clearing and Grubbing and no additional compensation will be paid.

The lump sum price paid for clearing and grubbing includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to perform the work, and for doing all the work involved in clearing and grubbing, including protection of existing trees, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency, including the removal and disposal of all the resulting material.

When the Contract does not include an item for clearing and grubbing, full compensation for clearing and grubbing required to perform the Work is included in the prices paid for the items of work requiring clearing and grubbing and no additional compensation will be paid.

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SECTION 16 WATER USED IN CONSTRUCTION

16-1 GENERAL

Water used in construction must conform to the State Specifications, and these Specifications.

The application of water is under the control of the Agency at all times and must be applied in the amounts and at the locations designated by the Agency or as specified in the Special Provisions.

At the option of the Contractor, areas to be excavated may be watered prior to excavation. Excess water is the responsibility of the Contractor.

Unless otherwise permitted by the Agency, at least one mobile unit with a minimum capacity of 1,000 gallons must be available for applying water on the project at all times.

The Contractor may use chemical additives in water used for compaction if approved by Agency. If additives are used, furnishing and applying the additives is at the Contractor's expense. The Agency reserves the right to prohibit the use of a particular type of additive, to designate the locations where a particular type of additive may be used, or both if the Agency has reasonable grounds for believing that use of the additive(s) will be detrimental to the Work.

The Contractor is responsible for making all arrangements for obtaining water for use in construction. Proof of such arrangement, including method of payment, must be provided to the Agency for review and approval.

Unless otherwise approved by the Agency, connections to an Agency-owned or operated water supply to fill tank trucks or other such equipment must include an air gap to separate the water supply from the equipment to be filled. The air-gap separation must be 1 inch or two times the diameter of the supply pipe, measured vertically from the flood rim of the receiving vessel to the supply pipe, whichever is greater. Direct connection to the Agency's water supply will not be permitted.

Before drawing any water from a Sacramento County Water Agency owned or operated hydrant, tap, outlet, or water system, the Contractor must obtain a Temporary Water Use Permit from the Sacramento County Water Agency. If the Contractor plans to draw water from the facilities of any other water purveyor, the Contractor must obtain any required permission or permit from that purveyor.

The Contractor must adhere to all stormwater pollution control requirements, including those in Section 10-4, “Erosion, Sediment, and Water Pollution Control”, of these Specifications to prevent sediment from entering the stormwater collection and conveyance system.

16-2 PAYMENT

Full compensation for water used in construction is included in the prices paid for the various items of work involving the use of water and no separate payment will be made.

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SECTION 17 DUST CONTROL

17-1 GENERAL

Dust control is the application of water or dust palliative to alleviate or prevent dust nuisance resulting from the Contractor's operations, either within or outside the Work right-of-way. All dust control activities must comply with Section 10-4, “Erosion, Sediment, and Water Pollution Control”, of these Specifications.

Dust control must be performed by the Contractor at any time dust resulting from the Contractor’s operations becomes a nuisance or visual impediment or when directed by the Agency. Failure to adequately control dust is cause for the Agency to direct the Contractor to suspend operations or for the Agency to perform such activity with all costs to be borne by the Contractor.

The application of water for dust control may be performed by the Contractor for the Contractor’s convenience. Water must be applied as provided in Section 16, “Water Used in Construction”, of these Specifications.

17-2 DUST PALLIATIVE

Dust palliative must be applied when, in the opinion of the Agency, this type of dust control is required. Dust palliative must be an asphaltic emulsion binder as specified in the State Specifications. Dust palliative must be applied as specified in the State Specifications, or as directed by the Agency.

17-3 MEASUREMENT AND PAYMENT

Full compensation for applying water for dust control is included in the prices paid for the various items of work involved and no additional compensation will be paid.

When asphaltic emulsion binder for dust palliative is paid for as an item of work, the unit of measurement is 1 ton. Quantities of asphaltic emulsion binder for dust palliative to be paid for will be determined prior to the addition of water as provided in the State Specifications. The price paid per ton for asphaltic emulsion binder for dust palliative includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in adding water, mixing, and applying the dust palliative as shown or specified in the Contract, as specified in these Specifications, and as directed by the Agency.

When the Contract does not include a pay item for asphaltic emulsion binder for dust palliative and the Agency directs the Contractor to apply dust palliative, furnishing and applying dust palliative will be paid for as extra work as provided in Section 9, “Changes and Claims”, of these Specifications.

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SECTION 18 EARTHWORK

18-1 GENERAL

Earthwork must conform to the State Specifications, and these Specifications. All references to the "roadway prism", "roadway facilities", "roadway", and "highway" refer to the applicable project features shown on the Plans or referenced in the Special Provisions.

The method and rate of applying water for earthwork and dust control must conform to Section 16, "Water Used in Construction", and Section 17, "Dust Control", of these Specifications.

Attention is directed to Section 10, "Environmental Controls at Work Site", of these Specifications for additional requirements.

Settlement of trenches, structural backfill, or roadways will be deemed to be caused by defective compaction efforts by the Contractor and will be corrected by the Contractor at no cost to the Agency, regardless of compaction test results performed during construction.

18-2 ROADWAY EXCAVATION

18-2.01 General

Roadway excavation must conform to the State Specifications, and these Specifications. The reference for compaction standard is ASTM D1557 throughout these specifications.

Roadway excavation includes removal of existing pavement sections, ditches and channels in the median area, between roadway and frontage roads and side ditches contiguous to the roadway and other locations shown on the Plans or referenced in the Contract. Excavation and embankment side slopes must be adjusted by the Contractor to clear existing utility poles, vegetation, and other improvements, as directed by the Agency.

Roadway excavation includes excavation of waterway channels as necessary to create a grading plane for the placement of slope protection.

18-2.02 Unsuitable Roadway Excavation and Backfill

Any unsuitable material encountered must be removed and backfilled in accordance with Section 18-5, "Unsuitable Material Excavation", in this Section of these Specifications.

18-2.03 Surplus Material

Unless otherwise specified in the Special Provisions, surplus excavated material is the property of the Contractor and must be disposed of away from the project site in accordance with the provisions in Section 18-7, "Surplus Material Disposal", of these Specifications.

18-2.04 Unsuitable Material in Embankments

Unsuitable material excavated as roadway excavation that, in the opinion of the Agency, can be used for roadway embankment must be placed in the embankment below a plane 30 inches below the finished grade and compacted to a minimum relative compaction of 90 percent.

Unsuitable material excavated as roadway excavation that, in the opinion of the Agency, cannot be worked into the roadway embankment is surplus material and must be removed from the work site or wasted within the right-of-way as directed by the Agency.

18-2.05 Subgrade Preparation

Subgrade preparation must conform to the State Specifications.

Organics that exist within the roadway prism prior to grading must be stripped from the ground surface. Stripping must extend 2 to 3 inches below the existing surface as directed by the Agency. Strippings are the property of the Contractor and must be removed from the job site. After removal of strippings, areas to receive fill material or new structural sections must be

scarified to a depth of at least 8 inches and recompacted to a relative compaction of at least 95 percent.

Relative compaction of not less than 95 percent must be obtained for a minimum depth of 0.5 foot below the subgrade grading plane for the width between the outer edges of shoulders, whether in excavation, embankment, or at original ground level. All other material must be compacted to a relative compaction of 90 percent, including subgrade under meandering sidewalks not adjacent to curb and gutter. Embankment under bridge and retaining wall footings must be compacted as specified in the State Specifications.

When the next layer of material to be placed on the subgrade is an asphalt concrete pavement, asphalt concrete base, or asphalt concrete subbase, the subgrade grading plane at any point must not vary more than 0.05 foot above or below the grade established by the Agency.

Subgrade or aggregate base must be stable prior to paving. The Agency may direct the Contractor to proof roll the area prior to placing asphaltic concrete. The equipment used for the proof rolling is subject to the approval of the Agency.

For roadway construction, material encountered at the subgrade grading plane as shown on the Plans that the Agency determines unacceptable for roadway foundation must be removed. If the depth of removal is less than 12 inches, the area must be filled with roadway excavation material, if available, or Class 2 aggregate base. If the depth of unsuitable material encountered within the roadway prism extends to a depth of more than 12 inches below the grading plane, removal of unsuitable material must extend to 12 inches below the grading plane. The area from which the unacceptable material has been removed must then be compacted to a relative compaction of 95 percent 95, or as determined by the Agency. Fill for areas of unsuitable material removed to a depth of 12 inches below the grading plane for roadway construction shown on the Plans must include placement of geotextile fabric as specified in Section 18-5.03, "Stabilization Fabric", of these Specifications, and backfilled with Class 2 aggregate base.

For roadway construction, if there are insufficient quantities of native material to make subgrade, recycled asphalt concrete from the Work must be used. Removed asphalt concrete must be processed to 3-inch maximum size and thoroughly mixed with local native material and placed in the lower lifts of roadway fills as necessary to achieve subgrade.

Subgrade preparation requirements may be waived if the width of the subgrade to be prepared is less than 4 feet and the Agency determines that the existing undisturbed subgrade is firm and stable. The Agency may order mechanical tamping to obtain the desired firmness and stability. The Agency may order removal of soft and unstable material below the grading plane and backfilling with acceptable import materials if the subgrade (grading plane) is unsuitable to place the next layer of the structural section.

18-2.06 Relative Compaction

Whenever relative compaction is specified in these Specifications or the Special Provisions, the relative compaction will be determined by California Test Method. 231, "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates by the Area Concept Utilizing Nuclear Gages", with the exception that an individual test result may not be reported as a representative test result. For County contracts, compaction testing will be reported on individual test results.

18-2.07 Measurement and Payment

Measurement and payment for roadway excavation will be the actual amount of roadway excavation performed as measured in the field and will conform to Section 8-1, "Measurement of Quantities," of these Specifications. The Contract price paid per cubic yard for roadway

excavation includes full compensation for compacting natural and original ground, subgrade preparation, haul and overhaul, excavation, placing earth embankment as shown on the Plans

and as directed by the Agency, and furnishing water necessary for the compaction of the material and subgrade preparation. The Contract price paid includes shaping and trimming slopes to solid material and to the lines and elevations shown on the Plans.

The removal of material within the areas of new landscaped median construction to allow for fill with imported topsoil for landscaping will be measured and paid for as roadway excavation. Material to be removed may include existing pavement, existing base material, existing soil and new fill material placed to construct the new roadway.

No additional payment will be made for proof rolling subgrade as directed by the Agency, removing unsuitable material from the work site, or placing unsuitable material in the roadway embankment.

Payment for geotextile fabric used in the backfill of unacceptable material encountered during roadway excavation will be paid for per Section 18-5.05, "Unsuitable Material Excavation – Payment", of these Specifications.

Payment for Class 2 aggregate base used in the backfill of unacceptable material encountered during roadway excavation for roadway construction will be paid for per Section 22-4, "Base and Subbase Material – Measurement and Payment", of these Specifications.

18-3 STRUCTURE EXCAVATION AND BACKFILL

18-3.01 General

Structure excavation and backfill must conform to the State Specifications, and these Specifications. Structure excavation and backfill includes all necessary excavation, structure backfill, and pervious backfill within the limits set forth on the Plans, Standard Drawings, and in the Special Provisions. Structure and pervious backfill must conform to the State Specifications.

Unless otherwise specified in the Special Provisions, jetting of structure backfill is not allowed.

18-3.02 Control Density Backfill

Control density backfill will only be permitted when specified in the Special Provisions. Where permitted, control density backfill must conform to the requirements of Section 50-15, "Control Density Backfill", of these Specifications.

18-3.03 Final Quantity

The quantity of structure excavation shown on the Plans and in the Estimated Quantities will be the final quantity for which payment will be made as provided in the State Specifications.

18-3.04 Measurement and Payment

Measurement and payment for structure excavation and backfill will be as set forth in the State Specifications, and these Specifications.

The Contract price per cubic yard for structure excavation includes full compensation for all necessary excavation, structure backfill, and pervious backfill within the limits set forth on the Plans, Standard Drawings, and in the Special Provisions.

When removing an existing structure which is to be replaced with a new structure, no payment will be made under this item for the area occupied by the existing structure.

18-4 DITCH AND CHANNEL EXCAVATION

18-4.01 General

Ditch and channel excavation must conform to the State Specifications, and these Specifications. Ditches and channels must be excavated to line and grade and sections as shown on the Plans. Material resulting from excavating ditches and channels must be used in fill and embankment areas as shown on the Plans.

18-4.02 Grade Control - Lined Channels

The Contractor must place grade control points at twenty-five-foot (25') intervals along the invert of the shaped channel. For channels greater than twelve feet (12') wide, the Contractor must place grade control points at twenty-five-foot (25') intervals along each edge of the bottom. Care must be taken to prevent excavating below the channel grade line or beyond the slope lines. Areas excavated below grade or beyond the slope must be filled with suitable materials, as determined by the Agency, and compacted to ninety percent (90%) relative compaction by the Contractor at the Contractor's expense.

18-4.03 Unsuitable Ditch and Channel Excavation and Backfill

Any unsuitable material encountered must be removed and backfilled in accordance with Section 18-5, "Unsuitable Material Excavation", in this Section of these Specifications.

18-4.04 Unsuitable or Surplus Material Disposal

Unsuitable or surplus material excavated as channel excavation which, in the opinion of the Agency, cannot be worked into the required embankments, is the property of the Contractor and must be disposed of as specified in Section 18-7, "Surplus Material Disposal", in this Section of these Specifications, unless otherwise specified in the Special Provisions.

18-4.05 Channel Backfill

In areas where the bottom of the existing channel is below the proposed grade or beyond the slope lines, the Contractor must fill and compact those areas to a minimum 90 percent relative compaction with suitable material, as determined by the Agency. This work is included in the Contract price paid for channel excavation and no additional payment will be made.

18-4.06 Channel Embankments

Embankments must be placed as shown on the Plans. Embankment areas must be filled with suitable material, as determined by the Agency, resulting from channel excavation. The fill must be placed in a neat and uniform manner, and must be spread uniformly to the grades as shown on the Plans. Where embankment is made on the existing channel or on other slopes, the existing slope must be plowed or cut into as the embankment is constructed so as to tie the new embankment to the existing slope. All fill slopes must be trimmed for a uniform appearance. Fill areas in unlined channels must be compacted to a minimum relative compaction of 90 percent, unless otherwise shown on the Plans.

In lined channels, fill areas must be compacted to a minimum relative compaction of 90 percent to an elevation 1 foot above the top of the channel lining, unless otherwise shown on the Plans.

Localized erosion, sloughing or other slight irregularities in the existing channel which may occur between cross-sections, may not be shown on the Plans or cross-sections. Where the localized erosion, sloughing or irregularities extend beyond the limits of the channel cross-section, these areas must be filled and compacted to conform to the design channel cross-section. No additional payment will be made for these fills.

18-4.07 Pipe Adjustments

Side drain pipes without racks or flap gates must be extended or shortened as required to discharge into the new channel so that the pipe outlet is flush with the channel. The pipe used for extending existing side drains must be of the same diameter as the existing pipe, and must conform to one of the options specified in these Specifications.

Side drain pipes with access control racks or flap gates must be extended or shortened to conform with Standard Drawing 9-26H. Access control racks must conform to Standard Drawing 9-26G.

The method of placing pipe extensions must conform to these Specifications and the Standard Drawings. Existing side drain pipes to be shortened must be neatly cut off parallel to the slope of the channel.

18-4.08 Payment

The unit price paid for ditch and channel excavation will be as specified in the State Specifications.

18-4.09 Final Pay Quantities

When the Estimated Quantities for a specific portion of the Work are designated on the Plans as Final Pay Quantities, the Estimated Quantities will be the final quantities for which payment for the 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 Agency. If the dimensions are revised, and the revisions result in an increase or decrease in the Estimated Quantities of portions of the Work, the final quantities for payment will be revised to the amount represented by the changes in the dimensions. The Estimated Quantities for specific portions of the Work are approximate only and no guarantee is made that the quantities that can be determined by computations based on the details and dimensions shown on the Plans will equal the Estimated Quantities. No additional payment will be made if the computed quantities do not equal the Estimated Quantities.

If portions of an item are not designated on the Plans as Final Pay Quantities, those portions will be measured and paid for in accordance with the applicable provisions of these Specifications and the Special Provisions.

In case of any discrepancy regarding final pay quantities, the Final Pay Quantities shown on the Plans will govern.

18-5 UNSUITABLE MATERIAL EXCAVATION

18-5.01 General

Unsuitable or unacceptable material encountered in the construction of roadways must be removed as roadway excavation and backfilled as detailed in Section 18-2.05, “Subgrade Preparation”, in these Specifications.

Unsuitable material is material determined by the Agency to be unsuitable in its natural location and condition for roadway, channel, or structural foundation. Unsuitable material is material below a horizontal plane 2 feet below subgrade for channel or foundation of structure as determined by the structural section, flow line or foundation, or 2 feet below original ground, whichever is lower.

The Contractor’s method of excavating unsuitable material must not undermine the existing base material. If, in the opinion of the Agency, the Contractor’s method of excavating is increasing the amount of unsuitable material required to be excavated, the Agency will direct the Contractor to correct the condition at the Contractor’s expense.

18-5.02 Backfill

Backfill to replace unsuitable materials must be placed and compacted to a minimum relative compaction of 95 percent within 30 inches of finished grade on roadways and structural foundations, and to a minimum relative compaction of 90 percent below 30 inches of finished grade on roadways and below subgrade in channels.

Suitable backfill material must be one of the following:

1. Pit run materials as specified in Section 50-8, “Pit Run Base (Graded)”, of these Specifications.
2. Roadway, structural, or channel excavation material approved by the Agency.
3. Imported borrow as specified in Section 18-6, “Imported Borrow”, of these Specifications.
4. Cobbles as specified in Section 50-9, “Cobbles”, of these Specifications.
5. Geotextile fabric as specified in Section 50-10.01, “Nonwoven Geotextile Fabric”, of these Specifications, backfilled with Class 2 aggregate base.

6. Any approved combination of 1, 2, 3 and 4 above.

18-5.03 Stabilization Fabric

If during the preparation of the bottom of an excavation, or during the proof rolling of roadway subgrade, it becomes apparent to the Agency that the existing grade is unstable, a woven stabilization (geotextile) fabric must be used as directed by the Agency. The fabric must be a woven fabric with similar characteristics as Mirafi 600X, as described in Section 50-10-02.

Prior to placing the stabilization fabric, the unstable road subgrade must be over-excavated a minimum of 18″, or as directed by the Agency, the exposed bottom must be rolled as smooth as practical before the stabilization fabric is placed. The fabric must overlap a minimum of 18 inches, or must be sewn or glued. If overlapped, the fabric must be placed so that the preceding roll overlaps the following roll in the direction that the aggregate base is to be spread. The fabric coverage must be wider than the unstable zone, a minimum of 18 inches in all directions, and may be tacked or pinned on the outer edges to hold in place. If sewn or glued, the seam strength must be at least 90 percent of the rated tensile strength of the fabric.

Once placed, the fabric must be covered by at least 18 inches of Class 2 Aggregate Base, unless other material is specified by the Agency. The first lift must be 12 inches in thickness, and all subsequent lifts must be 6 inches thick. All Aggregate Base must be compacted to a minimum degree of 95 percent of ASTM D-1557, unless otherwise specified by the Agency.

The geotextile fabric must be shipped and stored in a protective wrapping that protects the fabric from ultraviolet radiation. The fabric must be covered with the approved fill material within 48 hours of placement. The fabric must remain flat and unwrinkled during fill placement. If the fabric is damaged during construction, the damaged section must be covered by a new piece of fabric that is large enough to meet the overlap requirements described in this Section.

18-5.04 Approximate Quantity

Where a quantity is shown in the Contract for unsuitable material excavation, the quantity isis approximate and is indicated for bid comparison only. No guarantee is made or implied that the quantity shown will not be reduced or increased or deleted, as required by the Agency.

18-5.05 Payment

The additional excavation greater than that required for preparation of original ground or subgrade will be paid for at the Contract unit price per cubic yard for the various types of excavation involved. Unsuitable material excavated more than 2 feet below subgrade will be paid for as extra work per Section 9, “Changes and Claims”, of these Specifications if no item for unsuitable material excavation appears in the Contract.

Backfill, when made with material excavated from the work site, will be paid for at the same Contract unit price paid for roadway excavation or channel excavation, whichever applies. The pay quantity will be the same as that quantity computed for unsuitable material excavated.

Imported borrow, pit run material and cobbles, and the placing of such materials, will be paid for as specified in these Specifications for those items.

The quantity of geotextile fabric to be paid for will be measured by the square yard of area covered, not including additional fabric for overlap. The Contract price paid per square yard for the geotextile includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals. The price per yard also includes doing all work involved in placing the geotextile, complete in place, as directed by the Agency. The need for this item is contingent upon the need to stabilize unsuitable base material encountered during construction and may be extended or deleted without limit at the discretion of the Agency with no change in the Contract unit price.

If the Contractor elects to place cobbles or other material in the channel bottom to provide a working surface in lieu of de-watering the channel, the cost of furnishing and placing the material is at the Contractor’s sole expense.

18-6 IMPORTED BORROW

18-6.01 General

Imported borrow must consist of material required for the construction of embankments and must be obtained from sources listed in the Special Provisions or, if no sources are listed, from sources the Contractor may elect. The Contractor's sources must be approved in advance by the Agency. Imported borrow must be free of roots, vegetable matter, and other unsatisfactory material, and be of such character that it will readily bind to form a firm and stable embankment when compacted.

The imported borrow material must have a sand equivalent of not less than the average sand equivalent of the native material that is adjacent to the existing roadbed, and an R-value of not less than 20, or as otherwise specified in the Special Provisions. Clayey soils cannot be used. Imported borrow material must be tested by the Contractor at the Contractor's expense prior to being transported to the project site. Test result must be provided to the Agency.

If the Contract does not contain a pay item for imported borrow, the earthwork must be considered balanced with no imported material required. If the Agency deems it necessary to place imported borrow due to field conditions, shrinkage, or swell, the imported material must be furnished and placed as extra work, as provided in Section 9, "Changes and Claims", of these Specifications.

18-6.02 Agreements

The Contractor must enter into an agreement with the property owner of any privately owned material site to hold the owner harmless from any claims for injury to persons or damage to property resulting from the Contractor's operations on said property. The agreement must contain provisions to relieve the Agency of any obligation to the property owner or claims for injury or damage of persons or property. Copies of the agreement and all permits, licenses and environmental clearances required for the removal of the material from the site must be furnished by the Contractor to the Agency a minimum of 2 Working Days prior to commencing operations at the material site. The Contractor's attention is directed to the State Specifications regarding local materials and their sources.

18-6.03 Placement

The imported borrow material must be placed and compacted as specified for roadway embankment.

18-7 SURPLUS MATERIAL DISPOSAL

18-7.01 General

Surplus materials resulting from excavations not required for backfill or embankment construction or to satisfy right-of-way agreements as set forth on the Plans and in the Special Provisions, are the property of the Contractor, and the Contractor must dispose of the surplus materials off the rights-of-way or easements, unless permitted by the Agency to be disposed of on the work site.

18-7.02 Agreement

When any materials are to be disposed of outside the rights-of-way or easements, the Contractor must obtain written permission from the property owner upon whose property the disposal is to be made. The Contractor must enter into an agreement with the property owner to hold the owner harmless from any claims for injury to persons or damage to property resulting from the Contractor's operations on the property. The agreement must contain provisions to relieve the Agency of any obligation to the property owner for any injury or damage to persons or property. The agreement must also include a sketch showing the location where the material is to be deposited. A copy of the permission obtained from the property owner, the agreement, and all permits, licenses and environmental clearances required for the disposal must be

furnished by the Contractor to the Agency a minimum of 2 Working Days prior to commencing disposal operations. Excess materials cannot be deposited in a location that will block or restrict a natural or artificial drain. Material cannot be deposited within the dripline of certain ornamental, landmark, and native oak trees, as specified in Section 10-13, "Protection of Existing Trees", of these Specifications.

18-7.03 Permits

If copies of all required permits are not provided to the Agency as required, the Contractor's operations may be stopped in accordance with Section 5-21, "Temporary Suspension or Delay of Work", until copies of the permits are provided to the Agency.

The Contractor or owner of the property where excess material is to be deposited is responsible for obtaining all required permits from any agency that has jurisdiction over the proposed disposal site.

If the disposal of materials outside the right-of-way or easements could affect any waterway as set forth in Ordinance No. 1 of the Sacramento County Water Agency, the Contractor must obtain a permit from that agency, in addition to the property owner agreement as set forth above.

In addition to any permit required by the Sacramento County Water Agency, disposal of materials must conform to the applicable Agency grading ordinances. The Contractor or the owner of property on which material is to be disposed of must obtain a grading permit, if required, prior to disposal of any excess excavated material.

Copies of any required permits must be furnished to the Agency. No permits will be required if disposal sites are shown on the Plans unless otherwise specified on the Plans or in the Special Provisions.

Prior to placing any material within the 100-year floodplain of any of the 13 natural streams as adopted by the Board of Supervisors, the Contractor or property owner must first obtain a Use Permit from the Planning and Community Development Department.

18-7.04 Payment

Compensation for disposal of surplus material and all is included in payment for other earthwork items and no separate payment will be made.

18-8 CLASS "C" SUBGRADE

18-8.01 General

Areas of existing pavement shown on the Plans or as directed by the Agency to receive an overlay of asphalt concrete must be prepared as Class "C" subgrade. Class "C" subgrade applies to subgrade prepared on an existing roadbed, subbase, base, surfacing or pavement that was not constructed by the Contractor, and on which a layer of subbase, base, surfacing, pavement, or other specified material is to be placed.

18-8.02 Preparation

In advance of spreading new subbase, base, surfacing or pavement material, the existing roadbed, subbase, base, surfacing or pavement must be cleaned of all dirt and loose material.

If ordered by the Agency, a leveling course of the material to be placed must be spread upon the existing roadbed, subbase, base, surfacing, or pavement, in accordance with the specifications for the type of material being placed.

Where shown on the Plans or specified or directed by the Agency, the existing roadbed, subbase, base, surfacing or pavement must be scarified, watered, and rolled prior to placing new material.

Broken, failed or other unsatisfactory portions of the existing roadbed, subbase, base, surfacing or pavement, and sections interfering with new construction must be removed and disposed of. The areas and depths to be removed will be directed by the Agency. The area in

the exposed spaces must be watered and compacted, after which the space must be filled with subbase, base, surfacing or pavement material as directed by the Agency.

18-8.03 Payment

Unless otherwise specified in the Special Provisions, the excavation and disposal of existing pavement other than that shown on the Plans to be excavated as a part of, or adjacent to, an area to be excavated to provide a new structural section, will be paid for as extra work per Section 9, “Changes and Claims”, of these Specifications.

Excavation of pavement and materials shown on the Plans necessary for preparation of Class "C" subgrade will be paid for as roadway excavation as set forth in Section 18-2.07 “Roadway Excavation - Measurement and Payment”, of these Specifications.

Full compensation for furnishing all labor, material, tools, equipment, and incidentals and for doing all the work involved in preparing Class "C" subgrade, including the leveling course, excluding excavation, as shown on the Plans, specified in these Specifications or the Special Provisions, or as directed by the Agency, is included in the Contract prices paid for the materials, in place on the subgrade as shown on the Plans, or directed by the Agency.

SECTION 19 - TRENCH EXCAVATION, BEDDING AND BACKFILL
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SECTION 19 TRENCH EXCAVATION, BEDDING AND BACKFILL

All sewer facilities constructed within the Sacramento Area Sewer District service area (http://www.sacsewer.com/pdf/map-servicearea.pdf) must be constructed in accordance with the Sacramento Area Sewer District Standards and Specifications available at http://www.sacsewer.com/pdf/ord/2011-SASD-Standards-and-Specifications-v1.pdf

19-1 TRENCH EXCAVATION

Trench excavation includes the removal of all materials and obstructions and the control of water necessary to construct the Work as shown or specified in the Contract. Unless otherwise shown or specified in the Contract, excavation must be by open cut or as directed by the Agency.

Attention is directed to Section 10-5, "Control of Water in the Work", and Section 14, "Restoration of Surfaces", of these Specifications, for additional requirements. Surface water must not be allowed to enter the pipe trench or the existing downstream pipe system. Surface water, groundwater, pipe leakage, or the contents of severed pipe must not be permitted to enter water pipe that is not abandoned.

Section 18-2.03, "Surplus Material" and Section 18-7, "Surplus Material Disposal", of these Specifications applies to excess material from trench excavations.

19-1.01 Exploratory Excavation

An encroachment permit must be obtained from the Agency prior to exploratory excavations within highway rights-of-way or other public easements. Prior to the end of each work day, exploratory excavations made outside of the paved surface during that work day must be backfilled with sand or native excavated materials as directed by Agency and mechanically compacted to prevent settlement. Excavations made within the paved surface must be permanently restored per Standard Drawing 4-64.

19-1.02 Trench Width

Minimum and maximum trench widths at the top of the pipe must be as shown or specified in the Contract Documents or these Specifications. If trench widths at the top of the pipe are exceeded, the Contractor must provide stronger pipe or improved bedding and backfill conditions, as approved by the Agency to meet the changed load requirements. If the trench width is exceeded for any reason within the Contractor's control, the stronger pipe or improved bedding and backfill will be provided at the Contractor's expense.

19-1.02.A Storm Drain Pipe

Unless otherwise shown or specified in the Contract, for storm drain pipe the minimum and maximum trench width must be as shown on Standard Drawing 9-1.

19-1.02.B NOT USED

19-1.02.C Water Pipe

Water pipe minimum and maximum trench widths are shown on Standard Drawing 8-17 unless otherwise shown or specified in the Contract.

19-1.03 Pavement Cutting

When the trench is in an existing paved area, work must be done in accordance with Standard Drawing 4-64. Pavement must be saw cut on neat lines parallel and equidistant from the trench centerline. The width of the saw cut must not be greater than is required to properly install the pipe and not damage the edges of the pavement left in place, or as directed by the

Agency. Pavement between the lines must be broken up and removed as directed by the Agency immediately ahead of the trenching operations.

Pavement must not be cut until the respective utility companies have marked the location of their underground facilities and the Agency has given final approval of the trench alignment.

19-1.04 Maximum Length of Open Trench

Unless otherwise specified in these Specifications or the Special Provisions, or approved by the Agency in writing, at the end of each work day, no more than 300 feet of trench is allowed to remain open at any one location, including excavation, pipe laying and appurtenant construction, backfill, and trench that has not been temporarily resurfaced, but excluding manhole excavations. The remainder of the trench must be backfilled and compacted, and when in streets, opened to traffic as soon as possible. The maximum allowable length of open trench for cast-in-place concrete pipe is specified in Section 36-3, "Trench Excavation", of these Specifications. Failure by the Contractor to comply with these limitations may result in a temporary suspension of work in accordance with Section 5-21, "Temporary Suspension or Delay of Work", of these Specifications.

19-1.05 Control of Water

Control of water must conform to the requirements in Section 10-5, "Control of Water in the Work", of these Specifications.

19-1.06 Shoring and Bracing

The Contractor must furnish and install sufficient shoring and bracing to insure the safety of personnel and public, protect the Work, and protect adjacent improvements. The Contractor must comply with the requirements of Section 12-6, "Excavation and Trench Safety", of these Specifications.

Sheeting must not extend below the bottom of the pipe barrel. The contractor must take care to prevent damage to existing surface or subsurface improvements, both public and private, during drilling and driving operations. Unless otherwise specified in the Special Provisions or required by the Agency, all sheeting, timbering, lagging, and bracing must be removed during backfilling, and in a manner that prevents movement of the ground or damage to the pipe or other structures. When the Agency requires that sheet piling, lagging, and bracing be left in place, it must be cut off where designated and the upper part withdrawn. If steel piling is used, it may be removed as backfill is placed and compacted.

When using movable trench supports, care must be exercised to prevent disturbing the pipe location, jointing, or embedment. Removal of trench protection below the top of the pipe and within 2-1/2 pipe diameters on each side of the pipe will be prohibited after the pipe embedment has been placed and compacted. Movable trench supports will only be allowed in either wide trench construction where supports extend below the top of the pipe or on a shelf above the pipe with the pipe installed in a narrow, vertical wall subditch. Voids left in the trench wall or embedment materials by support removal must be filled with bedding material and compacted. Removal of bracing between sheeting must only be done where backfilling proceeds and bracing is removed in a manner that does not relax trench support.

19-1.07 Special Foundation Treatment

Whenever the bottom of the trench is soft, spongy, unstable, rocky, or, in the opinion of the Agency, otherwise unsuitable as a foundation for pipe bedding, the unsuitable material must be removed to a minimum depth of 6 inches, or to a depth designated by the Agency, and replaced with compacted crushed rock, gravel, or sand as directed by the Agency. When the trench bottom is cobbled or of material that might, in the opinion of the Agency, allow loss of sand backfill, the backfill material must be crushed rock or gravel graduated so that 100 percent will pass the 3/4 inch sieve and not more than 15 percent will pass the number 8 sieve. Crushed rock or gravel must conform to Section 50-16, "Clean Crushed Rock", of these Specifications.

Sand backfill, when permitted or required by the Agency, must conform to the requirements in Section 50-13.01, "River Sand", of these Specifications. The backfill must be compacted to a non-yielding condition. Jetting is not permitted. As an alternate to the bedding materials specified above, the Agency can direct the Contractor to furnish and place geotextile fabric below the bedding materials. The geotextile material must be a woven fabric in accordance with Section 50-10.02, "Woven Geotextile Fabric", of these Specifications. Unless stated otherwise in the Special Provisions, furnishing and placing of geotextile fabric will be paid for as extra work per Section 9, "Changes and Claims", of these Specifications.

If material more than 12 inches below the typical trench bottom is ordered removed by the Agency, the excavation below that point and the imported material required to backfill the trench to that elevation will be paid for as extra work per Section 9, "Changes and Claims", of these Specifications unless otherwise specified in the Special Provisions. Before excavation of the pipe trench in fill areas or roadway embankments, the fill area or embankment must be completed to a height above the pipe invert grade line of not less than 2 times the internal pipe diameter or to final fill or embankment subgrade, whichever is lower, but in no case less than 12 inches above the top of the pipe. The embankment must be compacted to a minimum relative compaction of 90 percent for a distance on each side of the pipe equal to at least 2 pipe diameters. The remainder of the embankment must be compacted to the minimum relative compaction specified elsewhere in these Specifications for the type of construction being done, or as specified in the Special Provisions or on the Plans. Special foundation treatment for cast-in-place concrete pipe must be as specified in Section 36-4, "Cast-In-Place Concrete Pipe (CIPCP) - Special Foundation Treatment", of these Specifications.

19-1.08 Excavation Method

Methods used in excavation must not damage surrounding property, remaining pavement, or existing improvements that are to remain. Outriggers for excavation equipment, and other heavy equipment, must be fitted with street pads to prevent pavement damage.

19-1.09 Payment

Full compensation for trench excavation, including all equipment, labor, materials, control of water, shoring and bracing, and other safety measures required, is included in the prices paid per linear foot of the respective sizes, grades, and types of pipes listed in the Contract, and no additional compensation will be paid.

Additional bedding material used to stabilize the foundation if required, over the amount required by the Contract, will be paid for as provided in the Special Provisions, unless the necessity for the additional bedding material was caused by an act or failure to act on the part of the Contractor or is required for the control of groundwater, in which case the Contractor is responsible for the expense of the additional excavation and material.

19-2 PIPE BEDDING AND BACKFILLING OF TRENCHES

19-2.01 Pipe Bedding

Pipe bedding must be furnished and placed as shown on the Plans and in accordance with the requirements of these Specifications. Pipe must be placed on a firm layer of bedding material, and must be bedded uniformly throughout its length. Pipe bedding material for water distribution systems must conform to the requirements in Section 50-13.02, "Graded Sand", of these Specifications.

19-2.01.A NOT USED

19-2.01.B Storm Drain

Unless otherwise indicated in the Contract, storm drain pipe bedding must be furnished and placed as detailed in Standard Drawing 9-1 and in conformance with these Specifications.

Storm drain pipe bedding material must conform to Section 50-16, "Clean Crushed Rock", of these Specifications.

To achieve uniform placement in the bedding material, shape the bedding or, if approved by the Agency, lightly "bounce" the pipe to set it into the bedding. Pipe bedding material must be placed at a minimum thickness meeting the greater of the following criteria:

1. The minimum bedding thickness is 3 inches for pipe with an internal diameter 10 inches or less, and 4 inches for pipe with an internal diameter 12 inches or greater; or
2. The minimum bedding thickness must be equal to the difference between the outside diameter of the pipe barrel and bell plus 1-1/2 inches; or
3. When soil conditions in the trench bottom are unstable, rocky, or otherwise unsuitable as a foundation for pipe bedding, the minimum bedding thickness must conform to Section 19-1.07, "Trench Excavation - Special Foundation Treatment", in this Section.

19-2.01.C Water Distribution Systems

Water distribution pipes must have 6 inches of sand bedding that conforms to the requirements of Section 50-13.02, “Graded Sand”, of these Specifications. If existing soil is too porous to hold sand, a geotextile fabric approved by the Agency must be placed on the trench bottom. Ductile iron pipe and fittings, copper pipe and fittings, valves, and all other buried metal must be encased in 8 mil polyethylene encasement in accordance with AWWA C105 and Section 41-5.03, “Polyethylene Encasement,” of these Specifications.

19-2.02 Initial Backfill

Initial backfill must be furnished and placed as shown or specified in the Contract and in accordance with the requirements in these Specifications.

19-2.02.A NOT USED

19-2.02.B Storm Drain

Unless otherwise specified in the Special Provisions, the following initial backfill requirements apply.

- For cast-in-place concrete pipe, initial backfill must conform to Section 36-14, “Cast-in-Place Concrete Pipe (CIPCP) – Backfill”, of these Specifications and Standard Drawing 9-1.
- For all other pipes initial backfill for storm drain construction must conform to this Section 19 and Standard Drawing 9-1.
- Granular materials must conform to Section 50-16, "Clean Crushed Rock”, of these Specifications.
- For field conditions requiring control density backfill the material must conform to Section 50-15, "Control Density Backfill", of these Specifications.
- For field conditions requiring portland cement concrete backfill the material must conform to Section 50-5.01, "Portland Cement Concrete - Composition”, Class "B-2”, of these Specifications.

After placement of bedding, the Contractor must place initial backfill material to the spring line of the pipe, thoroughly compacting it by vibratory drum roller, vibrating surface plate, insertion vibrator, shovel slicing, or light tamping to provide proper support under the pipe haunches. The remaining initial backfill material must be placed per Standard Drawing 9-1. To reduce impact damage, there must be at least 12 inches of cover over the pipe before using hand-held or walk-behind compaction equipment, and at least 3 feet of cover before using ride-on equipment. The pipe must not be disturbed or displaced during placement and compaction.

When using control density or concrete backfill, the Contractor must anchor the pipe to prevent floating or displacement of the pipe. The anchors must be spaced to insure a continuous even grade in the flow line of the pipe.

19-2.02.C Water Distribution Systems

Initial backfill for water distribution systems must be placed immediately after pipe joints have been completed and inspected by the Agency and must comply with the requirements of Standard Drawing 8-17. Unless otherwise specified, initial backfill for water distribution systems, including pipes, fire hydrant branch leads, water services, and water appurtenances, must be sand conforming to the requirements in Section 50-13.02, "Graded Sand", of these Specifications. Initial backfill must be placed and compacted to a height of 8 inches above the top of the pipe.

Initial backfill must be placed immediately after pipe joints have been completed and inspected by the Agency. The material must be carefully placed and compacted so as not to disturb or damage the pipe, and must be brought up evenly on both sides. Initial backfill material must be placed in layers not exceeding 8 inches in depth before compaction at or near optimum moisture content. Compaction must be by mechanical pneumatic or vibratory compaction equipment approved by the Agency. Ponding or jetting is not permitted, although water may be sprayed from a 2-inch truck hose onto initial and final sand backfill. The compacted material must achieve a relative compaction of at least 90 percent as determined by ASTM D-1557. Trench jacks must not be removed prior to completion of initial backfill. If a trench shield or rolling shoring system is used, it must be raised as backfill lifts are compacted so that the bottom of the shoring is not within the lift being compacted. The method of raising must not allow loose soil from the trench walls to contaminate the initial backfill zone.

19-2.03 Trench Backfill

Trench backfill must consist of material placed between the initial backfill and subgrade in paved areas or to the top of the trench in unpaved areas, unless otherwise shown or specified in the Contract.

The trench backfill material can be native material excavated at the work site if the trench depth is greater than 4 feet measured from the top pipe to the finished road surface. The native material is subject to approval by the Agency, and must be free of organic or other unsuitable materials that can cause voids or depressions to develop during or after placement of the backfill. Rocks, stones and solid earth chunks exceeding 3 inches in greatest dimension are not allowed in trench backfill material.

Trench backfill material must be placed in layers not exceeding 8 inches in depth before compaction at or near optimum moisture content. Until the total backfill above the top of the pipe exceeds 3 feet, machine-placed backfill material must not be allowed to "freefall" more than 2 feet. Compaction effort must be applied parallel to the pipeline starting at the trench wall and proceeding to the center of the trench. If a trench shield or rolling shoring system is used, it must be raised as backfill lifts are compacted so that the bottom of the shoring is above the lift being compacted, without allowing the trench walls to collapse or otherwise contaminate the backfill.

The backfill material for trench depths less than 4 feet measured from the top pipe to the finished road surface must be imported granular material, uniformly graded Class 2 aggregate base conforming to the requirements in Section 50-7, "Aggregate Bases", of these Specifications. The imported granular material must be placed in lifts not to exceed 6 inches after compaction. Compaction requirements for imported granular material are the same as compaction requirements for job-excavated native material.

Unless otherwise shown or specified in the Contract, compaction of backfill material must be by mechanical pneumatic or vibratory compaction equipment appropriate to the existing conditions that will not result in damage to adjacent ground, existing improvements or the Work. Ponding and jetting methods will not be permitted, except by written permission of the Agency.

Unless otherwise shown or specified in the Contract, trench backfill material must be compacted to a relative compaction of not less than 90 percent, as determined by ASTM

D1557. The top 6 inches below the subgrade must be compacted to a relative compaction of 95 percent, except that trenches in easements outside the street rights-of-way must be compacted to 90 percent relative compaction throughout the depth. Compaction testing will be performed by the Owner and the cost thereof will be borne by the Agency, except that retests of areas that fail to meet the required compaction will be charged to the Contractor and deducted from payment due the Contractor.

Unless otherwise specified in the Special Provisions, the Contractor has the option to use imported granular material for trench backfill in place of native material excavated at the work site. The imported granular material must be uniformly graded Class 2 aggregate base conforming to the requirements in Section 50-7, "Aggregate Bases", of these Specifications. The imported granular material must be placed in lifts not to exceed 6 inches after compaction. Compaction requirements for imported granular material are the same as compaction requirement for job-excavated native material. Unless otherwise specified in the Special Provisions, the optional use of imported granular material for trench backfill is at the Contractor's expense.

No warranty is made or otherwise implied as to the suitability of native material excavated at the work site for use as trench backfill material. Costs for processing native materials for use as trench backfill materials must be at the Contractor's sole expense and are not reimbursable by the Agency.

19-2.04 Payment

Full compensation for furnishing, placing, and compacting pipe bedding and trench backfill materials is included in the prices paid per linear foot of the respective sizes, grades, and types of pipes listed in the Contract, and no additional compensation will be paid.

Actual excavation quantities to be paid for will be calculated based on the maximum width of trench shown on the plan and measured at the top of the pipe.

Actual trench resurfacing quantities to be paid for will be calculated based upon the maximum width of trench specified herein.

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SECTION 20 LANDSCAPING

20-1 GENERAL

Landscaping work shall consist of performing roadway planting, park landscaping, irrigation installation, and other work necessary for improving the appearance of the roadside and park facilities, as shown on the Plans and in accordance with these Specifications.

20-2 MATERIALS

Landscaping materials must conform to the requirements in Section 50-43, "Landscaping Materials", and these Specifications.

20-2.01 Root Control Barrier

Root control barriers must conform to Section 50-43.14, 'Root Control Barrier', the Special Provisions, and these Specifications. Root control barrier must be installed prior to topsoil placement or by means of trenching against existing surfaces. Panels must be installed vertical in planter, flush against edge of pavement or header board. Top of barrier must be one-inch (1") higher than planter finish grade. Top of barrier must be covered from view by mulch layer. Barrier deflectors must face inward towards root ball. Root control panels must provide a continuous barrier along the perimeter of each median planter, tree well, sidewalk, or other hardscape surface. Contractor must take measures to prevent separation, sagging, warping and damage to root barriers during construction.

20-2.02 Topsoil

Topsoil must be placed and spread to the line and grade as shown on the Plans or as directed by the Agency. Topsoil must be compacted to approximately eighty percent (80%) relative compaction, or as indicated on the Plans. All lumps and clods must be broken up before topsoil is spread. Topsoil in tree or shrub pits must be lightly tamped by hand so as to form a firm setting for the plant, but not hinder growth. Mechanical tamping will not be permitted.

After spreading the topsoil, any extraneous or unacceptable material not previously removed must be raked off and removed from the topsoil area. Spreading and compacting must be completed in such a manner that seeding, sodding, or planting can proceed without additional grading.

Immediately before planting, the topsoil must be cultivated and raked to provide a uniformly smooth, firm, friable, fine textured finished surface. No grading equipment will be permitted on the topsoil after the area has been finish graded and prepared for planting.

20-2.03 Soil Amendment

Soil amendment must be uniformly spread at the rate specified and thoroughly incorporated with a rotary cultivator to obtain a homogeneously blended soil six inches (6") in depth, unless specified otherwise in the Special Provisions.

20-2.04 Liquid Green Dye

Liquid green dye used in erosion control and hydroseeding work must be 48-hour colorfast, applied at the rate of two (2) quarts per acre, unless otherwise specified in the Special Provisions.

20-2.05 Mulch

Mulch must be top dressed, where specified, to a minimum depth of three inches (3") over

soil level. Ground cover areas planted from containers less than one-gallon in size may receive a minimum depth of two-inches (2") of mulch. Do not bury or cover over plant material with mulch layer. Taper mulch away from the crowns of all newly planted and existing trees.

20-3 EROSION CONTROL

Erosion control materials must conform to Section 50-43, "Landscaping Materials", the Special Provisions, and these Specifications.

20-3.01 Seeding Application

Seeding application must conform to the Special Provisions and these Specifications.

If the Contractor elects to hydroseed, a minimum of fifteen hundred (1,500) pounds of fiber per acre must be mixed and applied with the seed, and fertilizer (if required) may be mixed with the seed and fiber and applied in the hydroseeding operation.

The Contractor must scarify to a depth of six inches (6") 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 one inch (1") must be removed and the area raked smooth.

The Contractor must avoid any compaction of the soils after treatment, and must not permit traffic over such areas. In case of such compaction, the areas must be recultivated by the Contractor, at the Contractor's expense.

Areas to be treated for weed control must be treated as shown or specified in the Contract .

Equipment for hydroseeding application must 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 must provide even distribution of the slurry on the slopes to be seeded. The slurry tank must have a minimum capacity of one thousand (1,000) gallons.

The slurry preparation must begin by adding water to the tank. When the water level has reached the height of the agitator shaft, the stabilizing agent must be added. Seed and fertilizer must then be added, followed by the fiber mulch. The combined materials must then be uniformly blended prior to application. Spraying must commence within two (2) hours after the tank is full.

The Contractor must perform hydroseeding during calm wind conditions. The operator must spray the slopes with a uniform, visible coat, using the color of the mulch as a guide. The slurry must be applied in a sweeping motion to allow the fibers to build on each other, until a good coat is achieved. Unless otherwise specified in the Special Provisions, the application rates must be:

Material	Application Rate per Acre
Mulch	1,500 pounds
6-20-20 fertilizer	400 pounds
Seed Mix	See Plans or Special Provisions
Liquid Green Dye	2 quarts
Stabilizing Emulsion	As approved by the Agency

20-3.02 Measurement and Payment

The quantity of erosion control to be paid for by the square foot, square yard, acre or as designated in the Contract will be calculated on the basis of actual or computed slope measurements.

The price paid per square foot, square yard, or acre includes compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in performing erosion control work and hydroseeding, complete in place, including site preparation, hydroseeding application, and clean-up as shown on or specified in the Contract, as specified in these Specifications, and as directed by the Agency.

20-4 PLANTING

This work shall consist of furnishing and installing planting materials, clearing planting areas, preparing planting areas, planting plants and establishing plants as shown on the Plans and as specified in these Specifications and the Special Provisions.

Planting materials must be as specified in Section 50-43, "Landscaping Materials", and these Specifications, and must be installed in accordance with Standard Drawings L-1 and L-2.

20-4.01 Pesticides

The Contractor must obtain recommendations for the use of pesticides from a licensed Pest Control Adviser in accordance with the requirements of the California Food and Agricultural Code. At least twenty-four (24) hours prior to using any pesticides, a copy of such recommendations must be submitted to the Agency for approval. The recommendations must include, but not be limited to, the pesticides to be used, rates of application, methods of application and areas to which pesticides are to be applied.

Pesticides for weed control must be applied with a photosensitive dye which will produce a contrasting color when sprayed upon the ground. The color must disappear between two (2) and three (3) Calendar Days after being applied. The dye must not stain any surfaces nor injure plant or animal life when applied at the manufacturer's recommended application rate.

Pesticides must not be applied when weather conditions, including wind conditions, are unsuitable for such work.

Any new or existing plants which, in the opinion of the Agency, have been damaged by the application of pesticides must be replaced by the Contractor at his expense.

20-4.02 Preparing Planting Areas

The Agency must approve the ground locations of plants by inspecting the placement of the plants, stakes, or other suitable markers. The Contractor must furnish all labor, materials, and transportation required to adequately mark the various plant locations.

In areas to be planted, all rocks and other debris greater than one inch (1") in diameter must be removed and disposed of.

In areas to be planted, the grade must be one to two inches (1"-2") below the planned finish grade prior to conditioning the soil. In all other areas, the grades must be as indicated at the grading plane for the type of facility to be constructed thereon.

The formation and compaction of embankments must conform to the provisions as specified in Section 18, "Earthwork", of these Specifications and as modified herein. In areas to be planted, compaction of the fill must be not more than eighty-five percent (85%) for the upper one foot (1') of such fill.

Cultivation must be performed with as many passes with the cultivator as necessary, as determined by the Agency, 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 must be cultivated by hand.

After cultivation, the surface must be raked, rolled, or otherwise smoothed to remove ridges and fill depressions. The finished surface must be uniform, evenly graded, and reasonably firm. The grades of the finished surface must be approximately two inches (2") below the top of adjacent curbs or pavement, unless otherwise shown on the plans.

Soil preparation and planting operations must be conducted under favorable weather conditions only. Soil must not be worked when excessively dry or wet and the Agency has the right to stop any work taking place during a period when conditions are considered detrimental to soil structure or plant growth.

The work involved in preparing planting areas must be so conducted that the existing flow line in drainage ditches will be maintained. Material displaced by the Contractor's operations that interferes with drainage must be removed and dispersed of as directed by the Agency.

Cultivation must be performed until the soil is in a loose condition to a minimum depth of six inches (6”). Soil clods must not be larger than two inches (2”) in any dimension after cultivation. Planting areas that have been cultivated and become compacted for any reason must be recultivated by the Contractor at his expense.

Areas to receive a pre-emergent weed control must be treated following planting and prior to applying mulch layer, as noted in the Plans or specified in the Special Provisions.

Follow the manufacturer’s recommendations for proper application rate, precautions and safety. Apply with a properly calibrated applicator that will distribute granules uniformly on surface of planting area. After application, remove excess granules from plant foliage. Do not apply to wet foliage. Irrigate planting area lightly following application.

20-4.03 Header Boards

Header boards must conform to Section 50-43.12, "Lumber", of these Specifications and must be installed in accordance with Standard Drawing L-30.

Header board stakes must be of the size and shape shown on the Plans. Each stake must be driven flush with the top edge of the header board and the stake top must be beveled away from the header board on a forty-five-degree (45°) angle. Stakes must be at four feet (4’) on center along the length of the header board. Stakes must be attached to header boards with a minimum of two (2) 12-penny hot-dip galvanized common nails per stake.

Where asphalt concrete or portland cement concrete surfacing must be removed to permit the installation of header boards, and no joint exists between the surfacing to be removed and surfacing to remain in place, the surfacing must be cut in a neat line to a minimum depth of 0.17-foot with a power driven saw before the surfacing is removed.

20-4.04 Planting

Plant material must conform to Section 50-43.15, “Plants”, of these Specifications and must be installed in accordance with Standard Drawings L-1 and L-2, unless otherwise noted in the Plans or Special Provisions.

No planting must be done in any area until the area concerned has been prepared in accordance with these Specifications and the Special Provisions and presents a neat and uniform appearance satisfactory to the Agency. When an irrigation system is required, the irrigation system must be installed and checked for coverage to the satisfaction of the Agency prior to planting plants.

Planting will not be allowed in any area that in the opinion of the Landscape Architect is too wet or too dry or that is in any other way unacceptable for planting.

Where vines are to be planted against walls or fences, the vines must be planted as close as possible to the wall or fence as shown on the Plans.

Plants must be removed from the containers in such a manner that the ball of earth surrounding the roots remains intact, and they must be planted and watered as hereinafter specified immediately after removal from the containers. Containers must not be cut prior to delivery to the planting site.

Roots of plants not in containers must be kept moist and covered until such plants are planted.

Before planting in holes or trenches, water must be applied to the backfill with a pipe or tube inserted to the bottom of the hole until the backfill material is saturated for the full depth. Backfill for planting holes and trenches must be placed in two (2) lifts. Water must be applied to the backfill between lifts with a hose and allowed to fill and percolate. Additional backfill must not be placed until the water has percolated and saturated the planting hole to its full depth.

Each tree and shrub location must be as shown on the Plans, or as approved by the Agency. Plants must be spaced as indicated on the Plans or in the Special Provisions. Plants in adjacent rows must be staggered. Tree and shrub locations must not conflict with any existing utilities, utility boxes, or other improvements. Conflicts at the time of planting or that can be foreseen upon maturity of the trees or shrubs must be brought to the attention of the Agency immediately. Field adjustments to plant placement must be approved by the Agency. Plants improperly located must be replanted by the Contractor in the proper location at no additional cost to the Agency.

Planting must be performed in accordance with the details shown on the Plans and Standard Drawings. Each plant must 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. Organic matter must not be placed beneath the plant's root ball. Plants ,must be set in the backfill material in flat bottomed holes to such depth that after the soil has settled the top of the plant ball will be one inch (1") above the bottom of the basin or even with surrounding soil where there is no basin.

Plants must be planted in such a manner that the roots will not be restricted or distorted. Soil must not be compacted around the roots or ball of the plant during or after planting operations. The plant must be set so that the root crown is one-half inch (1/2”) or three-quarter-inch (3/4”) higher than average surrounding grade. The ground around the plant must be shaped to drain water away from the root crown or trunk of plant. Any plants that have settled deeper or stand higher than specified must either be raised back to the required level or replaced, at the option of the Contractor.

After planting operations have been completed, the Contractor must remove all trash, empty plant containers, tools, and equipment used in this work, and any other marks in the area caused by this work must be repaired at the Contractor's expense, and the ground left in a neat and orderly condition.

20-4.04.A Preparation for Ground Covers

Areas to be planted with ground cover must receive fertilizer and soil amendment, uniformly distributed and thoroughly cultivated into the top six inches of soil (6”). The rate of application for fertilizer and soil amendment must be as shown or specified in the Contract.

The Contractor must fine grade the planting area so that proper drainage of the entire ground cover is assured.

The Contractor must avoid any compaction of the soils after treatment, and must not permit traffic over such areas. In the event of such compaction, the areas must be recultivated by the Contractor, at the Contractor’s expense.

Ground covers must be planted in the prepared soil, which must be moist and friable, never dry or wet and soggy. The moist condition must extend to the full depth of cultivation.

Ground cover plants must be planted in neat, straight rows parallel to the nearest pavement or fence.

The spacing of ground cover plants must be as shown on the Plans and in accordance with Standard Drawing L-21. Plants must be planted in neat, evenly spaced rows with staggered triangular spacing. Ground cover must be planted around shrubs to within one foot (1’), and around trees to within eighteen inches (18”). Ground cover in one-gallon containers must not be planted closer than two feet (2’) to walls and fences, unless otherwise shown on the Plans or

specified in the Special Provisions. Ground cover from flats must not be planted closer than six inches (6") to walls and fences, unless otherwise shown or specified in the Contract.

20-4.04.B Preparation for Trees and Shrubs

Trees, shrubs, and vines in ground cover areas must be planted before ground cover plants or cuttings are planted. Holes for trees and shrubs must be excavated by auger unless otherwise indicated on the Plans or specified in the Special Provisions. Before an augured hole is made, the top six inches (6") of soil amendment treated soil must be removed and stockpiled at one side of hole.

A twelve-inch (12") diameter by ten feet (10') deep tree pit must be bored prior to planting all trees fifteen (15) gallons or larger, unless otherwise specified in the Special Provisions. Boring must take place prior to placement of topsoil. Backfill for bored pit must be excavated bored material. Backfill must be jetted and settled a minimum of four (4) Calendar Days prior to planting trees.

When the backfill around the plant is approximately two-thirds (2/3) completed, the plant must be thoroughly watered, after which the backfill must be completed to the grade of the surrounding area.

Planting tablets conforming to Section 50-43.02, "Commercial Fertilizer", of these Specifications must be installed according to the following schedule:

Plant Container Size	**Planting** Tablets
One gallon	2 tablets, 21 gram
2 or 5 gallon	3 tablets, 21 gram
15 gallon	6 tablets, 21 gram
24-inch box stock or larger	10 tablets, 21 gram

No boxed, balled, or canned trees must be planted if the rootball is broken or cracked, either before or during the process of planting.

All trees must be provided with two (2) tree stakes. Tree ties must be placed in one place just below the main fork or branches. Tree ties must be nailed or tacked through knot to the tree stake with an appropriate length fastener. Tree stakes must not be driven into the root ball.

Except in turf areas, each plant must have a soil berm constructed around it to retain water. The soil berm must be at least four inches (4") high and must have a minimum inside diameter of two feet (2') for shrubs and three feet (3') for trees.

Each tree in a turf area must have the turf removed in a ring around the tree base. For five-(5) gallon trees, the ring must be twenty-four inches (24") in diameter; for fifteen-(15) gallon and larger trees, the ring must be thirty inches (30") in diameter.

20-4.04.C Preparation for Turf

All turf areas must receive fertilizer and soil amendment, uniformly distributed at the following minimum rates per one thousand (1,000) square feet and thoroughly cultivated into the top six inches (6") of soil, unless otherwise specified in the Special Provisions:

Material	**Distribution Rate per 1,000 Square Feet**
Fertilizer	18 pounds
Soil Amendment	4 cubic yards

After application of fertilizer and preparation of soil has been completed, the areas to be sodded or seeded in lawn must be brought to a smooth, uncompacted grade.

The Contractor must fine grade so proper drainage of the entire area is assured. Rocks, soil lumps, and other deleterious materials larger than one inch (1") must be removed and the area raked smooth.

The Contractor must avoid any compaction of the soils after treatment, and must not permit traffic over such areas. In case of such compaction, the areas must be recultivated by the Contractor, at the Contractor's expense.

The soil on which the turf sod is to be placed must be moist at the time of planting. The Contractor must install the turf sod in conformance with the supplier's recommendations.

Sod must 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 must be stacked, kept moist, and protected from exposure to the air and sun. The stored sod must be installed in place not more than 48 hours after cutting.

The sod must be installed to the smooth finish grade with tight edges and no gaps. Sod pieces must be placed with ends staggered. Sod must not be stretched. Sod must be rolled or folded prior to lifting. Handling of sod must be done in a manner that will prevent tearing, breaking, drying, or any other damage.

After the sod has been placed, it must be rolled with a roller to ensure no air pockets are between the roots and the soil. Sod must be watered immediately after installation.

Turf to be seeded must be sown in prepared soil at the rate of twelve (12) pounds per one thousand (1,000) square feet or as shown on the Plans or specified in the Special Provisions. Seed must be raked in lightly and rolled.

20-4.05 Watering

Water from facilities within the limits of the project that are owned by the Agency, located downstream of a water meter, and for which the Owner has an established water billing account, may be obtained by the Contractor free of charge. Water from other sources must be paid for by the Contractor. Before drawing any water from a Sacramento County owned or operated hydrant, tap, outlet, or water system, the Contractor must obtain a Temporary Water Use Permit from the Sacramento County Water Agency.

Trees, shrubs, and vines must be watered immediately after planting. Water must be applied until the backfill soil around and below the roots or ball of earth around the roots of each plant is thoroughly saturated.

Where watering is done with a hose, a water disbursement device or pressure-reducing device must be used. Under no circumstances shall the full force of the water from the open end of a hose be allowed to fall within the basin around any plant.

Sprinklers must water ground cover plants in areas provided with an irrigation system. Several consecutive waterings may be necessary to thoroughly saturate the soil around each plant.

Water must be applied to plants as often and in sufficient amount to keep the plants in a healthy, growing condition during the life of the Contract.

Precautions must be taken to prevent water from wetting vehicles, pedestrians, and pavement. The Contractor, at the Contractor's expense, must repair any erosion or slippage of the soil caused by watering.

Compliance with the provisions in this Section does not relieve the Contractor of responsibility for the replacement of plants. The Contractor, at the Contractor's expense, must furnish any additional watering required to maintain the plants in a growing condition.

20-4.06 Plant Replacement

Plants that show signs of failure to grow at any time during the plant establishment period, or which have been injured, damaged, vandalized, or stolen as to render them unsuitable for the

purpose intended, as determined by the Agency, must be removed and replaced. Replacement plants must be furnished and planted by the Contractor at the Contractor's expense. The Contractor and Landscape Architect may agree to the substitution of alternative species of plants to be used as replacements. Any damage to the finish grading caused by replanting operations and/or vandalism must be repaired by the Contractor at the Contractor's expense.

Turf damage caused by vandalism or premature use must be repaired and reseeded before final inspection but will not cause extension of the maintenance period. Turf failure caused by improper maintenance practices and/or weather, as determined by the Agency, must be replanted and the maintenance period extended to thirty (30) Calendar Days after the replanting or as required by the Agency.

Unless otherwise permitted by the Agency, the Contractor must complete replacement of unsuitable plants within one (1) week after the Agency marks or otherwise indicates that such plants must be replaced.

20-4.07 Inspection for Plant Establishment Period

Upon completion of the planting work and irrigation installation, and prior to substantial completion, the Contractor must notify the Agency that the landscaping is ready to enter into the plant establishment maintenance period. The Agency will then schedule a pre-maintenance walk-through inspection and will notify the Contractor and the Landscape Architect of the time and date. Upon inspection, if the Agency and the Landscape Architect find the irrigation and landscape work complete and in compliance with the Contract, the Agency will authorize the start of the plant establishment period. Written notice will be given to the Contractor by the Agency as to the starting date of the plant establishment period.

20-4.08 Plant Establishment Period

The number of Calendar Days for the plant establishment period must be designated in the Special Provisions.

Plant establishment work must 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 throughout the plant establishment period. Vines next to walls and fences must be kept staked and tied.

During the plant establishment period, irrigation systems must be operated in the automatic mode, unless otherwise permitted by the Agency. Plants must be watered in an efficient manner to provide optimum growth conditions. The Contractor must provide equipment and means for the proper applications of water to planted areas not provided with an irrigation system. The Contractor must be responsible for the replacement and/or repair of all irrigation equipment which is stolen, vandalized, or damaged during the establishment period.

The project site must be kept free of trash and debris during the plant establishment period.

Commercial fertilizer must be applied to trees, shrubs, vines, and ground cover areas as specified in the Special Provisions and must be watered into the soil after each application. The Contractor must notify the Agency at least forty-eight (48) hours prior to applying each application of commercial fertilizer.

During the plant establishment period, trees, shrubs, vines, and ground cover plants, planted as part of the Contract, must be pruned by the Contractor at the Contractor's expense, as directed by the Agency. Pruning must conform to ANSI standard practices.

Trees and shrubs must be watered, cultivated, and sprayed as required in an efficient manner to assure a vigorous, thriving condition from day of planting to end of plant establishment period. Weeds must be removed during this period. Overhead irrigation watering during the establishment period must adhere to the allowable hours of operation stipulated by County Ordinance or the local water purveyor, whichever of the two is more restrictive. Along roadways, the Contractor must avoid scheduling any irrigation between the hours of 7:00am and 7:00pm, when feasible. Overspray onto paved travel surfaces must be minimized through

adjustments to the system. Operation of the irrigation system outside the normal watering window is allowed for auditing, repairs and review purposes.

Should the Contractor fail, be neglectful, or negligent in this work, the Agency may elect to perform plant establishment work. The Agency will charge the Contractor the cost for performing the required work by deducting this cost from the payments due the Contractor.

Turf must be watered, reseeded, edged, weeded, and mowed as required to assure a neat appearance and a healthy and vigorous growth from the day of seeding to the end of plant establishment period. The first mowing must not be done until the grass is generally at least two inches (2") but less than three inches (3") high. For the first mowing and all subsequent mowing, the mower must be set to cut at a height of one and one-half inches (1-1/2"). Subsequent mowings, as required, must be done before the grass is three inches (3") high. Grass clippings for all mowings must not be allowed to lie after mowing. A catcher must be used on the mower, and grass clippings must be removed and discarded off site.

Immediately following the first mowing of the turf, turf areas must be fertilized at the rate of eight pounds (8 lbs.) per 1,000 square feet or as otherwise specified in the Special Provisions. Reapplication of fertilizer must take place as directed by the Agency during the plant establishment period.

Just prior to the end of the plant establishment period, the Contractor must cut all grass, weed all planting areas, and leave the work area in a neat and attractive condition. Prior to final inspection, all trash and debris must be removed and disposed of off-site.

At the end of the plant establishment period, all plant material must be in a healthy, growing condition. If, in the Agency's opinion, the plant material is not healthy, the Contractor must replace the unhealthy plant material at his expense. If 20% or more of the plant material requires replacement, the plant establishment period will start over.

The Contractor must guarantee a weed free, even stand of the lawn grass, with ninety-five percent (95%) coverage, of the varieties specified. If such stand does not develop as a result of the first seeding, the Contractor must reseed and care for thin spots until an even stand with ninety-five percent (95%) 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 Agency, if the Contractor deems it necessary. The type of herbicide to be used and method of application must be approved by the Agency.

Record drawings for the irrigation and planting, as well as irrigation controller charts must be prepared by the Contractor, unless otherwise noted in the Special Provisions. Refer to Section 20-6 'Record Drawings and Controller Charts' regarding submittal and approval.

20-4.09 Inspection Prior to Final Acceptance of Landscape

At least 14 Calendar Days before the end of the plant establishment period, the Contractor must request a final walk-through for the landscape and irrigation system. The project must have been maintained and monitored as specified in Plant Establishment Work and Maintenance Period section of the Special Provisions. The Agency's landscape architect must attend along with the Agency inspector and a representative from the Contractor. Any deficiencies in the landscape and irrigation system observed during the walk-through will be noted and made part of the final inspection punch list.

At least 7 Calendar Days prior to the final walk-through of the landscape and irrigation, instructions (including laminated controller charts if required by the Special Provisions) must be given to Agency maintenance personnel by a qualified person from the Contractor on the use and adjustment of the installed irrigation controllers. The Contractor's representative must perform a field test of the irrigation system operation and equipment at the same time. Any deficiencies with the irrigation system will be noted and made part of the final walk-through punch list items.

20-4.10 Final Acceptance of Landscape

The Contractor shall have 21 Calendar Days to address any final punch list items. Agency Inspection must confirm in writing that the final punch list has been addressed and will designate a date for the Agency to take over maintenance responsibilities on the project. Until written notification is received, the Contractor must be responsible for continuing maintenance and the plant establishment period.

20-4.11 Measurement and Payment

Planting work will be paid for at a single lump sum price or at unit prices for separate items of planting work, as designated in the Contract. Full compensation for providing planting work is included in the prices paid for the various items and no additional compensation will be paid.

Payment for the plant establishment period is considered to be included in other items of work unless noted otherwise in the Special Provisions.

20-5 IRRIGATION SYSTEMS

Irrigation system materials must be as specified in Section 50-43, "Landscaping Materials" of these Specifications.

Recycled, reclaimed, and non-potable irrigation systems must also comply with the requirements of Section 41-22, "Recycled Water," of these Specifications.

This Section 20-5 shall not apply to any portion of a water system upstream of a Water Utility water meter. Refer to Section 41, "Water Distribution Systems," of these Specifications for requirements for water meters and the upstream water system.

20-5.01 Maintain Existing Water Supply

The Contractor must notify the Agency and the property owner, manager, or tenant at least forty-eight (48) hours prior to shutting off the water supply to any portion of an existing irrigation system. The Agency and the property owner, manager, or tenant must also be notified when the water supply is returned to said portion of the irrigation system.

Where work is performed on an existing irrigation system, the system must be checked by the Contractor for proper operation after the work is completed and any malfunctions resulting from the Contractor's operations must be corrected at the Contractor's expense. If the work will interrupt the water supply for more than twenty-four (24) hours, the Contractor must water existing landscaping, including that being maintained by Agency landscape maintenance forces, in the area irrigated from that water supply as often as necessary to maintain healthy plant growth. The watering will be at the Contractor's expense. At the option of the Contractor, temporary connections to an operational existing irrigation system may be made as approved by the Agency until the interrupted water supply has been restored.

20-5.02 Remove Existing Plants for Trenching

Where trenching for new irrigation facilities is performed in areas planted with existing trees or shrubs, the trenching alignment must be adjusted as necessary to avoid damage to such trees or shrubs and their root systems.

Where trenching for new irrigation facilities is performed in existing ground cover or turf, sufficient plant material must be removed to permit the proper installation of such facilities, but in no case shall the removal width exceed five feet (5'). All turf repair or ground cover replacement planting must be performed before the start of the plant establishment period, or at least fourteen (14) Calendar Days prior to the acceptance of the Contract if there is no plant establishment period.

20-5.03 Electrical Service for Electric Automatic Irrigation Systems

Electrical service for electric automatic irrigation systems must conform to Section 49, "Signals, Lighting and Electrical Systems", of these Specifications and Standard Drawing 5-32,

"Signal, Lighting and Electrical Systems Metered Service Can", of the County Improvement Standards.

20-5.03.A Components

Electrical components for electric automatic irrigation systems must include irrigation controllers with weatherproof enclosures; remote control valves; valve boxes; pull boxes; conductors between controllers, pumps and valves; moisture sensors; rain switches; and all appurtenances, incidentals, and accessories required for proper installation and operation of the electrical portions of such systems.

Electrical components requiring modifications to conform to the specified requirements must have such modifications made by the manufacturer before shipment to the project. Components must also include the electric service pedestal for the irrigation controller.

20-5.03.B Controllers

Controllers must conform to Section 50-43.21, "Automatic Irrigation Controllers", of these Specifications and must be installed in accordance with Standard Drawing L-19.

Controllers must be the type and model specified in the Plans and Special Provisions.

All wiring to and from the controller must be through color-coded plugs and sockets.

All controller locations are essentially diagrammatic and must be confirmed in the field prior to installation by the Contractor with the Agency representative.

Remote control valves must be connected to the controller as shown on the Plans, unless otherwise directed by the Agency.

A complete maintenance and operations manual for each type of controller installed must be submitted to the Agency.

The controller housing enclosure must house the irrigation controller and moisture sensor control panel (if specified) and must be installed according to the Standard Drawings.

20-5.03.C Control Wire, Electrical Conduit and Pull Boxes

Control wire must conform to Section 50-43.34, "Irrigation Control Wires", of these Specifications. Unless otherwise stated in the Special Provisions, the color of the control wire from the controller must be red, the common wire must be white, all spare wires must be yellow, and the wires from the master valve must be orange. Pull boxes must conform to Section 50-43.35, "Pull Boxes", of these Specifications.

Where control wires are installed in the same trench or opening as irrigation pipe, such control wires must be placed at the same depth or below the pipe.

Sharp bends or kinks in the control wires will not be permitted. Control wires must be unreeled in place alongside or in the trench and must be carefully placed along the bottom of the trench and installed in conduit when under pavement. Under no condition shall the cable be unreeled and pulled into the trench from one end.

Not less than one foot (1') of cable slack must be left on each side of all splices at all points where cable is connected to field equipment. The slack cable must be placed in the trench in a series of "S" curves.

Conductors must be run continuous without splices from controller enclosure to the valve boxes. Splices must be made only in pull boxes or valve boxes. Splices must be clamped and sealed with waterproof connectors. When splices are necessary, the wire color must not change along the wire run. Conductors from controllers to valves must be wrapped together with electrical tape at ten-foot (10') intervals. An eighteen-inch (18") wire loop must be provided at each valve.

All pull boxes must be made of reinforced concrete with lids marked 'irrigation'. Unless otherwise stated in the Special Provisions, pull boxes set in the roadway must be traffic rated with a steel cover. Pullboxes must be installed at the following locations:

1. At all control wire splices, except splices made in valve boxes.

2. At intervals not to exceed two hundred fifty feet (250') along any low voltage, neutral and control wire runs. Valve boxes installed along a control wire run must not be considered as pull boxes in determining the spacing.
3. Within five feet (5') of irrigation controllers or within five feet (5') of cabinets housing one (1) or more controllers.
4. At ends of electrical conduits.
5. At other locations shown on the Plans.

When approved by the Agency, the Contractor may install additional pull boxes to facilitate the work. Additional pull boxes installed for the Contractor's convenience will be at the Contractor's expense.

The tops of all pull boxes must be flush with the surrounding finished grade.

20-5.03.D Testing

Field tests must be performed by the Contractor to demonstrate that electrical components of the irrigation systems function as specified and the system is operational.

A field test must be satisfactorily completed prior to the start of planting, the plant establishment period, and Final Acceptance, unless otherwise authorized by the Agency. Field test must be done to determine that all sprinklers function according to manufacturer's data. The Contractor must replace any sprinklers/emitters not functioning as specified; otherwise correct system to provide satisfactory performance and retest.

The controller must be tested in the automatic, semi-automatic, and manual operation modes.

20-5.04 Installation

20-5.04.A General

Foreign material must be prevented from entering the irrigation system during installation. Immediately prior to assembling, all pipes, valves, and fittings must be cleaned. All unattached ends of pipe, fittings, and valves must be plugged or capped pending attachment of additional pipe or fittings. All lines must be thoroughly flushed out prior to attachment of sprinklers, emitters, and other terminal fittings. Repair of irrigation systems must be made within one (1) Calendar Day after a malfunction or damage to any portion of the system has occurred, unless otherwise directed by the Agency.

The system must completely, efficiently and evenly irrigate all areas, and must be left ready for operation to the satisfaction of the Agency.

The Contractor must install the specified pipe, valves fittings, wiring, switches, controls and appurtenances at the locations shown on the Plans. The irrigation system as shown on the Plans, except for sprinkler locations, is diagrammatic. The Agency will, or direct the Contractor to, determine specific locations.

The Contractor must provide, at the work site, temporary facilities required for the safe and proper storage of materials, tools, etc. These facilities must be constructed only in locations approved by the Agency or as designated on the Plans, and must not interfere with the work of any other contractor. At such times as the Contractor's facilities interfere with the proper installation and completion of the Work, they must be removed by the Contractor, at the Contractor's expense, within three (3) Calendar Days after having been notified by the Agency that such removal is necessary.

20-5.04.B Irrigation Sleeving

Sleeving for water line crossovers and sprinkler control crossovers must conform to Section 50-43.19, "Irrigation Sleeving Conduit", of these Specifications.

Control wire, water supply line or lateral line pipe crossovers must be installed in conduits or as shown on the Plans. After completing conduit backfill and prior to performing the pressure test on a water line crossover, the Contractor must demonstrate that the water line crossover

can be moved longitudinally within the conduit. Where water line crossovers are installed for future use, the ends of such crossovers must be capped immediately after testing.

Conduits must extend a minimum of twelve inches (12”) beyond edge of paving unless otherwise noted on the Plans. At perpendicular crossings, the Contractor must install a No. 5 pull box at each end of the conduit, with eighteen-inch (18”) wire loop

The location of each conduit must be designated by cementing a Type A pavement marker to the paved shoulder near each end and over the centerline of the conduit using a standard set type adhesive. Type A pavement markers and adhesive must conform to the provisions in the State Specifications and must not conflict with existing markers within the project site.

20-5.04.C Water Line Crossovers

Water line crossovers are supply line or lateral line pipes installed in conduits.

Water line crossovers must be polyvinyl chloride (PVC) plastic pipe, Class 315 or Schedule 40, with a minimum pressure rating of three hundred fifteen (315) pounds per square inch, and must be sized as shown or specified in the Contract .

After completing conduit backfill and prior to performing the pressure test on a water line crossover, the Contractor must demonstrate that the water line crossover can be moved longitudinally within the conduit. The water line crossover must then be positioned to extend at least one (1) foot beyond each end of the conduit.

Where water line crossovers are installed for future use, the ends of such crossovers must be capped immediately after testing.

20-5.04.D Trenching and Backfilling

Trenching and backfilling must be in accordance with Standard Drawing L-20. Trenches must be excavated only as far in advance of pipe laying as is permitted by the Agency. Excavated material must be piled in a manner that will not endanger the Work and will avoid obstructing sidewalks and driveways. Open trenches and piles of dirt must be marked and lighted as to provide safety to all pedestrians and to vehicular traffic.

Rock, pavement, and other debris encountered during trenching operation must be removed and disposed of outside of the project limits at the Contractor's expense. The size and quantity of material to be disposed of will be determined by the Agency.

Trenches for plastic pipe must be smooth and free of jagged rubble or sharp objects which will cause bending stress and uneven weight distribution to pipes, conduits and conductors during backfilling operations. Trenches for solvent-cemented plastic pipe supply lines must be of sufficient width to permit snaking of the pipe. Other trenches must not be excavated wider than necessary for the proper installation of pipe supply lines.

Except as otherwise specified in this Section, backfill material must be material excavated from the trenches, compacted by an Agency-approved method other than ponding or jetting with water until the backfill material, after settlement, is level with the surrounding soil. When any backfilled area has settled excessively, said area must be refilled and compacted by the Contractor at the Contractor’s expense, including furnishing, placing, and compacting the fill material.

Trenches for pipe and electrical conductors may be excavated manually or with mechanical trenching equipment. Trenching equipment must be essentially vertical so that a minimum of surface is disturbed. Blades of road graders must not be used to excavate trenches. Trenches for pipe must be excavated to the depths shown on the Plans.

Pipe must have a firm, uniform bearing for the entire length of each pipe line. Wedging or blocking of pipe will not be permitted.

Trenches must not be excessively wet and must not contain pools of water during backfilling operations.

Extreme care must be exercised by the Contractor while backfilling. Any materials or equipment damaged while backfilling must be repaired or replaced by the Contractor as directed by the Agency, at no cost to the Agency.

Rock saw trenching within asphalt pavement must be repaired in accordance with Section 14, “Restoration of Surfaces”, of these Specifications.

20-5.05 Pipe

Plastic pipe supply lines, plastic pipe irrigation lines, and fittings must be installed in accordance with the pipe and fitting manufacturers' printed instructions and these Specifications. Irrigation system trenching must be in accordance with Standard Drawing L-20.

PVC pipe one and one-half inches (1-1/2”) or less in diameter must be cut with "PVC cutters”, not by sawing. Pipe greater than one and one-half inches (1-1/2”) in diameter must be cut with a fine-toothed hacksaw and any burrs must be removed. All pipe must be cut straight and true.

The outside surface of the pipe and the inside surface of the fittings must be wiped with a clean cloth to remove all dirt and moisture before the solvent cement solution is applied. Solvent cement welding must be done in accordance with the printed instructions of the solvent manufacturer.

The male portion of each threaded plastic pipe and fitting connection must be wrapped with at least two (2) layers of approved pipe thread sealant tape. Pipe from the service connection through a backflow preventer assembly to plastic pipe supply lines must be copper, bronze, or as shown on the Plans, and must be wrapped with six (6) mil plastic tape.

Plastic pipe supply lines must be installed not less than twenty-four inches (24”) below the finished grade, measured from the top of pipe, unless otherwise shown or specified in the Contract.

Valves and fittings must be designed for and must meet the requirements for service at an operating pressure of one hundred fifty pounds per square inch (150 psi), unless otherwise specified.

Valves and fittings must have connections compatible with the type of pipe joint selected by the Contractor. If mechanical joints or slip-type joints are used, the Contractor must furnish and install necessary Portland cement concrete thrust blocks as specified by the Agency.

Guarantee must cover workmanship of materials from the plastic pipe manufacturer for all plastic pipe and fittings. Main irrigation lines must be Schedule 40 for lines two-inches (2”) and smaller and Class 315 PVC for lines two-and-one-half to three-inches, and Class 200 PVC rubber ring and gasket for lines four-inches and larger. Lateral irrigation lines must be Class 200 PVC. PVC pipe must conform to CS 256 and ASTM Designation: D 2241.

Pipe fittings must 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 must conform to the following specifications.

All slip-joint PVC fittings must be Schedule 40. All Schedule 40 PVC couplings four inches (4”) in diameter or larger must be a minimum of seven inches (7”) in length.

The Contractor must use only the solvent supplied and recommended by the manufacturer to attach PVC pipe and pipe joints. The pipe and fittings must be thoroughly cleaned of dirt, dust, and moisture before applying solvent.

The Contractor must make solvent weld joints with non-synthetic 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 one-quarter (1/4) turn to distribute the solvent and remove air bubbles. Hold the joint for approximately fifteen (15) seconds so the fitting does not push off the pipe.
4. Use a clean rag and wipe off all excess solvent.
5. To prevent disturbing the last completed joint, the pipe must not be twisted when making subsequent joints.

Allow at least fifteen (15) minutes setup time for each welded joint before moving.

On plastic to steel connections, the Contractor must work the steel connections first. For all PVC threaded connections use thread sealing paste with virgin Teflon. In no event must an oil base joint compound be used on a PVC joint.

The Contractor must exercise care in handling, loading, unloading, and storing plastic pipe and fittings. All plastic pipe and fittings must be stored under cover before using, and must be transported in a vehicle that can support the entire length of pipe. The Agency will inspect all pipe before it is laid and will reject any section that is damaged or is found to be defective to a degree which will materially affect function and service of pipe. Any section of pipe that has been bent, dented, or damaged must be discarded until said section of pipe is cut out and rejoined with a coupling.

The Contractor must install the pipe to line and grade, as staked by the Agency. The Contractor's facilities for lowering the pipe into the trench must be such that neither the pipe nor the trench will be damaged.

All pipes must be assembled free from dirt, pipe scale, and burrs. Each section of lateral pipe must be flushed out before sprinkler heads or emitters are attached.

Plastic pipe must not be laid when there is water in the trench.

20-5.05.A Subsurface Dripperline

Subsurface dripperline must conform to Section 50-43.18, “Subsurface Dripperline”, of these Specifications and must be installed in accordance with Standard Drawings L-15, L-16, and L-17.

Dripperlines must be installed four inches (4”) below finish grade unless otherwise specified on the Plans or in the Special Provisions. Dripperlines must be installed at the spacing distance specified on the Plans or in the Special Provisions. Install dripperlines with orifices facing down and as shown on the Plans.

Dripperlines must be installed using barbed fittings only. Subsurface dripperline systems must be installed with flush valves and air vacuum relief valves, as recommended by the manufacturer.

20-5.05.B Valves and Valve Boxes

Irrigation control valves and valve boxes must be of the type shown on the Plans or specified in the Special Provisions and must conform to Sections 50-43.23, “Control Valves,” and 50-43.25, “Valve Boxes”, of these Specifications. Irrigation control valves must be installed in accordance with the corresponding detail in the Standard Drawings.

The Contractor must provide and install valves as shown on the Plans and as required for the proper control of the piping systems in which they are incorporated. Main shut-off valves must be gate valves.

Where a remote control valve is shown on the Plans as located at the edge of turf and shrub areas, it must be placed in the shrub area.

Valves must be placed in groupings for ease of maintenance.

Valve boxes that contain remote control valves must be identified on the top surface of the valve box covers by the appropriate letters and numbers for controller and station numbers as shown on the Plans.

Valve boxes must be identified by labels attached to the covers that contain the appropriate abbreviations. Remote control valves must be labeled with the controller station. Quick

coupling valves must be labeled “QC”. Gate valves must be labeled “GV”. Labels for valve boxes must consist of either one of the following:

1. Engraved letters and numbers on a two-layer white over black, exterior sign-plate plastic. The dimensions of the labels must be a minimum of two-inches by three-inches by one-eighth inch thick (2” x 3” x 1/8” thick).
2. Hot-stamped black letters on a yellow background of UV resistant polyurethane Behr Desopan. The dimensions of the labels must be a minimum of two-and-one-quarter inches by two-and-three-quarters inches (2-1/4” x 2-3/4”).

The letters and numbers must be a minimum of one and one-eighth inches (1-1/8”) in height. Labels must be bolted to the valve box covers with commercial quality brass or stainless steel machine screws, nuts and washers.

20-5.05.C Quick Coupling Valve

Quick coupling valves must conform to Section 50-43.22, “Quick Coupling Valves”, of these Specifications and must be installed in accordance with Standard Drawing L-6. Quick coupling valves must be installed with Sch. 80 PVC fittings and swing joint assemblies.

Valve box for the quick coupling valve must be green heavy duty ten-inch (10") diameter and installed two inches (2”) above finished grade.

20-5.05.D Backflow Preventers

Backflow preventers must conform to Section 50-43.26, “Backflow Preventers”, of these Specifications and must be installed in accordance with Standard Drawing 8-8A or 8-8B, unless otherwise specified. Backflow preventer assemblies must consist of backflow preventer, wye strainer (when specified), gate valves, pipe fittings, portland cement concrete supports, and portland cement concrete pad for the assembly, and must conform to the details shown on the Plans, these Specifications, and the Special Provisions. Components of the backflow preventer assembly must be of the type shown on the Plans or specified in the Special Provisions and must conform to Section 50-43.25, "Backflow Preventers”, of these Specifications. Backflow preventer assemblies must be from the approved list issued by the Sacramento County Environmental Health Division.

Installation of backflow preventer assemblies must conform to Agency codes and ordinances regarding cross connection control installation, must be UL listed and approved by the Research Foundation for Cross Connection Control, University of Southern California. Special attention must be given to the minimum and maximum heights of assemblies.

The bottom of backflow preventers must be installed twelve inches (12”) above finished grade or concrete pad. Exposed top surfaces of concrete foundations and pads must have a medium broom-finish applied parallel to the long dimension of foundations and pads. Backflow preventer assembly must be tested by a certified backflow device tester prior to initial usage and operation of the system.

Backflow preventer installations must include freeze protection in the form of a backflow device blanket cover or insulated enclosure, as indicated on the plans.

20-5.05.E Master Valve/Flow Meter Assembly

Assembly must conform to Section 50-43.24, “Master Control Valve/Flow Sensor Assembly”, of these Specifications and be installed in accordance with the corresponding detail in the Standard Drawings. Assembly must be installed after the water meter and the backflow preventer at the irrigation point of connection. Unit must be installed above grade either on downstream leg of backflow unit or as an isolated installation, as shown on the Plans. Assembly must be as shown or specified in the Contract, and must conform to Section 50-43.23, “Master Control Valve/Flow Sensor Assembly”, of these Specifications.

Installation must include providing five (5) #14 control wires, unless otherwise specified, from the master valve/flow meter assembly to the irrigation controller. Wiring must include a hot and a common conductor for both the master valve and the flow meter and one (1) spare conductor.

20-5.05.F Air Vacuum Relief Valve

Air vacuum relief valve must conform to Section 50-43.31, "Air Vacuum Relief Valve", of these Specifications and must be installed in accordance with Standard Drawing L-9.

Air vacuum relief valve must be installed in-line with a subsurface dripperline at the highest point of the system. Valve box for the air vacuum relief valve must be ten inches (10") diameter with a two-inch (2") layer of pea gravel and installed two inches (2") above finished grade.

20-5.05.G Flush Valve

Flush valve must conform to Section 50-43.32, "Flush Valve Assembly", of these Specifications and must be installed in accordance with Standard Drawing L-8.

Flush valves must be installed at the end of a subsurface dripperline system as shown on the Plans and at a low point of planter, as recommended by the manufacturer. Install a minimum of one flush valve on each circuit for every 15 gallons per minute (GPM) of flow. Valve box for the flush valve must be ten-inch (10") diameter with a four-inch (4") layer of pea gravel inside and installed two inches (2") above finished grade. Installation must include a plastic ball valve before the flush valve and a thirty-inch (30") minimum length of flexible one-half inch (1/2") polyethylene tubing coiled within the valve box, for the purpose of periodic maintenance. Flush valves must be installed at the end of tubing and be able to be extended outside of valve box for manual flushing.

20-5.05.H Sprinklers and Emitters

Sprinklers and emitters must conform to Section 50-43.20, "Sprinklers and Emitters", of these Specifications and must be installed in accordance with the corresponding details in the Standard Drawings.

20-5.05.I Pressure Testing

Except for non-rigid pipelines and lateral irrigation lines, pressure testing for leakage must be performed on all supply lines installed by the Contractor. Pipelines must be tested in place and all open ends of the pipeline and fittings must be plugged or capped prior to testing.

The Contractor must notify the Agency at least twenty-four (24) hours prior to performing any pressure test. Pressure tests must be performed only between the hours of 8:00 a.m. and 5:00 p.m. except that no pressure tests shall be made on Saturdays, Sundays, or legal holidays, unless otherwise approved in writing by the Agency. Each pressure test must be observed by the Agency.

Pipelines to be tested must be filled with water, and a pressure gauge must be connected to the pipeline. The pipe must then be placed under a pressure of one hundred twenty-five pounds per square inch (125 psi) (except as otherwise specified below) by air or water pressure, after which the source of pressure must be cut off, leaving the line under the required pressure.

The pressure gauge must be calibrated from zero (0) to two hundred (200) pounds per square inch (psi) in five (5) pound increments and must be accurate within a tolerance of two (2) pounds.

The Contractor must provide the necessary pump and equipment required for this test.

The pipeline must be tested under the required pressure for a period of one (1) hour. The pressure gauge must remain in place until each test period has been completed. Leaks that develop in the tested portion of the system must be located and repaired after each test period when a drop of more than two (2) pounds is indicated by the pressure gauge when testing pipe over one hundred feet (100') in length. There must be no pressure drop permitted when testing

pipe from one foot (1') to one hundred feet (100') in length. After such leaks have been repaired, the one-hour pressure test must be repeated and additional repairs made until there is no drop in pressure for pipe lengths up to one hundred feet (100'), or the drop in pressure is two pounds per square inch (2 psi) or less for pipe lengths over one hundred feet (100'). If testing by means of water pressure, air must be expelled from the pipe prior to testing.

Tests on pressure lines must be completed prior to backfilling; however, sufficient backfill must 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 twenty-four (24) hours to cure.

Where any section of the pipe system is provided with a concrete thrust block, the test must not be made until at least five (5) Calendar Days have passed after the concrete thrust block was installed. If higher early-strength cement is used in the concrete thrust block, the test must not be made until at least two (2) Calendar Days have elapsed.

Contractor must disinfect potable water lines according to AWWA standards.

20-5.05.J Repairs and Coverage

All leaks that develop and all defective material in any portion of the irrigation system installed by the Contractor must be repaired or replaced by the Contractor.

The entire system must be checked and, if necessary, adjusted for uniform and complete coverage after installing the sprinklers. All emitters must be checked for proper operation and, if necessary, cleaned and replaced.

The risers for sprinklers on slopes must be set approximately perpendicular to the slope. Each series of sprinklers must be installed and test operated. Nozzles of all sprinklers and bubblers must be adjusted for proper rate of flow and coverage. Sprinklers and/or bubblers must be relocated as required to produce uniform coverage.

Any revision of the proposed irrigation systems ordered by the Agency and necessary to achieve complete and adequate coverage and operation of the system, which is not within the scope of work, must be paid for as extra work as provided in Section 9, "Changes and Claims", of these Specifications.

20-5.06 Measurement and Payment

Except as otherwise provided in these Specifications or the Special Provisions, full compensation for conforming to the requirements in this Section (Section 20) is included in the prices paid for the various items of work and no additional compensation will be paid.

20-6 RECORD DRAWINGS AND CONTROLLER CHARTS

The Contractor must maintain neat and accurate record drawings in conformance with the requirements in Section 11, "Preconstruction Photographs and Record Drawings", of these Specifications and this Section. Drawings shall be subject to the inspection of the Agency at all times and must be kept current with all work instructions, change orders, substitutions, and construction adjustments shown thereon and initialed by the inspector.

Immediately following the start of the Plant Establishment Period, the Contractor must submit to the Agency one (1) full size set of Record Drawings. Record drawings will be reviewed by the Landscape Architect and shall be returned to the Contractor with comments for revisions, if necessary. Notes and dimensions must be drafted on the record drawings in a neat and legible manner. Drawings must be of sufficient quality to allow further black and white reproduction of the original to be clear. Illegible, inaccurate, or incomplete record drawings will be returned to the Contractor for revisions.

The work will not be formally accepted until the Record Drawings are approved by the Landscape Architect. Upon approval by the Landscape Architect, two (2) bond sets of these

record drawings must be delivered to the Agency in good and acceptable condition prior to final acceptance of the Work.

The Contractor must provide two (2) sets of 11" x 17" charts for each controller. One copy must be placed on the inside of the controller enclosure door. The second copy must be provided to Agency maintenance personnel. The base plan for the controller charts must be the approved irrigation Record Drawings.

Each controller chart must show the as-built condition of the area controlled by the automatic controller. All symbols must be readable at the final reduced size. The controller chart must include:

1. Connections to existing water lines (point-of-connections);
2. Location of backflow preventer(s) and controller(s);
3. Routing of pressure lines and sleeves (show typical station offset and/or dimensions on record drawings);
4. Routing of irrigation conduit and pull boxes;
5. Locations of remote control valves, gate valves, and quick coupling valves (show station offset and/or dimensions on record drawings); and
6. Other items as directed by the Agency.

The chart must be color-coded to easily identify each valve and the respective hydrozone area it irrigates.

When completed and approved, the chart must be hermetically sealed between two (2) pieces of 10 mil plastic, minimum.

Each chart must be completed and approved prior to final inspection of the irrigation system.

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SECTION 21 FINISHING ROADWAY

21-1 GENERAL

Upon completion of all construction operations, the entire roadway or roadways must be finished as specified in the State Specifications, and these Specifications.

References to “highway” or “right-of-way” are references to any earthwork or grading operation.

21-2 PAYMENT

Full compensation for finishing is included in the prices paid for the various items of work and no additional compensation will be paid.

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SECTION 22 BASE MATERIAL

22-1 LIME TREATED BASE

Road-mixed lime treated base must be constructed in accordance with the State Specifications.

Lime must conform to the requirements of the State Specifications.

The percentage of hydrated lime to be added by weight will be specified in the Special Provisions.

Lime treated base must be compacted to a minimum relative compaction of 95 percent under California Test Method 231.

22-2 AGGREGATE BASE

Aggregate base must conform to the State Specifications, and these Specifications.

The Contractor may propose the use of recycled Portland Cement Concrete or asphalt concrete materials for aggregate base. The Contractor must submit to the Agency material samples and laboratory test data certifying that the proposed materials meet all the quality requirements of the State Specifications, and these Specifications. The Contractor may not propose to use recycled asphalt concrete, generated from asphalt concrete removed from within the area of work, for aggregate base unless the recycled material is surplus material from the Work. Recycled materials must not be used in the Work unless approved in writing by the Agency. Data and samples must be submitted at least 30 Calendar Days prior to expected use of the proposed materials in the Work.

The material must be deposited on the roadbed in a manner which provides a uniform section of material within 5 percent tolerance of the predetermined required volume. Deposition must be by methods that prevent segregation of the material. The deposited material must contain sufficient moisture to prevent segregation. Aggregate base material must be immediately spread to its planned grade and cross section. Segregation or excessive drifting or spotting of material is not permitted. Material determined by the Agency to be unsuitably segregated must be removed from the roadbed or completely reworked to provide the desired uniformity.

The Contractor is responsible for maintaining the required moisture content until the next successive layer of material is placed. No additional compensation will be paid for water applied to the aggregate base after the material has been weighed.

Aggregate bases must be compacted to a minimum relative compaction of 95 percent as determined by California Test Method 231.

The surface of the finished aggregate base at any point must not vary more than 0.05-foot above or below the grade established by the Agency.

22-3 CEMENT TREATED BASES

Road-mixed and plant-mixed cement treated bases must be in accordance with the State Specifications.

22-4 MEASUREMENT AND PAYMENT

Lime stabilization will be measured by the square yard in accordance with the State Specifications. The price paid per square yard for lime treated base includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing lime treated base, complete in place, as shown or specified in the

Contract and these Specifications, and as directed by the Agency. Full compensation for removal of rocks and solids greater than 2-1/2 inches in size is included in the price paid per square yard for lime treated base and no additional compensation will be made.

The quantity of aggregate base to be paid for will be measured either by the ton or cubic yard, as designated in the Contract. The quantity to be paid for will be calculated using the dimensions shown on the Plans adjusted by the amount of changes ordered by the Agency. No allowance will be made for any aggregate base placed outside Plan dimensions unless otherwise directed by the Agency.

The price paid per ton or cubic yard for aggregate base includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and placing aggregate base, complete in place, including applying water, compacting the material, and finishing the surface, as shown or specified in the Contract and these Specifications, and directed by the Agency.

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SECTION 23 - ASPHALT CONCRETE

23-1 GENERAL

Asphalt Concrete (AC) must conform to Section 39 of the State Specifications, except that Sections 39-3, “Method Construction Process” and 39-4, “Quality Control/Quality Assurance Construction Process”, do not apply to Agency projects. All Agency projects must comply with Section 39-2, “Standard Construction Process”, of the State Specifications and these Specifications. “AC” or “AC” is the same as “Hot Mix Asphalt” or HMA”. “Asphalt Rubber Hot Mix” or “ARHM” is the same as “Rubberized Hot Mix Asphalt” or “RHMA”.

AC is designated as Type A, Type B, Open Graded, or ARHM. AC is also designated by gradation, according to the 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 Contractor's operations must be conducted in a manner that will not harm or damage existing facilities or improvements.

At locations where public traffic is routed over the base grade, the Contractor must 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, must do so in accordance with the provisions of Section 12, "Construction Area Traffic Control", of these Specifications.

23-2 MIX FORMULA AND DESIGN

Mix designs for Type A, Type B, Open Graded, and ARHM must meet all of the requirements of Section 39-1.03B, “Hot Mix Asphalt Mix Design”, of the State Specifications.

The Contractor must submit a job mix formula and mix design to the Agency for approval. Mix designs must be accompanied by current test results that indicate compliance with these Specifications and the Special Provisions. A job mix formula must be submitted by the Contractor for each designation of AC, based on samples of conforming aggregate materials supplied for each source or supplier proposed by the Contractor, with optimum binder content determined per California Test Method 367 with the exception that CKE test is waived and California Test Method 309 must be used to determine the Maximum Theoretical Density of the mixture. The job mix formula must establish a single percentage of aggregate passing each required sieve size and a percentage of asphalt binder to be added to the aggregate. The AC binder content must be based on 4.0 percent air voids.

Where more than one source or supplier is designated to supply AC, those mixes must be kept separate. The mixes must not be intermixed in the same lift or section of pavement. The Contractor must submit paving plans showing, in advance, where the mixes from each source will be used. This plan will be subject to approval by the Agency.

23-3 AGGREGATES AND BINDERS

23-3.01 Aggregates

The aggregate gradation must be 3/4, 1/2, or 3/8 inch for Type A or B AC and 1/2 inch for ARHM-GG and must conform to Section 39-1.02E, “Aggregate”, of the State Specifications. Select aggregate size based on AC lift thickness.

AC Lift Thickness	Aggregate Size
Less than 2-1/4”	1/2”
Greater than or equal to 2-1/4” where total AC section is less than or equal to 3”	1/2”
Greater than or equal to 2-1/4” where total AC section is greater than 3”	3/4”

23-3.02 Binders

The asphalt binder grade must comply with Section 92, “Asphalts” of the State Specifications and the following:

Type of AC and Use	PG Grade Binder
Conventional dense graded AC used on on-ramps, off-ramps, arterial streets and thoroughfare streets	64-10
Conventional dense graded AC used on residential and collector streets	64-10
ARHM	64-16

23-3.03 Quality Control Sampling and Testing

Sampling and testing must be done in accordance with Section 39-2.02B, “Quality Control Testing”, of the State Specifications.

23-4 RECLAIMED ASPHALT PAVEMENT

At the option of the Contractor, reclaimed asphalt pavement (RAP) may be substituted for virgin aggregate in accordance with Section 39 of the State Specifications. The Agency must be given unrestricted access to stockpiles for inspection and testing as deemed necessary.

The amount of virgin asphalt binder to be mixed with the combined virgin aggregate and RAP will be determined by the Contractor in conformance with California Test Method 367, with the exception that the C.K.E. test is waived and California Test Method 309 must be used to determine the Maximum Theoretical Density. In lieu of historical data, the approximate asphalt demand may be calculated in accordance with the Asphalt Institute Handbook MS-4.

The percentage of RAP and the mixture gradation Target Values must be designated job mix design. Changes in the Target Values of the aggregate grading and design asphalt content will not be permitted without additional testing to verify compliance with the requirements for stability and air voids. Changes will not be allowed without the approval of the Agency.

The proposed mix design must be submitted to the Agency for review and approval. In addition to the requirements of Section 39 of the State Specifications, the Contractor must provide the Agency with the following information:

- Location of RAP stockpile
- The individual and average asphalt content test results representative of the proposed RAP stockpile based on a minimum of 1 test per 5,000 tons of material in the RAP stockpile. The asphalt content must be determined in accordance with ASTM D 2172, Method B.
- The individual and average asphalt-free gradations of the RAP material derived from the samples used to determine the asphalt content.

RAP must be produced per Section 39, “Hot Mix Asphalt”, of the State Specifications, except that the requirement for storing and drying does not apply to the RAP material. When the RAP mixture is produced by batch mixing, the time of mixing must not be less than 35 seconds.

The Contractor's mixing equipment must be equipped with a suitable, safe sampling device, or locations, capable of providing representative samples of virgin aggregates and RAP production materials being incorporated into the recycled asphalt pavement mixture. Should a continuous mixing plant be used, the RAP material must be protected from direct contact with the burner flame by means of a shield, separator, secondary drum or other method approved by the Agency.

The binder must be introduced into the mixer after the virgin aggregate and RAP material have been combined. If a batch mixing plant be used, the RAP material must be kept separate from the virgin aggregate until both ingredients enter the weigh hopper and/or pugmill.

23-5 HAULING EQUIPMENT

Vehicles used for hauling AC mixtures must have tight, smooth, metal beds, and must be free from dust, screenings, excessive petroleum oils, volatiles, or other mineral spirits that may affect the mix being hauled. Trucks must be provided with tarpaulins or cargo covers of sufficient size and weight to protect the entire load.

23-6 WARM MIX ASPHALT (WMA)

At the option of the Contractor, WMA technology may be used. Acceptable WMA technologies include water injected foam, chemical additive or organic additive technologies. WMA must be produced in accordance with the manufactures recommendations. AC mixes produced using warm mix technology must be produced between 230 and 300° F. The Job Mix Formula (JMF) submitted to the Engineer for approval must not incorporate the WMA additive. When WMA technology is proposed for use, identify the WMA manufacturer and dosage rate on the JMF submittal. When required, JMF verification testing will be performed on plant-produced material.

23-7 NOT USED

23-8 AC PLACEMENT METHOD

23-8.01 General

Unless otherwise specified in the Special Provisions, AC must be placed as specified in this Section.

AC placed on minor streets may be placed in a single lift up to 3 inches thick. For major streets, the top layer of AC must be placed in a lift between 1-1/2 and 2-1/2 inches in compacted thickness. The next lower layer of AC must be placed in a lift between 1-1/2 and 3 inches in compacted thickness. All other lower layers must be placed in lifts 4 inches or less in compacted thickness.

The total thickness of AC must be as shown on the plans with the following exception for AC paving in the vicinity of sidewalk ramps. For the area of pavement that is no greater than twelve feet wide and adjoins the lip of gutter of a sidewalk ramp, new AC paving must be allowed to be constructed with a pavement thickness that is up to 3/4 inch less than the thickness of the AC pavement section shown on the plans (see Standard Drawing 4-51).

Paving must be a continuous non-stop operation with delivery trucks arriving in a uniform manner. The Agency will meet daily with the Contractor to evaluate the Contractor's operations relative to the work time restrictions.

The AC must be delivered to the site in a thoroughly blended condition and must be spread by a self-propelled asphalt paving machine in such a manner as to avoid segregation during the placing operations. AC must be transported, spread, and compacted in accordance with Section 39-3.04, "Transporting, Spreading, and Compacting", of the State Specifications, except

as specified in the Contract or these Specifications. The first lift of multi-lift pavement can be placed at a lower temperature if approved in writing in advance by the Agency.

Paving is not allowed when the roadway is moist or damp or when it is raining. For the purpose of this provision, "raining" means any weather condition that causes the roadway to become moist or damp. In the case of sudden precipitation, all paving work must stop immediately, all AC on site not yet placed and all AC in transit from the plant will be rejected and no payment will be made for the rejected material.

When new AC is placed in contact with existing AC, the surface must be cleaned and a tack coat of asphaltic emulsion applied per Section 39-1.09C, “Tack Coat”, of the State Specifications. Asphaltic emulsion must be applied to vertical edges of existing pavement, curbs, and gutters adjoining the area to be paved. Asphaltic emulsion must be of the high viscosity type subject to the approval of the Agency, and must conform to Sections 39 and 94 of the State Specifications.

Unless otherwise specified in the Special Provisions or these Specifications, the minimum compacted thickness of AC must be as shown on the Plans.

At the end of the work day, the distance between the ends of adjacent improved lanes must be between 5 and 10 feet, unless otherwise approved by the Agency.

23-8.02 Pre-Overlay Preparation

Existing AC roadways to be overlaid with AC must be prepared as follows:

- A leveling course is required where the difference in elevation between the existing pavement surface and the finished pavement surface, as indicated on the Plans, exceeds the thickness of the overlay designated for the associated areas of roadway by more than 0.02 feet. The total thickness for AC leveling course varies. When the leveling course exceeds 3 inches in thickness, the leveling course must be placed in lifts 3” or less. For projects with pavement reinforcing fabric, leveling course material must be placed prior to the placement of the fabric. Leveling courses must be Type "A" AC with 3/8 inch aggregate gradation.
- All vegetation must be removed from the edge of pavement and the pavement swept and washed, if required, in advance of the overlay operation. A power water wash must be used in the deceleration zones of intersections for the complete removal of dust that may cause overlay slippage.
- All pavement markers, temporary Type "B" Detector Handhole protection devices, and temporary traffic stripe (tape), must be removed. In addition, the Contractor must remove and dispose of existing traffic bars as required by the Agency.
- All thermoplastic limit lines, crosswalks, and legends existing on the road surface must be scarified prior to placing the overlay. Scarification must be performed by grinding to expose a minimum of 50 percent of the underlying pavement. All areas where thermoplastic is to be removed must show evidence of scarification. All material resulting from the grinding operation are the property of the Contractor and must be removed immediately from the right-of-way and properly disposed of.
- Striping removal should occur immediately prior to placement of AC overlay, and cannot occur sooner than the day before the scheduled date for the placement of AC overlay. If striping is removed on a day other than the day of the pavement overlay, the Contractor must supply and install temporary pavement markings. Temporary pavement markings must be flush mounted reflectorized tape squares, 4-inch by 4-inch #M “Staymark” with backing liners, detour grade, #6350 yellow and #6351 white, or approved equal. Right turn barrier lines, edge lines, and shoulder lane lines must not be delineated with temporary pavement markings. Temporary pavement markings must be removed prior to placement of the overlay. The spacing of the temporary pavement markings must be:

Line Type	Color	Spacing
Centerline (straight roadway portions)	Yellow	48’ O.C.
Centerline (tapered or curving portions)	Yellow	24’ O.C.
Stop Lines	White	6’ O.C.
Channelizing Line	White	24’ O.C.

- Manhole and other utility covers in the area to be overlaid must be carefully referenced out by the Contractor and the locations of the covers painted on the surface immediately after paving. All storm drain and sewer manhole and monitoring well box adjustments are the responsibility of the Contractor. Adjustment to grade of other utility covers will be by others.
- The Contractor is responsible for furnishing and placing an asphalt emulsion tack coat in advance of the overlay per Section 23-8.01 of these Specifications.

23-8.03 Spreading

23-8.03.A Hand Spreading

Areas inaccessible to spreading and compaction equipment may be paved by methods and in areas approved by the Agency. In limited areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the AC mixture may be spread, raked, and luted by hand tools. The mixture must be thoroughly compacted by means of pneumatic tampers or other methods. AC paving placed by hand is exempt from the pay reduction factors in Section 23-9.02, “Pay Factors”, in these Specifications. When hand spreading is permitted, the mixture must be dumped either on the grade or on dump sheets outside the area where 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, will have the required thickness and will conform to the grade and surface tolerance specified.

Whenever hand spreading or backwork is required behind the paving spread, the paving machine must be stopped until such hand spreading or backwork is completed.

23-8.03.B Mechanical Spreading Equipment

In addition to the requirements in Section 39-1.10, “Spreading and Compacting Equipment”, of the State Specifications, a 12-foot long straightedge is required on all paving machines.

The paver must have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The paver must be equipped with distributing screws to place the mixture uniformly in front of the screed.

The screed must be equipped with a controlled heating device for use when required. The screed must strike off the mix to the depth and cross-section specified.

The material being placed in the abutting lanes must be tightly crowded against the face of the previously placed lane. The paving machine must 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 must be removed from the pavement surface and discarded.

When placing AC to lines and grades established by the Agency, the automatic controls must control the longitudinal grade. Grade and slope references must be furnished, installed, and maintained by the Contractor. A ski device must be used on roadways with 2 or more lanes

in any one direction, or if required by the Special Provisions. The minimum length of the ski device is 27 feet, and the entire length must be utilized in activating the sensor.

When placing the initial mat of AC on existing pavement, the end of the screed nearest the centerline must be controlled by a sensor activated by a ski device. When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat must be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 0.01-foot tolerance. The end of the screed farthest from the previously placed mat must be controlled in the same manner as when placing the initial mat.

Should the automatic screed controls fail to operate properly during any day's work, the Contractor may use manual control of spreading equipment for the remainder of that day. However, the equipment must be corrected or replaced with alternative automatically controlled equipment conforming to the requirements in this Section before starting another day's work.

23-8.04 Joints

Lines for the paver to follow in placing individual lanes must be parallel to the centerline of the roadway or to a baseline established by the Agency. Longitudinal pavement joints must be within 6 inches of the lane lines shown on the Plans or as specified in the Special Provisions.

Transverse construction joints and temporary runoff tapers must be constructed so that no gradual ramping down of the mat occurs back from the joint. Bond breaking paper may be required under the runoff taper for later removal if specified by the Special Provisions.

23-8.05 Compacting

The Contractor must furnish equipment capable of producing the required compaction. For vibratory rollers, the vibratory mode must automatically shut off when machine direction is changed.

All AC paving must be constructed to produce material with a density between 92 and 97 percent per California Test Method 309. The density of the initial lift of multi-lift paving may be between 90 and 97 percent, if approved by the Agency.

23-8.05.A Density requirements - Minor Streets

Density on minor streets must be determined by nuclear gage testing or approved non-destructive testing method. The Contractor must provide quality control testing at locations based on a random sampling plan with at least 1 test per 500 tons. If the density is outside of the density range, the Contractor may test at two additional locations within the same 500 tons and average the results of all of the 3 tests. This averaged result must fall within the above-specified range. The Contractor must notify the County inspector prior to paving and provide contact information for Contractor's testing personnel. The Agency reserves the right to conduct parallel quality assurance testing at its discretion in accordance with California Test Methods 308, 309, and 375.

23-8.05.B Density Requirements - Major Streets

Density of AC paving placed on major streets must be measured as specified in Section 23-9.

23-9 AC PLACEMENT ACCEPTANCE TESTING

Laboratories must be accredited for testing AC in accordance with ASTM D3666. Technicians must be certified by Caltrans to perform specified tests.

Except as detailed above for minor streets, materials testing necessary to determine conformance with the requirements of this Section, excluding bituminous distributor testing, will be performed by the Agency and the cost thereof will be borne by the Agency.

When testing plant-produced WMA to determine mix volumetrics or stability, condition the

mix for 15 to 18 hours at 140 ± 5 degrees F or for 2 to 3 hours at 295 ± 5 degrees F in accordance with California Test Method 304M (August 2008) prior to testing. WMA may be cooled to room temperature prior to conditioning. Mixture conditioning is not required for the Theoretical Maximum Specific Gravity test.

23-9.01 Pavement Density Testing

Pavement density will be determined by comparing the average density of cores taken from the compacted pavement to the Maximum Theoretical Density as determined by California Test 309.

23-9.01.A Lot Sizes

The pavement will be accepted for density on a lot basis. A lot is 500 tons or a portion thereof. If the portion is 200 tons or less it might be incorporated into the last 500-ton lot of the day or the first 500-ton lot of the following day and might not be sampled separately.

23-9.01.B Maximum Theoretical Density (Rice)

Bituminous mixture for Maximum Theoretical Density must be randomly sampled on a lot basis.

23-9.01.C Core Density

Cores for determining the density of the compacted pavement will be taken on a lot basis, a minimum of 3 random cores per lot taken in the presence of the Inspector. The cores must be taken in accordance with the Special Provisions and as directed by the Agency. The density of each core must be determined per California Test Method 308.

Core samples for determination of the density of completed pavements must be obtained by the Contractor at the Contractor's expense, and no additional compensation will be paid. The core samples must be 4 inches in diameter. The Contractor may utilize a nuclear density gauge for preliminary testing. Dry ice may be used for cooling the pavement prior to coring. The number and locations of the samples will be as agreed upon in the field by the Agency and the Contractor. Samples must be neatly cut with a saw, core drill, or other approved equipment. The Contractor must provide the core samples to the Agency within 2 hours after final compaction. Special arrangements must be made with the Agency Material Testing Laboratory if the Contractor wishes test results within less than 12 hours for night paving or normal work performed late in the day.

Actual test location will be randomly selected per ASTM D3665 (Random Method).

23-9.02 Pay Factors

AC paving placed on minor streets and base course paving as defined in Section 23-8.05 are exempt from the pay reduction factors.

For all AC pavement subject to acceptance testing, the finished AC pavements that do not conform to the specified relative compaction requirements will be paid for using the following pay factors:

Reduced Payment Factors for Percent of Maximum Theoretical Density			
AC Type A and B and ARHM-GG Percent of Maximum Theoretical Density	Reduced Payment Factor	AC Type A and B and ARHM-GG Percent of Maximum Theoretical Density	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 and Replace	> 99.0	Remove and Replace

23-10 ASPHALT RUBBER HOT MIX-GAP GRADED (ARHM-GG)

Where specified in the Special Provisions, Asphalt Rubber Hot Mix-Gap Graded (ARHM-GG) must be used. ARHM-GG must conform to the provisions for RHMA-G AC in Section 39, "Hot Mix Asphalt", of the State Specifications, and these Specifications. ARHM-GG must conform to the quality characteristics shown for RHMA-G in Section 39-1.03B, "Hot Mix Asphalt Design", of the State Specifications.

Binder for ARHM-GG may be, at the Contractor's option, Type 1 or Type 2 asphalt-rubber binder as specified in Sections 23-10.01 and 23-10.02 of these Specifications.

The asphalt used in asphalt-rubber binder must be PG 64-16 per Section 92 of the State Specifications. The amount of asphalt in the mix must be established per Section 23-2 of these Specifications. The temperature of the aggregate at the time the asphalt-rubber binder is added must be not more than 350 degrees F.

Rubber for use in asphalt-rubber binder must be free of loose fabric, wire, and other contaminants, except that up to 4 percent (by weight of rubber) calcium carbonate or talc may be added to prevent rubber particles from sticking together. The rubber must be sufficiently dry to be free flowing and not produce foaming when blended with the hot asphalt. The Contractor must furnish a "Certificate of Compliance" per Section 6-2.05B, "6-2.05B Crumb Rubber (Pub Res Code § 42703(D))", of the State Specifications.

A sample of the asphalt-rubber binder proposed for use on the project, consisting of 4 one-quarter cans, together with the proposed formulation of the binder, must be furnished to the Agency at least two weeks before ARHM-GG pavement construction is scheduled to begin. These samples will be held at the Agency Lab for comparison to material in the field, if necessary.

The method and equipment for combining the rubber and asphalt must be designed and accessible so the Agency can readily determine the percentage by weight for each material being incorporated into the mixture.

Equipment utilized in the production and proportioning of the asphalt-rubber binder must include the following:

- An asphalt heating tank (per Section 23-10.04.B in this Section)
- A mechanical blender (per Section 23-10.04.C in this Section)
- A supply system (per Section 23-10.04.E in this Section)

Traffic must not be allowed on the ARHM-GG for at least 1 hour after final rolling operations have been completed. Before opening a traffic lane to public traffic, the Agency may direct that a sand cover be spread uniformly over areas where ARHM-GG has been placed. The sand must be free from clay or organic material and must be of such size that from 90 to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve. Sand must be spread at the approximate rate of 1 to 2 pounds per square yard.

The asphalt-rubber mixture must not be used as a binder after it has been retained for more than 48 hours.

23-10.01 Type 1 Asphalt-Rubber Binder

Type 1 asphalt-rubber binder must be a uniform reacted mixture of compatible paving grade asphalt and reclaimed vulcanized rubber.

The reclaimed vulcanized rubber must be produced primarily from the processing of automobile and truck tires. The rubber must be produced by ambient temperature grinding process only.

The specific gravity of the rubber must be between 1.10 and 1.20 and must conform to the following gradation when tested in accordance with ASTM C 136:

Sieve Size	Percentage Passing
No. 10	100%

The length of the individual rubber particles must not exceed 3/16 inch.

The asphalt-rubber mixture must contain between 14 and 20 percent rubber by weight of the total asphalt-rubber mixture.

The temperature of the asphalt must be between 350°F and 425°F at the time the rubber is blended with the asphalt. The asphalt and rubber must be combined and mixed together in a blender unit, pumped into the agitated storage tank, and then reacted for a minimum of 45 minutes from the time the rubber is added to the asphalt. The temperature of the asphalt-rubber mixture must be maintained between 325°F and 375°F during the reaction period and must possess the following physical property after the reaction period:

Viscosity, 350°F (ASTM D 2196) (Brookfield)	1500 cp minimum

After the material has reacted for at least 30 minutes, the asphalt-rubber must be metered into the mixing chamber of the AC production plant at the percentage specified or designated by the Agency.

After reaching the desired consistency, the asphalt-rubber mixture must not be held at temperatures over 325°F for more than 4 hours.

The Contractor must provide to the Agency confirmation of viscosity test results from the asphalt-rubber tank. The test must be, in the opinion of the Agency, sufficient to verify that the viscosity of the entire tank is homogenous during the AC production.

23-10.02 Type 2 Asphalt-Rubber Binder

Type 2 asphalt-rubber binder must be a uniform reacted mixture of compatible paving grade asphalt, extender oil, and granulated reclaimed vulcanized rubber.

Extender oil must be resinous, high flash point aromatic hydrocarbon conforming to the following:

Test Parameter	Requirement
Viscosity, SUS @ 100°F (ASTM D 88)	2500. min
Flash Point, COC, °F (ASTM D 92)	390. min
Molecular Analysis (ASTM D 2007)	
Asphaltness, % by weight	0.1 max
Aromatics, % by weight	55.0 min

The asphalt and extender oil, when combined, must form a material that is chemically compatible with the rubber.

The rubber used in Type 2 asphalt-rubber binder must be reclaimed vulcanized rubber and must contain between 20 and 30 percent, by weight, natural rubber when tested in accordance with ASTM D 297. The rubber must conform to the following grading when tested in accordance with ASTM C 136:

Sieve Size	Percentage Passing
No. 8	100

The rubber must contain no particles longer than 1/4 inch in length.

The extender oil must be added to the asphalt at a rate between 2 percent and 6 percent by weight of the asphalt. The exact amount must be determined by the asphalt-rubber supplier. The asphalt must be at a temperature between 350°F but not more and 425°F when the extender oil is added.

The asphalt-extender oil blend and rubber must be combined and mixed together in the blender unit to produce a homogeneous mixture.

The amount of rubber to be added to the asphalt-extender oil blend must be between 17 percent and 23 percent by weight of the total combined mixture of asphalt, extender oil, and rubber. The exact amount must be determined by the asphalt-rubber supplier. The asphalt-extender oil blend must be at a temperature between 350°F and 425°F when the rubber is added. After the material has reacted for at least 30 minutes, the asphalt-rubber must be metered into the mixing chamber of the AC production plant at the percentage specified or ordered.

The asphalt-rubber mixture must be reacted for a minimum of 30 minutes from the time the rubber is added to the asphalt-extender oil blend. The temperature of the asphalt-rubber mixture must be maintained between 375°F and 425°F during the reaction period.

The asphalt-rubber mixture must possess the following physical property after the reaction period:

Viscosity at 400°F (ASTM D 2196) (Brookfield)	600 to 2,000 cp

The asphalt-rubber mixture, after reaching the desired consistency, must not be held at temperatures over 375°F for more than 4 hours.

The Contractor must provide the Agency viscosity test results from the asphalt-rubber tank, which must be, in the opinion of the Agency, sufficient to verify that the viscosity of the entire tank is homogenous during the AC production.

23-10.03 Aggregate

The aggregate for ARHM-GG must comply with Section 39-1.02E, "Aggregate", of the State Specifications.

23-10.04 Equipment

23-10.04.A Haulers

All trucks hauling AC must have tarps available and the loads must be covered from the plant to the paving machine, unless the ambient air temperature exceeds 75°F or the haul distance is less than 10 miles.

23-10.04.B Asphalt Heating Tank

The asphalt heating tank must be equipped with a hot oil heat transfer system or retort heating system capable of heating asphalt cement to the necessary temperature for blending with granulated rubber. This unit must be equipped with a thermostatic heat control device and capable of heating a minimum of 2500 hundred gallons of asphalt cement.

23-10.04.C Mechanical Blender

The asphalt-rubber mechanical blender must be capable of proper proportioning and thorough mixing of the asphalt and rubber and have a 2 stage continuous mixing process capable of producing a homogenous mixture of asphalt cement and granulated rubber at the mix design ratios. The unit must be equipped with a granulated rubber feed system capable of supplying the asphalt cement feed system so the continuity of the blending process is not interrupted. The maximum capacity of the primary blending vessel must be 500 hundred gallons. Both the primary and secondary blenders must be equipped with an agitation device oriented horizontally in the blending vessel. The blending unit must be capable of fully blending the individual rubber particles with the asphalt cement. Separate asphalt cement feed and finished product pumps are required. This unit must have both an asphalt cement totaling meter (gallons or liters) and a flow rate meter (gallons per minute or liters per minute).

23-10.04.D Storage/Reaction Tank

The asphalt-rubber storage/reaction tank must be equipped with a heating system capable of maintaining the temperature between 300 and 375 degrees F for reacting, pumping, and adding the binder to the aggregate. The storage/reaction tank must be separate from the primary blender and secondary blender of the blending unit. The maximum capacity of the storage/reaction unit must be 800 gallons. The unit must have an internal mixing device capable of maintaining a uniform mixture of asphalt cement and granulated rubber. The internal mixing device must be oriented horizontally in the tank.

23-10.04.E Supply System

The asphalt-rubber supply system must be equipped with a pump and a direct interlock metering device capable of adding the binder by volume to the aggregate at the percentage required by the mix design.

23-10.04.F Temperature Gage

An armored thermometer of adequate range in temperature reading must be fixed in the asphalt-rubber feed line at a suitable location near the mixing unit.

23-10.05 Placement

ARHM-GG must be spread at a temperature between 285 and 325 degrees F, measured in the hopper of the paving machine. See Section 23-8.02, “Pre–Overlay Preparation”, of these Specifications for additional placement requirements.

23-11 MEASUREMENT AND PAYMENT

Measurement and payment for AC will be as specified in Section 9-1.02, “Measurement”, and 39-6, “Payment”, of the State Specifications, and these Specifications.

When acceptance testing is required for AC placement, full compensation for placement of the test section is included in the price paid per ton for AC and no additional compensation will be paid.

ARHM-GG will be measured by the ton as specified for AC in Section 9-1.02, "Measurement”, of the State Specifications.

The unit price paid per ton for ARHM-GG includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in placing ARHM-GG complete in place, including furnishing and spreading sand cover if directed by the Agency, as shown on the Plan, as specified in the State Specifications, these Specifications, and the Special Provisions, and as directed by the Agency, except that Type "A" AC leveling courses will be paid per ton of Type "A" AC, and no additional compensation will be paid.

Type A AC leveling courses will be measured and paid for by the ton as AC.

23-12 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

23-12.01 General

Each lot must be subject to a Pay Factor as specified in Section 23-9.02, “Pay Factors,” of the Standard Construction Specifications.

The Agency adjusts payment if the California Statewide Crude Oil Price Index for the month the material is placed is more than five percent (5%) higher or lower than the price index at the time of bid.

The California Statewide Crude Oil Price Index is determined each month on or about the 1st business day of the month by the Department using the average of the posted prices in effect for the previous month as posted by Chevron, ExxonMobil, and ConocoPhillips for the Buena Vista, Huntington Beach, and Midway Sunset fields.

If a company discontinues posting its prices for a field, the Department determines the index from the remaining posted prices. The Department may include additional fields to determine the index.

For the California Statewide Crude Oil Price Index, go to http://www.dot.ca.gov/hq/construc/crudeoilindex/

The Department includes payment adjustments for price index fluctuations when making adjustments under Section 2.101, Unit Price Bid in these Specifications.

If you do not complete the work within the contract time, payment adjustments during the overrun period are determined using the California Statewide Crude Oil Price Index in effect for the month in which the overrun period began.

If the price index at the time of placement increases twenty-five percent (25%) or more over the price index at bid opening, do not furnish material containing asphalt until the Agency

authorizes you to proceed with that work. The Agency may decrease Bid item quantities, eliminate Bid items, or terminate the contract.

23-12.02 Asphalt Quantities

HMA:

The Engineer calculates the quantity of asphalt in Hot Mix Asphalt (HMA) using the following formula:

Qh = HMATT x [Xa / (100 + Xa)]

where:

Qh = quantity in tons of asphalt used in HMA

HMATT = HMA total tons placed

Xa = theoretical asphalt content from the job mix formula expressed as percentage of the weight of dry aggregate

RHMA:

The Engineer calculates the quantity of asphalt in rubberized HMA (RHMA) using the following formula:

Qrh = RHMATT x 0.80 x [Xarb / (100 + Xarb)]

where:

Qrh = quantity in tons of asphalt in asphalt rubber binder used in RHMA

RHMATT = RHMA total tons placed

Xarb = theoretical asphalt rubber binder content from the job mix formula expressed as percentage of the weight of dry aggregate

HMA (with Modified Asphalt Binder):

The Engineer calculates the quantity of asphalt in modified asphalt binder using the following formula:

Qmh = MHMATT x [(100 - Xam) / 100] x [Xmab / (100 + Xmab)]

where:

Qmh = quantity in tons of asphalt in modified asphalt binder used in HMA

MHMATT = modified asphalt binder HMA total tons placed

Xam = specified percentage of asphalt modifier

Xmab = theoretical modified asphalt binder content from the job mix formula expressed as percentage of the weight of dry aggregate

HMA (with RAP):

The Engineer calculates the quantity of asphalt in HMA containing RAP using the following formulas:

Qrap = HMATT x [Xaa / (100 + Xaa)]

where:

Xaa = Xta - [(100 -Xnew) x (Xra / 100)]

and

Qrap = quantity in tons of asphalt used in HMA containing RAP

HMATT = HMA total tons placed

Xaa = asphalt content of HMA adjusted to account for the asphalt content in RAP expressed as percentage of the weight of dry aggregate

Xta = total asphalt content of HMA expressed as percentage of the weight of dry aggregate

Xnew = theoretical percentage of new aggregate in the HMA containing RAP determined from RAP percentage in the job mix formula

Xra = asphalt content of RAP expressed as percentage

Other:

For other materials containing asphalt not covered above are not subject to payment adjustments.

23-12.03 Payment Adjustments

Payment adjustments for price index fluctuations will be included in Contract Change Orders per section 9-14, Contract Change Orders in these Specifications. If material containing asphalt is placed within 2 months during 1 estimate period, the Engineer calculates 2 separate adjustments. Each adjustment is calculated using the price index for the month in which the quantity of material containing asphalt subject to adjustment is placed in the work. The sum of the 2 adjustments is used for increasing or decreasing payment in the progress pay estimate. The Engineer calculates each payment adjustment as follows:

PA = Qt x A

where:

PA = Payment adjustment in dollars for asphalt contained in materials placed in the work for a given month.

Qt = Sum of all quantities of asphalt-contained materials in pavement structural sections and pavement surface treatments placed (Qh + Qrh + Qmh + Qrap).

A = Adjustment in dollars per ton of asphalt used to produce materials placed in the work rounded to the nearest $0.01.

A = [(Iu / Ib) - 1.05] x Ib x [1 + (T / 100)] for an increase in the crude oil price index exceeding 5 percent

A = [(Iu / Ib) - 0.95] x Ib x [1 + (T / 100)] for a decrease in the crude oil price index exceeding 5 percent

Iu = California Statewide Crude Oil Price Index for the month in which the quantity of asphalt subject to adjustment was placed in the work.

Ib = California Statewide Crude Oil Price Index for the month in which the bid opening for the project occurred

T = Sales and use tax rate, expressed as a percent, currently in effect in the tax jurisdiction where the material is placed. If the tax rate information is not submitted timely, the statewide sales and use tax rate is used in the payment adjustment calculations until the tax rate information is submitted.

SECTION 24 - SIDE FORMS AND HEADERS
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SECTION 24 SIDE FORMS AND HEADERS

24-1 GENERAL

Side forms and headers for portland cement concrete pavement or asphalt concrete pavement must be furnished and placed on an approved subgrade prepared per Section 18, "Earthwork", of these Specifications. All requirements specified in this Section also apply to headers. All forms must be mortar tight.

Side forms must be straight, free from warps, bends, indentations, or other defects. The top edge of each section of form must not vary more than one quarter inch (1/4") from a true, straight line in the length of the form, and must be placed to the required grade and alignment of the edge of the finished pavement. Side forms must not deflect during placing, tamping and finishing of the pavement. Side forms must not deviate laterally more than one-quarter inch (1/4") or vertically more than one-eighth inch (1/8") from proper line and grade. Defective forms must be removed from the Work.

All forms must be thoroughly cleaned and oiled before each use.

24-2 FORM JOINTS

Form joints must provide perfect support. If in the opinion of the Agency the joints do not furnish perfect support, the Contractor will be required to either substitute acceptable forms or, with the approval of the Agency, wedge the forms with wood and provide double supporting stakes underneath the form ends. There must be a 1/4 inch expansion gap between the ends of the frame.

24-3 TIMBER SIDE FORMS

Timber side forms must be Construction Grade Douglas Fir, in accordance with Standard Grading Rules of the Western Wood Products Association, and must be at least 2 inches, surfaced on 1 edge and on the side that is placed next to the pavement. The depth of timber forms must equal the specified depth of the edge of the pavement, but cannot be less than 4 inches, except where placed on existing pavements. Timbers with rounded edges, ends, corners, or split ends cannot not be used.

Timber side forms must be secured by nailing to side stakes spaced not more than 4 apart and driven vertically so that their tops are 1 inch below the top edge of the side form. Stake dimensions must not be less than 3 inches wide, 1-1/2 inches thick, and 18 inches long. Stake length must be increased if the character of the soil does not permit sufficient bearing to an 18-inch stake.

Side form joints must be spliced with a section of timber 4 feet long, 1 inch thick and 6 inches wide. The splice section must be nailed lengthwise, lapping the joints.

Timber side forms must be supported on 2 by 3 inch stakes, spaced not more than 4 feet apart and driven with their tops to the line and grade for the bottom of the side form. These stakes must be of adequate length to rigidly support the forms, but must be at least 8 inches long.

24-4 METAL SIDE FORMS

Metal side forms must have sufficient rigidity to prevent springing during the placing, tamping and finishing of the pavement. The depth of the metal side forms must equal the specified depth of the edge of the pavement. Forms must be of the full depth required, in one piece. Splicing of forms by the addition of a wooden base is not permitted.

Metal side forms must be supported at each end on a 2 by 3 inch stake. Stakes must be of adequate length to rigidly support the form, but must be at least 8 inches long. The stakes must be driven with their tops to the line and grade for the bottom of the side form.

Metal forms must be staked firmly by means of steel stakes, placed not more than 5 feet apart, and must be designed so stakes may be driven through the base of the form and locked in position.

24-5 FORM MAINTENANCE

Side forms must be furnished, installed, and maintained to the required line and grade at least 1 day ahead of the placing of portland cement concrete or asphaltic concrete. When side forms do not conform to the correct line and grade, or have become loose, work will be stopped until the side forms are corrected by the Contractor, to the satisfaction of the Agency.

24-6 PAYMENT

Full compensation for furnishing and placing side forms and headers is included in the prices paid for the various items of work involving the use of side forms and headers and no separate payment will be made.

SECTION 25 - PORTLAND CEMENT CONCRETE PAVEMENT
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SECTION 25 PORTLAND CEMENT CONCRETE PAVEMENT

25-1 GENERAL

Portland cement concrete pavement must conform to the State Specifications, and these Specifications.

Portland cement concrete pavement must be constructed to the dimensions, lines and grades shown on the Plans. Unless otherwise provided in the Special Provisions, the pavement must be constructed of Class “A” or "B" concrete, at the Contractor’s option, conforming to the requirements of Section 50-5, “Portland Cement Concrete”, of these Specifications. Unless otherwise specified in the Special Provisions, the portland cement used in the concrete must be Type II.

25-2 SUBGRADE

Subgrade for concrete pavement must be prepared as specified in Section 18-2.05, “Subgrade Preparation”, of these Specifications. Subgrade must be free of all loose or deleterious material and must be uniformly moist. Excess water on subgrade surface must be removed prior to placing concrete, as directed by the Agency.

25-3 SIDE FORMS

Side forms must be furnished and installed in accordance with Section 24, “Side Forms and Headers”, of these Specifications.

25-4 CONCRETE CUTTING

Where new concrete is to join existing concrete, the existing concrete must be cut to a true line to a minimum depth of 1-1/2 inches with a power driven abrasive saw.

25-5 EXPANSION JOINTS IN ALLEY PAVEMENT

Expansion joints must be placed 10 feet from each end of the work and every 20 feet therefrom, and at other locations shown or specified in the Contract. The expansion joint material must be at least 3/8 inch in thickness and must conform to Section 50-4, “Premoulded Expansion Joint Filler”, of these Specifications.

25-6 PLACING CONCRETE PAVEMENT

The Contractor must make adequate advance arrangements to prevent delay in delivery and placing of the concrete. If there is an interval of more than 45 minutes between placing of any 2 consecutive batches or loads paving operations will be stopped and the Contractor must make a contact joint in the concrete already placed at the location and of the type directed by the Agency. The contact joint is at the Contractor’s expense.

Slip-form paving and finishing equipment must be properly adjusted and in satisfactory operating condition. Prior to placing concrete, the Contractor must demonstrate proper adjustment of all screeds and floats by measurements from grade stakes. Satisfactory operation and adjustment of propulsion and control equipment, including pre-erected grade and alignment lines, must be demonstrated by moving slip-form pavers and finishing machines over a 500 foot length of prepared subgrade, with all propulsion and control equipment fully operational.

Unless otherwise required by these Specifications or the Contract, concrete pavement must be constructed in 12-foot traffic lane widths separated by contact joints or monolithically in multiples of 12-foot traffic lane widths with a longitudinal weakened plane joint at each traffic lane line.

Pavement concrete must be placed while fresh. The use of water for retempering concrete is not allowed. The temperature of the concrete mix at the time of placement must not exceed 90 degrees F.

25-7 FINISHING CONCRETE PAVEMENT

The surface of concrete pavement must be finished smooth and true to grade with wooden floats. Floats must be operated from the end of the pavement and parallel with the centerline of the pavement.

High areas of concrete pavement must be cut down using the edge of a float while the concrete is workable. Material removed by the float must be worked into depressions with the float until a true surface is obtained.

Finishing and floating of the concrete pavement must continue after concrete placement has stopped, until the concrete has achieved initial set.

25-8 CURING PORTLAND CEMENT CONCRETE PAVEMENT

Portland cement concrete pavement must be cured with a pigmented curing compound as specified in Section 50-6, “Curing Compounds for Concrete“, of these Specifications.

25-9 PROTECTION OF PAVEMENT

The Contractor must protect the surface of the concrete pavement from damage and markings from both pedestrians and traffic. Barriers must be placed to protect the concrete from traffic.

The concrete pavement must be maintained at a temperature of not less than 45 degrees F for 72 hours after placement. When required by the Agency, the Contractor must submit a written outline of the proposed methods for protecting the concrete pavement and maintaining the required temperature.

When required by the Special Provisions, bridges or other devices shown on the Plans or approved by the Agency must be furnished and installed by the Contractor across the pavement to provide crossings for public and private traffic. The Contractor must maintain the crossing devices throughout the period of their use at any location. When no longer required, the crossing devices must be removed and disposed of by the Contractor.

After the Agency has ordered the pavement opened to traffic the Contractor will not be held responsible for damage by public traffic. The Contractor is liable for any damage to newly laid pavement caused by the Contractor’s operations.

25-10 PAVEMENT DAMAGE AND REPAIR

All damage done to concrete pavement or openings cut in concrete pavement or alley crossings during the progress of the Work must be repaired by the Contractor under the direction of the Agency. Materials for repairs must conform to these Specifications.

25-11 MEASUREMENT

Earthwork and subgrade preparation will be measured in accordance with Section 18, “Earthwork”, of these Specifications.

The quantity of portland cement concrete pavement to be paid for will be measured by the cubic yard. The volume to be paid for will be calculated on the basis of the lines, grades and thicknesses shown on the Plans. If the subgrade is low or irregular and requires additional yardage above that computed from the dimensions on the Plans no allowance will be made for the additional concrete pavement, unless otherwise ordered by the Agency.

25-12 PAYMENT

Earthwork and subgrade preparation will be paid for in accordance with Section 18, "Earthwork", of these Specifications.

The price paid per cubic yard for portland cement concrete pavement includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the portland cement concrete pavement complete in place, including furnishing and placing expansion joint material, finishing concrete surface, furnishing and applying curing compound, protecting the pavement and repairing any damage, as shown or specified in the Contract, in these Specifications, and directed by the Agency.

SECTION 26 - COLD PLANE ASPHALT CONCRETE PAVEMENT
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SECTION 26 COLD PLANE ASPHALT CONCRETE PAVEMENT

26-1 GENERAL

Existing asphalt concrete pavement must be cold planed at the locations shown or specified in the Contract and in accordance with these Specifications, unless directed otherwise by the Agency.

Cold planing machines must have a cutter head at least 30 inches wide and must not produce fumes or smoke. The cold planing machine must be capable of planing the pavement without requiring the use of a heating device to soften the pavement during or prior to the planing operation.

The depth, width, and shape of the cut must be as shown or specified in the Contract or as directed by the Agency. The final cut must result in a uniform surface conforming to the details shown or specified in the Contract. The outside lines of the planed area must be neat and uniform.

The Contractor must remove existing asphalt concrete from the top of the gutter pan and from the face of gutter lip as directed by the Agency. The Contractor must not damage the surfacing to remain in place or the gutter lips during the planing operation. The Contractor must replace damaged gutter lips with spalls in excess of 1 inch deep by 5 inches long at the Contractor's expense.

Streets being planed must be swept with a mechanical pickup machine throughout the course of planing operations and must be left clean of all planing debris at the end of each work day. Planing debris must not be spilled into drain inlets and or onto rail tracks, and the Contractor must clean up any spillage immediately. All vegetation must be removed from the gutter lip and other street areas to be resurfaced.

The planed material is the property of the Contractor, unless otherwise specified in the Contract. If specified in the Contract, the Contractor must transport the material to the Agency's stockpile at the County yard at the intersection of Roseville Road and Watt Avenue. The Contractor must coordinate deliveries of the material to the County's stockpile location through the Agency. The Contractor must notify the Agency a minimum of 2 Working Days prior to the proposed transport and delivery.

At the option of the Contractor, planed material may be used as fill material within the balance of the project and will be considered as included in the price paid for Imported Borrow.

26-2 PAVEMENT KEYCUTTING

Pavement keycutting is the cold planing of asphalt concrete pavement adjacent to the lip of gutters and across street intersections, as shown on the Plans. Cold planing for pavement keycutting must be to a depth of at least 1-1/2 inches adjacent to the gutter lip and must be tapered to the existing pavement grade over a distance of approximately 12 feet from the gutter lip, as shown or specified in the Contract or as otherwise directed by the Agency.

At cross-streets within the limits of the Work, pavement keycutting must continue in a straight line from curb line to curb line parallel to the direction of work. Elevation differences between the pavement keycutting and cross-streets must be lessened with temporary asphalt concrete tapers. The slope of the temporary asphalt concrete tapers cannot be greater than 1 inch vertical in 12 inches horizontal. Asphalt concrete for tapers must be commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers and all loose material from the underlying surface must be completely removed before placing permanent surfacing.

A planed pavement conform must be constructed at the beginning and ending limits of the planing work, as specified in Section 26-4, "Planed Pavement Conforms", of these Specifications.

26-3 PAVEMENT PLANING

Pavement planing is the cold planing of a continuous width of asphalt concrete pavement to the limits shown or specified in the Contract. The depth of planing below gutter lips must equal the specified thickness of asphalt concrete overlay as shown or specified in the Contract. The depth of planing at the street centerline must equal the specified thickness of asphalt concrete to be placed on the street, and must slope smoothly from the lip of gutter to the street centerline.

Planed widths of pavement must be continuous except for special treatment at traffic signal detector loops and at manhole rims as shown or specified in the Contract or as directed by the Agency. In areas where full width planing is not possible because of traffic signal detector loops, separation must be maintained from traffic signal detector saw cuts and loops. Pavement planing must be to within 1 foot horizontally of manhole rims on all sides, unless width of grinding falls below 5 feet wide. The planing may be omitted in the areas where a 5-foot width cannot be obtained.

At cross streets with traffic signals, the planing must be carried around the corner to the center crosswalk and limit line of the adjacent intersection, unless otherwise directed by the Agency.

At cross streets without traffic signals, the planing must be carried around the corner to the mid-point of the curb radius of the adjacent side street, unless otherwise directed by the Agency.

At the end of each work day there must not be any elevation difference between planed and unplaned pavement in the traveled vehicle lanes. Any differences that parallel the centerline of the street must be sloped either by temporary asphalt concrete tapers or additional planing to produce a bevel within the planed pavement. The slope of either the temporary asphalt concrete tapers or the bevel must not be greater than 1 inch vertical in 12 inches horizontal. When temporary asphalt concrete tapers are used, asphalt concrete for tapers must be commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers and all loose material from the underlying surface must be completely removed before placing the permanent surfacing. Elevation differences between planed pavement and lips of gutters are not required to be sloped.

Elevation differences perpendicular to the centerline of the street or elevation differences between the planed street and cross-streets must be lessened with temporary asphalt concrete tapers, as specified above. Temporary asphalt concrete tapers and loose material from the underlying surface must be completely removed before placing the permanent surfacing.

At the limits of the planing work, a planed pavement conform must be constructed as specified in Section 26-4, "Planed Pavement Conforms", of these Specifications, or as directed by Agency.

Contractor must provide a means for temporary lane delineation, including centerline (yellow) and lane lines (white), between the time of planing operations and roadway paving, as specified in Section 12-3, "Public Safety and Traffic Control", of these Specifications.

26-4 PLANED PAVEMENT CONFORMS

Planed pavement conforms must be constructed at the limits of the Work as shown or specified in the Contract and as directed by the Agency.

Except on residential streets or where shown or specified in the Contract, where the beginning or ending limit is a cross street, a 50-foot planed conform extending to the round

corner of the cross street must be constructed to the dimensions and depths of cut shown or specified in the Contract. On residential streets, an 18-foot planed pavement conform must be constructed. The slope of the temporary asphalt concrete tapers at the limits must not be greater than 1 inch vertical to 36 inches horizontal.

Where the beginning or ending limit is not at a cross street, or where a cross street or other feature that is not to be resurfaced causes a discontinuity in the Work, a planed pavement conform must be constructed. The conform must span the full width of the street for a distance of 50 feet back from the limit line or feature causing the discontinuity in the work. At bridge decks the conform must span the full width of the street for a distance of 50 feet. The depth of cut must be 1-1/2 inches at the limit of work and must be progressively decreased to 0 inches over the conform length.

Planed pavement conforms must also be constructed at freeway entrance and exit ramps and at right and left long-radius turn lanes that diverge from or converge onto the street to be resurfaced. These conforms must span the full width of the ramp or turn lane for a distance of 18 feet and must be constructed where shown on the Plans or directed by the Agency.

26-5 PAVEMENT REINFORCING FABRIC

Pavement reinforcing fabric must be installed in conformance with the State Specifications, the manufacturer's recommendations, and the Contract.

Pavement fabric must be used in pavement overlay areas where shown or specified in the Contract and must extend at least 2 feet beyond any joints between the new pavement and overlay sections. The fabric must be installed at least 24 inches from the lip of gutter and the edge of pavement.

After thoroughly cleaning the surface to receive fabric, all cracks greater than 1/4 inch wide must be filled with a hot asphaltic crack filler and allowed to cure. Crack filler must not extend above the existing pavement surface. Crack filler material will be paid for under the unit price bid per pound for crack filler and no additional payment will be made. If a leveling course is used, crack sealing is not required. A Type “A” 3/8 inch maximum gradation leveling course must be placed prior to placing pavement reinforcing fabric. Leveling course material must be placed as shown on the Plans and will be paid for under the unit price bid per ton for asphalt concrete and no additional payment will be made.

Pavement fabric binder must be PG64-10. The asphalt binder must be at least 290 degrees F, with a distributor tank temperature less than 324 degrees F. The asphalt binder must be placed at a rate of 0.25 gallon per square yard, or as directed by the Agency.

If mechanical laydown equipment is used, it must be capable of handling full rolls of fabric and be capable of laying the fabric smoothly without excessive wrinkles and/or folds.

26-6 MEASUREMENT

Cold planing asphalt concrete for pavement keycutting will be measured by the linear foot for the pavement keycutting width shown or specified in the Contract. The quantity paid for will be the actual length of pavement cold planed.

Cold planning asphalt concrete for pavement planing of continuous widths of asphalt concrete pavement will be measured by the square yard. The quantity paid for will be the actual area of pavement cold planed.

Planed pavement conforms will be measured by the square yard. The quantity to be paid for will be the actual area of pavement conforms planed.

Quantities of pavement reinforcing fabric, including binder, will be measured by the area of roadway covered with pavement fabric. Placement of pavement fabric beyond the limits shown or specified in the Contract, without written direction from the Agency, is not allowed and no payment will be made.

26-7 PAYMENT

The price paid per linear foot for pavement keycutting for the width shown on the Plans includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in pavement keycutting, complete in place, including disposal or transport of planed material, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

The price paid per square foot for pavement planing includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in pavement planing, complete in place, including disposal or transport of planed material, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

The price paid per square foot for planed pavement conforms includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in planed pavement conforms, complete in place, including disposal or transport, and processing for fill of planed material, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

Full compensation for furnishing asphalt concrete for temporary tapers and for constructing, maintaining, removing, and disposing of the tapers is included in the prices paid for the various items of work involved in cold planning asphalt concrete pavement, and no additional compensation will be paid.

Full compensation for furnishing and applying the pavement reinforcing fabric, the binder, and for furnishing and spreading sand to cover exposed binder material, as necessary, or as directed by Agency, and all preparation activities, including, but not limited to, street cleaning and crack sealing, is incidental and included in the unit price paid for reinforcing fabric and no additional compensation will be paid.

SECTION 27 - CURBS, GUTTERS, SIDEWALKS, AND DRAINAGE STRUCTURES
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SECTION 27 CURBS, GUTTERS, SIDEWALKS, AND DRAINAGE STRUCTURES

27-1 GENERAL

Concrete curbs, gutters, sidewalks, and drainage structures must be constructed as shown on the Plans and as specified in these Specifications.

27-2 FORMS

Forms must conform to the requirements in Section 24, “Side Forms and Headers”, and these Specifications.

Forms for curb and gutter must be wood with a smooth upper edge, having a width equal to the full depth of the curb and gutter and a nominal thickness of 2 inches. Warped forms and forms not having a straight upper edge cannot be used. Benders, or thin plank forms, rigidly placed, may be used for returns and other curves. Forms must be carefully set to proper alignment and grades and must be rigidly held in place by the use of at least 5 pairs of stakes for every 20-foot, or portion of, section, and other sections in proportion. Clamps, spreaders, and braces must be used where required or as directed by the Agency.

Sidewalk forms must be surfaced wood with a smooth upper edge, having a width equal to the full depth of the finished sidewalk and a nominal thickness of 2 inches. Warped forms and forms not having a straight upper edge cannot be used. Sidewalk forms must be set with the upper edge true to line and grade and must be rigidly held in place by stakes placed on the outside of the forms and set flush with the top edge of the form. The side forms must remain in place for at least 12 hours after the finishing has been completed.

Curbs, gutters, and sidewalks may be placed by using an extrusion machine as provided in Section 27-7, “Extruded Construction”, of these Specifications in lieu of using forms.

27-3 CONCRETE IN CURBS, GUTTERS, AND SIDEWALKS

Concrete in curbs, gutters, and sidewalks must be Class "B-2”, as specified in Section 50-5, “Portland Cement Concrete”, of these Specifications.

Subgrade must be prepared as specified in Section 18-2.05, “Subgrade Preparation”, of these Specifications. Relative compaction of not less than 95 percent must be obtained for a minimum depth of 0.5 foot below the subgrade grading plane for driveways, V-ditches, cross gutters, or as directed by Agency. A 6-inch thick Class 2 aggregate base section is required under curbs, gutters, and sidewalks. The requirement to excavate for and place the 6-inch thick Class 2 aggregate base section applies to construction of new curbs, gutters, and sidewalks, and the replacement of existing curbs, gutters, and sidewalks.

Before placing concrete, the subgrade must be well dampened. A joint must be constructed at the end of concrete placement, each day, or whenever the concrete placement work is terminated. The joint must be vertical and square ended, and must be placed at the point of an expansion joint, per Section 27-3.01 of these Specifications.

27-3.01 Expansion Joints, Weakened Plane Joints, and Score Marks

In curbs, gutters, and sidewalks, an expansion joint must be placed at the end of round corners and at major structures such as utility vaults, at portions of sidewalk that include a manhole, and at other locations shown on the Plans or as directed by the Agency. In addition, expansion joints must be placed at 60-foot intervals for all curbs, including median curbs, gutters, sidewalks, and concrete median pavement. Dowels must be placed at expansion joints as shown on Standard Drawing 4-32. For expansion joints in curbing that has longitudinal reinforcing such as Type 4 curbs, Type 6 curbs, and curbs along bus stops, the curb reinforcing must be discontinuous at the expansion joint with the curb reinforcing held back 2 inches from

the expansion joint and the curb reinforcing must overlap the expansion joint dowels. Expansion joint material must be 1/2 inch thick, shaped to fit the geometry of the curbs, gutters, and/or sidewalks, and extend for the full depth of the curbs, gutters and/or sidewalks. Expansion joint material must conform to Section 50-4, "Premoulded Expansion Joint Filler", of these Specifications. Expansion joints must be at right angles to the line of the work. Sealant must be placed over the expansion joint material if directed by the Agency.

All 4-foot wide sidewalks must be scored at 4-foot intervals. In lieu of every third score mark, at 12-foot intervals, weakened plane joints must be constructed. In lieu of every fifth weakened plane joint, at 60-foot intervals, expansion joints must be constructed as detailed above.

All 6-foot sidewalks must be scored at 5-foot intervals. In lieu of every other score mark, at 10-foot intervals, weakened plane joints must be constructed. In lieu of every sixth weakened plane joint, at 60-foot intervals, expansion joints must be constructed as detailed above.

Weakened plane joints must extend through both the sidewalk and the curb and gutter when constructed at the same time and monolithically. Curb and gutter constructed without monolithic sidewalk construction must be constructed with weakened plane joints at 10-foot intervals and expansion joints at 60-foot intervals.

27-3.02 Finishing Concrete Surfaces

The top and exposed surface of the concrete curb must be finished as follows:

- A direct finishing method, whereby the curb concrete must be placed to exact form, double screeded, floated, troweled and smoothly finished, after which it must be broomed with a fine hair push broom drawn over the surface transverse to the line of work. Water may be applied to the surface immediately in advance of brooming.
- Surfaces of sidewalks must be finished by double screeding, which includes working the concrete until the coarse aggregate is forced down into the body of the concrete and a layer of mortar is forced to the top for floating, and troweling. The surface must then be marked as directed by the Agency, and broomed as described above.

All exposed surfaces of sidewalks, curbs, and gutters must be free of rock pockets, discoloration, graffiti, and blemishes. Surfaces must have a uniform texture and appearance free of bulges, depressions, or other imperfections. Surfaces must not vary by more than 1/4 inch from a 10-foot straight edge except at grade changes.

27-3.03 Curing of Concrete

Curing of concrete in curbs, gutters, and sidewalks must be with pigmented compound as specified in Section 50-6, "Curing Compounds for Concrete", of these Specifications. The curing compound must be applied as recommended by the manufacturer. Curing compound is to be completely and uniformly applied to the exposed surfaces of the concrete so that the compound leaves a neat appearance. Median islands must have white-pigmented compound. The Contractor must take care that the pigmented compound is contained within the intended area of work and does not discolor asphalt concrete or other adjoining improvements.

27-3.04 Median Openings and Allowance for Sign Placement on Ends of Medians and Traffic Islands

Gaps in medians must be provided where called for on the Plans to allow for roadway surface drainage and for the installation of pull boxes as shown on Standard Drawing 4-31. For the purposes of measurement and payment for medians, no deduction in the length of the median will be made at median openings less than 4 feet in length.

At each end of new medians and traffic islands the cross slope of the final 2 feet of the median or island must be 1.0 percent, as shown on Standard Drawing 4-31 and as required by these Specifications. For these final 2 feet the height of the lower of the 2 curbs on either side of the median or island must be increased as needed to achieve the required cross slope.

Conforms from the revised height for the curb on the lower side of the median or island must be achieved in a distance of 1 foot from 2 feet from the end of the curb to 3 feet from the end of the curb. For purposes of measurement and payment, the modification in the curb height for the final 3 feet of the median or traffic island is incidental and included in the bid price paid for the various items of work.

27-3.05 Minor Curb and Gutter and Sidewalk Replacement

For minor (single location, 12 cubic feet or less of concrete) curb and gutter and sidewalk replacement, the Contractor may use a portable concrete mixer, or a 1 yard transit-mix truck. Pre-mixed "buggy" concrete is not acceptable. A 50-50 mixture of concrete mix (fine and coarse aggregate) equivalent five (5) sack mix (aggregate and cement approximately 4:1) may be used. The County inspector may make concrete test cylinders in order to verify the mix. Test cylinders must attain 28-day strength of 2500 psi. Minor concrete that does not attain 2500 psi in 28 Calendar Days must be removed and replaced with transit mix concrete at the Contractor's expense.

This method of mixing and placing concrete applies only to minor curb and gutter and sidewalk replacement.

27-4 DAMAGE REPAIRS

All damage done or openings cut in concrete walks, curbs, or gutters during the progress of the Work must be repaired by the Contractor to the satisfaction of the Agency. Patching of damaged areas is not allowed. Partial removal and replacement of flags of sidewalk or portions of curbs and/or gutters less than 4 feet in length is not allowed. Removal of damaged sidewalk and/or curbing and gutter sections must extend to the nearest score mark, weakened plane joint, construction joint or expansion joint if within 4 feet of the limit of damaged concrete. A dowelled joint must be used as shown on Standard Drawing 4-32 at all connections of new sidewalk to existing sidewalk, new sidewalk to existing curbing, new curbing to existing curbing, and new curb and gutter to existing curb and gutter. Damaged areas must be removed per detail and replaced to the satisfaction of the Agency without additional cost to the Agency.

27-5 SIDEWALKS

27-5.01 Widening of Existing Sidewalk

If the Work includes widening an existing sidewalk, the existing sidewalk must be removed and replaced. A dowelled joint must be used as shown on Standard Drawing 4-32 at the connection of new sidewalk to existing curb and to existing sidewalk.

Payment for sidewalk removal will be made per square foot and includes saw cutting of the existing sidewalk, removal, disposal and all incidentals, providing all labor, tools and equipment required to remove the existing sidewalk and no additional payment will be allowed. If there is no bid item for sidewalk removal, the saw cutting, removal and disposal of the existing sidewalk in the area of sidewalk widening is incidental and included in the bid prices for the various items of work and no additional compensation will be made. Payment for sidewalk construction will be made per square foot of sidewalk installed as specified in Sections 27-14 and 27-15 of these Specifications and includes the supply and installation of dowels for the connection of the new sidewalk to existing curb and sidewalk.

27-5.02 Slope of Sidewalks

Unless otherwise shown or specified in the Contract, sidewalks and planting strips between curb and sidewalk must slope uniformly toward the street at a rate of 1.5 percent. At no place must the cross slope of sidewalk be greater than 2 percent. The transverse slope of the finished surface must be uniform to a degree such that no depressions greater than 0.01 foot

are present when tested with a 10-foot straightedge laid in a direction transverse to the centerline and extending across the width of the sidewalk.

27-6 CURB DOWELS AND REINFORCEMENT

Curb dowels and reinforcement must be installed as shown on Standard Drawings 4-43, 4-44, 4-30, 4-40 and 4-32, and as shown or specified in the Contract,

27-7 EXTRUDED CONSTRUCTION

At the Contractor's option, subject to the Agency's approval, curbs, gutters, and sidewalks may be constructed using an approved extrusion or slipform machine and method. The Contractor must provide the Agency with a written proposal and a test section if requested by the Agency. Except as noted otherwise, all extruded construction must comply with these Specifications and Standard Drawings 4-30, and 4-32. Curb, gutter and sidewalk may be constructed monolithically if approved by the Agency.

Concrete for extruded construction must be Class "B-2", as specified in Section 50-1, "Portland Cement Concrete", of these Specifications. The grading limits must be restricted if necessary to produce concrete that, after extrusion, has well defined web marks of water on the surface and is free from surface pits larger than 3/16 inch in diameter.

The consistency of the concrete must be such that it will maintain the shape of the section without support after extrusion.

Except as noted otherwise in the Contract documents, extruded concrete curbs must be anchored to existing pavement either by placing dowels or by using an approved adhesive. If an adhesive is used, in advance of placing the curbs on the existing pavement, the surface of the pavement must be thoroughly cleaned and the adhesive must be applied. The pavement must be cleaned either by wire brushing or by blast cleaning. The cleaned surface must be free from dust, loose material, or oil.

The adhesive must be an epoxy resin adhesive conforming to the State Specifications. Such adhesive may also be used for bonding new Portland cement concrete to existing asphalt concrete.

The top and face of the finished curbs must be true and straight and the top surface of curbs must be of uniform width, free from humps, sags, or other irregularities. Grade tolerance of the gutter flowline, back of curb and gutter, and back of sidewalk must not exceed ± 0.05 foot in any 25-foot length.

Concrete must be fed to the machine at a uniform rate. The machine must be operated under sufficient uniform restraint to forward motion to produce a well compacted mass of concrete free from surface pits and requiring no further finishing, other than light brooming with a broom filled with water only. Finishing with a brush application of grout will not be permitted.

27-8 CURB RAMPS AND DRIVEWAYS

Curb ramps and driveways must be constructed to the dimensions, lines, grades, and details shown or specified in the Contract. Curb ramps and driveways must conform to all requirements in these Specifications, including the requirement for excavating for and placing the 6-inch thick Class 2 aggregate base section. No utility pull box, utility pole, traffic signal pull box, traffic signal pole foundation, or any other facility that is visible on or above the surface of a curb ramp may be located within the area of a curb ramp. For the purpose of this Section, the area of the curb ramp must be the area including and bounded by the 1-foot wide tactile strip on either side of the inclined portion of the ramp, the gutter section and the curb along the back of sidewalk.

27-9 RECONSTRUCTION OF CURBS, GUTTER, AND SIDEWALK TO ACCOMMODATE DRIVEWAYS

Where curb and gutter and/or sidewalk are to be removed for the purpose of constructing a driveway, a sidewalk ramp, utility relocation or construction of utility facilities, or to replace cracked, broken, heaved or otherwise unacceptable concrete, the entire curb and gutter and/or sidewalk must be removed and reconstructed. The actual limit of concrete removal must extend to nearest score mark or joint, if nearest score mark or joint is within 4 feet of limit of removal as indicated on the Plans. Adjacent to all areas of removal of curb and gutter, a 2-foot minimum width, 4-inch minimum depth bank of existing roadway pavement must be saw cut and removed and replaced with permanent asphalt concrete pavement. A dowelled joint must be used as shown on Standard Drawing 4-32 at the connection of new driveway construction to existing sidewalk and curb and gutter. Removed materials must be disposed by the Contractor outside of the road right-of-way. Unless otherwise directed in the Special Provisions, payment for removals is included in the price paid for clearing and grubbing and no additional payment will be allowed.

27-10 RECONSTRUCTION OF CURBS, GUTTER, AND CURB AND GUTTER TO ACCOMMODATE SEWER AND STORM DRAIN SERVICE INSTALLATION

Where curbs, gutters, or curb and gutter are to be removed for the purpose of constructing a sewer service or storm drain service, the entire curb, gutter, or curb and gutter must be removed and reconstructed. The actual limit of concrete removal must extend to nearest score mark or joint, if nearest score mark or joint is within 3 feet of limit of removal as indicated on the Plans. A dowelled joint must be used as shown on Standard Drawing 4-32 at the connection of new sidewalk, and curb and gutter to existing sidewalk, and curb and gutter. Adjacent to all areas of removal of curb and gutter, a 2-foot minimum wide, 6-inch minimum deep bank of existing roadway pavement must be saw cut and removed. Removed materials must be disposed of by the Contractor. Portland cement concrete for the replacement must be Class “A-2” in accordance with Section 50-5, “Portland Cement Concrete”, of these Specifications.

27-11 CURB AND GUTTER TESTING AND TOLERANCE

The finished surface of curb and gutter must be free from humps, sags, or other irregularities. The surface must be uniform to a degree such that no depressions greater than 0.02 foot are present when tested with a 10-foot straightedge, except at grade changes. Curb and gutter must be tested by the application of water in the presence of the Agency. No standing water is permitted.

27-12 NOT USED

27-13 DROP INLETS AND CATCH BASINS

Drop inlets, catch basins, grates, and frame types must conform to the Standard Drawings and Section 50-34, "Sewer and Storm Drain Castings", of these Specifications.

Drop Inlets and catch basins must have beeding material that conforms to Section 50-16 “Clean Crushed Rock” Type B or C and is 4-inches thick. Concrete for drop inlets and catch basins must be either Class "A" or "B", and must conform to Section 50-5, “Portland Cement Concrete”, of these Specifications. The concrete box portion of the drop inlet and/or catch basin must be cast to the proper grade in a maximum of 2 placements of concrete. Use of grout to adjust the drop inlet and/or catch basin frame to the proper grade is not permitted without written approval from the Agency.

Grate and frame materials and method of placement must conform to the requirements in the State Specifications. Reinforcing bar supports or other approved means must be used to hold the frame at proper grade during final placement of concrete. Broken pieces of concrete, wood, or other debris cannot be used for this purpose.

The pipe connection to drop inlets and catch basins must conform to Standard Drawing 308-0 (1-2) for the following two conditions:

a. Pipe connection is through the corner of the structure.
b. Pipe connection angle is less than 70 degrees or greater than 110 degrees for pipes with a diameter less than or equal to 30 inches.

At the option of the Contractor, drop inlets and catch basins may be furnished and installed as precast units, or the units may be combined precast and cast-in-place structures, provided the structures in place substantially conform to cast-in-place construction as specified in these Specifications. Precast units must use a boot or integral connection. The maximum deflection of a boot is 7 degrees. If the deflection is more than 7 degrees, the unit must be built as a cast-in-place structure.

All drop inlet and catch basin installations, whether new or reconstructions, must include a permanent stormwater quality marking per the County of Sacramento Improvement Standards, or as directed by Agency.

Unless otherwise specified, exposed surfaces of the grates, frames and hoods with the parts assembled and disassembled must be painted with commercial quality asphaltum paint after testing and assembly.

27-14 MEASUREMENT

Curb, gutter, and curb and gutter will be measured and paid for by the linear foot for the type of curb, gutter, or curb and gutter designated in the Contract.

Sidewalks will be measured and paid for by the square foot for the type of sidewalk designated in the Contract.

Curb ramps will be measured and paid for by the unit, as designated in the Contract. If curb ramps are not included as a separate pay item in the Contract, the curb and gutter portion of the curb ramp will be measured and paid for by the linear foot as curb and gutter, and the sidewalk portion of the curb ramp will be measured and paid for by the square foot as sidewalk.

Driveways will be measured and paid for by the square foot or by the unit, as designated in the Contract. If driveways are not included as a separate pay item in the Contract, the curb and gutter portion of the driveway will be measured and paid for by the linear foot as curb and gutter, and the sidewalk portion of the driveway will be measured and paid for by the square foot as sidewalk.

Removal of sidewalk, curbs, gutters, or curb and gutters will be measured and paid for by the linear foot as designated in the Contract. If removal of sidewalks, curbs, gutters, or curb and gutters are not designated as separate pay items in the Contract, the removal of said facilities is included in the various items of work and no additional payment will be made.

Gutter drains, drop inlets, and/or catch basins will be measured and paid for by the unit for the types of gutter drains, drop inlets, and/or catch basins designated in the Contract.

27-15 PAYMENT

The price paid per linear foot for curb, gutter, or curb and gutter includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing curb, gutter, or curb and gutter, complete in place, including preparing the subgrade, form work, finishing and curing the concrete, furnishing and placing expansion joint material, furnishing and placing dowels and reinforcement, curb and gutter testing, and

repairing any damage, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the Agency.

The price paid per square foot for sidewalk includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing sidewalk complete in place, including form work, finishing and curing the concrete, furnishing and placing expansion joint material, and repairing any damage, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the Agency.

The unit price paid for curb ramps includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing curb ramps complete in place, including all form work, finishing and curing the concrete, furnishing and placing expansion joint material, and repairing any damage, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the Agency.

The unit price paid for driveways includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing driveway complete in place, including all form work, finishing and curing the concrete, furnishing and placing expansion joint material, and repairing any damage, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the Agency.

The price paid for drop inlets and catch basins includes full compensation for the cost of removal and replacement of adjacent asphalt, curb, gutter, and sidewalk to the limits required in Section 27-10, “Reconstruction of Curbs, Gutter, and Curb and Gutter to Accommodate Sewer and Storm Drain Service Installation”, of these Specifications and no additional or separate payment will be made.

The unit price paid for gutter drains includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in gutter drains, complete in place, including excavation, furnishing and installing the cast iron drain and vitrified clay or PVC elbow, and the concrete pad foundation and elbow encasement, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the Agency.

Excavation for aggregate base beneath sidewalk, curb ramps, driveways, and curb and gutter sections must be included in the bid item for roadway excavation if the Contract includes such an item. If there is no item for roadway excavation, the excavation for the aggregate base beneath sidewalk, curb ramps, driveways, and curb and gutter sections is incidental and included in the various pay items and no additional payment will be made. Supply and placement of aggregate base material will be measured and paid for as detailed in Section 22, “Aggregate Base”, of these Specifications.

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SECTION 28 PILING

28-1 GENERAL

Piling must conform to the State Specifications, and these Specifications.

The pile fabricator must furnish a Certificate of Compliance to the Agency, stamped and signed a Civil Engineer registered in the State of California, with experience in pile fabrication. The Certificate of Compliance must conform to the provisions in the State Specifications.

28-2 PAYMENT

Payment will conform to the State Specifications, and these Specifications. No deduction will be made for pile fabrication outside of Sacramento County.

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SECTION 29 PRESTRESSING CONCRETE

29-1 GENERAL

Prestressing concrete must conform to the State Specifications.

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SECTION 30 CONCRETE STRUCTURES

30-1 GENERAL

Concrete structures must conform to the State Specifications, and these Specifications.

Work under this Section includes constructing culverts, headwalls, retaining walls, slabs, foundations, and similar concrete structures. Concrete pavement, curbs, gutters, sidewalks, and drainage structures must be as specified elsewhere in these Specifications.

30-2 FOOTINGS

The elevations of the bottoms of footings shown on the Plans is approximate only and the Agency may order, in writing, changes in dimensions or elevations of footings as necessary for a satisfactory foundation. Additional structure excavation and structure backfill resulting from such changes will be measured and paid for as specified in Section 18-3, "Structure Excavation and Backfill", of these Specifications.

If the Contractor elects to fabricate materials or do other work prior to the final determination of footing elevations, the Contractor is responsible for additional costs incurred.

30-3 FORMS

Forms must be smooth and mortar tight, true to the required lines and grade, and of sufficient strength and supported in such a manner that no springing out of shape or sagging occurs between form supports during the placing of concrete. All dirt, chips, sawdust, nails and other foreign matter must be completely removed from forms before any concrete is deposited. Forms must be thoroughly coated with form oil, which must be of high penetrating qualities leaving no film on the surface of the forms that can be absorbed by the concrete.

Forms for all surfaces that will be exposed to view must be made of surfaced lumber or of other material that will provide a smooth and satisfactory surface. Lumber that is warped, badly checked, or contains loose knots or knot holes cannot be used on any surface form.

All sharp edges must be chamfered with 3/4 by 3/4 inch triangular fillets, unless the Plans specify that they not be used. Curved surfaces must be formed in a manner that will give accurate and true surfaces. The Agency must approve the construction methods of curved forms before the forms are placed.

Forms must be constructed so that form marks conform to the general lines of the structure.

Only approved form clamps, ties, or bolts can be used to fasten forms. Twisted wire ties are not permitted.

The strength of the forms and the supporting structure for forms are the responsibility of the Contractor and permission by the Agency to place concrete in forms does not relieve the Contractor of this responsibility. If sagging or appreciable deflection or movement of the forms occurs as the concrete is being placed, the Agency may reject the work. Rejected work must be removed and replaced at the expense of the Contractor.

30-4 REMOVAL OF FORMS

In general, forms for columns and piers may be removed before those for beams and decks. Form removal should be based on the resulting effect on the concrete. That is, there must be no deflection, distortion or damage to the concrete. Supporting forms must not be removed from beams, floors and walls until they are able to carry their own weight and any approved live load. Unless otherwise specified in the Contract, no forms can be removed until at least 24 hours after the concrete has been placed, and until the concrete has sufficient strength to prevent damage to the surface.

Supporting forms must not be removed from horizontal members before concrete is 80 percent of design strength. When high-early strength concrete is used, removal time may be reduced at the discretion of the Agency. When retarding agents are used, removal time should be increased at the discretion of the Agency.

30-5 REINFORCEMENT

Reinforcement in concrete structures must be as shown on the Plans and conform to Section 31, “Reinforcement”, of these Specifications.

30-6 MIXING AND TRANSPORTING

Mixing and transporting of concrete must be in accordance with the State Specifications. All concrete must be mixed in mechanically operated mixers except when permitted by the Contract. Concrete being transported must maintain consistency and workability; no additional mixing water must be incorporated unless authorized by the Agency.

The use of admixtures in concrete for structures will be subject to the written approval of the Agency, or as otherwise specified in the Special Provisions.

30-7 PLACING CONCRETE

30-7.01 General

Do not place concrete in forms until the forms have been approved by the Agency.

Concrete must not be placed on frozen or ice-coated ground or subgrade, or on ice-coated forms, reinforcing steel, structural steel, conduits, precast members, or construction joints.

Under rainy conditions, placing of concrete must be stopped before the quantity of surface water is sufficient to damage surface mortar or cause a flow or wash of the concrete surface, unless the Contractor provides adequate protection against damage, as determined by the Agency.

All concrete must be fresh and must be placed before it has taken an initial set. Retempering with additional water to make concrete more workable after it has partially hardened is not permitted. The temperature of the concrete at the time of placement must be between 55 and 90 degrees F, per ACI Manual of Concrete Practice Table 3.1.

Existing concrete surfaces to be connected to new concrete must be thoroughly cleaned as directed by the Inspector, and the surface must be roughened to approximately 1/4-inch depth. Irregular voids or surface stones may be left in place if sound, free of laitance, and firmly embedded.

30-7.02 Placement

When the Contract shows or specifies a concrete placement sequence or schedule, the sequence or schedule must not be varied without written approval of the Agency.

Fresh concrete must be placed in horizontal layers no deeper than can be satisfactorily consolidated with the vibrators. The concrete must be placed at or near its final position; the use of vibrators for extensive shifting of fresh concrete is not permitted. Fresh concrete must not be permitted to fall from a height greater than 6 feet. Tremies or "elephant trunks" must be used if the concrete is to be placed in a deep or hard to reach area.

After being deposited, the fresh concrete must be consolidated by mechanical vibration until voids are filled and free mortar appears on the surface.

The use of additional water in mixing the concrete to promote free flow is not permitted.

30-7.03 Vibrating

The location, manner, and duration of the application of the vibrators must achieve maximum consolidation of the concrete without causing segregation of the mortar and coarse aggregate. Vibrators must not be attached to or held against the forms or the reinforcing steel.

With written approval of the Agency, the use of external form vibrators is permitted when the concrete is inaccessible for adequate internal consolidation and the forms are constructed sufficiently rigid to resist displacement or damage from external vibration.

Concrete in structures must be tamped and consolidated by means of high frequency internal vibrators of a size, type, and number approved by the Agency. The number of vibrators must be sufficient to consolidate the incoming concrete within 15 minutes after it is deposited in the forms. No less than 2 serviceable vibrators must be available at all times. Surfaces must be smooth and free from voids caused by rock pockets. Vibration must be supplemented by hand spading to secure these results.

30-8 BONDING

Non-epoxy bonding compounds must be used for dry areas and epoxy resin bonding compounds must be used for areas exposed to moisture. Bonding compounds must be applied in accordance with the manufacturer's instructions.

Epoxy resins may be used for grouting dowels in concrete, crack injection, adhesive for bonding fresh and hardened concrete, as a binder for epoxy mortar in making concrete repairs, and under water. Some epoxies are not suitable for temperature extremes such as freeze-thaw environments; placing must be done within manufacturer’s allowable parameters. Epoxies may be fast-setting when approved by the Agency. The epoxy binder and adhesive must be a two-component mixture conforming to the State Specifications, and must be mixed at the work site. Safety, proportioning, mixing, and temperature are critical and must be done according to manufacturer’s instructions. Aggregate must conform to the State Specifications. When using epoxy as a binder to make mortar, the two components must be thoroughly mixed to a uniform gray color before the aggregate is added. Unless otherwise specified, the mix proportions must be 1 part epoxy binder to 4 parts aggregate by volume. When fine aggregate (sand) is used, the mix must be 1 part epoxy binder to 6 parts aggregate, by volume. The aggregate must have a moisture content of not more than 0.50 percent when mixed with binder. The aggregate size and proportions must be determined by the Contractor, subject to the approval of the Agency.

Appropriate uses of epoxy resin must conform to the State Specifications.

30-9 CONCRETE PLACED UNDER WATER

Unless specifically shown or specified in the Contract, concrete may not be placed underwater without written direction from the Agency.

When underwater placement of concrete is directed, the placement must be by approved tremie or bottom dump bucket. The consistency of the concrete must be appropriate for underwater placement and must be approved in writing by the Agency. Underwater placement must be continuous until completed. Placing concrete in running water is not permitted.

30-10 EXPANSION JOINTS

When premolded joint filler is shown or specified in the Contract, the filler must be anchored in the correct position before concrete is placed. The edges of the concrete at the joint must be finished with a 1/4 inch radius edging tool. Unless otherwise specified in the Contract, expansion joint material must be as specified in Section 50-4, “Premolded Expansion Joint Filler”, of these Specifications, except that partial depth expansion joint filler material with a minimum penetration of 2 inches is permitted in minor concrete structures, slope paving, sidewalk, curb, and gutter applications as specified in the State Specifications.

30-11 CONSTRUCTION JOINTS

Construction joints are required when sequencing concrete placement of large areas.

Construction joints must be made only where shown or specified in the Contract or authorized or directed by the Agency. When it is necessary to make a joint because of an emergency, as determined by the Agency, reinforcing steel must be placed through the joint as directed by the Agency. Furnishing and placing such reinforcing steel is at the Contractor's expense and no additional compensation will be paid.

After the concrete in a poured segment has hardened, the entire surface of the joint must be thoroughly cleaned of surface laitance, and aggregate must be exposed by abrasive blast cleaning. Wire brushing, air, or water blasting may be used while the concrete is fresh, provided results equal to abrasive blast cleaning are obtained.

Construction joints must be keyed. Keyways must be formed by beveled strips or boards placed at right angles to the direction of shear or as directed by the Agency. Except where otherwise shown or specified in the Contract, keyways must be at least 1-1/2 inches deep over at least 25 percent of the area of the section.

When new concrete is to be joined to existing concrete, holes must be drilled in the existing concrete and bar reinforcing steel dowels must be grouted in, as specified in the State Specifications.

30-12 WATERSTOPS

Waterstops, when shown or specified in the Contract, must conform to the requirements of the State Specifications.

30-13 CURING

Curing of concrete is essential for development of specified strength and durability. When not curing by forms-in-place, then exposed surfaces must be cured by one or more of the following methods:

- burlap or rugs kept continuously wet,
- waterproof membranes such as paper or plastic, or
- spraying liquid-membrane curing compound applied as soon as free water on the surface has disappeared but before surface drying begins.

Unless otherwise shown or specified in the Contract, curing compounds must conform to the requirements in Section 50-6, “Curing Compounds for Concrete”, of these Specifications.

Curing practices for concrete placed in extreme weather conditions must prevent too-rapid hydration or cold-weather freeze-thaw damage as specified in ACI Manual of Concrete Practice (most recent) or the State Specifications.

30-14 PROTECTING CONCRETE

In addition to the requirements of Section 5, "Control of Work and Materials”, of these Specifications, the Contractor must protect concrete as provided in this Section.

Concrete that has been frozen or damaged by other causes, as determined by the Agency, must be removed and replaced by the Contractor at the Contractor’s expense.

Concrete in structures must be maintained at a temperature of at least 45 degrees F for 72 hours after placement, and at least 40 degrees F for an additional 4 Calendar Days. When required by the Agency, the Contractor must submit a written outline of the proposed methods for protecting the concrete.

30-15 SURFACE FINISH

30-15.01 General

All exposed surfaces of structures must have a smooth form finish as specified in the ACI Manual of Concrete Practice 301.5.3.3, ”Finishing Formed Surfaces”, unless otherwise shown

or specified in the Contract. All other surfaces must have an ordinary surface finish unless otherwise shown or specified in the Contract.

Immediately after forms have been removed, all form bolts must be cut off 1 inch below the finished surface of the structure and the holes remaining must be filled with cement mortar using 1 part cement to 2 parts sand. Add white cement as needed to match surrounding concrete on all exposed surfaces.

Any defects in the concrete surface caused by poor material in the forms, poor form construction, or by voids or pockets in the concrete, must be repaired and finished to make the surface finish uniform. The Agency may direct the Contractor to correct such defects at the Contractor's expense.

30-15.02 Smooth Form Finish (Sacking)

A smooth form surface for exposed surfaces or preparation for coating must consist of finishing the surfaces of the structure to produce smooth, even surfaces of uniform texture and appearance, free of bulges, depressions and other imperfections. The degree of care in building forms and character of materials used in form work will be a contributing factor in the amount of additional finishing required to produce smooth, even surfaces of uniform texture and appearance, free of unsightly bulges, depressions and other imperfections, and the Agency will be the sole judge in this respect. The use of power carborundum stones or disks may be required to remove bulges and other imperfections. The grout-cleaned finish (sacking) requires a sound, clean, dry substrate. Grind surfaces, including seams, bumps, and imperfections smooth and flat. Remove form release agent, laitance, and cure, if present. If coating is required, provide a profile for coating adherence by whip-blasting or acid-etching. Wet a small area of concrete to be sacked and rub a slurry of gray concrete, white concrete (to match existing color), and fine sand into the surface with a sponge float, filling all holes. Non-epoxy acrylic bonding compound may be used in the slurry or in the water. Scrape off excess slurry and rub area lightly with a burlap sack until uniform in appearance. If approved by the Agency, a cementitious mortar may be troweled on the concrete surface after achieving a smooth and flat surface by grinding, including seams, bumps, and imperfections.

30-15.03 Ordinary Surface Finish

The ordinary surface finish required on non-exposed concrete structures must be minimized by careful forming, use of quality materials, and proper concrete placement procedures. Ordinary surface finish consists of removing snap ties and bolts to a minimum depth of 1 inch and filling the holes. Holes or depressions 3/8 inch or larger must be filled, all rock pockets must be repaired, and all fins must be removed.

30-15.04 Tolerance on Concrete Paving

All concrete structures having a roadway deck must have a smooth riding surface. The finished surface must be tested with a 12-foot straight edge. The surface must not vary more than 0.01 foot from a plane defined by the lower edge of the straight edge. All areas higher than 0.01 foot above the test plane must be removed by abrasive means. All areas lower than 0.01 foot below the test plane must be cut out to a depth of 1 inch below the test plane and patched with epoxy concrete.

30-15.05 Concrete Repair

30-15.05.A General

Evaluate the unsuitable concrete area to determine whether the concrete repair should be made with concrete, mortar (dry pack), shotcrete, or topped with an overlay.

30-15.05.B Replacement with Concrete

When there are extensive honeycombs or large voids in new construction, or extensive deterioration of existing concrete, the affected area must be removed to sound concrete (a minimum of 1 inch) and the area cleaned of deleterious material. All sides must be square;

forming may be required. Concrete for the repair must be similar to the original in cement-water ratio and aggregate size.

30-15.05.C Mortar (Dry Pack)

This method is suitable for snap-tie holes, spalls, and cavities (rock pockets) with a relatively high ratio of depth to width. Unsuitable concrete must be chipped by hand or mechanical means to sound and clean concrete. Flush the patch area with water and allow to dry. Coat surface with epoxy compound or acrylic bonding compound and allow to dry until tacky to the touch. Mix mortar composed of portland cement, sand, and water. White cement must be added when matching the color of the surrounding concrete is required. Proportion of cement to sand, by volume, must be no more than 1:2. Add only enough water to permit placing and packing. The mortar must be rammed into place in thin layers and leveled to the plane of the surrounding concrete. Cure with liquid-membrane cure, wet burlap, or water. Fast-setting, cementitious, pre-mixed packing materials may be used when approved by the Agency and must be applied per manufacturer's instructions.

30-15.05.D Shotcrete

Shotcrete is suitable for repairs to overhead or vertical surfaces and must be placed according to procedures in ACI Manual of Concrete Practice, 506R.

30-15.05.E Topping

Topping may be placed with or without surface hardener on a pre-existing base slab. Prior to placing, the entire area to be topped must be cleaned and free of all loose and unsound materials by abrasive blasting or machine scarifying, and clean aggregate exposed. The cleaned base must be kept wet for a period of 24 hours prior to the application of topping. Excess water must be removed and a neat cement bonding grout must be applied. It must be of equal parts cement and sand and enough water to make a creamy mixture. The cement bonding grout must not be allowed to dry or set before topping placement. Bonding agents other than cement grout may be used with prior Agency approval. The topping must then be placed to grade, compacted, and floated. The Contractor must check for trueness of surface with a 12-foot straightedge. Surface hardener, when used, must be applied according to manufacturer's instructions. Trowel or broom finish as specified in Contract.

30-16 MEASUREMENT AND PAYMENT

Except as otherwise provided, pay quantities of concrete in structures will be measured by the cubic yard in accordance with the dimensions shown or specified in the Contract, or as ordered in writing by the Agency. No deduction will be made for volume of reinforcing steel.

The price paid per cubic yard for concrete in structures includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing concrete structures, complete in place, including furnishing and building all necessary forms and falsework, furnishing and placing all concrete, reinforcing steel, expansion joint material and waterstops, curing the concrete, providing weep holes in walls, and finishing all concrete surfaces, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

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SECTION 31 REINFORCEMENT

31-1 GENERAL

Steel reinforcement must conform to the State Specifications, and Section 50-32, “Reinforcing Steel”, of these Specifications.

Reinforcing steel lists showing lengths and bending details must be prepared by the Contractor and submitted to the Agency for review. Agency review is for errors only, and does not relieve the Contractor of the responsibility for the accuracy of the steel reinforcement.

Existing reinforcing to be incorporated into new concrete must be mechanically cleaned as directed by the Inspector. A minimum of 1-inch of existing rebar must be exposed and cleaned prior to incorporation into the new concrete.

31-2 MEASUREMENT AND PAYMENT

Unless otherwise specified in the Special Provisions, reinforcement will not be measured or paid for separately.

Full compensation for furnishing and placing reinforcement, including preparing and submitting reinforcing steel lists, is included in the prices paid for the various items of work involved, and no separate payment will be made.

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SECTION 32 WATERPROOFING

32-1 GENERAL

Waterproofing must conform to the State Specifications.

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SECTION 33 STEEL STRUCTURES

33-1 GENERAL

Steel Structures must conform to the State Specifications, and these Specifications.

The fabricator must furnish a Certificate of Compliance to the Agency, stamped and signed by Civil Engineer registered in the State of California, with experience in structural steel fabrication. The Certificate of Compliance must conform to the provisions in the State Specifications and must certify conformance with the Contract.

33-2 PAYMENT

Payment will conform to the State Specifications, and these Specifications. No deduction will be made for pile fabrication outside of Sacramento County.

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SECTION 34 SIGNS

34-1 GENERAL

Signs must conform to the State Specifications, and these Specifications.

34-2 OVERHEAD SIGN STRUCTURES

Overhead sign structures must conform to the State Specifications, and these Specifications.

Welding of overhead sign structures must conform to the State Specifications, and these Specifications. The Contractor is responsible for welder certification.

34-3 ROADSIDE SIGNS

Roadside signs must conform to the State Specifications, and these Specifications. Unless otherwise shown or specified in the Contract, sign panels for permanent installation as standard roadside signs, including park signs as specified in this Section, will be furnished and installed by the Agency.

34-3.01 Traffic Sign Types

Traffic signs are classified by general types according to the information or traffic control required:

- **Warning Signs**—Call attention to conditions on or adjacent to a traveled way that are potentially hazardous to traffic.
- **Regulatory Signs**—Give notice of traffic laws or regulations.
- **Guide Signs**—Show route designation, guidance and directional information.
- **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 will be identified by codes. Warning, regulatory, guide, and construction signs are identified with a number preceded by one of the letters W, R, G, or C, which indicates the type of sign.

Installation and mounting of traffic signs, designated by type, must be according to the sign schedule or details shown on the Plans.

34-3.02 Sign Panel Fastening Hardware

Sign panel fastening hardware must conform to the State Specifications, and these Specifications. Lag screws, bolts, metal washers, and nuts may be cadmium-plated steel instead of commercial quality galvanized steel.

34-3.03 Park Signs

Signs with "Park Rules and Regulations" and "Park Hours" will be furnished by the Agency. The posts for park signs must be furnished by the Contractor and must be 2-3/8 inches outside diameter galvanized steel pipe, 14 feet in length, with a minimum wall thickness of 0.116 inches. Posts for park signs must be placed in a 3-foot 6-inch deep by 10 inch diameter portland cement concrete footing, leaving 10-foot 6-inch height of post from top of grade. Footing concrete must be Class “C” in accordance with Section 50-5, “Portland Cement Concrete”, of these Specifications.

34-3.04 Construction

Construction must conform to the State Specifications, and these Specifications. After the post holes are backfilled, wood posts installed in traffic islands must be wedged in place at the surface with redwood wedges. For posts installed in sidewalk areas, the space around the wood posts must be capped with concrete and finished to be level with the surrounding surface after the posts holes are backfilled.

34-3.05 Sign Panel Installation

Sign panel installation must conform to the State Specifications, and these Specifications. Sign panels, blind rivets, and closure inserts must be furnished by the Contractor and must be fabricated of materials as specified in this Section.

The exposed portion of fastening hardware on the face of signs must be painted using touch-up enamel that matches the background color exactly.

Park rules sign panels must be mounted flush with top of the post, with park hours sign panels mounted directly under. The bottom of the lowest sign panel must be at least 7 feet above the ground.

34-4 MEASUREMENT AND PAYMENT

Measurement and payment for overhead sign structures will conform to the State Specifications, and these Specifications. No deduction will be made for fabrication outside of Sacramento County.

Signs will be measured by the unit from actual count, complete in place, of the type or types of signs designated in the Contract.

The unit price paid for each sign of the type or types designated in the Contract includes full compensation for furnishing all labor, materials (except Agency-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, shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

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SECTION 35TIMBER STRUCTURES

35-1 GENERAL

Timber structures must conform to the State Specifications.

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SECTION 36 CAST-IN-PLACE CONCRETE PIPE (CIPCP)

36-1 GENERAL

All sewer facilities constructed within the Sacramento Area Sewer District service area (http://www.sacsewer.com/pdf/map-servicearea.pdf) must be constructed in accordance with the Sacramento Area Sewer District Standards and Specifications available at http://www.sacsewer.com/pdf/ord/2011-SASD-Standards-and-Specifications-v1.pdf

Construction of cast-in-place concrete pipe will be permitted when shown or specified in the Contract. Cast-in-place concrete pipe must consist of portland cement concrete placed in a prepared trench at the locations shown and specified in the Contract. The Agency may deny the use of cast-in-place concrete pipe if, in the Agency's judgment, local conditions make the use of such pipe undesirable.

Unless otherwise specified herein, the placement of cast-in-place concrete pipe must conform to the requirements of Section 38, "Storm Drain Construction", of these Specifications.

It is the Contractor's responsibility to determine the suitability of the excavated trench for the placement of cast-in-place concrete pipe. The Contractor must determine whether the trench walls will provide sufficient lateral support to prevent deflection and cracking of the pipe due to backfill and live loads, and that the trench width at the top of the pipe will be sufficiently narrow to preclude additional loading on the pipe.

If, after examining the sides of the trench, the Contractor elects to place cast-in-place concrete pipe, and the pipe subsequently develops longitudinal cracks exceeding 5 feet in length, the Contractor, at the Contractor's expense, must repair or replace the pipe as directed by the Agency.

Should the Contractor decide not to place cast-in-place concrete pipe after examination of the trench sidewalls, alternative pipe conforming to the requirements in Section 38, "Storm Drain Construction", of these Specifications must be furnished and placed, and no additional payment will be made.

36-2 PIPEMAKING EQUIPMENT

The pipe must be constructed with equipment specially designed for constructing cast-in-place concrete pipe, as approved by the Agency. The Contractor must furnish evidence of successful operation of the proposed equipment on other work. Equipment not suitable to produce the quality of work required for the pipeline will not be permitted to operate on the Work.

36-3 TRENCH EXCAVATION

Trench excavation must conform to Section 19, "Trench Excavation, Bedding and Backfill", of these Specifications. The trench must be excavated to the lines and grades of the completed pipe as shown on the Plans and within the tolerance specified in these Specifications. The trench must be of the proper width and the bottom of the trench must be shaped to the external diameter of the pipe to be constructed. The bottom of the trench must be prepared to provide full, firm, uniform support by undisturbed earth or compacted fill over a minimum of the bottom 180 degrees of the outside of the pipe. Trench width at the top of pipe must not exceed the outside diameter of the pipe at the spring line.

Unless otherwise directed by Agency or specified in the Special Provisions, the trench in which pipe was placed during the previous 24 hours, plus the trench required for the next day's work, plus additional trench 1/2 the length of the trench required for the next day's work, is the total maximum allowable length of trench on any portion of the Work that may remain open at

the end of each Working Day. The remainder of the trench must be backfilled and compacted, and when in streets or highways, opened to traffic as soon as practicable.

36-4 SPECIAL FOUNDATION TREATMENT

Whenever the bottom of the trench is soft, rocky or in the opinion of the Agency otherwise unsuitable as a foundation for the pipe, the unsuitable material must be removed to a depth such that when replaced with a suitable material, it will provide a stable and satisfactory foundation. Suitable materials for backfilling the trench below the pipe must consist of select material approved by the Agency compacted to a relative compaction of not less than 90 percent. Alternate backfill materials and methods may be used with the approval of the Agency.

36-5 CONCRETE

Concrete must be Class "A-1" portland cement concrete conforming to Section 50-5, "Portland Cement Concrete", and these Specifications.

The maximum aggregate size is determined by the size of cast-in-place concrete pipe constructed, and must be as follows:

Pipe Size	Maximum Aggregate
48" or less	1"
Over 48"	1-1/2"

Gradation for combined aggregates must conform to the State Specifications.

Slump must not exceed 2 inches as determined by the slump cone method of ASTM C143 or an equivalent slump as determined by California Test 533, unless otherwise permitted or directed by the Agency.

The minimum wall thicknesses for the various sizes of pipe must conform to the following table:

Internal Diameter	Minimum Wall Thickness
24” through 30”	3”
33” and 36”	3-1/2”
42”	4”
48”	5”
54”	5-1/2”
60”	6”
66”	6-1/2”
72”	7”
78”	7-1/2”
84”	8”
90”	8-1/2”
96”	9”
108”	10”
120”	12”
132”	14”
144”	15”

The compressive strength of the concrete must be at least 700 psi at 1 Calendar Day, at least 1400 psi at 3 Calendar Days, at least 2100 psi at 7 Calendar Days, and at least 3500 psi at 28 Calendar Days, as determined by moist-cured test cylinders.

36-6 PLACING CONCRETE

Prior to placing any pipe, the Contractor must secure the Agency’s written approval of the excavated trench. Concrete placement must conform to the provisions of the State Specifications. Surfaces against which concrete is to be placed must be free from standing water, mud, and debris, and must be firm enough to prevent contamination of the concrete by earth or other foreign material. Absorptive surfaces against which concrete is to be placed must be moistened thoroughly so that the moisture will not be drawn from the freshly placed concrete.

An approved method or device must be used when placing invert concrete to insure that thickness is maintained at not less than minimum wall thickness at any point. Written approval of the method or device must be obtained from the Agency prior to beginning concrete placement.

The cast-in-place concrete pipe must be constructed in one placement around the complete periphery.

The temperature of the concrete when it is being placed must be between 40 and 90 degrees F in moderate weather, or between 50 and 90 degrees F if the mean daily temperature in the vicinity of the work site falls below 40 degrees F. Whenever the mean daily temperature in the vicinity of the work falls below 40 degrees F for more than 1 day, the concrete must be maintained at a temperature of at least 50 degrees F for at least 72 hours after it is placed.

Concrete must be protected against freezing temperatures for 3 days immediately following the 72 hours of protection at 50 degrees F. Where artificial heat is employed, the concrete must be prevented from drying. If concrete is placed when the weather could cause the temperature of the concrete to exceed 90 degrees F, the Contractor must employ effective means, such as precooling of aggregates and mixing water and placing at night, to maintain the temperature of the concrete, as it is placed, below 90 degrees F.

36-7 START AND CLOSE SECTIONS

A starter section may be used at the beginning of each run of cast-in-place concrete pipe, such as beginning from an existing structure, or from a manhole, at a change in size or from a manhole at an angle point. Starter sections must be approximately 6 feet in length and of the same inside diameter as the cast-in-place concrete pipe, unless otherwise approved by the Agency. The strength of the reinforced concrete starter section must be as shown on the Plans and must be placed in accordance with the requirements of these Specifications.

A closing section must be used when directed by the Agency or where it is not possible to complete a run of cast-in-place concrete pipe because of lack of clearance ahead in the trench.

Starting and closing sections may be either concrete pipe or corrugated steel pipe meeting the strength requirements indicated in the Contract. However, if the combined length of the starting and closing sections exceeds 12 feet in 1 reach between manholes, concrete pipe must be used.

36-8 CONSTRUCTION JOINTS

If construction of the pipe stops short of a manhole or for more than 20 minutes, the resulting construction joint must be reinforced with a concrete collar. This collar must extend 1 foot either side of the joint and must be a minimum thickness equal to that of the pipe. The resulting end of pipe must be securely closed by a heavy canvas or equal to prevent excessive dehydration of the concrete already placed.

Joints must be clean and damp when covered with fresh concrete or mortar. Cleaning of construction joints must consist of removing all laitance, loose or defective concrete, coating, and foreign material.

36-9 FINISH

Flowline elevations of the completed pipe must not vary more than 0.05 feet from the design grade shown on the Plans. Variations in the internal diameter must not exceed 1/32 inch per diameter inch. (For example, for 24-inch pipe, 1/32 inch x 24 inches“ = 3/4 inch“ variation). Offsets at form laps must not exceed the limits specified in the following table:

Pipe Diameter	Maximum Offset
24” through 30”	3/8”
33” through 42”	1/2”
48” through 66”	5/8”
72” through 90”	7/8”
96” through 108”	1”
120” and larger	1-1/8”

The finished surface of the concrete pipe must be substantially free of fractures, cracks and interior surface roughness.

The Contractor must hand trowel the bottom 90 degrees of the inside of the pipe unless alternate provisions are made to provide a smooth interior surface satisfactory to the Agency. The remaining interior surface of the pipe not covered by forms must be equivalent to a steel screeded finish. All extraneous concrete must be removed from the interior surface as soon as possible after placing. Any additional finish work or repair work required to be done on the pipe must be completed within 5 days after the pipe is placed.

If obvious segregation or honeycombing or inadequate wall thickness is found by the Agency, the pipe may be rejected.

36-10 FORMS

Forms must be strong enough to permit the placement and vibrating of the concrete without causing distortion at any point. Form support systems must be constructed so that previously placed concrete will not be damaged. Form structure bearing plate indentations must not exceed one-eighth inch (1/8") and care must be taken when removing the forms to prevent damage to the pipe. After removal of the forms, the inside of the pipe will be inspected by the Agency and any repairs made promptly by the Contractor, at the Contractor's expense.

The surfaces of the forms against which concrete is to be placed must be cleaned of all dirt, mortar, and foreign material. Forms must be thoroughly coated with form oil prior to use. The form oil must be a commercial quality form oil or other equivalent coating that will permit the ready release of the forms.

36-11 CURING

Curing must take place immediately after finishing exposed exterior surfaces by one or a combination of the following methods:

- Pigmented curing compound, blanketing, cotton mat, polyethylene film or spraying methods as specified in the State Specifications.
- A 6-inch layer of moist earth backfilled over the pipe. Avoid damage to the fresh concrete while placing the backfill. The backfill must be kept moist for at least 7 days.

During the curing period, the ends of the pipeline must be securely closed with heavy canvas, or by other methods approved by the Agency, to maintain a humid condition within the pipe for a minimum of 7 days, except during periods when repair work is actually in progress on the inside of the pipe.

36-12 FIELD QUALITY CONTROL

36-12.01 Placement Tests

The Agency will be present for testing and inspection at all times during construction of a cast-in-place concrete pipe. Cast-in-place concrete pipe may not be constructed without the presence of the Agency.

A slump test of each truckload of concrete will be made by the Agency before the concrete will be permitted to be placed in the pipe casting machine.

Any concrete having a slump that exceeds the specified slump by more than 1/2 inch will be rejected. At least 3 compressive test cylinders will be cast from representative portions of each load of concrete. Each cylinder must have recorded the line, station number, date and batch ticket number. Compression tests will be made at the Agency's expense. Concrete compressive strength will be determined from 6 by 12 inch cylinders conforming to ASTM C31, tested in conformance with ASTM C39.

One cylinder of each set will be tested after curing for 2 days and 7 days, at the option of the Agency. The other cylinder of the set will be held for testing in the event that the Agency wishes to retest any batch.

If more than 2 cylinders tested in any day's concrete placement fall more than 10 percent below the minimum specified compressive strength, cores will be taken from the pipe and tested for compressive strength at the expense of the Contractor. If cores indicate concrete strength more than 20 percent below the minimum specified compressive strength, that portion of pipe must be removed and replaced with precast concrete pipe, at the expense of the Contractor.

36-12.02 Crack Repair

After completion of entire backfill and compaction, all cracks must be repaired as follows: Crack width must be determined by penetration to more than 0.25 inch (6.4mm) of a standard machinist gage leaf defined in AASHTO T 280.

Where the pipe function requires repair, circumferential cracks greater than 0.01 inch (0.3mm) and less than 0.06 inch (1.5mm) in width must be cleaned and filled with mortar. Circumferential cracks 0.06 inch or more in width must be cleaned and filled to a depth of 0.38 inch (9.5mm) with an elastomeric sealant.

Longitudinal cracks with a width of more than 0.01 inch (0.3mm) and a length less than that determined by the formula 0.0005 times the outside pipe diameter must be cleaned and filled to a depth of 0.38 inch (9.5mm) with an elastomeric sealant.

Longitudinal cracks having displacement greater than 0.08 inch (2.0mm) or width greater than that determined by the formula 0.0005 times the outside pipe diameter must be repaired by full depth epoxy pressure grouting.

36-13 REIMBURSEMENT FOR FIELD QUALITY CONTROL

The Agency has determined that there is an additional cost to the Agency for field quality control of cast-in-place concrete pipe over and above that required for other types of underground construction. This additional cost is fixed at the amount specified in the Special Provisions and must be reimbursed to the Agency in order that bids received for various pipe materials and methods of construction will be comparable in total cost. Reimbursement will be deducted from the prices paid per linear foot for each size of cast-in-place concrete pipe.

36-14 BACKFILL

Initial backfill is the material placed between the top of the pipe shoulder in contact with the trench and a point 12 inches above the top of the pipe. Initial backfill selected from job excavated material must be finely divided and free from debris, organic matter and pieces larger than 1 inch. The material must be placed immediately after the pipe has been completed, inspected and accepted by the Agency and permission to backfill has been obtained in writing from the Agency. The material must not to disturb or damage the pipe and must be brought up evenly on both sides.

The material must be compacted to a relative compaction of at least 90 percent as determined by ASTM D1557. Jetting will not be permitted during placement of initial backfill.

Jetting might be permitted for backfill above 12 inches over the pipe, if approved by the Agency.

As an alternative to job excavated material, initial backfill may consist of imported 3/4-inch clean crushed rock conforming to ASTM D448 sieve size number 6 or 7 and to Section 50-16, "Clean Crushed Rock", of these Specifications.

Intermediate and final trench backfill must conform to Section 19, "Trench Excavation, Bedding and Backfill", of these Specifications.

36-15 LOADING DURING CURING

No backfill other than a 6-inch layer permitted for curing purposes can be placed until designated tests have been made and permission to backfill has been obtained from the Agency. Depth of backfill over the top of the pipe must not exceed 12 inches until the concrete compressive strength reaches 700 psi or the pipe has been in place 24 hours, whichever is longer. Light traffic (axle load less than 6000 pounds) may be routed over the pipe when loosely backfilled and prior to jetting. Unrestricted traffic will be permitted over the pipe when the concrete strength reaches 1400 psi or the pipe has been in place for 72 hours, whichever is longer. In all cases, the Contractor is responsible for correcting any damage to cast-in-place concrete pipe caused by premature or excessive loading prior to the end of a 7 day curing period.

36-16 MEASUREMENT AND PAYMENT

The length of cast-in-place concrete pipe to be paid for will be the slope length designated by the Agency. Pipe placed in excess of the length designated will not be paid for. The price paid per linear foot for cast-in-place concrete pipe includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the pipeline, complete in place, including excavation, bedding material, special foundation treatment, backfill, and construction joints, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

SECTION 37 - BORING AND JACKING

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SECTION 37 BORING AND JACKING

37-1 GENERAL

All sewer facilities constructed within the Sacramento Area Sewer District service area (http://www.sacsewer.com/pdf/map-servicearea.pdf) must be constructed in accordance with the Sacramento Area Sewer District Standards and Specifications available at http://www.sacsewer.com/pdf/ord/2011-SASD-Standards-and-Specifications-v1.pdf

At locations shown or specified in the Contract, conductor pipe and associated carrier pipe must be jacked into place between the limits shown or specified, in accordance with the State Specifications, and these Specifications. All boring and jacking operations must comply with Cal OSHA Tunnel Safety Orders.

The Contractor must provide a boring and jacking plan to the Agency prior to beginning the boring and jacking operations. The boring and jacking plan must describe the equipment, method, and construction sequence for boring and jacking, and must include a proposed bore profile showing all verified utility depths with utility-required clearances and the projected bore path. Directional bore depths are to be a minimum of 42 inches below pavement grade.

The Plan must identify the location of all existing public and private utilities in the vicinity of the proposed bore and jack and address any potential conflicts with their systems. The Plan must also identify the location of nearby trees and address any conflicts with their root systems. Work associated with boring and jacking cannot begin until the Agency has reviewed the Contractor's boring and jacking plan.

Excavation of boring and receiving pits must be the minimum size necessary to complete the Work. Surface incisions on project streets must not exceed industry bore pit standards. In the event surface incision dimensions (i.e., length and width) on paved surfaces exceed industry bore pit standards (as determined by the Agency), additional pavement restoration will be required. Additional pavement restoration will include a slurry seal placed over the entire width of the roadway (or to the roadway centerline if disturbances are isolated to one half of the roadway) to encompass the area of restored pavement. Surface incisions located within 50 feet must be included in the same slurry seal area. Slurry seal must extend 4 feet beyond the outermost surface incisions.

Shoring and bracing for the boring and receiving pits must conform to the requirements in Section 19-1.06, "Shoring and Bracing", of these Specifications. Unless otherwise specified in the Special Provisions, backfill of the area excavated for the boring operation must conform to the requirements for structure excavation in Section 18-3, "Structure Excavation and Backfill", of these Specifications.

Unless otherwise specified in the Special Provisions, the Contractor may elect to either jack reinforced concrete pipe, vitrified clay microtunneling pipe, or ductile iron pipe, directly or place it in a conductor per these Specifications. If surface obstructions exist, pipelines must be placed within a conductor.

If a specific method is not stated in the Contract Documents, the method (auger bore and jack, pilot tube (guided bore), or microtunneling) must be approved by the Agency prior to implementation. Microtunneling must be used in all areas where tunneling operations occur below the groundwater table.

A directional bore profile, log of boring operations and a guidance system log must be kept on site, and up to date, during the boring operations. The profile must be included with the record drawings, as required by Section 11-3, "Record Drawings" of these Specifications.

37-2 NOT USED

37-3 INSTALLATION OF CONDUCTOR PIPE

The diameter of the bored hole must be not more than 0.1 foot greater than the outside diameter of the conductor pipe. Guide rails must be accurately set to line and grade to insure installation of the conductor pipe within permitted tolerances. The conductor pipe diameter must be sufficient to allow adjustment of line and grade of the carrier pipe to meet allowable tolerances and to allow sand to be placed between the conductor pipe and the carrier pipe. Conductor pipe sizes must be as shown or specified in the Contract, but in no case can the inside diameter of the conductor pipe be less than 6 inches greater than the outside diameter of the carrier pipe.

37-4 INSTALLING CARRIER PIPE INSIDE CONDUCTOR PIPE

Except for water pipe, carrier pipe having any part of a joint larger in diameter than the barrel of the pipe must be fitted with two 24-inch long polyurethane skids. The polyurethane skids must be attached to the carrier pipe as recommended by the manufacturer. The polyurethane skids must be located near the center of each carrier pipe section, and must be large enough to prevent any part of a joint from bearing on the conductor pipe.

Each joint of carrier pipe for water must be strapped according to the manufacturer's recommendations to 2 pairs of 24-inch long polyurethane skids. The polyurethane skids must be located at approximately (1/5) of the pipe length from each end of each carrier pipe section.

Carrier pipe with joints not larger than the pipe barrel must be slid into place on 2 polyurethane skids that have been securely fastened to the invert of the conductor pipe, or strapped to the barrel of the carrier pipe as specified above.

Carrier pipe sections must be joined outside the conductor pipe and then slid into place. The space between the carrier pipe and the conductor pipe must be completely filled with clean, dry sand. The method of placing sand must be approved by the Agency. Except for water pipe, necessary adjustments in grade must be made by adjusting the height of the skids. Adjustment in grades for water pipe must be as shown or specified in the Contract, or as directed by Agency.

37-5 VOIDS

When material tends to cave in from outside the permitted diameter of the bored hole, a shield must be used ahead of the first section of conductor pipe or the face of excavation must not extend beyond the end of pipe more than 1-1/2 feet, unless permitted by the Agency. The shield must cover the upper 2/3 of the conductor pipe and project not more than 1/2 inch beyond the conductor pipe's outer surface. Excavation must not project beyond the shield.

Voids larger than those permitted by these Specifications must be filled with sand or mortar, as directed by the Agency.

To assist in the detection of voids, a settlement monitoring grid will be established by the Agency. A minimum number of monitoring points will be quarter stations along the centerline of the pipe alignment plus wing points 25 feet on either side of the centerline points.

The Contractor must run levels over these points, and record their elevations before the boring and receiving pits are constructed and each day that material is removed from the excavation. A final set of elevations must be recorded 2 weeks after the conductor pipe is filled with sand and the bulkheads are in place. A copy of the elevation records must be provided to the Agency at the end of each day. Any settlement over 1/4 inch must be corrected by the Contractor to the satisfaction of the Agency at the Contractor's expense.

37-6 TOLERANCES

The maximum deviation of conductor pipe from the line and grade shown on the Plans must be such that line and grade of the carrier pipe can be adjusted within the conductor pipe and maintain the line and grade along its full length.

Unless otherwise shown or specified in the Contract, directly jacked pipe must not deviate more than 3 inches per 100 feet from the line and grade shown on the Plans.

37-7 DRY BORING UNDER CURB, GUTTER AND SIDEWALK

Unless otherwise specified in the Special Provisions, portions of drainage lines, irrigation lines, water mains, and services that pass beneath curbs, gutters, sidewalks, and other obstructions may be installed by dry boring. The bore must begin at the edge of the street pavement, or as directed by Agency, and continue to 6 inches beyond the property line.

If the pipe material is vitrified clay, the pipe must be plain end connected with compression-type couplings. The bore must be just large enough to pass the couplings and need not be backfilled. Unless otherwise shown or specified in the Contract, the maximum length of bore is 15 feet.

37-8 WET BORING OF SMALL DIAMETER PIPELINES

When specified in the Special Provisions, pipelines that are 6 inches and smaller may be installed by wet boring. Pipe must be ductile iron pipe conforming to Section 50-25, “Ductile Iron Pipe (DIP), and Cast Iron Pipe and Ductile Iron Fittings”, of these Specifications or polyvinyl chloride (PVC) pressure Class 200 pipe conforming to the requirements of AWWA Standard C900.

If the diameter of the boring hole is more than 0.1 foot greater than the outside diameter of the pipe to be installed, the void must be filled with sand or mortar, as directed by the Agency.

37-9 MEASUREMENT AND PAYMENT

Boring and jacking will be measured by the unit for each location for the size and type of pipe to be placed by boring and jacking as designated in the Contract.

The unit price paid for boring and jacking for each location for the size and type of pipe includes full compensation for furnishing all labor, materials (including conductor pipe when specified), tools, equipment, and incidentals, and for doing all the work involved in boring and jacking pipe, complete in place, including the excavation and backfill, as shown or specified in the Contract, as specified in these Specifications, and directed by the Agency.

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SECTION 38 STORM DRAIN CONSTRUCTION

38-1 GENERAL

All sewer facilities constructed within the Sacramento Area Sewer District service area (http://www.sacsewer.com/pdf/map-servicearea.pdf) must be constructed in accordance with the Sacramento Area Sewer District Standards and Specifications available at http://www.sacsewer.com/pdf/ord/2011-SASD-Standards-and-Specifications-v1.pdf

Storm drain construction must conform to the details shown on the Plans and these Specifications. The Contractor must furnish and install pipe of the materials shown or specified in the Contract. Where alternate pipe materials are listed in the Bid, the Contractor must bid only one of the alternates shown. Substitution of alternate pipe material after bid is not permitted.

38-2 MATERIALS

Storm drain pipe must be of the type, class and size as shown or specified in the Contract, and must conform to the requirements of Section 50, "Construction Materials", of these Specifications for each type and class of pipe.

38-3 EXCAVATION AND BEDDING

Trench excavation and bedding for storm drain pipe construction must conform to Section 19, "Trench Excavation, Bedding and Backfill", of these Specifications.

The Contractor must expose the end of existing pipe to be extended for verification of alignment and elevation by the Agency prior to trenching for new pipe.

38-4 LAYING PIPE

38-4.01 Placement

Pipe laying can proceed after the trench has been excavated to the proper depth, foundation soils are found to be firm and non-yielding, and bedding has been placed and compacted to a non-yielding condition. Pipe laying must proceed upgrade with the bell end of the pipe placed upstream. Each section of pipe must be laid to plan line and grade, with uniform bearing under the full length of the barrel of the pipe. Suitable excavation must be made to receive the bell, which must not bear on the subgrade or bedding. Any pipe that is not in true alignment or shows any undue settlement after laying must be taken up and re-laid at the Contractor's expense. Pipe sections must be laid and jointed so the offset of the inside of the pipe at any joint is held to a minimum at the invert. The maximum allowable offset is as follows:

Pipe Diameter	Allowable Offset Joint
Less than 12 inches	3/8 inch
12 inch to 18 inch	1/2 inch
21 inch to 42 inch	5/8 inch

For joints that are polyurethane compression type, the mating surfaces must be clean and lubricated with a lubricant recommended by the pipe manufacturer. The pipe must be joined spigot into socket. For joints that are shielded rubber coupling the surface of the rubber sleeve must be thoroughly wetted with a silicone base lubricant as recommended by the manufacturer. Joints installed must have compression bands torqued to 70 inch-pounds minimum and must provide uniform tension.

The interior of the pipe must be cleared of all dirt and debris as the work progresses. Pipe must not be laid when the condition of the trench or the weather is unsuitable in the opinion of the Agency. Dewatering of the trench must be maintained as described in Section 10-5, "Control of Water in the Work", of these Specifications. All open ends of pipe and fittings must be closed whenever the work is discontinued. For remedial maintenance or improvement projects in established areas, the Contractor must coordinate the work so that storm drain systems are fully operational at the end of each work day. No runoff is allowed to flow uncontained through any trenches or excavations.

Circular reinforced concrete pipe with elliptical reinforcement must be placed with the minor axis of the reinforcement in a vertical position.

38-4.02 Lines and Grades

All pipe must be laid in strict conformity to the prescribed line and grade with grade bars set and each pipe length checked to the top grade line. Three consecutive points on the same grade of slope must be used at all times to detect any variation from a straight grade. In case any discrepancy exists, the work must be stopped and the discrepancy immediately reported to the Agency. In addition, when requested by the Agency, a string line must be used in the bottom of the trench to insure a straight grade and alignment of the pipe.

The Contractor may use a laser beam system for grade and alignment control. The laser beam must have a minimum accuracy of ± 0.01 foot per 100 feet on line, a minimum visible range of 1000 feet, and must comply with OSHA requirements. The laser system must have good visibility when used with suitable target material. The laser system must be of the self-leveling type so that the laser beam is automatically compensated for small grade disturbances. The laser system must also have an early warning system that warns when the laser is off grade.

38-4.03 NOT USED

38-4.04 Grade Tolerance – Storm Drain

Grade tolerance of the flow line of storm drain pipe must not exceed ± 0.10 feet. The total variation (plus or minus) from design grade must not exceed the following for the stated pipe size:

1. Pipe 21-inch or smaller – 1 inch in 25 feet
2. Pipe 24 through 36 inches - 1.5 inches in 25 feet
3. Pipe 42 inches or larger – 2 inches in 25 feet

38-4.05 Existing Utilities and Facilities

Mortar or brick plugs must be installed in existing manholes as directed by the Agency in order to prevent surface water, ground water, and debris from entering existing storm drain systems during construction. Inflatable plugs are not permitted. Existing storm drain services must not be interrupted. Plugs must be removed upon completion of testing per Section 38-10, "Testing of Pipe", of these Specifications.

The Contractor is responsible for avoiding and protecting all utility, service, or other conflicting lines that are not in direct physical conflict with the facility under construction. The Contractor may arrange with the owner of the utility to temporarily disconnect house service lines or other facilities along the line of work for the Contractor's convenience. The Contractor is responsible for all costs for disconnecting and restoring such utilities.

Utility or other lines that are in direct physical conflict with the structural section of the facility being constructed or appurtenant structures and that cannot be avoided by rerouting the facility being constructed, or for which relocation is not provided in the Plans and Specifications, will be relocated by the owner of the utility prior to or during construction in accordance with Section 42, "Relocation and Maintenance of Utility Facilities", of these Specifications.

If the facility being constructed needs to be rerouted to avoid an existing utility or other obstruction and the rerouting is ordered by the Agency, compensation for the rerouted line will

be made at the unit price bid for the installation of the facility and no additional compensation will be made except as provided in Section 9, “Changes and Claims”, of these Specifications.

When indicated on the Plans or directed by the Agency, storm drain pipes and structures must be abandoned in conformance with Section 15-1.04, "Abandonment of Pipes and Manholes", of these Specifications.

If existing facilites are damaged due to adjacent construction the Agency or Utility is responsible for notifying the affected homeowner and/or Agency. The Agency or Utility causing the damage is responsible for replacement or repair of the pipeline and any damage resulting due to their actions.

38-4.06 NOT USED

38-5 NOT USED

38-6 STORM DRAIN INLET LATERALS

Unless otherwise indicated on the Plans or in the Special Provisions, storm drain inlet laterals must be a minimum of 12 inches in diameter. Unless otherwise indicated in the Contract, materials for inlet laterals must conform to requirements of Section 50, “Construction Materials”, of these Specifications for each type and class of pipe.

Connections of laterals to manholes and inlets must be water and soil tight, and must conform to Section 39, "Manholes", and Section 27-13, "Drop Inlets and Catch Basins”, of these Specifications.

All inlet laterals must be inspected by television inspection per Section 38-10.04, "Television Inspection (TVI)", in this Section of these Specifications.

38-7 PIPE JOINTS

Joints in pipe must conform to the requirements of Section 50, “Construction Materials”, of these Specifications and the manufacturer’s recommendations for the type of pipe being installed.

38-8 PROTECTIVE COVERING

38-8.01 NOT USED

38-8.02 Storm Drain Pipe

Unless otherwise shown in the Contract, storm drain pipe laid in trenches at such an elevation that the top of the pipe bell has less than the minimum cover indicated in Table 38-1 must be protected with a concrete cap, as shown on Standard Drawing 9-1, "Storm Drain Pipe Bedding and Initial Backfill". Unless otherwise specified in the Contract, the concrete used in making the cap must be Class "B" concrete conforming to Section 50-5, "Portland Cement Concrete", of these Specifications.

Table 38-1 Minimum Pipe Cover Requirements	
Pipe Material Type and Location	**Minimum Cover Requirement**
Corrugated Metal	Span/8 but not less than 12
Spiral Rib - Steel	Span/3 but not less than 12 inches
Spiral Rib - Aluminum with spans less than or equal to 72”	Span/2 but not less than 12 inches
Spiral Rib - Aluminum with spans greater than 72”	Span/3 but not less than 30 inches
Reinforced Concrete in unpaved areas and under flexible pavements	1/8 the diameter or rise (the greater of) but not less than 12 inches
Reinforced Concrete under rigid pavements	A 9-inch space between top of pipe and bottom of slab consisting of compacted granular fill must be maintained at a minimum.
Cast-in-Place-Concrete-Pipes in paved areas	The Structural Section plus 24 inches
Cast-in-Place-Concrete-Pipes in unpaved areas	Twenty-four inches (24”)
Polyvinyl Chloride - D2241, D3034, F679, F789, F949, F1803,	Twenty-four inches (24”)
Polyvinyl Chloride - C900, C905, C909	Twelve inches (12”)
Polypropylene – F2736 & F2764	Twenty-four inches (24”)

Note: 1. All depths shown are for a minimum trench width per Standard Drawing 9-1.
2. Cover for paved areas is defined as bottom of asphalt to the top of pipe.
3. Metal/steel/aluminum pipe may not be used for mainline drainage facilities.

38-9 BACKFILLING PIPE TRENCHES

Backfill of all storm drain pipes must conform to the requirements in Section 19, “Trench Excavation, Bedding and Backfill”, of these Specifications.

38-10 TESTING OF PIPE

Unless otherwise specified in the Contract, after laying, backfilling, and compacting pipe, and before placing the roadway aggregate base, the Contractor must clean the pipe system, test for obstructions and leakage, and perform the television inspection (TVI). The Agency might require pipes to be re-tested prior to the completion of the one-year warranty. The Contractor is responsible for the costs associated with this re-testing.

38-10.01 Tests for Obstructions

Unless otherwise indicated in the Contract, balling and flushing or other approved methods for cleaning storm drains is not required unless visual inspection by television or lamping indicates obstructions in the line.

38-10.02 Tests for Leakage

All leakage tests must be completed and approved at finished subgrade and prior to placing the aggregate base. The Contractor is responsible for conducting all leakage tests. The Contractor is responsible for providing all equipment, materials, and labor for performing and making measurements of the leakage tests. The Agency must witness all leakage tests and verify the accuracy and acceptability of the equipment utilized.

When leakage or infiltration exceeds the amount allowed by these Specifications, the Contractor must , at its own expense, determine the source, or sources, of leakage and repair or replace all defective materials and workmanship to the satisfaction of the Agency. The extent and type of repair that will be allowed, as well as results, is subject to the approval of the Agency. The completed pipe installation must then be retested and is required to meet the

requirements of this Section. Any individually detectable leaks must be repaired, regardless of the results of the tests.

The Contractor must test all sections of storm drain pipes for leakage by either air or hydrostatic testing. It is the intent of the leakage testing to test every installed pipe and pipe joint. If groundwater is present but the groundwater elevation is unknown, refer to Section 38-10.02.D(6) to determine necessary groundwater adjustment parameters for the leakage testing. If, in the opinion of the Agency, excessive groundwater is present, the water infiltration test must be used as specified in Section 38-10.02.E(2).

Leakage testing for pipes with a diameter greater than 42 inches must be specified in the Contract and approved by the Agency.

38-10.02.A NOT USED

38-10.02.B NOT USED

38-10.02.C NOT USED

38-10.02.D Air Test for Leakage - Storm Drain

The installer may use this test as a presumptive test to determine the condition of the line prior to backfilling, however, only lines tested after backfilling to final grade will be considered for acceptance.

The Contractor must furnish all the necessary equipment and be responsible for conducting all low-pressure air tests. In addition, the Contractor is responsible for any necessary repair work on sections that do not pass the test. Sealant must not be used in any newly installed storm drain without the prior approval of the Agency. Proper structural repair work will be required by the Agency.

The Agency will witness all low-pressure air tests and verify the accuracy and acceptability of the equipment utilized.

38-10.02.D.(1) *Plug Restraint*

Plug restraints must be provided to prevent blowouts of the plug. Sudden expulsion of a poorly installed plug or of a plug that is partially deflated before the pipe pressure is released can be very dangerous. Every plug must be positively braced against the manhole walls and that no one be allowed in the manhole adjoining a line being tested so long as pressure is maintained in the line

38-10.02.D.(2) *Relief Valve*

All pressurizing equipment used for low-pressure air testing must include a regulator or relief valve set no higher than 9 psig to avoid over-pressurizing and displacing temporary or permanent plugs. The pressure in the test section must be continuously monitored to make certain that it does not at any time exceed 9 psig. (Note: It may be necessary to apply higher pressure at the control panel to overcome friction in the air supply hose during pressurization.)

38-10.02.D.(3) *Equipment*

38-10.02.D.(3)(a) Plug Design

Either mechanical or pneumatic plugs may be used. The Contractor must internally restrain or externally brace the plugs to the manhole wall throughout the test. Prior to any air pressure testing, all pipe plugs must be checked with a soap solution to detect any air leakage. If any leaks are found, the air pressure must be released, the leaks eliminated, and the test procedure started over again.

38-10.02.D.(3)(b) Singular Control Panel

To facilitate test verification by the Agency, all air used must pass through a single, above ground control panel.

38-10.02.D.(3)(c) Equipment Controls

The above ground air control equipment must include a shut-off valve, pressure regulating valve, pressure relief valve, input pressure gauge and a continuous monitoring pressure gauge having a pressure range from 0 to 15 psi. The continuous monitoring gauge must be at least 4 inches in diameter with minimum divisions of 0.10 psi and an accuracy of ± 0.04 psi.

38-10.02.D.(3)(d) Separate Hoses

Two separate hoses must be used: one to connect the control panel to the sealed line for introducing low-pressure air, and a separate hose connection for constant monitoring of air pressure build-up in the line.

38-10.02.D.(3)(e) Pneumatic Plugs

If pneumatic plugs are used, a separate hose is required to inflate the pneumatic plugs from the above ground control panel.

38-10.02.D.(3)(f) Air Compressor Capacity

To provide satisfactory test results, the air compressor capacity must be capable of pressurizing the test section in the required time, or less, as determined in Section 38-10.02.A.(3)(e). The compressor capacity required to accomplish the pressurization is equal to the rate necessary to fill the test section to the desired pressure plus the allowable air loss rate:

$$C = 0.17D^2L /T + Q$$

Where:
C = compressor capacity, ft^3/min,
T = required test time, or less, min,
D = pipe internal diameter, ft,
L = length of test section, ft, and
Q = allowable air loss rate, ft^3/min

38-10.02.D.(4) *Pipe Preparation*

38-10.02.D.(4)(a) Laterals, Stubs and Fittings

All laterals, stubs and fittings into the storm drain test section must be properly capped or plugged to prevent air loss that could cause an erroneous air test result. Restrain gasketed caps, plugs or short pipe lengths with bracing stakes, clamps and tie-rods, thrust blocks or wire harnesses over the pipe bells.

38-10.02.D.(4)(b) Pipe Wetting

If porous pipe materials are used, the pipe walls must be wetted to temporarily reduce the porosity of the material.

38-10.02.D.(5) *Test Procedure*

38-10.02.D.(5)(a) Plug Installation and Testing

After a manhole-to-manhole reach of pipe has been backfilled to final grade and prepared for testing, plugs must be placed in the line at each manhole and secured.

All plugs must be tested for leakage before use. Plug the upstream end of the line first to prevent any upstream water from collecting in the test line.

When plugs are being placed, the pipe adjacent to the manhole must be visually inspected for evidence of shear in the pipe due to differential settlement between the pipe and the manhole. The plug must be placed in the connected pipes outside of the manhole base and beyond the resilient connector. A probable point of leakage is at the junction of the manhole and the pipe; this junction will be tested in the manhole leakage testing in accordance with Section 39-4.02 of these Specifications.

Install and brace plugs to prevent blowouts. The amount of back pressure on the plug must

be calculated to be certain the plug being used is designed to withstand this pressure. A pressure gauge and regulator must always be used when inflating a plug. Under-inflated plugs will not be able to withstand the required back pressure.

38-10.02.D.(5)(b) Pipe Pressurization

Low pressure air must be slowly introduced into the sealed line. The internal air pressure must not exceed 5 psi for areas without groundwater located above the crown of the pipe. In areas with groundwater, the internal air pressure must be increased in accordance with Section 38-10.02D(6), "Determination of Ground Water Elevation and Air Pressure Adjustment", of these Specifications.

38-10.02.D.(5)(c) Pressure Stabilization

The air supply may be throttled to maintain internal pressure until the temperature stabilizes.

38-10.02.D.(5)(d) Timing Pressure Loss

When temperatures have been equalized and the pressure stabilized, the air hose from the control panel to the air supply must be shut off or disconnected. The continuous monitoring pressure gauge must be observed while the pressure is decreased to at least 3.5 psig greater than the average back pressure of groundwater over the pipe. At a reading of between 3.5 and 4.0 psig greater than the average groundwater back pressure, timing must commence with a stopwatch or other timing device.

38-10.02.D.(5)(e) Test Time

Table 38-2 shows the required test time, *T*, in minutes per 100 feet of pipe for each nominal pipe size. The criteria in Table 38-2 were calculated using the following formula:

Minimum test time (T) at a given allowable air loss (Q):

$$T = K \times D^2 L / Q$$

Where:
D = nominal size, in. (mm),
K = 0.370×10^{-3} for inch-pound units,
K = 0.564×10^{-7} for S.I. units,
L = length of line of one pipe size, ft (m)
Q = air loss, ft^3/min (m^3/min), and
T = time for pressure to drop 1.0 psi (7 kPa), min/100’

TABLE 38-2
MINIMUM TEST TIME AND AIR COMPRESSOR CAPACITY FOR AIR LEAKAGE TEST

Nominal Pipe Size, D in. (mm)	Minimum Test Time, T (Min:sec/100 ft)	Allowable Air Loss, Q (ft^3/min)	Minimum Air Compressor Capacity (ft^3/min)
4 (100)	0:18	2.0	8.4
6 (150)	0:42	2.0	8.4
8 (205)	1:12	2.0	8.4
10 (255)	1:30	2.5	10.5
12 (305)	1:48	3.0	12.6
15 (380)	2:06	4.0	16.8
18 (455)	2:24	5.0	21.0
21 (535)	3:00	5.5	23.0
24 (610)	3:36	6.0	25.1
27 (685)	4:12	6.5	27.2
30 (760)	4:48	7.0	29.3
33 (840)	5:24	7.5	31.4
36 (915)	6:00	8.0	33.5
39 (990)	6:36	8.5	35.6
42 (1065)	7:18	9.0	37.7

38-10.02.D.(5)(f) Testing Pipes with or Lateral Connections

If lateral connections are included in the test section, the lengths of the service or lateral connections may be ignored when computing required test times, unless otherwise specified in the Contract or directed by the Agency.

If the test section includes more than one pipe size, determine the minimum test time for each size and add the test times to arrive at the total test time for the section.

38-10.02.D.(5)(g) Pipe Acceptance Criteria

If the test time shown in Table 38-2 elapses before the air pressure drops 1 psig, the section undergoing the test has passed the test. The test may be discontinued once the prescribed time has elapsed even though the 1 psig drop has not occurred.

38-10.02.D.(6) *Determination Of Groundwater Elevation and Air Pressure Adjustment*

38-10.02.D.(6)(a) Applicability

The requirements of this Section apply where groundwater is known to exist or is anticipated above the pipe to be tested.

38-10.02.D.(6)(b) Pipe Nipple Installation

During manhole installation, a 1/2-inch diameter threaded pipe nipple must be installed through the manhole wall directly on top of 1 of the pipes entering the manhole. The threaded end of the nipple can extend a maximum of 2 inches on the inside of the manhole. The total length of the nipple must exceed the manhole wall thickness by at least 4 inches. The pipe nipple must be non-corrosive and resistant to chemicals common in domestic sewage. A permanent, watertight seal must be provided around the pipe nipple at the manhole wall. The pipe nipple must be sealed with a threaded 1/2-inch cap. Not every manhole is required to have a pipe nipple. A few key manhole locations is sufficient to establish a groundwater profile for the

test area. The Agency will assist the Contractor in selecting appropriate manholes for pipe nipple installation.

38-10.02.D.(6)(c) Groundwater Elevation

Immediately before testing, the groundwater level must be determined by removing the threaded cap(s) from the nipple(s) nearest the section to be tested, blowing air through the pipe nipple(s) to remove any obstructions, and then connecting clear plastic tube(s) to the pipe nipple(s). Each plastic tube must be held vertically to allow groundwater to rise in it. After the water level in the tube has stopped rising, a measurement of the height in feet of water over the invert of the pipe must be taken. (See Figure 38A). If the section to be tested is not immediately adjacent to an installed pipe nipple, the groundwater height must be estimated based upon nearby height readings and the pipe's invert elevation.

38-10.02.E Hydrostatic Tests for Leakage

38-10.02.E.(1) *Water Exfiltration Test*

The Contractor, at his own expense, must provide the water used in testing. If, in the opinion of the Agency, excessive groundwater is encountered in the construction of the storm drain, the water exfiltration test for leakage must not be used and the water infiltration test for leakage per Section 38-10.02.E(2) of these Specifications must be used.

38-10.02.E.(1)(a) Test Procedure

A section of pipe must be prepared for testing by plugging the upper side of the downstream manhole and all openings in the upstream manhole except the downstream opening. Service to existing storm drain laterals must not be interrupted. Plugs must be installed and tested as required in Section 38-10.02.D, “Plug Restraint”, of these Specifications. Where grades are slight, 2 or more sections between manholes may be tested at once. Where grades are steep and excessive heads would result by testing from one manhole to another, test tees, the same size as the main, must be installed at intermediate points so the maximum head on any section under test does not exceed 11.5 feet.

The sealed test section must be filled with water to the Water Test Elevation at the upstream end of the test section. If it is not possible to test the pipe to the Water Test Elevation, the system must be tested to the surface of the lowest manhole or inlet rim in the section tested. The water must be introduced into the test section in advance of the test period to allow the pipe and joint material to become saturated with water. The water level must then be brought to the Water Test Elevation mark again. At the beginning of the test, the elevation of the water in the upper manhole must be carefully measured from a point on the manhole rim or test tee. After a measured period of time, the water elevation must be measured from the same point on the manhole rim or test tee and the loss of water during the test period calculated. If this calculation is difficult, enough water must be measured into the upper manhole to restore the water to the level existing at the beginning of the test, and the amount added taken as the total leakage.

38-10.02.E.(1)(b) Water Test Elevation

The Water Test Elevation for storm drain pipe must be 11.5 feet of head or 11.5 feet above the exisint ground water elevation, whichever is greater.

38-10.02.E.(1)(c) Pipeline Acceptance Criteria

The allowable exfiltration rate for any length of the storm drain pipe between manholes must be measured and cannot exceed 500 gallons per inch of internal pipe diameter per mile of pipe per day.

38-10.02.E.(2) *Water Infiltration Test*

38-10.02.E.(2)(a) Test Procedure

The end of the pipe at the upper structure must be closed sufficiently to prevent the entrance of water, and pumping of groundwater must be discontinued for at least 3 Calendar Days, after which the section must be tested for infiltration.

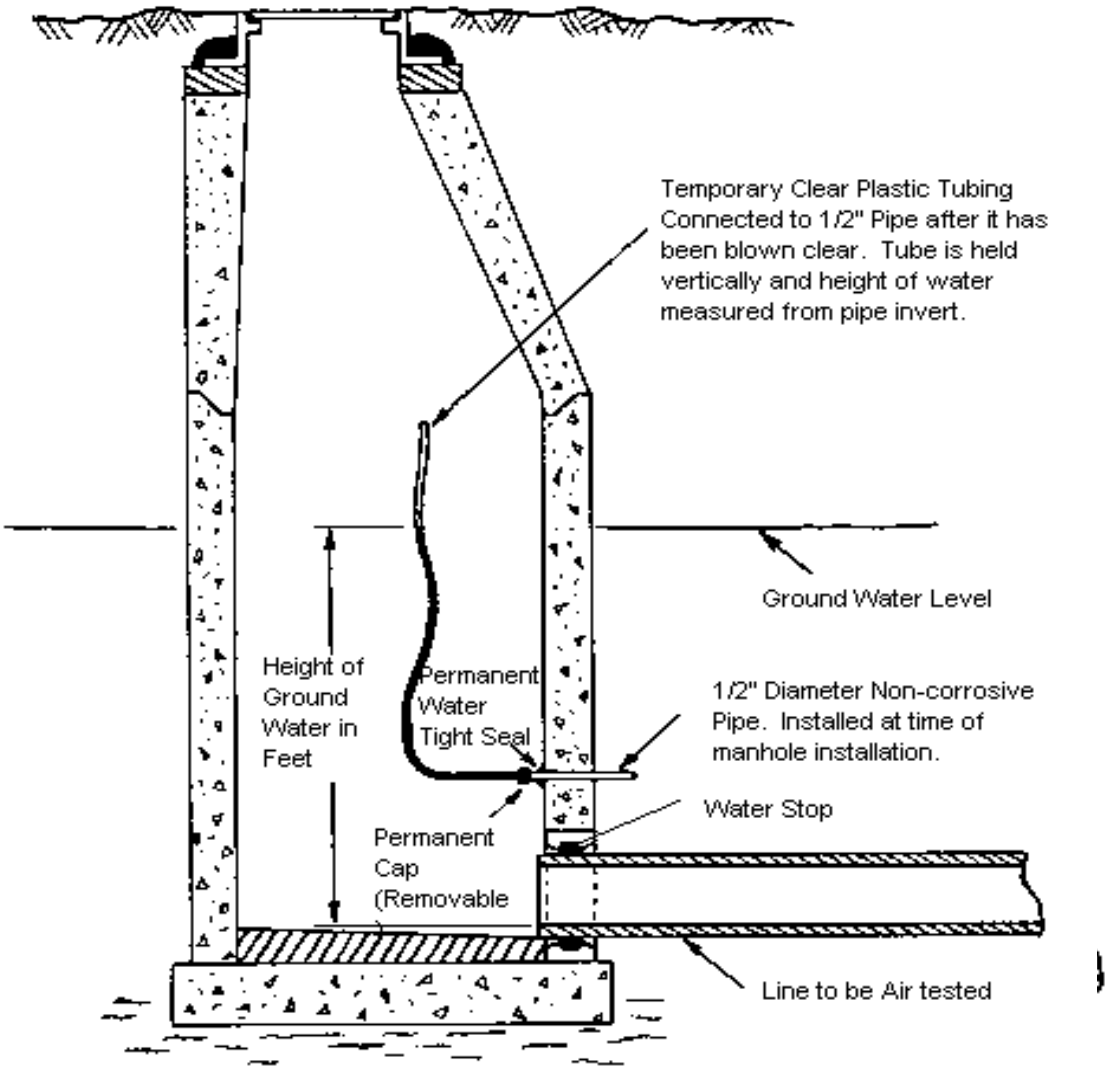
The infiltration rate for the test section must be measured by a weir or current meter placed in the appropriate manhole.

38-10.02.E.(2)(b) Pipeline Acceptance Criteria

The allowable infiltration rate for any length of the storm drain pipe between manholes must be measured and cannot exceed 500 gallons per inch of internal pipe diameter per mile of pipe per day.

FIGURE 38A

MANHOLE CROSS-SECTIONAL VIEW OF THE PROPER METHOD FOR DETERMINING GROUND WATER HEIGHT



38-10.02.E.(2)(c) Air Pressure Adjustment

The air pressure correction, which must be added to the 3.5 psig normal test starting pressure, must be calculated as follows:

(Average vertical height, in feet, of groundwater above the invert of the storm drain pipe to be tested) ÷ 2.31

The result gives the air pressure correction in pounds per square inch, gauge, to be added. (For example, if the average vertical height of groundwater above the pipe invert is 2.8 feet, the additional air pressure required is 2.8 divided by 2.31, or 1.2 psig. This requires a minimum starting pressure of 3.5 psig plus 1.2 psig, or 4.7 psig.). The allowable pressure drop of 1.0 psig and the times in Table 38-2 are not affected and remain the same.

38-10.02.E.(2)(d) Maximum Test Pressure

The starting test pressure must not exceed 8.5 psig. If the average vertical height of groundwater above the pipe invert is more than 11.5 feet, the submerged section must be tested using 8.5 psig as the starting test pressure.

38-10.02.E.(2)(e) Re-sealing Of Pipe Nipples

After the groundwater height has been determined, each pipe nipple must be recapped and sealed to prevent any future infiltration.

38-10.03 Tests for Deflection

38-10.03.A NOT USED

38-10.03.B Storm Drain

When indicated in the Contract, or when inferior products or construction methods are used or visual inspection by television or lamping indicates a potential for excessive deflection, a deflection test must be performed by the Contractor on PVC drain pipe. The test must be made after completion and acceptance of all backfill operations and prior to placement of the finished surface, if any. Deflection testing must be conducted no sooner than 30 Calendar Days after completion and acceptance of all backfill operations, unless otherwise approved by the Agency.

The deflection testing must be witnessed by the Inspector and must be conducted by the Contractor at the Contractor's expense. Unless otherwise shown on the Plans or in the Special Provisions, 100 percent of all mainline PVC drain pipe installed must be deflection tested for excessive vertical deflection using a pre-sized, rigid mandrel or "Go-No-Go" device approved by the Agency. The mandrel size must be clearly labeled and must be sized to provide a diameter of at least 92.5 percent of the "Base Internal Diameter" per ASTM D 3034 for PVC. Base inside diameters for larger diameters of PVC pipe can be found in ASTM F 679.

The Contractor must remove, replace, and retest any pipe section through which the mandrel is unable to pass. The use of any rerounding device or similar method to correct or reduce over deflection is not permitted. Re-tests for deflections must be made at the Contractor's expense.

38-10.04 Television Inspection (TVI)

This section documents the general procedures and codes required to perform a TVI. The need for a TVI is generated by both internal operations for the purposes of proactive maintenance activities or response to customer calls and by external projects existing or new systems. The processes may be slightly different depending on the need. For existing storm drain systems the TVI is used to identify the condition of the facilities and identify the location and extent of defects. The TVI provides information to allow for a determination of rehabilitation needs, to document pre-rehabilitation pipeline condition, and to document post-rehabilitation condition. The TVI is also used to schedule routine maintenance, thus avoiding emergency calls. For new storm drain systems, the TVI is used to document the initial condition of the pipe and

find defects caused by the installation of the pipelines.

For new facilities, a TVI must be performed to document that the new facilities were installed in accordance with the Contract and these Specifications. The TVI must be performed after all other testing has been completed to the satisfaction of the Agency, and before placement of AB road base or finished improvements within the storm drain easement.

A TVI must be conducted prior to all new pipeline acceptance. The TVI must document and verify the following:

- The condition of the pipeline.
- The location of laterals and taps.
- Line and grade.
- Cleanliness.

Prior to the TVI, the pipeline, including all appurtenances, must be sufficiently cleaned, as directed by the Agency, to allow for complete visual inspection of the pipe.

The TVI performed on all projects must be performed to these Specifications using the inspection (header) information described in this section and utilizing the National Association of Sewer Service Companies (NASSCO) code system within the Granite XP software, and be delivered on an external hard drive with a USB connection for the Agency to review for compliance with these Specifications. The hard drive will be returned to the TVI Contractor within 10 Working Days. Direct TVI submittals to:

County of Sacramento Department of Water Resources Drainage Maintenance Engineering Section:
10151 Florin Road (MS 87-003)
Sacramento CA 95829
Phone: (916) 875-7159

The TVI must be performed after all required testing specified in the Contract is satisfactorily completed. The Contractor must perform separate TVIs on each lateral and each mainline.

The Agency will make a visual inspection of each facility after it has passed the testing requirements and is considered to be in its final condition. The inspection will determine the completeness of the facility; defects must be corrected to the satisfaction of the Agency before the TVI commencement.

38-10.04.A Safety

Safety and traffic control procedures must be maintained at all times in accordance with the requirements of Section 12, “Safety, Public Convenience, and Traffic Control”, of these Specifications, and any other applicable procedures or requirements.

The TVI must be conducted from above ground. Prior to opening a manhole cover or a confined space area, a gas monitor must be used to detect the oxygen level, presence of explosive or flammable gases, vapors, or mist in excess of 10 percent of the (LEL/LFL), and toxic gases in excess of the permissible exposure levels (Hydrogen Sulfide, Carbon Monoxide.)

Manhole entry, if required, must be conducted in strict accordance with permit required confined space entry regulations as specified in Section 12-1.05, “Confined Spaces”, of these Specifications.

38-10.04.B Agency-Approved TVI Contractor List

Before a TVI Contractor performs a TVI on an Agency storm drain system, the Contractor must demonstrate that their equipment, video quality, and data capture system is in compliance with the Specifications. When the TVI Contractor has met the Agency requirements, the TVI Contractor will be added to the "Approved TV Contractors" list. This section presents the requirements that a TVI Contractor must meet to be on this list. The TVI Contractor must be on the Agency's "Approved TV Contractors" list prior to the submittal of any publically bid project by the Agency.

The "Approved TV Contractors" list will be updated annually in March. Recertification of each Contractor will be required every March.

38-10.04.B.(1) *Sample Video and TVI Report Submittal*

Prior to TVI Contractor approval by the Agency, the TVI Contractor must submit a sample video to the Agency for review in accordance with these Specifications. The sample video must represent the quality of video inspection and electronic data to be provided by the Contractor. Contractors must submit a complete sample inspection, similar in content to the project requirements, for the Agency to review prior to starting inspection work on the project.

38-10.04.B.(2) *TVI Equipment Submittal*

TVI equipment must include video cameras, a color monitor, digital recording equipment, sound, and voice recording capabilities, gauging tool, cables, power sources, and all equipment necessary to perform a TVI in accordance with the Contract and these Specifications. The Contractor must submit a complete list of equipment and operational information to be used for TVI's, in accordance with Section 5-8 "Contractor's Submittals", of these Specifications.

38-10.04.B.(3) *Camera*

The camera must be a pan and tilt camera system, and must be specifically designed and constructed for storm drain environments. The camera must include a solid-state color video camera with a panning and rotational camera head, remote adjustable optical focus and automatic light compensation iris with remote override, camera controller with remote focus, iris and auto centering control and camera lighting system.

There must be no geometrical distortion of the image. The camera and monitor must be able to produce a minimum 460 lines of horizontal resolution and 400 lines of vertical resolution. Focal distance must be adjustable from a range of 1 inch to infinity. The camera must be mounted on skids or a tractor suitably sized for each pipe diameter to be inspected. The camera must move through the pipeline in a downstream direction whenever possible at a maximum uniform rate of 30 feet per minute. Maximum allowable error for all the footage counters cannot exceed 0.5 percent.

38-10.04.B.(4) *Computer System*

The Agency uses Granite XP software for capture of TVI data. Granite XP software must be used by all Contractors submitting TVIs for review and acceptance of work. Inspections must follow the Agency configuration standards and be exported according to specific directions provided by the Agency.

38-10.04.B.(5) *Lighting*

Illumination sensitivity must be 3 lux or less. During inspection, lighting intensity must be adjusted to minimize glare. Lighting and picture quality must be adjusted to provide a clear, in-focus picture of the entire periphery of the pipeline for all conditions encountered. Lighting must be adjusted according to the size of the pipe.

38-10.04.B.(6) *Agency Facility Numbers*

The Agency assigns facility numbers to each manhole and drain inlet. For new and replacement projects, facility numbers will not be assigned until the facilities are in the ground. The Contractor must submit 2 complete sets of approved plans, including the plan and profile sheets, reflecting the actual installation to the

County of Sacramento Department of Water Resources Drainage Maintenance Engineering Section:

10151 Florin Road (MS 87-003)

Sacramento CA 95829

Phone: (916) 875-7159.

Private systems will not be assigned Agency Facility Numbers or be reviewed for electronic compliance by the Agency.

38-10.04.C Scheduling a TVI for Construction

Prior to the TVI, the following items must be completed.

- Agency numbers assigned to manholes and drain inlets.
- Install backfill and compact:
  - underground facilities,
  - utility piping,
  - conduits, and
  - access structures.
- Acceptance of air or water leakage test.
- Cleaning of pipes.

The Contractor must coordinate with the Agency Inspector to be on site and witness the entire TVI. If an Agency inspector is not available, one of the two following situations will apply.

1. If the pipeline installation Contractor is doing the TVI an Inspector must be present. An alternate inspector may be requested from the Agency.
2. If the pipeline installation Contractor is not doing the TVI the TVI Contractor must verify on the TVI video the introduction of water into the pipe system and verify the target size with a tape measure.

The Project Inspector will fill out the top portion of the TVI Form and give to the TVI Contractor to be turned in with the TVI data. The Agency TVI Reviewer will complete the form after an office review of the pipe installation and distribute comments appropriately.If the TVI is witnessed, the inspector must fill out the TVI Form in full.

38-10.04.D Procedure

38-10.04.D.(1) *Water Introduction – New Construction*

Prior to performing the TVI on new construction, the Contractor must introduce enough water in the pipe segment(s) to fill all low sections and flow through the downstream structure. A 2-inch target must be used for storm drain pipelines, unless otherwise specified or directed by the Agency. If any section of the pipe segment appears to be dry, additional water must be introduced as described above. The Agency Inspector will verify the adequacy of water and target size before the TVI is performed. The TVI must begin within 30 minutes of introducing water into the pipe segment.

38-10.04.D.(2) *Direction of TVI*

Mainlines must be inspected from upstream structure to downstream structure whenever possible, except for drain inlets and stubs. Pipelines inspected against the flow direction must

be noted “Against the Flow” to indicate a reverse setup on the TVI Report.

38-10.04.D.(3) *Pipelines (Mainelines and Laterals)*

The Contractor must verify footage counter accuracy prior to the start of the TVI and calibrate the counter every 2 weeks during the TVI portion of the project. The recording must begin at the street surface. The camera set point (footage counter set point) must be from the center of the manhole to the focal point in the direction of camera travel. The footage counter must appear on the screen at all times. The camera must travel at a maximum speed of 30 feet per minute (fpm) with slowdowns at joints. The camera must stop and pan or tilt to observe and clearly identify the following.

- Centerline – Center of structure both at the upstream and downstream sections,
- Laterals that discharge into the structure,
- Start Line – The point of transition between structure and the pipe,
- Camera Set Point,
- Lateral taps,
- Joint separation (gap),
- Offset joints,
- Alignment problems and elbows,
- Cracked or damaged pipe including lined or point repaired pipe,
- Debris in the pipeline,
- Identifiable sags or high points in the pipeline,
- Root intrusion,
- Inflow or infiltration,
- Grease,
- Corrosion,
- Material Changes,
- Diameter Changes,
- End of Pipeline – End of the pipe at the structure wall.

38-10.04.E Electronic Data

38-10.04.E.(1) *Header Information*

This section covers the information and standard formats and codes required for completion of the TVI header in Granite XP, which is input prior to conducting the TVI. The header information contains the date and time of TVI and information about the inspection location, operator conducting the TVI, and pertinent data about the pipe being inspected. The header is completed in the field to provide as much information as possible about the inspection work. The table below includes a list of basic header information required for a TVI.

The following guidelines must be followed when completing the TVI header.

- Unless specifically required, do not enter units or abbreviations for measurements (e.g. in, “, feet, ft, ‘,).
- Use all capital letters.
- Enter all numeric entries to one decimal place, unless otherwise directed in these instructions.
- If the TVI extends through a structure and spans more than 1 pipe segment, a new header form must be completed at the start of each subsequent pipe segment.
- If a reverse set up is required because the TVI in the downstream direction could

not be completed due to an obstruction, a new header form must be completed at the start of the reverse set up TVI. If an inspection from the upstream structure was started and a video exists, a hew header form must be completed at the start of the reverse set up TVI and the video should be related to the same inspection records as the initial video from the upstream structure.

Table 38-4 lists the required reporting header information for the TVI and provides an explanation of appropriate responses to each item.

Table 38-4 Granite XP Header Information

Information Label or Field Name	Appropriate Sample Responses	Description/Comments
Date Created	8/8/2010	Date TVI was performed
Start Date/Time	8/8/2010 18:34:24	Time of day using 24-hour clock
Status	PENDING	Status of the inspection progress
Surveyed Footage	152 FT	Length of the inspection
Direction	D – DOWNTSTREAM	Indicates whether TVI is in normal, With the Flow (upstream to downstream direction) (D) or Against the Flow (reverse set-up) (U).
Operator	DOEJ or Vendor ID	Vendor or Employee performing inspection
WO #	322527	The Agency work order number, if known
Review Priority	1	The Agency priority, if known
Facility Number	364-182-M24	ID of facility number
City	RANCHO CORDOVA	Jurisdiction in which site is located.
Street	123 MAIN ST	Street (or nearest street if pipe is in easement) and address number of upstream node of inspected segment
Pipe Size	8	Pipe diameter in inches
Pipe Material	RCP	Pipe material (see abbreviations)
Catalog #		Appropriate Number (Hanging Plan Number, Work Order)
Project Name/Work Order	PROJECT 2 SOUTH LAGUNA UNIT 2	Name of project for which TVI is being done or Agency Work Order Number
Comments/Summary		Indicate other pertinent information, such as if pipe was plugged during TVI, whether pipe was cleaned prior to, during, or after TVI, last PM date, reason if inspection was abandoned. Also indicate wheeled length if segment length was measured.

38-10.04.E.(2) ***Digital Data Format***

The video files generated within Granite XP must use the Granite default format.

38-10.04.F Visual Data Procedure

38-10.04.F.(1) ***Pipelines (Mainelines and Laterals)***

Mainline and lateral inspections are performed from structure to structure. Each individual pipe segment requires a separate inspection record and video. Immediately before the insertion of the camera into the structure, the following information must be provided as text on the video recording. The text must be clearly displayed on a contrasting background (e.g. white text on dark background or black text on white background). The text must be displayed for approximately 15 seconds or for the duration of the Start-up Narration, whichever is longer.

If an inspection is being performed on consecutive pipe segments with the same set-up, this information must be provided at the start of each pipe segment.

- Upstream and downstream facility numbers (or “from” and “to”) facility numbers of inspected pipe segment.
- Direction of camera travel: The direction of camera travel must be in the direction of flow in the pipe unless there are access problems that require a reverse set-up, or the camera cannot pass through the pipe from end-to-end in the direction of flow. A reverse set-up must be performed against the flow is there is an upstream structure access problem or restricted mainline access, or because an obstruction prevents the camera passing. Reverse set-ups for convenience are not acceptable. All TVI observation locations are to be recorded based on the direction of camera travel.
- Purpose of the TVI.
- Location.
- Date and time of day.
- Project name or work order number.
- TVI company or Agency staff.
- Operator’s name.

During the TVI, the running screen must include the following information. The display of this information must in no way obscure the central focus of the pipe being inspected.

- Running footage (distance traveled): The “zero” point of the TVI is the centerline of the structure where the camera is inserted. The footage counter must be set accordingly by adding the footage from the centerline of the structure to the edge of the structure plus the camera length (or the camera length plus the camera focal length).
- Upstream and downstream facility numbers.

Defect codes must not be shown on screen text. The end point of the segment is the centerline of the structure at the opposite end of the pipe segment from the starting structure. The end point of the inspected pipe segment must be recorded for approximately 15 seconds.

If a TVI set-up passes through a structure not shown on the storm drain maps, a structure centerline observation code must be recorded at the footage location of the new structure. At the same footage location a structural UNK code must also be created to annotate an unknown structure has been found. A new TVI record must not be started.

38-10.04.F.(2) ***Interruption of Progress***

If the camera becomes stuck or otherwise cannot progress, the cause of the interruption must be evaluated, reported, and, if possible, corrected. If the camera cannot pass, a reverse

set-up must be used if feasible to complete the TVI. If cleaning the pipe is required before the TVI can be resumed, recording of TVI observations must continue at 0.1 foot beyond the position where the TVI was interrupted. A comment regarding the cleaning procedures must be included in the data record.

38-10.04.F.(3) *Defect Panning*

When a defect or other feature is encountered in a pipe, it must be recorded at the footage indicated on the footage counter by using the Observation Codes contained in Granite XP under the NASSCO code system. Progress of the camera must be slowed and stopped for a minimum of 15 seconds or as needed so that the observation can be panned with the camera, the data recorded, narration made, and a still picture captured if required.

38-10.04.F.(4) *Counter Calibration*

The footage counter for the camera must be calibrated at least every 2 weeks during TVI operations. The footage counter must be accurate to 0.5 percent. The calibration is performed by checking the cable counter against a measured length of 400 feet. The date of last calibration must be verified by the Inspector before every TVI.

38-10.04.F.(5) *Verification of Map Length*

If the map length (as indicated by the written distance shown on storm drain plans) and the TVI field length for a pipe segment differ by more than 0.5 percent, the field length must be verified by measuring between the centerlines of the structures using a measuring tape or wheel. The measuring wheel must also be calibrated every 2 weeks along with the TV footage counter. In measuring the pipe length, common sense must be used to take into account the topography of the ground surface and the alignment of the storm drain.

38-10.04.F.(6) *Lighting*

Lighting in the pipe must adequately illuminate the pipe with a minimum amount of glare. Lighting must be adjusted to provide a clear picture of the entire periphery of the pipe for all conditions encountered. Illumination sensitivity must be 3 lux or less.

38-10.04.F.(7) *Flow Level*

The flow level requirements for TVI vary depending on the type of inspection being performed. Generally, the more pipe visible, the more data is obtained. Lower amounts of visible pipe wall may be allowed, depending on site conditions, with approval of the Agency.

For new construction, nearly 100 percent of the circumference of the pipe wall circumference must be visible. A small amount of water must be introduced for purposes of sag identification.

38-10.04.F.(8) *Camera Travel Speed*

The camera travel speed must be a uniform rate of no more than 30 fpm. The camera speed must be slower when recording features and defects.

38-10.04.F.(9) *Clarity*

All video and still picture images must be clear and sharp. The camera operator must adjust focus, iris, zoom, and lighting as needed to obtain a satisfactory image. The recorded image from the TVI camera must be free of fog or haze in the pipe. If the camera lens becomes obscured with condensation, grease, scum, or debris, the camera must be removed from the pipe, cleaned, and reinserted to continue inspecting the pipe. For increased clarity, the Contractor must also try adjusting the iris, focus and zoom of the camera.

38-10.04.G Pipeline Narration

The TVI video recordings are part of the Agency's permanent records and must not contain inappropriate language, idle chatter, background noise, and discussions between the operator

and other crew members. All video narration must be live by the TVI operator. All defect codes must be narrated. Digital voice narration is only allowed if specifically approved by the Agency.

38-10.04.G.(1) *Pipelines (Mainlines and Laterals)*

A voice narration must be included in the video recording. This narration must include the following information at the beginning of each pipe segment.

- Upstream and downstream facility numbers.
- Direction of camera travel.
- Type (mainline) and purpose of inspection.
- Location (address).
- Date.
- Work Order Number (if applicable) and project name.
- Pipe size.
- Pipe material.
- TVI company or Agency Staff Name.

All observations along the length of the pipe must also be narrated, with a description of the observation and clock position, if applicable. For example

- "Tap at 10 o'clock at 56 feet; factory tap"
- "Severe roots at 23 feet, all around crown of pipe"
- "Medium grease and scum at flow line starting at 45 feet"… "End grease at 85 feet"

At the conclusion of the inspection of a pipe segment, the operator must state the final TVI footage and indicate that the TVI of the pipe segment is complete. For example

- "TVI of storm drain mainline from manhole 364-182-M24 to manhole 364-182-M25 is complete at 222 feet" If the inspection had to be abandoned before reaching the ending structure, then a statement to this effect must be made as part of the ending narration with a reason given as to why the inspection could not be completed.

38-10.04.H Observation Codes

NASSCO code system will be used for recording observations of pipe features and defects identified during the TVI.

38-10.04.I Nonconforming TVI

If the quality of the video recording is not in compliance with these Standards and Specifications, the pipeline must be reinspected or revised at the Contractor's expense. *All inspections that fail to meet these standards can and will be rejected.*

38-10.04.J Acceptance Criteria for New Construction

The following types of deficiencies must be corrected by the Contractor at no cost to the Agency:

- Joint separation equal to or greater than 1/2 inch.
- Offset mainline joints equal to or greater than one-half the pipe wall thickness.
- Joint deflection of more than 75 percent of manufacturer's recommended maximum.
- Cracked or damaged pipe, including liner pipe.
- Debris in the pipeline.
- Identifiable sags or high points (i.e., out of tolerance grades per Sections 38-4.04).

- All necessary easements must be recorded prior to pipeline acceptance.
- Noncompliance with any other requirements of these Specifications or the Contract Documents.

The Contractor will be notified in writing of any deficiencies. The Contractor may request to review the video with the Agency. Deficiencies in electronic data must be corrected and resubmitted to the Agency within 10 Working Days, and must reflect current coding and labeling procedures as referenced in these Standards and Specifications.

Upon completion of all required corrective actions, the pipes must be cleaned as necessary and reinspected (TVI) in accordance with these Standards and Specifications and submitted within 5 Working Days after completion of the TVI. This process must be repeated until the Agency review of the final TVI Report indicates that the pipe installation, cleaning, and electronic data meet all requirements of the Contract Documents.

38-11 NOT USED

38-12 MEASUREMENT AND PAYMENT

The quantity of storm drain construction of the sizes, grades, and types of pipes listed in the Contract is the slope length designated by the Agency, measured along the centerline of the pipe from manhole to manhole, and includes the straight run of all wyes and tees where used. The length is measured from the inside face of the structures and does not include the inside diameter of manholes and other structures. The prices paid per linear foot for the sizes, grades, and types of pipes listed in the Contract include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in storm drain construction, complete in place, including furnishing pipe, excavation and backfill, removing obstructions, removing and replacing utilities, bedding, placing and jointing the pipe, testing pipe lines, connecting to existing manholes or pipes, as shown or specified in the Contract, in these Specifications, and as directed by the Agency. Full compensation for wye or tee fittings placed in a main storm drain in connection with storm drain services is included in the price paid per linear foot for the main storm drain pipe and no additional compensation will be paid.

The quantity of storm drain services of the sizes, grades, and types of pipes listed in the Contract will be measured by the unit constructed in place. The unit prices paid for the storm drain services of the respective sizes, grades, and types of pipes listed in the Contract include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing and placing all service pipe from the wye or the fitting in the main storm drain to the property line, complete in place, including furnishing and placing other necessary bends and stoppers to construct the service, as shown or specified in the Contract, as specified in these Specifications, and directed by the Agency.

The cost of each TVI and inspection is all-inclusive and is included in the price paid per linear foot of pipe, or as specified in the Contract Documents. Payment for TVI work that is not required as part of construction work for pipeline rehabilitation will be made on an actual inspected lineal footage basis per diameter of pipeline inspected and includes the cost of all items necessary to complete the TVI including bypass pumping or flow control that is required to perform the inspection.

No direct payment will be made for TVI services required as part of a construction work for pipeline rehabilitation. Payment for TVI is included in the Contract bid prices for the related rehabilitation items.

SECTION 39 - MANHOLES
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SECTION 39 MANHOLES

39-1 GENERAL

All sewer facilities constructed within the Sacramento Area Sewer District service area (http://www.sacsewer.com/pdf/map-servicearea.pdf) must be constructed in accordance with the Sacramento Area Sewer District Standards and Specifications available at http://www.sacsewer.com/pdf/ord/2011-SASD-Standards-and-Specifications-v1.pdf

Storm drain manholes, as shown on the Plans, must be in accordance with Standard Drawing 9-7A or 9-8A and these Specifications.

39-2 CONCRETE MANHOLES

39-2.01 NOT USED

39-2.02 Concrete Storm Drain Manholes

All manholes must be precast unless specified as Cast-In-Place in the project plans. If a Cast-In-Place manhole is specified, but a precast manhole can be constructed per specifications, the precast manhole must be installed. The substitution of manhole types (Precast/Cast-In-Place) will not warrant additional compensation.

Precast manhole barrels, risers, cones, flat slab tops, and grade rings must conform to ASTM C478 with the additional requirement that the cement used must be Type II. Manhole sections must be manufactured without the provision for steps. Precast manholes must be vacuum tested by the manufacturer per Section 39-4.02.A of these Specifications prior to delivery.

Manhole bases must be precast when the internal diameter of the largest pipe is less than 33 inches. Precast manhole bases must be placed on a minimum of 4 inches of 3/4-inch crushed rock conforming to Section 50-16, "Clean Crushed Rock", of these Specifications. Pipe connections to manholes must be made using a resilient connector conforming to ASTM C923. For precast bases the connection must be made with a flexible compression gasket set during the precast process or a boot connector. For cast-in-place bases the connection must be made with a water stop. All connections must be water and soil tight. Mortar used in finishing the manhole and the method of placement must conform to the State Specifications. The surface finish must conform to the State Specifications.

When the inside diameter of the largest pipe is 33 inches or greater, the manhole base may be cast-in-place. The base must not be cast less than 4-inches or more than 12-inches above the outside top of the main incoming or outgoing pipe. Concrete used must be Class "A" conforming to Section 50-5, "Portland Cement Concrete", of these Specifications. Slump must not exceed 2 inches as determined by the slump cone method of ASTM C143, or an equivalent slump as determined by California Test Method 533. Minimum and maximum wall thicknesses for the cast-in-place sections must conform to the following Table 39-1 and must be strictly adhered to:

TABLE 39-1 MINIMUM/MAXIMUM WALL THICKNESSES FOR CAST-IN-PLACE SECTIONS		
Manhole Diameter (inches)	**Minimum Wall Thickness (inches)**	**Maximum Wall Thickness (inches)**
48	5	7
60	6	8
72	7	9
84	8	10
96	9	11

Inside diameters of the cast-in-place portions must equal the diameter of the manhole specified. Standard precast manhole riser sections and other components as specified in this Section must be used above the cast-in-place base to bring the manhole rim to grade. Manholes with cast-in-place bases and all of the associated connections and joints must be capable of passing the leakage test as specified in these Specifications.

Cast-In-Place manholes must maintain the specified internal diameter throughout the manhole base and riser sections. The internal diameter must not be decreased until the cone section or flat slab top is placed. Cast-In-Place manhole base bottoms must be placed on a minimum of 4 inches of 3/4-inch crushed rock conforming to Section 50-16, “Clean Crushed Rock”, of these Specifications. Cast-In-Place manhole bases must be 8 inches thick with #4 steel reinforcing bars placed at 12 inches on center each way. The reinforcing must be centered between the manhole invert and bedding.

Concrete on the cast portion may be placed against undisturbed earth provided wall thickness requirements can be met; otherwise, outside forms are required. Forms must be removed and the structure visually inspected prior to backfill. All rock pockets, cracks, or other defects must be patched in conformance with of the State Specifications or, as an alternate, Section 30-15.05, "Concrete Repair", of these Specifications.

Standard concentric cones conforming to ASTM C478 must be used on all manholes shown on the Plans unless otherwise specified. Where depth is insufficient for cones, concentric flat slab tops must be used.

Joints in precast manhole shafts must be sealed by buttering the joint space of the previously laid barrel section or base with mortar, or must be sealed with preformed plastic sealing compound conforming to Federal Specifications SS-S-0021A and installed as recommended by the manufacturer. All joint surfaces must be thoroughly cleaned prior to placing the sealing compound or buttering with mortar. The inside and outside of mortared joints must be plastered with mortar and the inside brushed to a smooth finish with a wet brush. Special precautions must be taken to see that the entire joint space is filled with mortar and is watertight.

Manhole frames and covers must be of the type and size shown on the Plans and must conform to Section 50-34, “Storm Drain Castings”, of these Specifications, Standard Drawing 9-9A/9B or 9-10, and these Specifications. Use of grate-type manhole covers conforming to Standard Drawing 9-9A/9B or 9-11 might be approved by the Agency on a case-by-case basis. In unpaved areas, grate-type manhole frames and covers must be set 1 inch below adjacent grade. The joint between the manhole frame and the cone or grade ring must be sealed by buttering the joint space with mortar or using an epoxy adhesive. The adhesive must be as described in the State Specifications. A concrete collar must be placed on all manhole frames per Standard Drawing 9-7A. The concrete collar must be Class "A-2" in conformance with Section 50-5, "Portland Cement Concrete", of these Specifications. The in-place depth of the

24-inch manhole opening must not exceed 18 inches from the top of the frame to the top of the cone. If the manhole is a flat slab top, or if the depth of the opening must exceed 18 inches, a 36-inch frame and cover with corresponding 36-inch manhole components must be used. The depth of a 36-inch opening as described above must not exceed 24 inches. Components for construction of manholes must be selected to provide the least achievable vertical dimension between the finished frame surface and the top of the cone or soffit of the flat slab top. The depth of precast grade rings or cast-in-place grade rings must not exceed 8 inches on new or reconstructed manholes.

At the Contractor's option, the manhole frame and cover size may be increased from 24 to 36 inches if necessary to facilitate testing of the storm drain system. No additional compensation will be paid to the contractor if the contractor elects to increase the size, and the manhole frame and cover will be paid for at the unit price bid for the 24-inch frame and cover. If the Contractor elects to install a 36-inch frame and cover, it must remain as a permanent part of the improvements (i.e. it must not be replaced with a 24-inch frame and cover after testing).

All castings must be manufactured true to pattern and with satisfactory fit of all component parts. Round frames and covers must have machined bearing surfaces. Manhole covers that do not fit neatly and bear firmly in the ring will be rejected.

Unless otherwise specified, exposed surfaces of the castings with the parts assembled and disassembled must be painted with commercial quality asphaltum paint after testing and assembly.

39-3 SADDLE SEWER MANHOLES

39-3.01 NOT USED

39-3.02 Saddle Storm Drain Manholes

Saddle storm drain manholes must be constructed in accordance with Standard Drawing 9-8A (for cast-in-place pipe). Saddle storm drain manholes are not allowed for any other type of pipe. The concrete must be Class "A" in conformance with Section 50-5, "Portland Cement Concrete", of these Specifications. Reinforcing steel must conform to Section 50-32, "Reinforcing Steel", of these Specifications. Manhole frames and covers, risers, cones, grade rings, flat slab tops, and other features of the manholes must be constructed in accordance with Section 39-2.02 of these Specifications.

39-4 MANHOLE TESTING

39-4.01 NOT USED

39-4.02 Storm Drain Manholes

All new manholes must be tested for leakage after assembly but prior to back-filling around the manhole. The Contractor is responsible for conducting all leakage tests. The Contractor is responsible for providing all equipment, materials, and labor for performing and making measurements of the leakage tests. The Agency must witness all leakage tests and verify the accuracy and acceptability of the equipment utilized. The Agency may require a manhole to be tested after backfilling if there is reason to suspect that the manhole has been disturbed during the backfilling operation or at other times during construction.

When leakage exceeds the amount allowed by these Specifications, the Contractor, at its own expense, must determine the source, or sources, of leakage and repair or replace all defective materials and workmanship to the satisfaction of the Agency. The extent and type of repair that may be allowed, as well as results, are subject to the approval of the Agency. The completed manhole installation must then be retested and required to meet the requirements of this Section. Any individually detectable leaks must be repaired, regardless of the results of the tests.

Manholes must be tested for leakage by the following method:

39-4.02.A Manhole Vacuum Test

All lift holes, connections, and inside and outside joints must be sealed as described in this Section. All pipes entering the manhole must be plugged, taking care to securely brace the plug from being drawn into the manhole. Plugs and the ends of pipes connected by flexible boots must be blocked to prevent their movement during the vacuum test. When plugs are being placed, the pipe adjacent to the manhole must be visually inspected to detect any evidence of shear in the pipe due to differential settlement between the pipe and the manhole. A probable point of leakage is at the junction of the manhole and the pipe, therefore the plug must be placed in the connected pipes outside of the manhole base. The test head must be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendations. In the case of flat slab top manholes, the test head must be placed at the top surface of the flat slab top. A vacuum of 10 inches of mercury (approximately 5 psi) must be drawn and the vacuum pump shut off. With the valves closed, the time must be measured for the vacuum to drop to 9 inches. The manhole passes the test if the measured time is greater than the times listed in the following Table 39-2 for the particular manhole size.

TABLE 39-2
MINIMUM VACUUM PASS TIMES

Manhole Size (inches)	Minimum time (seconds) to drop to 9" Hg
48	60
54	67
60	75
72	90
84	105
96	120

If the manhole fails the initial test, repairs must be made while the vacuum is still being drawn. Re-testing must continue until a satisfactory test is obtained.

39-4.02.B Test by the Exfiltration Method

At the discretion of the Agency, the Contractor can substitute the Exfiltration Method of testing for the Vacuum Test described in Section 39-4.02.A. This method can only be used when ground water is not present. If ground water is present, a Vacuum Test must be used unless otherwise directed by the Agency. All backfilling and compaction must be completed prior to the commencement of testing.

The procedures for the test include the following:

1. Manhole section interiors must be carefully inspected; units found to have through-wall lift holes, or any penetration of the interior surface by inserts provided to facilitate handling, will not be accepted. Coating must be applied after the testing unless coating is applied before field assembly, or at the factory. All lift holes and exterior joints must be plugged with an acceptable non-shrink grout. Grout must not be placed in horizontal joints. Tests must be performed before grouting the invert or around pipe penetrations and before coating the interior surfaces of the manhole or junction box.
2. After cleaning the interior surface of the manhole, the Contractor must place and inflate pneumatic plugs in all of the connecting pipes to isolate the manhole; sealing pressure within the plugs must be as recommended by the plug manufacturer.

3. Concrete manholes must be filled with water or otherwise thoroughly wetted for a period of 24 hours prior to testing.
4. At the start of the test, the manhole must be filled to the top with water. The test time is 1 hour. The Inspector must be present for observation during the entire time of the test. Permissible loss of water in the 1-hour test time is 0.025 gallons per diameter foot, per foot of manhole depth. For a 4-foot diameter manhole, this quantity converts to a maximum permissible drop in the water level within the 2-foot diameter manhole opening of 0.05 inches per foot of manhole depth or 0.5 inches for a 10-foot deep manhole.

39-4.02.C Failure to Pass the Test - Records of Tests

If the manhole fails to pass the initial test method as described in Section 39-4.02.A, “Test by the Vacuum Method”, of these Specifications, and, if allowed, the Exfiltration Test Method, per Section 39-4.02.B, of these Specifications, or if visible groundwater leakage into the manhole is observed, the Contractor must locate the leak, if necessary by disassembling the manhole. The Contractor must check the gaskets and replace them if necessary. The Contractor may re-lubricate the joints and re-assemble the manhole, or the Contractor may install an acceptable exterior joint sealing product on all joints and then retest the manhole. If the Contractor chooses to attempt to repair the manhole rather than replace it, the manhole must be retested until it passes. Cold applied preformed plastic gaskets cannot be used for repair. Records of all manhole testing must be made available to the Agency at the close of each working day, or as otherwise directed by the Agency. Any damaged or visually defective products or any products out of acceptable tolerance must be removed from the site.

39-4.02.D Inspection

The Agency must make a visual inspection of each manhole after it has passed the testing requirements and is considered to be in its final condition. The inspection must determine the completeness of the manhole; any defects must be corrected to the satisfaction of the Agency.

39-5 ADJUST STORM DRAIN MANHOLES TO GRADE

Existing manholes must be adjusted to grade of elevation as indicated on the Plans and must conform to the State Specifications. Should an expanding ring raising device be used, the mechanism for ring expansion must be a turnbuckle linkage that has pivoting connections at both ends. Expanding ring raising devices are not allowed for areas where the roadway is to be raised by a non-uniform thickness over the area of the manhole structure. Cast-in-place rings must be Class "A-2”, in conformance with Section 50-5, "Portland Cement Concrete", of these Specifications. The cast-in-place rings must have a height between 3 and 6 inches. The concrete pour must extend to 1 inch below the top of the frame.

Adjusting manholes to grade within publicly used traffic lanes must be completed, including placing paving material around and to the level of the frame and cover, by the end of the same day on which work is started. If permanent pavement backfill cannot be completed by the end of the work day, the Contractor must place temporary paving material to the finished grade level of the frame and cover. The Contractor must maintain the temporary paving smooth and level with the frame and cover until the permanent paving is placed.

39-6 RECONSTRUCT STORM DRAIN MANHOLES

The Contractor must reconstruct storm drain manholes as shown or specified in the Contract.

In order to access and maintain storm drain facilities, the maximum depth of a 24-inch manhole opening is 18 inches and the maximum depth of a 36-inch manhole opening is 24 inches. The depth of the opening is measured from the top of the finished grade of the frame to the top of the cone or to the soffit of the flat slab top. When the depth of the opening exceeds

this requirement, it is necessary to reconstruct the manhole by placing additional barrel sections to bring the top of the cone or soffit of the flat slab top to within 18 inches of the finished surface.

The Contractor must remove and dispose of the existing frame and cover and demolish the remaining structure down to the elevation where a standard precast barrel section or combination of barrel sections will bring the top of the cone or soffit of the flat slab top to within a maximum of 18 inches of the finished surface or as indicated on the Plans. The resulting debris and hardware become the property of the Contractor. Standard precast barrel sections are available in depths of 12, 18, 24, 36, and 48 inches. The top of the remaining structure must be trimmed to provide a suitable foundation for the new barrel components. The joint between the existing structure and the new component must be sealed in conformance with Section 39-2.02, "Precast Concrete Storm Drain Manholes" of these Specifications. The remaining structure must be constructed in conformance with Sections 39-2.02 or 39-3.02. If not called out on the Plan, it is the responsibility of the Contractor to determine whether the existing structure is precast, cast-in-place, or a precast structure with a cast-in-place base.

39-7 ABANDON STORM DRAIN MANHOLES

When indicated on the Plans or directed by the Agency, storm drain pipes, manholes, and other structures must be abandoned in conformance with Section 15-1.04, "Abandonment of Pipes and Manholes", of these Specifications.

39-8 MEASUREMENT AND PAYMENT

The quantity of each type of manhole will be measured by the unit.

The unit price paid for each manhole includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing manholes, complete in place, including excavation and backfill, manhole bases, mortar, concrete, reinforcement, and acceptance testing, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

Payment for adjusting drain manholes will conform to the State Specifications, with the following exceptions: 1) the unit price paid includes all necessary excavation, backfill, sealing, and concrete; and 2) the unit price paid will be the average of all depths and limits of adjustment required.

The unit price paid for manhole reconstruction includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in reconstructing manholes, complete in place, including excavation and backfill, demolition, disposal, mortar, concrete, and reinforcement as shown or specified in the Contract, in these Specifications, and as directed by the Agency.

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SECTION 40 MISCELLANEOUS FACILITIES

40-1 STREET BARRICADES

40-1.01 General

Street barricades must conform to the Standard Drawings and to these Specifications. The barricades must be placed where shown on the Plans or as designated by the Agency.

Wood members must be either Redwood or Douglas Fir. Douglas Fir must be treated with a wood preservative in conformance with the State Specifications.

A fully reflectorized sign, as shown in Standard Drawing 4-63, must be placed on the barricade with bolts, nuts, and washers, and must face oncoming traffic to designate dead end streets. All barricades must be painted white, with 2 applications of a latex base paint formulated for use on exterior wood.

40-1.02 Measurement and Payment

Street barricades will be measured by the unit from the actual count of street barricades complete in place.

The unit price paid for street barricades includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing street barricades, complete in place, including furnishing and installing reflectorized signs, as shown or specified in the Contract, as specified in these Specifications, and as directed by the Agency.

40-2 MISCELLANEOUS FACILITIES PLACED WITHIN PAVEMENT, SIDEWALK AND LANDSCAPED SURFACES

Access and utility boxes, including valve boxes, manholes, well monitoring vaults, electrical access vaults, etc., placed within the County right of way must have a permanent identification tag indicating, at a minimum, the owner of the facility and contact information, and must be permanently wired or attached to the inside of the facility.

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SECTION 41 WATER DISTRIBUTION SYSTEMS

41-1 GENERAL

This section applies to all potable and non-potable water distribution systems.

Refer to Section 41-22, "Recycled Water", of these Specifications for requirements for recycled, reclaimed, and non-potable water distribution systems.

Materials, storage, and installation must comply with the strictest requirements of these Specifications, the Contract Documents, the American Water Works Association (AWWA) Standards, and the manufacturers' recommendations.

Materials must be new, undamaged, and without defects. Loose gaskets and small items must be stored in sealed containers until installation. Pipe, fittings, valves, and appurtenances must be covered during storage to prevent wind-blown dirt and contamination from entering the interiors and to prevent rubber and plastic materials and components from being exposed to UV sunlight. Materials showing evidence of defects, damage, aging, or improper storage, as determined by the Water Utility Inspector, will be rejected and removed from the job site.

All buried metal must be encased with 8 mil polyethylene so that no soil is in contact with metal, in compliance with Section 41-5.03, "Polyethylene Encasement."

The term "Water Utility" is defined as the agency, department, or company responsible for operation and maintenance of the public water distribution system. Where the term "Water Utility" is used in these Specifications or in the Standard Drawings, this definition applies. There are approximately 25 separate water utilities that operate public water distribution systems in Sacramento County. An unofficial, approximate service area map and a phone contact list can be obtained from www.SCWA.net. The Contractor must identify the water utility for the existing and new water pipes, water valves, and water appurtenances within the project area. The Contractor is cautioned that the project area might include existing or new water facilities of more than one water utility. Certain service areas have two different water utilities -- a wholesale water utility and a retail water utility. Projects located on the border of water utility service areas typically have water facilities of both adjacent water utilities.

41-2 WATER PIPE

Water pipe, fittings, and joint restraints must comply with Sections 50-25, "Ductile Iron Pipe (DIP), and Cast Iron and Ductile Iron Fittings", and 50-26, "Polyvinyl Chloride (PVC) Water and Drainage Pipe", of these Specifications. Pipe materials used for water services must comply with Section 50-40, "Water Service Connection Materials", of these Specifications.

Storage of PVC pipe must conform to AWWA C605. Pipe must not be exposed to sunlight for more than 6 months. Pipe showing indications of excessive sunlight exposure will be rejected.

Pipe type and minimum class must comply with the following table. Unless otherwise specified in the Plans, Standard Drawings, or these Specifications, the Contractor may choose the pipe material from the table below subject to the restrictions in Table Notes 1, 2, 3, and 4.

Pipe Type and Minimum Pressure Class	
Size	**Type and Minimum Pressure Class**
4" – 12"	AWWA C151 Ductile Iron Class 350, or
	AWWA C900 PVC Class 150 (DR 18) (see Notes 1, 2)
Note 1: The Plans might restrict pipe type to ductile iron pipe for all or part of the main. In these areas, only ductile iron pipe can be used and PVC pipe is not allowed.	
Note 2: PVC pipe cannot be used in sections of mains requiring restrained joints, except where the required "restrained-length" is less than one pipe length and is accomplished without PVC-to-PVC pipe joints.	
Note 3: The Plans might specify heavier class pipe for all or part of the piping. In those areas, the minimum pipe class is the heavier class specified in the Plans.	
Note 4: Heavier class ductile iron pipe is required for fabricated flanged pipe.	

41-3 EXCAVATION

Trench excavation for water distribution pipes and water appurtenances must comply with Section 19-1, "Trench Excavation", and these Specifications.

Water mains must be installed to the alignment and elevations shown on the Plans. If the Plans do not specify pipe elevations, water mains must be installed with the following cover:

- Cover for water mains installed within improved streets with curb, gutter, and sidewalk must be between 36 and 54 inches, measured from the flowline of the gutter to the top of the pipe.
- Cover for water mains installed in unimproved areas or in existing streets without curb, gutter and sidewalk must be between 54 and 60 inches, measured from the top of the pipe to the existing ground or pavement surface at the centerline of the pipe.

The width of the trench must comply with Standard Drawing 8-17 and Section 19-1.02, "Trench Width", of these Specifications.

Trenches for water mains must be overexcavated to a depth of at least 6 inches below the outside diameter of the pipe. At locations of joints or couplings the depth of over excavation must be measured from the outside diameter of the pipe joint or couplings.

Unless otherwise specified in the Special Provisions, excavate trenches only as far in advance of pipe laying as permitted by the Agency and in compliance with the requirements of Section 19-1.04, "Maximum Length of Open Trench", of these Specifications.

Cut and abandoned pipes within the area of the trench, including existing water mains, that are not removed in accordance with the Plans or Section 13-2.05, "Abandoned Underground Facilities", must be plugged in accordance with Section 15-1.04, "Abandonment of Pipes, Conduits, and Structures", of these Specifications.

Surface water, groundwater, pipe leakage, or the contents of severed pipe must not be permitted to enter any water pipe that is not abandoned.

41-4 LAYING WATER PIPES

The Contractor must seal shut pipe ends at the end of each workday and whenever the work of laying pipe is discontinued to secure the end of the pipe from animals, trench water intrusion, and windblown dirt. The seal must be watertight. The minimum requirement is to seal the end of the pipe with 8 mil polyethylene secured with metal banding, place plywood against the plastic, and temporarily cover the pipe end with earth. A manufactured pipe end plug approved by the Agency may be used instead of plastic and plywood.

Pipe must be installed in trenches as specified in Section 19, "Trench Excavation, Bedding and Backfill," of these Specifications.

Pipe must not be placed during inclement weather or when the conditions in the trench will interfere with proper jointing of the pipe.

Installation of water pipe, fittings, valves, and water appurtenances must comply with the requirements of these Specifications, the Contract Documents, the American Water Works Association (AWWA) Standards, and the manufacturers' recommendations. Each section of pipe, each fitting, and each valve must be thoroughly cleaned before it is installed. Pipes, valves, fittings, and appurtenances must be lowered into the trench in a manner that prevents damage, particularly to the pipe lining and coating. When required by the Agency, approved slings must be used to lower the pipe. Do not drop pipe, fittings, valves, appurtenances, or accessories into the trench.

The pipe must be laid true and uniform to line and grade, with no visible change in alignment at joints unless a curved alignment is shown on the Plans. The maximum allowable horizontal installation tolerance is 6 inches or as necessary to comply with statutory horizontal separation distances, whichever is less. The maximum allowable vertical installation tolerance is 0.10 foot, as necessary to maintain an unbroken slope direction as indicated on the plans, or as necessary to comply with statutory vertical separation distances, whichever is less. The maximum deflection of ductile iron pipe at joints must not exceed the limits described in Standard Drawing 8-9A. Deflection and bending of polyvinyl chloride pipe must not exceed the limits described in Standard Drawing 8-9B.

Where necessary to properly locate valves and fittings, the pipe must be neatly and squarely cut to length, using methods recommended by the manufacturer.

When field cuts are made in polyvinyl chloride pipe, the cut ends must be cut square and all burrs removed from the pipe interior. The beveling of the pipe ends must be as specified by the manufacturer. Guide marks for jointing the pipe, after cutting, must be made on the pipe in accordance with the manufacturer's specifications.

Except in water systems installed for new subdivisions, no more than 3000 linear feet of water main is to be installed before starting installation of water services and water.

Service line and appurtenance construction must be concurrent with pipe laying. Service line and appurtenance construction must be completed no later than 15 Working Days after the installation of the portion of the water main that they connect to.

41-5 UNDERGROUND WARNING TAPE, LOCATING WIRE, AND POLYETHYLENE ENCASEMENT

41-5.01 Underground Warning Tape

Underground warning tape must be installed above buried water pipes, water service lines, and water appurtenance lines.

Underground warning tape must be 12-inch wide 4 mil minimum thickness low density

polyethylene formulated for extended use underground, minimum tensile strength 4100 MD and 3650 TD in accordance with ASTM D882. Tape elongation must be greater than 550 percent at break point. Unless otherwise directed by the Agency, all lettering must be BLACK on the following background colors:

- Warning tape for potable water pipes must be BLUE and marked "WATER MAIN BURIED BELOW," or "WATER LINE BURIED BELOW."
- Warning tape for potable water transmission mains must be BLUE and marked "WATER TRANSMISSION MAIN BURIED BELOW."
- Warning tape for raw water transmission mains must be GREEN and marked "RAW WATER MAIN BURIED BELOW."
- Warning tape for recycled, reclaimed, and non-potable water pipes must be PURPLE and marked "RECYCLED/RECLAIMED WATER MAIN BURIED BELOW."

Underground warning tape must be placed 12 to 18 inches above the top of the water pipe along the length of the pipe. The backfill lift at that height must be compacted prior to placing the warning tape.

41-5.02 Locating Wire

A locating wire must be installed on the center of the top of buried water pipes, water service lines, and water appurtenance lines. The locating wire must be an insulated 10 gauge solid, single strand, soft drawn copper locating wire with 1/16 inch PVC insulation along the entire length of the pipe. Locating wire must extend into each valve box and each service box, and be installed in accordance with Standard Drawings 8-4A and the other water supply Standard Drawings. Locating wire must be continuous and splices are not allowed except at the following locations: tees, crosses, and connections to existing locating wires. Splices must be soldered, then shrink-wrapped or taped in accordance with Standard Drawing 8-4A.

When locating wire runs exceed 600 feet between access points, a locating wire station must be installed midway between the access points in accordance with Standard Drawing 8-4B. The maximum allowable distance from access point to station or from station to station is 600 feet. The spacing must be equidistant between access points and stations when 2 or more stations are required. The locating wire station must be constructed with a traffic-rated valve box. For recycled, reclaimed, and non-potable water locating wire stations, the top surfaces of the box and cover must be coated with a purple coating in accordance with Section 41-22.04, "Purple Identification Coating," of these Specifications, and the 2-inch PVC riser must be purple PVC.

A continuity test must be performed on each splice prior to backfill. In addition, a continuity test must be performed on all new locating wires after all other utilities are installed prior to paving. Each segment of locating wire between access points must be tested separately. Tests must be performed with a multimeter, set to "ohms," and set to "x 1" scale. Multimeter probes must be extended with insulated copper wire and soldered copper alligator clips equipped with set-screw tighteners. A reading near zero ohms is a passing test. Repeat for each segment of the locating wire circuit.

41-5.03 Polyethylene Encasement

All buried metal must be encased with 8 mil polyethylene so that no soil is contact with metal. Polyethylene encasement materials and installation must comply with AWWA C105. Pipe must be encased using Method A of Section 4.4 of AWWA C105. Adhesive tape must be used to secure and seal encasement. Tape must be 10 mil PVC tape. Tears, punctures, and damage must be repaired and sealed with tape, or with an 8 mil sheet wrapped around the pipe to cover the damaged area and secured and sealed with tape. Backfill must be performed

without puncturing or stressing the wrapping. Excessive damage to encasement, as determined solely by the Agency, is cause for rejection of the entire section of encasement.

Polyethylene encasement for potable water pipes must be BLACK or CLEAR. Polyethylene encasement for raw water pipes must be GREEN and must be marked "RAW WATER." Polyethylene encasement for recycled, reclaimed, and non-potable water pipes must be PURPLE and must be marked "CAUTION: RECLAIMED/RECYCLED WATER." The warning message must be in minimum 1" tall black letters, repeating every 24 inches along the length, and repeating every 12 inches around the circumference. The encasement must be installed so that the warning message appears along the top of the pipe after installation.

41-6 THRUST BLOCKS AND RESTRAINED JOINTS

Pipes, fittings, and valves must be restrained from movement as a result of thrust on the fittings and valves of the water distribution system. To accomplish this, thrust blocks or pipe-restraining devices must be installed at all valves, tees, crosses, elbows, reducers, dead ends, and pipe deflections greater than 5 degrees.

Thrust blocks must comply with Standard Drawing 8-3A. Thrust blocks must be used for the configurations covered in Standard Drawing 8-3A. Restraint for all other thrust configurations must be accomplished with the use of restrained joints. If a thrust block cannot be poured against undisturbed soil, restrained joints must be used to resist the thrust.

Restrained joints must be provided where specified in the Plans and Standard Drawings and where required to resist thrust. Restrained joints must be used to resist thrust at valves and at fittings in thrust configurations not covered in Standard Drawing 8-3A. Restraining devices must comply with Sections 50-25.03.C and 50-26.03.C of these Specifications.

The Plans or Standard Drawings might require both a thrust block and restrained joints in certain locations, and both must be provided. If the thrust block bearing soil is disturbed in those locations, the soil must be recompacted to 90 percent relative compaction before the thrust block is installed.

41-7 SETTING FIRE HYDRANTS

Fire hydrant installations must comply with Standard Drawings 8-2A and 8-2B and Section 50-37, "Fire Hydrants", of these Specifications.

Materials other than ductile iron or polyvinyl chloride pipe must not be used as branch leads that connect fire hydrants to water mains.

Fire hydrants must not be installed within 3 feet of a building or any other structure that would limit access. Fire hydrants must stand plumb with the hex nut for the pumper outlet a minimum of 20 inches above the sidewalk or concrete pad surrounding the hydrant. A 2 by 2 foot by 4-inch thick concrete pad must be installed surrounding the fire hydrant. The top of the pad must be at the elevation of the finished grade.

- In streets where the sidewalk is contiguous with curb and gutter, fire hydrants must be placed behind the sidewalk within the public utility easement.
- In streets where the sidewalk is separated from the curb and gutter by a planter or park strip, or at locations where there are to be curbs and gutters but no sidewalks, fire hydrants must be placed 3 feet behind the curb.
- In streets that are paved but lack curbs, gutters and sidewalks, new and relocated fire hydrants must be placed within 10 feet of the edge of pavement.
- Fire hydrants placed at street intersections must be installed at the beginning or end of curb returns.
- On standard hydrants, the 4-1/2-inch nozzle or outlet must lie on a line perpendicular to the centerline of the street.

- On double pumper hydrants, a line bisecting the angle between the two 4-1/2-inch nozzles or outlets must be perpendicular to the centerline of the street.

Where the Plans indicate that existing fire hydrants are to be removed and salvaged, the salvaged hydrants must be removed intact and delivered undamaged to the Agency Corporation Yard location as directed by the Agency.

41-8 SETTING GATE VALVES

Gate valves must comply with the requirements of Section 50-38.01, "Gate Valves", of these Specifications.

Gate valves at tees, crosses, reducers, elbows, and other fittings must be provided with flanged joints and bolted directly to the flanged fittings.

41-9 BACKFLOW PREVENTION ASSEMBLIES

Backflow prevention assembly installations must comply with Standard Drawings 8-8A, 8-8B, and 8-8C.

Backflow prevention devices must be located in lawn or planter areas, unless otherwise specified in the Plans. If conflicts occur, the location must be approved by the Water Utility prior to installation.

The Reduced Pressure, Double Check Detector, or Reduced Pressure Detector Assemblies must be tested by a certified backflow prevention assembly tester at the time of installation.

Backflow prevention device installations must include an insulated, UV resistant, protective cover (bag), appropriate for the assembly, and properly placed over the assembly.

41-10 FIRE PROTECTION SERVICE ASSEMBLIES

Fire protection service installations must comply with Standard Drawing 8-7, and must include a double detector check valve assembly with by-pass meter and piping. Fire protection service assembly piping must be flanged ductile iron Class 53 conforming to Section 50-25, "Ductile Iron Pipe (DIP), and Cast Iron Pipe and Ductile Iron Fittings", of these Specifications.

Buried water valves must be as specified in Section 50-38, "Valves", of these Specifications. Except for water check valves, all valves must be furnished with flanged ends.

Double detector check valves must be listed by Underwriters Laboratories and approved by Factory Mutual.

By-pass water meters must be 5/8 by 3/4 inch, all copper alloy body conforming to AWWA C700. Bronze check valves must be installed downstream of the by-pass meter. Bronze ball or gate valves must be installed to allow for removal of the by-pass meter without affecting the fire protection system. All piping must be Type "K" copper.

Double detector check valve assemblies must be installed in lawn or planter areas. If conflicts occur, the location must be approved by the Agency prior to installation.

41-11 BLOW-OFFS

Four-inch blow-off assemblies must comply with Standard Drawings 8-13A, 8-13B, and 8-13C. Temporary blow-off assemblies must comply with Standard Drawing 8-12.

41-12 PIPE BEDDING AND BACKFILLING OF TRENCHES

Pipe bedding and backfill for water pipes and appurtenances must comply with Standard Drawing 8-17 and Section 19-2, "Pipe Bedding and Backfilling of Trenches", of these Specifications.

41-13 REPAVING WATER PIPE TRENCHES

Repaving of trenches for water pipes and appurtenances must comply with Standard Drawing 8-17 and Section 14, “Restoration of Surfaces”, of these Specifications.

41-14 WATER SERVICES

Water services must comply with Standard Drawings 8-1, 8-6A-1, 8-6B, and 8-6C, and with Sections 50-40, “Water Service Connection Materials”, and 50-38, “Valves”, of these Specifications.

Gate valves for water services 3 through 12 inches in diameter must be installed with a box and riser in compliance with Standard Drawing 8-5.

Service saddles must be bronze.

Fitting (tee, ell, etc.) must not be tapped to accommodate a service.

Water services must be 1-1/2 inches in diameter with a 1 inch water meter unless otherwise specified. All buried copper and other metal must be encased with 8 mil polyethylene so that no soil is in contact with metal, in compliance with Section 41-5.03, “Polyethylene Encasement.”

Where the curb and gutter exists, or is to be constructed concurrently with the improvements, the location of each service must be permanently indicated by inscribing the letter "W" in the curb directly above the line when the service is perpendicular to the street centerline. Otherwise, the "W" mark for a skewed or angling service must be placed at a right angle to the end of the service. When water services are installed in a street with existing curb, the curb mark must be placed at the time the services are installed to assure proper location. In new subdivisions when the services are installed before the curb is constructed, the Contractor must establish and mark the exact location of each service and ensure that the "W" is placed in the curb when it is poured. The "W" must not be placed more than 6 inches from the service.

41-15 WATER METERS AND METER BOXES

A water meter is required for all services except fire services.

Water meter installations must comply with Standard Drawings 8-6A, 8-6B, and 8-6C. The size of the meter must be as specified in the Plans. If not specified in the Plans, the size of the meter must be the same size as the service line at the connection to the main.

The water meter box must be located within the parcel being served, unless otherwise specified. Water meter boxes must be located adjacent to the property line or within water or other appropriate public utility easements, and must be located in lawn or planter areas. Meter boxes must not be located in a driveway or traffic area. If conflicts occur, the location must be approved by the Water Utility prior to installation.

The water service line must be thoroughly flushed immediately prior to water meter installation.

41-16 DISINFECTION, FLUSHING, AND BACTERIOLOGICAL TESTING

New water pipes and water appurtenances must be disinfected and protected by use of the following procedures:

- Precautions must be taken to prevent contaminated materials from entering pipe interiors, fittings, and valves during the construction of the water distribution system.
- Water pipes and water appurtenances must be flushed after construction to remove contaminants.
- Water pipes and appurtenances must be disinfected to remove residual contamination.
- Bacteriological water quality tests must be performed by laboratory testing after disinfection.

Newly constructed, modified, or repaired water pipes must not be connected to an existing

water system or placed into service until the Agency has determined that the water pipes have been disinfected in accordance with this section.

Water for filling and flushing pipes must be obtained from the existing public water system. Temporary piping connections to the existing water system must include a reduced pressure backflow prevention assembly that is on the most recent list of approved backflow prevention devices of the Sacramento County Environmental Management Department. The list can be downloaded at www.emd.saccounty.net in the Cross-Connection Control Program section.

41-16.01 Disinfection

All new, modified, and repaired water pipes and water appurtenances must be disinfected in accordance with AWWA C651 "Disinfecting Water Mains."

The disinfection methods below are allowed by the Agency. Other disinfection methods published in AWWA C651 might be allowed if approved by the Agency.

41-16.01.A Disinfection by the Tablet Method

The Tablet Method must employ the use of a sufficient number of 5 gram calcium hypochlorite tablets as a disinfectant to yield an average chlorine dose of approximately 25 milligrams per liter. The 5 gram calcium hypochlorite tablets must contain at least 65 percent available chlorine by weight. The tablets, 6 to 8 to the ounce, are designed to dissolve slowly in water. These tablets must comply with the requirements of AWWA B-300 standard for hypochlorites.

Because preliminary flushing cannot be performed if tablets are used, cleanliness must be exercised during construction of the water main.

The calcium hypochlorite tablets must be placed at the upstream end of each section of pipeline or branch and at every 500-foot interval along pipelines, in hydrants, hydrant branches, and other appurtenances. They must be attached by an adhesive to the top of the pipe interior. If the tablets are fastened before the pipe section is placed in the trench, their position must be marked on the section to assist in keeping the tablet's position at the top of the pipe.

The adhesive must be Permatex No. 1, or approved equal. There must be no adhesive on the tablet except on the broad side next to the surface to which the tablet is attached. The tablets must be fastened to the pipe to prevent washing to the pipe end.

The minimum number of calcium hypochlorite tablets required for water main disinfection must be as shown in the following Table 41-1:

TABLE 41-1
REQUIRED 5 GRAM CALCIUM HYPOCHLORITE TABLETS*

Pipe Diameter (inches)	Length of Pipe Section (feet)				
	13 or less	18	20	30	40
4	1	1	1	1	1
6	1	1	1	2	2
8	1	2	2	3	4
10	2	3	3	4	5
12	3	4	4	6	7
16	4	6	7	10	13

* Based on 3.25 grams of available chlorine per tablet. Any portion of tablet rounded to next higher number.

When the installation of the water distribution system has been completed, the pipes must be filled with water at a velocity of less than 1 foot per second. During filling, air must be released from all high points in the line. In addition, as the chlorinated water flows past tees and crosses, related valves, hydrants, and appurtenances must be operated to disinfect the branches and appurtenances.

41-16.01.B Disinfection by the Continuous-Feed Method

The Continuous-Feed Method requires chlorinating the pipe with the injection of sodium hypochlorite solution or calcium hypochlorite solution. The process consists of completely filling the pipe with water, removing air pockets, flushing the pipe to remove particulates, and then filling the pipe with chlorinated water.

The chlorine concentration must be sufficient to yield a free chlorine residual of not less than 10 mg/L measured 24 hours after the pipe is filled.

41-16.01.B.(1) Filling and preliminary flushing:

When the installation of the water distribution system has been completed, the pipes must be filled with water at a velocity of less than 1 foot per second. During filling, air must be released from all high points in the line. Before the pipe is chlorinated, it must be pressure tested and flushed to remove particulates. The flushing velocity in the pipe must be at least 2.5 feet per second and must comply with Section 41-16.02.

41-16.01.B.(2) Chlorination Procedure:

- Water must flow at a constant, measured rate into the new pipe.
- At a point not more than 10 feet downstream from the start of the new pipe, water entering the pipe must receive a dose of chlorine fed at a constant rate to produce a chlorine solution of not less than 25 mg/L free chlorine. The chlorine concentration must be measured and verified at regular intervals in compliance with the procedures in AWWA C651, Appendix A "Drop Dilution Method (DPD)" for chlorine residual testing.
- Unless otherwise approved by the Agency, a chlorine metering pump must be used to

perform the dosing, and the dosing location must be in the temporary jumper piping downstream of the temporary backflow prevention assembly.

- During feeding, end points in the water system must be opened to release the non-chlorinated water and allow the chlorinated water to fill the system.
- As the chlorinated water flows past tees and crosses, related valves, hydrants, and appurtenances must be operated to fill the branches and appurtenances with chlorinated water. The Contractor must verify that all portions of the water system have been filled with the highly chlorinated water.
- The chlorine residual must be checked after 24 hours at locations directed by the Agency to verify that it is at least 10 mg/L free chlorine.

Table 41-2 shows the amount of chlorine required for each 100 feet of pipe for various diameters. Solutions of 1 percent chlorine can be prepared with sodium hypochlorite or calcium hypochlorite. The calcium hypochlorite solution requires 1 pound (454 grams) of calcium hypochlorite in 8 gallons (30.3 liters) of water.

TABLE 41-2
Chlorine Required to Produce 25-mg/L Concentration in 100 ft. of Pipe by Diameter

Pipe Diameter	100% Chlorine		1% Chlorine Solution	
Inches	Pounds	(Grams)	Gallons	(Liters)
4	0.013	(5.9)	0.16	(0.6)
6	0.030	(13.6)	0.36	(1.4)
8	0.054	(24.5)	0.65	(2.5)
10	0.085	(38.6)	1.02	(3.9)
12	0.120	(54.4)	1.44	(5.4)
16	0.217	(98.4)	2.60	(9.8)

41-16.01.C Holding Period and Final Flushing

The chlorinated water must remain in the pipe for a minimum period of at least 24 hours. At the end of this period the chlorinated water must be flushed from the pipe and water appurtenances in accordance with Section 41-16.02, "Flushing of Water Pipes," until the chlorine concentration in the water leaving the pipe and appurtenances is no higher than that generally prevailing in the existing distribution system, or less than 1 mg/l total residual chlorine.

41-16.01.D Disinfection of Tie-In's, Cut-In's, and Repairs

Disinfection of the final connection to the existing water system must comply with AWWA C651, Section 4.6. The Contractor must perform all procedures listed as "optional" in C651-4.6.

Disinfection of Cut-In's and Repairs must comply with AWWA C651, Section 4.7.

41-16.02 Flushing of Water Pipes

Newly constructed, modified, and repaired water pipes and water appurtenances must be flushed with a minimum flushing velocity in the pipe of not less than 2.5 ft/sec.

Table 41-3 shows the rates of flow required to produce a velocity of 2.5 ft/sec (0.76 m/sec) in the common pipe sizes. Note that flushing must not be a substitute for preventive measures during construction.

TABLE 41-3
Required Flow and Openings to Flush Pipes
(40 psi Residual Pressure in Water Main)*

Pipe Diameter	Flow Required to Produce 2.5 ft/sec (approx.) Velocity in Pipe	Size of Tap			Number of 2.5-inch Hydrant Outlets
		1-inch	1.5-inches	2-inches	
Inches	Gallons per Minute	Number of Taps on Pipe**			
4	100	1	--	--	1
6	200	--	1	--	1
8	400	--	2	1	1
10	600	--	3	2	1
12	900	--	--	2	2
16	1,600	--	--	4	2

* With a 40-psi pressure in the main with the hydrant flowing to atmosphere, a 2.5-inch hydrant outlet will discharge approximately 1,000 gpm; and a 4.5-inch hydrant outlet will discharge approximately 2,500 gpm.

** Number of taps on pipe based on discharge through 5 feet of galvanized iron pipe with one 90° elbow.

Water distribution systems must be flushed in a one-direction flow pattern to systematically expel the existing contents out through every end point. The contractor must prepare a step-by-step flushing procedure for the sequential opening and closing of end points and system valves to accomplish the requirements of this Section. The flushing procedure must be designed to prevent the possibility of re-circulating or backwashing existing contents back into the system from branches, appurtenance laterals, and valved off pipe sections. Looped systems require special procedures to ensure that existing contents are expelled in the far portion of the loop with the required velocity. A copy of the flushing procedure must be provided to the Agency prior to flushing.

41-16.03 Bacteriological Testing

After disinfection and final flushing, prior to connecting to the existing water system, new, modified, and repaired water pipes must be sampled for bacteriological water quality in accordance with the most recent edition of AWWA Standard C651, Section 5. Two (2)

consecutive sets of acceptable samples taken at least 24 hours apart must be collected from water pipes at each of the following water sample test points:

- At every 1,200 feet along the water pipe.
- At end points of the water pipe.
- At each branch end.
- At additional sample point locations selected by the Agency.

Sample collection must comply with "Standard Methods for the Examination of Water and Wastewater" authored by AWWA, the American Public Health Association, and the Water Environment Federation. Water samples must be collected in a sterile bottle treated with sodium thiosulfate. The samples must be tested by an independent testing laboratory certified by the California Department of Health Services for:

- The absence of coliform bacteria, and
- A standard heterotrophic plate count (HPC) less than 500 cfu/mL, and
- Chlorine residual.

The water must comply with State and Federal drinking water standards; Title 22 of the California Administrative Code; and the 1986 Amendments to the Safe Drinking Water Act of 1974, as issued by the United States Environmental Protection Agency (EPA).

Water pipes found to have unsatisfactory bacteriological test results must be re-disinfected and tested in accordance with AWWA C651, Section 5.2. The water mains must not be connected to the existing system and placed into service until acceptable water quality test reports are received and approved by the Agency.

41-17 PRESSURE TESTING

All new water pipes and water appurtenances must be pressure tested. Pressure tests must be successfully completed prior to bacteriological testing and prior to making connections to the existing water system.

Permanent pavement must not be placed prior to successful completion of the test. Pressure testing must not be conducted until the water pipes are backfilled, the road subgrade is made and compacted, all other pipe and utility undercrossings are installed including joint utility trenches, and thrust blocks have been in place for at least 36 hours if high-early-strength cement is used or at least 7 Calendar Days if standard cement is utilized.

Water for pressure testing must be obtained from the existing public water system. Temporary piping connections to the existing water system must include a reduced pressure backflow prevention assembly that is on the most recent list of approved backflow prevention devices of the Sacramento County Environmental Management Department. The list can be downloaded at www.emd.saccounty.net in the Cross-Connection Control Program section.

Each section of the pipe to be tested must be slowly filled with water, and all air must be expelled from the pipe. The release of the air can be accomplished by opening fire hydrants and service line cocks at the high points of the system and blow-offs at dead ends. The valve controlling the admission of water into the section of pipe to be tested must be opened wide before shutting the hydrants or blow-offs. After the system has been filled with water and all air expelled, the line must remain in this condition for a period of at least 24 hours.

The pipe must be refilled, if necessary, and a pressure test of 150 psi must be applied and held for a period of 2 hours for each section of the system to be tested. The Contractor must provide the necessary pump and a clean calibrated container for measurement of make-up water required to replace leakage during the 2 hour test.

For acceptance of the water system, each test section must not exceed the allowable make-up water as determined in accordance with the following formula:

$$L=SDT/10,876$$

Where:

L = the maximum allowable make-up water in gallons
S = the length of the test section in feet
D = the diameter of the pipe in inches
T = the test time period in hours

No leakage is allowed for welded steel pipe with welded joints.

All defective items discovered during the pressure test must be repaired or replaced. The test must be repeated after any repair until the system meets the above leakage requirement. Even if the leakage is less than the allowable, all observed leaks must be repaired. The test must be witnessed by the Agency.

The Contractor must prevent joints from moving while the pipe lines and their appurtenances are being tested. Damage to pipes, appurtenances, or to any other structures or facilities, resulting from or caused by the tests, must be repaired by the Contractor at the Contractor's expense.

41-18 CONNECTIONS TO EXISTING WATER MAINS

Do not connect newly-constructed water pipes and appurtenances to existing water mains until:

- All new water pipes have been completed except for the tie-in's;
- All water valves and water appurtenances have been completed and are ready for operation;
- Pressure testing and bacteriological testing of all new water pipes and appurtenances have been successfully completed except for the tie-in's; and
- All other items specified in the Contract Documents to be completed prior to water tie-in's have been completed.

Pipe and fittings in the tie-in closure must be disinfected in accordance with Section 41-16.01.D, "Disinfection of Tie-In's, Cut-In's, and Repairs," of these Specifications.

The contractor must not operate valves in the existing public water distribution system. Opening and closing of valves in the existing public water distribution system will be performed by the Water Utility.

In general, shutdowns will be made only at times when there will be the least interference with consumer service. A minimum of 5 Working Days' notice is required for shutdowns except that certain shutdowns involving the shut off of an existing customer or water utility facility that does not have a redundant backup can require longer than 5 Working Days to schedule. Connections are only allowed after complete and satisfactory preparation has been made in order that the shutdown duration is as short as possible. Unless otherwise specified in the Special Provisions, the Agency will notify affected Fire Districts and consumers concerning the interruption of water service.

Hot-taps must be performed by hot-tap specialists employed by or hired by the Contractor and approved by the Agency and the Water Utility. Tapping sleeves for 3 inch and larger connections must be flanged, rated for 150 psi working pressure, with Type 304 stainless steel components, Mueller H-304, Ford FTSS, JCM 432, or equal. Tapping sleeves must be approved by the Water Utility prior to beginning work. An insulating gasket assembly must be installed between the flange of the sleeve and the tapping valve.

41-19 REGULATIONS RELATING TO SANITARY HAZARDS

Water system construction (including recycled, reclaimed, and non-potable water systems) must comply with the regulations for safeguarding the public health, particularly the regulations relating to cross connections and waterworks in the California Code of Regulations, Title 17

Public Health, Chapter 5 Sanitation (Environmental), Sections 7583-7622, and Title 22 Social Security, Division 4 Environmental Health, Chapter 16 Waterworks Standards, and guidance documents issued by the California Department of Health Services. The Contractor must maintain a 10-foot minimum horizontal distance (O.D. to O.D.) between parallel water and sanitary sewer lines and services, and the water main must be installed at least 12 inches (O.D. to O.D.) above the sanitary sewer. The Contractor must maintain a 5-foot minimum horizontal distance (O.D. to O.D.) between parallel water and recycled water lines and services, and the water main must be installed at least 12 inches (O.D. to O.D.) above the recycled water line. When crossing a sanitary sewer force main or hazardous fluid pipeline, the water distribution main must be ductile iron, installed a minimum of 12 inches (O.D. to O.D.) above the pipeline, as close to perpendicular as possible, and with no pipe joints within 8 feet horizontally of the O.D. of the pipeline. Field changes that conflict with these requirements are not allowed without the prior written approval of the Agency.

41-20 SETTING, ADJUSTING AND LOCATING WATER BOXES

Prior to construction, the Contractor must furnish reference points or swing ties to all existing water boxes within the construction area. A copy of the box location measurements must be provided to the Agency prior to construction.

The Contractor must furnish and install water boxes, covers, drop caps, and risers in accordance with the Standard Drawings. Unless otherwise shown in the Plans, in construction areas with existing water boxes involving grade elevation changes or where existing water boxes or risers are disturbed, the Contractor must furnish new replacement water boxes and adjust them to final grade to comply with the requirements of the Standard Drawings. Existing water boxes that comply with the Standard Drawings, that are undamaged, and in good condition may be reused by the Contractor upon approval by the Agency.

Covers must not be interchanged between different make or model boxes.

Water boxes removed for subsequent reinstallation to allow reconstruction of existing streets must be temporarily replaced with a protective metal container such as a 5 gallon bucket or pail. The temporary metal container must cover the riser over the valve and will assist in keeping the location of the valves visible during street reconstruction activities. The risers at each valve must be kept free of debris and the valve operating nut left exposed.

41-21 ADJUSTING AIR RELEASE VALVES

The Contractor must install new air release valve boxes and adjust existing air release valve boxes to comply with the requirement of Standard Drawings 8-14A and 8-14B. Existing air release valves within manhole enclosures must be adjusted to grade using the standard method for adjusting manholes to finish grade, and plugged vent holes in the cover must be cleaned out.

41-22 RECYCLED WATER

The term “recycled water” is defined as reclaimed water or non-potable water. The requirements for recycled water apply whenever the terms “reclaimed water” or “non-potable water” appear in the Contract Documents.

Recycled water systems must comply with the requirements specified for potable water systems except as modified in this Section or the Contract Documents.

This Section specifies modifications to the potable water system requirements and specifies certain requirements that are specific to recycled water systems.

41-22.01 General

Recycled water systems must comply with the requirements of the most recent edition of "Rules and Regulations for Recycled Water Use and Distribution, County of Sacramento," hereafter referred to as the "Recycled Regulations.

41-22.02 Recycled Water Distribution System

This Section specifies requirements for the recycled water distribution system. The recycled water distribution system is defined as all portions of the recycled water system except the portion downstream of a water meter.

The requirements for the portion of the recycled water system downstream of a water meter are specified in Section 41-22.03, "Onsite Recycled Water System," of these Specifications.

41-22.02.A Pipes

PVC, polyethylene, and other plastic pipe must be purple, with the words "CAUTION: RECYCLED WATER – DO NOT DRINK" or "CAUTION: RECLAIMED WATER - DO NOT DRINK" embossed or integrally stamped/marked on the pipe. The warning must be stamped on opposite sides of the pipe, repeated every 3 feet.

Ductile iron, copper, and other metal pipe must be encased with eight (8) mil purple polyethylene, in compliance with Section 41-5.03, "Polyethylene Encasement."

Underground warning tape must be purple, in compliance with Section 41-5.01, "Underground Warning Tape," of these Specifications.

Valve risers must be 8-inch purple C900 PVC pipe.

If the horizontal separation required in Section 41-19, "Regulations Relating to Sanitary Hazards", is not possible, written approval for deviations must be obtained from the Agency and the State Department of Health Services prior to commencement of construction. Common trench construction is not permitted.

Recycled water pipes and appurtenances must be disinfected in accordance with Section 41-16, "Disinfection, Flushing, and Bacteriological Testing," of these Specifications, unless otherwise specified.

41-22.02.B Valve Boxes and Covers

Valve boxes and covers must comply with the requirements of Standard Drawing 8-5, for recycled water. Lids must be labeled "RECYCLED WATER" in cast or bead-welded letters. The top surfaces of the box and cover must be coated with a purple coating in accordance with Section 41-22.04, "Purple Identification Coating," of these Specifications. Risers must be purple C900 PVC.

41-22.02.C Meter Boxes and Covers

Meter boxes and covers must comply with the requirements of Standard Drawings 8-6A, 8-6B, and 8-6C, for recycled water. Precast concrete boxes must have a purple polyethylene face ring. Covers must be labeled "RECYCLED WATER" in cast or bead-welded letters on the metal portion of the cover. The top surfaces of the cover must be coated with a purple coating in accordance with Section 41-22.04, "Purple Identification Coating," of these Specifications.

41-22.02.D Blow-Off and ARV Boxes and Covers

Blow-off boxes and covers must comply with the requirements of Standard Drawings 8-12, 8-13A, 8-13B, and 8-13C, for recycled water. Covers must be labeled "RECYCLED WATER" in cast or bead-welded letters. The top surfaces of the blow-off box and cover must be coated with a purple coating in accordance with Section 41-22.04, "Purple Identification Coating," of these Specifications.

Air release valves must comply with the requirements of Standard Drawings 8-14A and 8-14B, for recycled water.

41-22.03 Onsite Recycled Water System

This Section specifies requirements for the onsite recycled water system. The onsite recycled water system is defined as the portion of the recycled water system downstream of a water meter.

The requirements for the portion of the recycled water system upstream of a water meter are specified in Section 41-22.02, "Recycled Water Distribution System," of these Specifications.

41-22.03.A Pipes

PVC, polyethylene, and other plastic pipe must be purple, with the words "CAUTION: RECYCLED WATER – DO NOT DRINK" or "CAUTION: RECLAIMED WATER - DO NOT DRINK" embossed or integrally stamped/marked on the pipe. The warning must be stamped on opposite sides of the pipe, repeated every 3 feet. If purple pipe is not available, plastic pipe must be encased in a continuous purple sleeve as specified below for metal pipe.

Ductile iron, copper, and other buried metal pipe must be encased in a continuous purple polyethylene sleeve, with black lettering with the words "CAUTION: RECYCLED WATER – DO NOT DRINK" or "CAUTION: RECLAIMED WATER - DO NOT DRINK," and "PELIGRO: AGUA IMPURA – NO BEBER." Each section of sleeve must overlap the next section a minimum of 24 inches and must be secured at the overlap.

Above-ground pipes must be coated with a purple coating in accordance with Section 41-22.04, "Purple Identification Coating," of these Specifications. Valve risers must be 8 inch purple C900 PVC pipe.

If the site is being supplied with new potable water pipes, the potable water pipes downstream of the water meter must be marked with a continuous blue tape with the words "DRINKING WATER LINE" and "TUBERIA DE AGUA POTABLE." The tape must be at least 3 inches wide and must be fastened directly to the top of the potable pipe.

If the horizontal separation required in Section 41-19, "Regulations Relating to Sanitary Hazards", is not possible, written approval for deviations must be obtained from the Agency and the State Department of Health Services prior to commencement of construction. Common trench construction of potable water pipes and recycled water pipes is not permitted.

41-22.03.B Backflow Devices

Backflow devices must not be installed, unless otherwise specified. If a backflow device is required, it must meet the requirements of Section 41-9, "Backflow Prevention Assemblies", in this Section of these Specifications.

41-22.03.C Valves

Valves must have visible identifying purple tags mechanically attached to the valve body by wire or snap tie or other approved device and have the words "WARNING Reclaimed Water Do Not Drink" and "AVISO AGUA IMPURA NO TOMAR" (T. Christy RC1P2 or equal).

41-22.03.D Recycled Water Boxes and Covers

41-22.03.D.(1) Concrete Boxes and Covers

Traffic concrete boxes and covers must comply with the requirements of the Standard Drawings, for recycled water. Lids must be labeled "RECYCLED WATER" in cast or bead-welded letters. The top surfaces of the box and cover must be coated with a purple coating in accordance with Section 41-22.04, "Purple Identification Coating," of these Specifications.

Non-traffic concrete boxes and covers must have a purple polyethylene face. The face must be etched, have an ultraviolet inhibitor, and be anchored in the concrete. Concrete box covers must have the words "NONPOTABLE WATER" or "RECLAIMED WATER" or "RECYCLED WATER" stamped into the face. The top surfaces of the cover must be coated with a purple coating in accordance with Section 41-22.04, "Purple Identification Coating," of these Specifications.

41-22.03.D.(2) Rigid Plastic or Composite Boxes and Covers

Rigid plastic or composite boxes and covers must be purple, and must have the words "NONPOTABLE WATER" or "RECLAIMED WATER" or "RECYCLED WATER" stamped into the cover.

41-22.03.E Hose Bibs

Hose bibs are prohibited in recycled water systems and must not be connected to the recycled water system.

41-22.03.F Quick Coupling Valves

Quick coupling valves must comply with Section 50-43.22, "Quick Coupling Valves", of these Specifications.

41-22.03.G Sprinklers

Sprinklers must have manufacturer-recommended purple identifiers approved by the Agency.

41-22.03.H Warning Signs

Warning signs must comply with the requirements of Standard Drawing 8-16. Signs must be located in accordance the Recycled Regulations and as directed by the Water Utility.

41-22.03.I Special Cross Connection Test

A special cross connection test is required for sites using recycled water. The cross connection test will be performed by the water purveyor or the Sacramento County Environmental Management Department (EMD) representative after the recycled water, potable water, and fire systems are completely installed and have passed the required pressure testing and disinfection testing. The test must be performed and successfully passed prior to site occupancy. Domestic systems can be shut down for 12 hours and irrigation systems can be shut down for 24 hours during testing.

41-22.04 Purple Identification Coating

The purple identification coating system work must consist of the following:

- Removal of incompatible factory coatings from the surfaces to be coated.
- Surface preparation.
- Two prime coats, 4-8 dry mils each.
- One finish coat, 3-5 dry mils.

Coating work for precast concrete boxes and covers must be performed in a shop prior to installation.

The purple identification coating system must be an industrial coating product of a single manufacturer and must be manufactured by PPG, Tnemec, Sherwin Williams, Devoe, or approved equal. The prime coat material must be a high solids epoxy for immersion service with high abrasion resistance, and must be tintable to the required color. The finish coat material must be a high solids urethane or polyurethane with high weathering resistance, high color retention, good abrasion resistance, and must be tintable to the required color. The coating materials are not required to be approved for contact with potable water. The color of the prime coat material and the finish coat material must be OSHA "Safety Purple," Pantone 522C, or approved similar color. The color of the prime coat material and the finish coat material are not required to be identical.

Bituminous coatings, asphaltic paint, and other factory coatings that are incompatible with the prime coat material must be removed from the surfaces to be coated prior to surface preparation.

Surface preparation must comply with the following:

- Ferrous Metal: SSPC SP-6 (Commercial Blast Cleaning) or SSPC SP-11 (Power Tool Cleaning to Bare Metal).

- Galvanized Metal and Non-Ferrous Metal: SSPC SP-1 (Solvent Cleaning).
- Precast Concrete: Remove laitance and sealers and lightly roughen surfaces by chemical cleaning or abrasive sandsweeping. Wash off thoroughly with water and allow to completely dry.

The seating surfaces of boxes and covers, and holes for cover retention bolts must not be coated and must be cleaned of coating splatter prior to shipment to the field. Coating application work must comply with the recommendations of the manufacturer's published data sheets and instructions. Coatings on precast boxes and covers must be allowed to cure for a minimum of one week before the boxes and covers are installed in the field.

41-23 FIELD WELDING OF STEEL WATER PIPE

Field welding is required where specified and for connections to existing steel water pipes that do not have an existing connection flange.

Field welding must be in accordance with AWWA C206, and AWS D7.0 "Field Welding of Steel Water Pipe Joints." Field welding must be performed by welder operators qualified in three position welding per AWWA, ASME, or other similar three position-root bend test method of qualification. The welder or welding operator must provide proof upon request by the Agency of having been engaged in similar welding techniques within 6 months of the proposed project welding date. The Agency may request welding sample coupons for testing. The tests results must show weld strength at least equal to the plate strength to be acceptable. Acceptable test costs will be borne by the Agency; unacceptable test costs and weld repairing will be borne by the Contractor. Welding must be done with E6010 S.M.A.W. Welding Process welding rod as in ASME-Boiler and Pressure Vessel Codes; Section IX, Welding Operator Qualification.

Lining and grouting must be applied after welding of joints to preclude formation of welding gas pockets. When internal pipe welding is in progress, the Contractor must provide forced air draft venting of the pipe.

Artificial cooling of the weld area during welding or quenching completed welds is not permitted.

41-24 PAYMENT

Unless otherwise specified in the Special Provisions, payment for the water distribution system will be by lump sum.

The lump sum price paid for water distribution system includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the water distribution system, including cutting, trenching, laying, blocking, making connections, disinfecting, testing, backfilling, as shown or specified in the Contract, in these Specifications, and as directed by the Agency.

The unit price paid for fire hydrants includes excavation, furnishing and placing the tee in the main, the 6-inch lateral to the hydrant, the gate valve, the fittings, and the hydrant, all as detailed on the Plans. Also included in the unit price are blocking, backfill, restoration of street surfaces, and all other labor, equipment and material necessary for installing the fire hydrant in accordance with the Contract.

SECTION 42 - RELOCATION AND MAINTENANCE OF UTILITY FACILITIES
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SECTION 42 RELOCATION AND MAINTENANCE OF UTILITY FACILITIES

42-1 RELOCATION OF UTILITY FACILITIES

When shown or specified in the Contract, existing utility facilities will be relocated by the facility owner during the Work. The Contractor must notify the Agency in writing prior to doing any work in the vicinity of the affected facilities. The Contractor must not interfere with the utility facility until after the expiration of the time specified, and then only with the permission of the Agency.

If, in the opinion of the Agency, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being removed or relocated, the Contractor may receive an extension of time for the delays to the extent provided in Section 7-12.02, “Unavoidable Delays”, of these Specifications.

The right is reserved by the Agency and the owners of utility facilities, or their authorized agents, to enter the work site to make changes necessary for the rearrangement of their facilities. The Contractor must cooperate with forces engaged in such work. The Contractor’s operations must be conducted to avoid any unnecessary delay or hindrance to the work being performed by other forces.

All Work by the Contractor to assist utilities in the relocation of utility facilities are understood to be done as an expediency for the Contractor. If the Contractor desires compensation for its assistance efforts, the Contractor must enter into a separate agreement with the utility. No compensation other than a time extension may be provided by the Agency.

42-2 MEASUREMENT AND PAYMENT

Full compensation for conforming to the provisions in this Section, not otherwise provided for, is incidental to other items of work and no additional compensation will be paid.

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SECTION 43 CLEANING PIPELINES

43-1 GENERAL

Upon completion of construction and prior to final inspection, the Contractor must clean new pipelines of all dirt and debris. Pipeline installation will not be accepted as complete until the cleaning is complete and acceptable to the Agency.

Pipelines with a diameter of 24 inches or less must be cleaned by the controlled balling method, or an alternative method if approved in writing by the Agency. Pipelines greater than 24 inches in diameter must be cleaned as approved in writing by the Agency.

Temporary plugs must be installed and maintained during cleaning operations at points of connection to existing facilities to prevent water, dirt, and debris from entering the existing facility. The temporary plugs must be approved by the Agency and must remain in place until the completion of the balling and flushing operation. The plugs must be installed and removed in the presence of the Agency.

43-2 MEASUREMENT AND PAYMENT

Full compensation for cleaning pipelines, including all equipment, labor, materials, is included in the prices paid per linear foot of the respective sizes, grades, and types of pipes listed in the Contract, and no additional compensation will be paid.

SECTION 44 – SHOTCRETE, CAST CONCRETE CHANNEL LINING, AND GROUTED COBBLE

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SECTION 44 SHOTCRETE, CAST CONCRETE CHANNEL LINING, AND GROUTED COBBLE

44-1 SHOTCRETE

44-1.01 Description

This work consists of lining ditches and channels, embankment protection, and constructing warped sections and other similar features with shotcrete in accordance with the Contract and these Specifications.

Shotcrete must consist of concrete or mortar pneumatically applied onto a surface. Shotcrete must be applied by the dry-mix or wet-mix process. The shotcrete must be applied by a nozzleman certified by the American Concrete Institute The dry-mix process must consist of delivering dry mixed aggregate and cement pneumatically to the nozzle body, and adding water and mixing the materials in the nozzle body.

The resulting surface must be uniform and free from humps or depressions.

44-1.02 Materials

Portland cement must conform to the requirements of Section 50-5, “Portland Cement”, of these Specifications.

Sand must be clean, sharp, and free from clay, silt and loam. Sand must be well graded and suitable for the purpose intended with no particles larger than 3/8 inch.

The sand must contain between 3 and 5 percent moisture by weight.

44-1.03 Proportions

The proportion of cement to sand must be based on dry and loose volume and must not be less than 1 part portland cement to 4-1/2 parts sand. The water content must be maintained at a practical minimum and not in excess of 3 gallons per 94 pounds of cement as placed.

44-1.04 Mixing

Before being charged into the machine, the cement and sand must be thoroughly mixed dry in an approved power batch mixer equipped with a device for accurately measuring the quantity of sand and timing the mixing operation. The mixture must be mixed for at least 1-1/2 minutes during which time the mixer must rotate at a peripheral speed of 200 feet per minute. The dry mixed materials must be used promptly after their preparation and any material that has been mixed for more than 45 minutes cannot be used. Rebound must not be used on any portion of the Work.

44-1.05 Surface Preparation

When shotcrete is to be placed on an earth slope for embankment protection, the earth surface must be cleaned of grass, roots, and other deleterious matter. The surface must be made smooth and must be well watered and compacted. Header board must be placed as shown on the Plans. All surfaces must be damp, but not wet to the extent that free water exists at the time of application.

When shotcrete is applied to steel or concrete structures, the surface must be cleaned of all loose material and be damp, as specified above, at the time of application of the material.

44-1.06 Placing

The velocity of the material as it leaves the nozzle must be such that minimum rebound occurs. Velocities of the material must be constant. The nozzle must be held in a position and at a distance that the stream of flowing material will impinge at approximately right angles to the surface being covered and that excessive impact will be avoided.

Pneumatic pressure at the machine must not be less than 30 psi when the length of hose does not exceed 100 feet. Pressure must be increased 5 psi for each additional 50 feet of hose or fraction thereof. Water used for hydration at the nozzle must be supplied at pressure of at least 15 psi greater than the air pressure. The shotcrete must have uniform consistency.

After the shotcrete has been applied to the surface to finished grade, the surface of the shotcrete must be checked with a minimum 10-foot straightedge. Low spots must be raised by additional application of shotcrete. The final surface of the shotcrete must be finished with a wood float.

44-1.07 Curing and Protection

Curing must be as specified in Section 30-13, “Curing”, of these Specifications. Protection must be as specified in Section 30-14, “Protecting Concrete”, of these Specifications.

44-1.08 Reinforcement

Reinforcement must be as shown on the Plans and must conform to Section 31, “Reinforcement”, of these Specifications. Reinforcement must be placed in the shotcrete as it is applied. Reinforcement must be not less than 1/4 inch from unexposed faces and 3/4 inch from exposed faces.

44-1.09 Expansion Joints

When premoulded joint filler is shown or specified in the Contract, the filler must be placed in correct position before shotcrete is placed. The edges of the shotcrete at the joint must have a finished edge, edged with a 1/4-inch radius edging tool. Unless otherwise specified in the Contract, expansion joint material must be as specified in Section 50-4, “Premoulded Expansion Joint Filler”, of these Specifications.

44-1.10 Measurement and Payment

Unless otherwise specified in the Contract, quantities of shotcrete in lining ditches and channels, embankment protection, and constructing warped sections and other similar features will be measured by the square foot, computed from measurements along the slope of actual areas placed. Shotcrete placed outside the dimensions shown on the Plans or to fill low foundations will not be paid for. The price paid per square foot for shotcrete includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing shotcrete, including surface preparation, reinforcement, joint filling material, and finishing, as shown or specified in the Contract, as specified in these Specifications, and as directed by the Agency. No additional compensation will be allowed for rebound.

44-2 CAST CONCRETE CHANNEL LINING

44-2.01 Description

This work consists of lining channels with cast-in-place concrete in accordance with the details and dimensions shown or specified in the Contract and these Specifications.

44-2.02 Materials

Materials for cast-in-place concrete lining must be Class "B" concrete as specified in Section 50-5, “Portland Cement Concrete”, of these Specifications. Slump for concrete channel lining must not exceed 4 inches as determined by the slump cone method of ASTM C143 or an equivalent slump as determined by California Test 533. Lesser slumps may be required by the Agency if the concrete begins to develop surface cracks. At the Contractor’s option, shotcrete conforming to Section 44-1, “Shotcrete”, of these Specifications may be used for side lining only.

When shown or specified in the Contract, grouted cobbles conforming to Section 44-3, “Grouted Cobbles”, of these Specifications must be used for side or bottom lining.

44-2.03 Placement and Thickness

The thickness of the bottom lining in channels must not be less than 4 inches. The thickness of the side lining in channels must not be less than 3 inches.

Lining must be placed as shown on the Plans and Standard Drawing 9-24, and as directed by the Agency.

The appearance of the lining must be neat and uniform conforming to the lines shown on the Plans or as directed by the Agency. A 2 by 4 inch header board placed along the top of the lining or other method approved by the Agency must be used as a control while placing the lining.

The surfaces of areas to be lined must be evenly graded to the lines and grade and sections as shown on the Plans. The surfaces must be moistened thoroughly. All surfaces must be free from standing water, mud, and debris and must be firm enough to prevent contamination of the fresh lining by earth or other foreign material. The excavated channel must be approved by the Agency before the Contractor begins concrete placement.

Grade control points must be placed in accordance with Section 18-4.02, "Grade Control - Lined Channels", of these Specifications.

After the concrete has been placed, the surface must be checked with a minimum 10-foot straightedge. Low spots must be filled to finish grade. The finished concrete surface must be smooth and uniformly constructed to the design finish grade.

44-2.04 Reinforcement

The channel lining must be reinforced with 4 by 4 inch – W4 x W4 welded wire fabric conforming to ASTM A185. The welded wire fabric reinforcement must be embedded in the concrete so that it will be a minimum of 1 inch clear from either face of the concrete, unless otherwise shown on the Plans. The wire fabric must be maintained at the required minimum clear distance from the soil through the use of dobies or other methods approved by the Agency before and during concrete placement.

44-2.05 Joints

Joints in cast concrete channel lining consist of construction joints, transverse expansion joints, and transverse contraction joints. Joints must be true to a uniform line and neat in appearance.

Construction joints must be square, and must have a finished edge, edged with a 1/4-inch radius edging tool. The edge must be thoroughly wetted before the next section of lining is placed. Construction joints must be constructed whenever the operation is halted for a period exceeding 30 minutes. Reinforcement must extend through the construction joints.

Transverse expansion joints must be constructed at intervals of not more than 50 and must be filled with premoulded expansion joint filler material, unless otherwise shown on the Plans. The material must have a minimum thickness of 3/8 inch. The edges of the concrete at the joint must have a finished edge, edged with a 1/4-inch radius edging tool. Unless otherwise specified in the Special Provisions, expansion joint material must be as specified in Section 50-4, "Premoulded Expansion Joint Filler", of these Specifications.

Transverse contraction joints must be constructed at intervals of 10 feet and must be scored by troweling a 5/8-inch deep groove, 1/4 inch wide, unless otherwise shown on the Plans.

44-2.06 Weep Holes

On channels with side lining extending more than 18 inches vertically above the channel toe, weep holes must be constructed at intervals of 10 feet midway between contraction joints on each side of the channel. Weep holes must be constructed using perforated 2-inch diameter, schedule 40, polyvinyl chloride (PVC) or acrylonitrite butadine-styrene (ABS) pipe. The pipe must be cut to fit the channel slope and must be placed 1 foot above the toe of slope. The pipe perforations must be a minimum of 1 square inch per linear foot of pipe. The weep

holes must be backed by a minimum of 1 cubic foot of aggregate material tied in a burlap bag. The aggregate must extend at least 6 inches above and below and to each side of the weep hole, and at least 10 inches into the side slope. The side and back of the burlap bag must be protected from being coated by concrete during the placing operation by a suitable means approved by the Agency. On the day following concrete placement, each weep hole must be rodded to assure that it has not been blocked.

44-2.07 Cutoff Walls

Cutoff walls must be constructed around the perimeter at each end of the channel lining and at all locations where the new lining meets structures or an existing lining, and in other locations shown on the Plans. The cutoff walls must be a minimum of 6 inches thick and 18 inches deep measured from the surface of the lining. The channel lining reinforcement must be bent down into the cutoff walls.

44-2.08 Finishing

Cast-in-place concrete channel lining must be placed and tamped until it is thoroughly compacted and mortar flushes to the surface. After striking off to grade, the concrete must be hand floated with wooden floats. The entire surface must then be broomed with a fine hair push broom to produce a uniform surface. Brooming must be done when the surface is sufficiently set to prevent deep scarring, and must be accomplished by drawing the broom parallel to the expansion and construction joints.

44-2.09 Curing and Protection

Curing must be as specified in Section 30-13, “Curing”, of these specifications. Protection must be as specified in Section 30-14, “Protecting Concrete”, of these Specifications.

44-2.10 Measurement and Payment

Unless otherwise specified in the Contract, quantities of cast-in-place concrete channel lining will be measured by the square foot computed from measurements along the slope, of actual areas placed. The vertical legs of cutoff walls are not considered surface area. The price paid per square foot for cast-in-place concrete channel lining includes full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in cast-in-place concrete channel lining, including surface preparation, reinforcement, joint filling material, finishing, and constructing cutoff walls, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

44-3 GROUTED COBBLES

44-3.01 Description

This work consists of furnishing and placing grouted cobbles in the side or bottom of cast-in-place concrete channel lining. Grouted cobbles must be in accordance with the details shown or specified in the Contract, and these Specifications. Cast-in-place concrete channel lining must conform to Section 44-2, “Cast Concrete Channel Lining”, of these Specifications.

Reinforcement and expansion joints will not be required in grouted cobble channel lining.

44-3.02 Materials and Placement

Cobbles must be clean river rock cobbles having a maximum size of 10 inches and must conform to the following grading:

Sieve Sizes	Percentage Passing
Greater than 4”	40 - 100
4”	0 - 40
1-1/2”	0

Grout must conform to the requirements for Class “B” concrete as specified in Section 50-5 “Portland Cement Concrete”, and these Specifications. Aggregate size must be limited to that necessary to obtain the required penetration into the interstices of the cobbles, as specified below. The water content of the grout must permit gravity flow of the grout into the interstices of the cobbles.

The cobbles must be uniformly placed to a thickness of approximately 12 inches. Minimum penetration of the grout into the interstices of the cobbles must be 4 inches measured from the outer surface of the cobbles.

The surfaces of the cobbles must be cleaned of any adhering soil and then moistened. Grout must be uniformly placed over the cobbles. Grout must not be permitted to flow across the cobbles a distance in excess of 10 feet. The temperature of the grout at the time of placement must not exceed 90 degrees F.

Immediately after placement, the grout must be spaded or rodded into place until minimum required penetration is obtained.

After the grout has been placed, the cobbles must be thoroughly brushed to expose their top surfaces. The outer cobbles must project 1/4 to 1/3 of their diameter above the grout surface. After completion of any 10-foot strip of grouted cobbles, no personnel or equipment is permitted on the surface for a period of 24 hours. Grouted cobbles must be cured as specified in Section 30-13, “Curing”, of these Specifications.

44-3.03 Measurement and Payment

Unless otherwise specified in the Contract, quantities of grouted cobbles will be measured by the square foot computed from measurements, along the slope, of actual areas placed. The vertical legs of cutoff walls are not considered surface area. The price paid per square foot for grouted cobbles includes full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in grouted cobbles, including surface preparation, and finishing, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

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SECTION 45 CHAIN LINK FENCE

45-1 GENERAL

Fences must conform to the State Specifications, and these Specifications.

Temporary fencing for the control, safety or convenience of traffic, or the preservation of property required during the course of construction, must conform to these Specifications or the Special Provisions.

45-2 MATERIALS

Chain link fence and gate materials must conform to the State Specifications.

45-3 CONSTRUCTION

Unless otherwise shown or specified in the Contract, chain link fences and gates must be constructed as shown on State Plan A85, and in accordance with these Specifications. Concrete for post foundations must be as specified in the State Specifications. Concrete bases for terminal, gate and line posts must cure for at least 72 hours before chain link fence fabric is placed. Allow bases to cure for 5 Calendar Days before tensioning devices (gates, guy wires, etc.) are installed.

Unless otherwise specified in the Special Provisions, all fences must be constructed with a top rail and a bottom tension wire.

Fabric must be fastened to line posts with fabric bands spaced approximately 14 inches apart, and to top rail and bottom tension wire with 9 gauge galvanized tie wires spaced approximately 24 inches apart.

At locations where breaks in a run of fencing are required for gates, or at intersections with existing fences, adjustments in post spacing must be made to conform to the requirements for the type of closure indicated.

Unless otherwise directed by the Agency, temporary guys or bracing must be installed to hold posts in proper position until the concrete has set.

45-4 MEASUREMENT AND PAYMENT

Quantities of chain link fence to be paid for will be determined by the linear foot from actual measurements of the completed fence. Measurements will be made parallel to the ground slope along the line of completed fence, deducting the widths of openings. Chain link fence will be paid for at the price per linear foot for chain link fence of the type designated in the Contract.

Quantities of gates will be determined from actual count. When more than one gate is placed in an opening, each single unit placed will be counted as a gate. A gate unit complete in place is one gate with all necessary fittings, hardware, and gate and latch posts with braces. Gates will be paid for at the unit price per chain link gate. The size and type of gate will be designated in the Contract.

The above prices and payments include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing chain link fences and gates, complete in place, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

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SECTION 46 SURVEY MONUMENTS

46-1 GENERAL

This work consists of constructing cast-in-place portland cement concrete survey monuments at the locations shown on the Plans or directed by the County Surveyor. Survey monuments must conform to the requirements in the State Specifications, these Specifications, and the Special Provisions.

The Agency will show the location and character of all existing survey monuments within the construction area on the Plans.

Whenever a survey monument not shown on the Plans is discovered, the Contractor must immediately bring it to the attention of the Agency and must protect it.

When set forth in the Special Provisions that the Contractor is to provide all surveys, the Contractor is responsible for referencing, re-setting, and filing of corner records for all survey monuments disturbed or destroyed by construction activities in accordance with Section 8771 of the Land Surveyors Act.

All survey monuments and references must be set or re-set by or under the direction of a California Licensed Land Surveyor or a California Registered Civil Engineer authorized to practice Land Surveying.

46-2 MATERIALS

Unless otherwise specified in the Contract, survey monuments must be Type D, Alternative 1, as detailed in the current State Standard Plans., except for those to be installed in new bridge deck construction. Survey monuments placed in new bridge deck construction must be modified Type A, as detailed in the current State Standard Plans, and must consist of a marker disc placed on the surface of the concrete bridge deck without specific concrete depth, reinforcing or chamfer.

Concrete must be Class "B-2" concrete as specified in Section 50-5, “Portland Cement Concrete”, of these Specifications.

Unless otherwise specified in the Special Provisions, survey marker discs must be furnished by the Contractor and must be leaded red or semi-red brass conforming to ASTM Designation: B 584, Copper Alloy UNS No. C84400. The disc must be 2-1/2 inches in diameter and at least 2-1/2 inches long.

Mortar must be as specified in the State Specifications.

46-3 CONSTRUCTION

The brass disc must be imbedded in fresh concrete and centered within the cross ties of the survey point.

Finished monument cases must be flush with the surrounding area and must be secured by a concrete or mortar collar as detailed on the State Plan A74. Survey monuments on new deck construction do not have monument cases.

It is essential that the survey monuments be placed in the correct locations. Survey monuments placed in locations unacceptable to the County’s Surveyor must be removed and replaced at the Contractor’s expense.

46-4 MEASUREMENT AND PAYMENT

The quantities of each type of survey monument will be paid for as survey monuments by units, in place, determined from actual count. The unit prices paid for survey monuments

include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the survey monuments, complete in place, including monument cases, granular material, excavating and backfilling holes, and disposing of surplus excavated material, as shown or specified in the Contract, specified in these Specifications, and directed by the Agency.

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SECTION 47 RAILINGS AND BARRIERS

47-1 GENERAL

Railings and barriers must conform to the State Specifications.

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SECTION 48 TRAFFIC STRIPES AND PAVEMENT MARKINGS

48-1 GENERAL

Traffic stripes and pavement markings must be as shown on the Plans and must conform to these Specifications.

The traffic stripes and pavement markings must conform to the standards, dimensions, and details as specified in the latest edition of the California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD as amended for use in California). In addition, the traffic stripes and pavement markings must conform to County Standard Drawing 4-77.

48-2 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS

Thermoplastic traffic stripes and pavement markings must conform to the State Specifications, and to these Specifications. Thermoplastic must be Alkyd type for extrusion application, and must produce an adherent reflectorized strip capable of resisting deformation by traffic.

The thermoplastic material must be 100 percent solids. The binder must consist of synthetic alkyd resins, and must be homogeneously incorporated with all the necessary prime pigments, fillers and glass beads to produce a coating that meets the requirements specified in the following table:

REQUIRED THERMOPLASTIC CHARACTERISTICS		
Requirement	**Color**	
	White	Yellow
• Glass Beads, AASHTO M-247, Type I, percent by weight, min. (California Test Method 423)	30	30
• Titanium Dioxide (Ti02), percent by weight, min. (AASHTO T250)	10	
• Lead Chromate, Medium Heat Stability, percent by weight, min.		2.5
• Specific Gravity, max. (California Test Method 423)	2.15	2.15
• Binder, percent by weight, min. (California Test Method)	18	18
• Ring & Ball Softening Point, °F (ASTM E28)	200 - 240	200 - 240
Tests on Material after 4 hours heat with stirring at 425°F+ 2°F, which includes 1 hour for meltdown and temperature stabilization:		
• Bond Strength to Concrete, 0.125-inch thick film drawdown at 425°F test at 75°+ 2°F, psi, min. (California Test Method 423)	180	180
• Brookfield Thermosel Viscosity, Spindle SC4-27, 20 RPM at 425°F, Poise (California Test Method 423)	30 - 45	30 - 45
• Impact Resistance, Falling Ball Method, 0.125 inch thick film drawdown at 425°F on concrete. Test at 75+2°F, inch-lbs., (ASTM D2794)	10	10
• Daylight Luminous Reflectance, min. (ASTM E97)	75	40
• Yellowness Index, max., (ASTM E313)	0.15	
• Hardness, Shore A-2 Durometer with 2 kilogram weight at 115°F. (California Test Method 423)	60 - 80	60 - 80
• Low Temperature Stress Cracking, Resistance at 25°F, (AASHTO T250)	No Crack	No Crack
• Color Match, Federal Std. No. 595a, Color No. 33538		Passes

The thermoplastic material must be applied in a single, uniform layer by extrusion methods.

Stencils must be used when applying thermoplastic pavement markings. Stencils may be new or used if in good condition. If stencils are bent or damaged they must be replaced.

The pavement surface to which thermoplastic material is applied must be completely coated by the material and the voids of the pavement surface must be filled.

Unless otherwise specified in the Special Provisions, the thermoplastic material for traffic stripes must be applied at a minimum thickness of .075 inch. Thermoplastic material for pavement markings must be applied at a thickness of 0.125 inch. Glass beads must be applied immediately to the surface of the molten thermoplastic material at rate of not less than 8 pounds per 100 square feet. The amount of glass beads applied must be measured by stabbing the glass beads tank with a calibrated rod.

48-3 PAINTED TRAFFIC STRIPES AND PAVEMENT MARKINGS

Painted traffic stripes and pavement markings must conform to the State Specifications, and these Specifications.

Self-sticking traffic marking tape, vinyl or otherwise, developed for such use must be used for temporary striping as required, unless otherwise shown or specified in the Contract.

48-4 PREFORMED TRAFFIC STRIPES AND PAVEMENT MARKINGS

48-4.01 General

Preformed traffic stripes and pavement markings must be furnished and placed in accordance with these Specifications and as directed by the Agency. Pavement markings must be in conformance with the State of California Manual on Uniform Traffic Control Devicesl.

The preformed stripes and pavement markings must consist of white or yellow film with pigments blended to conform to standard highway marking colors. The pigments must be thoroughly blended to produce long lasting colors resistant to the effects of weather exposure and to last through the expected life of the film.

The preformed tapes must consist of a pressure sensitive adhesive that is capable of adhering to clean and dry bituminous or portland cement surfaces. All surfaces must be prepared and tape applied as indicated by the manufacturer's specifications.

The Contractor must post-inlay all traffic stripes and markings on new asphalt surfaces in accordance with the manufacturer's recommendations and these Specifications. The Contractor must post-inlay within 24 hours of the placement of an asphalt overlay.

The Contractor must not apply tape without assistance of a manufacturer's factory service representative, who must be present during tape application.

The Contractor must provide manual or automatic application equipment as required. The application equipment must be capable of simultaneously applying 2 parallel 4-inch lines spaced 3 inches apart. The application equipment must also be capable of applying unlinered, pre-coated, pressure-sensitive, adhesive pavement marking tape.

The manual unit must have a manually actuated product feed advance system and a foot operated product cutting mechanism.

The automatic unit must have the capability of advancing, applying, and cutting the pavement marking tape at specific pre-programmed lengths, at speeds up to 6.5 miles per hour when towed by an appropriate vehicle.

Additional supplemental equipment for manual application of required primer, or for manual tamping of the applied markings must also be provided.

Prior to installation, the Contractor must submit to the Agency for approval the method the Contractor proposes to use to install traffic stripes and markings, including a list of equipment to be used in the installation.

The completed traffic stripes and markings must have clean, well-defined edges, without deformations, and be free of tears or other disfigurements. Improperly placed, defective, or disfigured traffic stripes and markings must, at the Contractor's expense, be immediately removed from the pavement surface by methods approved by the Agency.

Completed traffic stripes must be uniform, straight on tangent alignment, and on a true arc on curved alignment. On tangent alignment, when a one-hundred-foot (100') string line is stretched taut and placed directly on the outer edge of the completed traffic stripe, the distance between the string and the edge of the traffic stripe must not exceed 3/4 inch, measured anywhere along any 100-foot interval of the tangent alignment. On curved alignment, the outer edge of the traffic stripe must not deviate more than 3/4 inch from the true arc. The lengths of the gaps and individual stripes that form broken traffic stripes must not deviate more than 2 inches from the lengths required to produce a uniformly repeating, broken-stripe pattern.

48-4.02 High Reflective Preformed Traffic Striping

Preformed striping material must be durable retroreflective preformed patterned pavement tape (#380) with ceramic beads as manufactured by the 3M Company or equivalent if approved in writing by the Agency.

The preformed tape must have the following minimum retroreflective values measured in accordance with ASTM D4061:

Requirement	Color	
	White	Yellow
Entrance Angle	86.0° - 86.5°	86.0° - 86.5°
Observation Angle	0.2° - 1.0°	0.2° - 1.0°
Specific Luminance [(mcd·ft)·fc]	1,100 - 700	800 - 500

48-4.03 Preformed Traffic Stripes

Preformed striping material must be durable retroreflective preformed pavement tape (#5730) with glass beads as manufactured by the 3M Company or equivalent if approved in writing by the Agency.

The preformed tape must have the following minimum reflective values measured in accordance with ASTM Designation: D 4061:

Requirement	Color	
	White	Yellow
Observation Angle	0.2° - 0.5°	0.2° - 0.5°
Specific Luminance [(mcd·ft)·fc]	550 - 380	410 - 250

48-4.04 Twelve-Inch Preformed Traffic Striping (White and Yellow) and Markings

Twelve-inch (12”) preformed traffic striping (white and yellow) and markings must be furnished and placed in accordance with these Specifications and as directed by the Agency.

Preformed traffic stripes must be installed on all newly resurfaced streets.

Preformed striping material must be durable retroreflective preformed pavement tape (#420) with glass beads as manufactured by the 3M Company or equivalent product as approved by the Agency.

The preformed tape must have the following minimum reflective values as measured in accordance with ASTM D4061:

Requirement	White		
Entrance Angle	86.0°	86.0°	86.5°
Observation Angle	0.2°	0.5°	1.0°
Specific Luminance [(mcd·ft)·fc]	700	500	400

48-5 PLACEMENT

New traffic striping of the roadway centerline must be installed on each segment of roadway construction on the same day that the final lift of asphalt concrete pavement is placed on that roadway segment.

New traffic striping of lane lines, crosswalks, and stop bars (skip white and solid white) must be installed on each segment of roadway construction within one Calendar Day of the final lift of asphalt concrete pavement placed on that roadway segment.

If application of lane line striping, crosswalks, and/or stop bars is not completed on the required day, the Contractor must supply and install temporary pavement markings as detailed below:

Temporary pavement markings must be flush mounted reflectorized tape squares, four inch by four inch (4" x 4") 3M "Staymark" with backing liners, detour grade, #6350 yellow and #6351 white, or approved equal. Right turn barrier lines, edge lines, and shoulder lane lines must not be delineated with temporary pavement markings. The spacing of the temporary pavement markings must be as follows:

Line Type	Color	Spacing
Centerline (straight roadway portions)	Yellow	48' O.C.
Centerline (tapered or curving portions)	Yellow	24' O.C.
Stop Lines	White	6' O.C.
Channelizing Line	White	24' O.C.

The Contractor must remove the temporary pavement markings prior to the installation of new striping.

All other required new striping (e.g. bicycle lane stripes, edge lines, pavement markings, etc., not listed above) must be installed on each roadway segment within 2 Working Days of the day the final lift of asphalt concrete pavement is placed on that roadway segment.

48-6 MEASUREMENT AND PAYMENT

Thermoplastic traffic stripes will be measured by the linear foot along the line of the traffic stripes, without deductions for gaps in broken traffic stripes. Unless otherwise indicated in the Contract, measurement of thermoplastic traffic stripes does not include the supply and installation of reflective pavement markers.

If the Contract includes a separate pay item for two-direction, no passing zone striping, as depicted in Details 15, 16, 18, 19, 21 or 22 of State Standard Plan A20A, both stripes of the double traffic stripe are measured together by the linear foot such that one foot of measurement for payment includes two stripes each one foot long. If the Contract does not have a separate pay item for two-direction, no passing zone striping, each stripe of a double traffic stripe will be measured separately.

If the Contract includes a separate pay item for median island and/or two-way left turn striping as depicted in Details 28, 29, 31 or 32 of State Plan A20B, all four stripes of the quadruple traffic striping will be measured together by the linear foot such that one foot of measurement for payment includes four stripes each one foot long. If the Contract does not have a separate pay item for median island and/or two-way left turn striping, each stripe of a quadruple traffic stripe will be measured separately.

If the Contract includes a separate pay item for channelizing striping, as depicted in Details 38 or 38A of State Standard Plan A20D an 8-inch wide stripe will be measured by the linear foot. If the Contract does not include a separate pay item for channelizing striping, each linear foot of 8-inch wide striping installed will be measured as 2 feet of traffic striping.

If the Contract includes a separate pay item for bicycle lane striping, as depicted in Detail 39 or 39A of State Plan A20D, a 6-inch wide stripe will be measured by the linear foot. If the Contract does not include a separate pay item for bicycle lane striping, each linear foot of 6-inch wide striping installed will be measured as 1-1/2 feet of traffic striping.

Thermoplastic pavement markings, including crosswalk lines and stop bars, will be measured by the square foot for the actual area covered. The prices paid per linear foot for thermoplastic traffic stripes of the widths and patterns designated in the Contract and per square foot for thermoplastic pavement markings include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying thermoplastic traffic stripes and pavement markings, complete in place, including establishing alignment for stripes, and layout work, as shown or specified in the Contract, these Specifications, and directed by the Agency.

Painted traffic stripes will be measured by the linear foot along the line of the traffic stripes, without deductions for gaps in broken traffic stripes. A double traffic stripe, consisting of two 4-inch wide yellow stripes separated by a 3-inch wide black stripe, will be measured as one traffic stripe. Painted pavement markings will be measured by the square foot for the actual area painted. The prices paid per linear foot for painted traffic stripes and per square foot for painted pavement markings include full compensation for furnishing all labor, materials, tools, equipment, and incidentals involved in painting traffic stripes. Compensation includes establishing alignment for stripes and layout work as shown or specified in the Contract, these Specifications, and directed by the Agency. All exposed surfaces of asphalt concrete dike used around corner returns at intersections must be painted with two coats of traffic white paint. The supply and painting of the asphalt concrete dikes is considered incidental and included in the unit prices of the various bid items and no additional compensation will be allowed.

Preformed traffic stripes will be measured by the linear foot along the line of the traffic stripes, without deductions for gaps in broken traffic stripes. A double traffic stripe, consisting of two 4-inch wide yellow stripes, will be measured as two traffic stripes. Undulation striping will be paid for under this item. Preformed pavement markings will be measured by the square foot for the actual area covered. Parking stall brackets are considered markings for payment purposes. The prices paid per linear foot for preformed traffic stripes of the widths and patterns designated in the Contract and per square foot for preformed pavement markings include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying preformed traffic stripes and pavement markings, complete in place, including establishing alignment for stripes, and layout work, as shown or specified in the Contract, these Specifications, and directed by the Agency.

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SECTION 49 SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

49-1 GENERAL

Signals, lighting and electrical systems must be constructed or installed as shown or specified in the Contract, these Specifications, the applicable State Plans, and the applicable provisions of the State Specifications.

49-1.01 Definitions

Definitions for signals, lighting and electrical systems must be as specified in the State Specifications, and the following:

Programmed Visibility Signal Head—A type of signal head that can be optically programmed to restrict visibility of indication(s) to only those areas or lanes designated.

Signal Standard—Any pole that supports signal head(s).

Street Light Standard—The pole, and mast arm if required, that supports the luminaire.

49-1.02 Abbreviations

Abbreviations for signals, lighting and electrical systems must be as specified on State Plans, and the following:

I/C—Interconnect Cable
L.C.—Lower Case
PG&E—Pacific Gas & Electric Company
SMUD—Sacramento Municipal Utility District
U.C.—Upper Case

49-1.03 Regulation and Code

Electrical equipment must conform to the following standards wherever applicable: the International Municipal Signal Association (IMSA) and The National Electrical Code (NEC), as amended by the County, and the standards cited in the State Specifications.

49-1.04 Equipment List and Drawings

If requested by the Agency, the Contractor must submit for review sample articles of the material proposed for use. After review, said sample articles will be returned. The Contractor must include on the equipment list and on the equipment itself the installation location of material supplied. This must be done by the use of street names, the alphabetical letter designation used on the Plans, or a location as otherwise noted on the Plans. Equipment lists and drawings must conform to the State Specifications.

The equipment and materials proposed for use on any project must be approved by the Agency before starting work.

In conformance with the requirements in Section 11-3, “Record Drawings”, of these Specifications, the Contractor must maintain record drawings that must show in detail the construction changes of all traffic signal and streetlight wiring, conduits, standards, and associated equipment. In particular, the record drawings must accurately depict the location and depth of conduits, location of standards, pull boxes, wiring changes, and all applicable manufacturer’s operation and maintenance information.

49-1.05 Ordering of Signal and Lighting Equipment

The Contractor must place the order for long lead-time signal and lighting equipment not provided by the Agency within 5 Calendar Days after the date of the Notice to Proceed or within 5 Calendar Days after the start of the Contract Time, whichever comes first. The Contractor

must submit a copy of the equipment order to the Agency. Liquidated damages, as set forth in Section 8-10, "Liquidated Damages for Delay", of these Specifications, apply in case of failure to comply. No extension of time will be allowed for delay in delivery of traffic signal poles, street light standards, luminaries, or traffic signal equipment. The Agency hereby guarantees payment for long lead-time equipment ordered prior to execution of the Contract.

The Contractor must furnish the Agency with a statement from the vendor(s) that the order for the electrical material required for the contract has been received and accepted by the vendor(s). The statement must be furnished within 10 Calendar Days after receiving notice that the Contract has been executed for the Agency. The statement must give the date that the electrical equipment will be shipped.

49-1.06 Maintaining Existing and Temporary Electrical Systems

Maintaining existing and temporary electrical systems must conform to Section 86-1.06, "Maintaining Existing and Temporary Electrical Systems", of the State Specifications, except that paragraphs 11, 12, and 13 do not apply.

Existing electrical systems, including traffic signals, traffic signal vehicle and pedestrian detection facilities, traffic signal/Intelligent Transportation System (ITS) communication and monitoring facilities, street lighting facilities, flashing beacons and sign illumination facilities, or approved temporary replacements thereof, must 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 must notify the Agency at least 2 Working Days prior to performing any work on existing systems, including any work that may take vehicle detectors out of service or may reroute traffic off of existing vehicle detectors.

The Contractor must notify the Agency at least 2 Working Days prior to any operational shutdown of traffic signals, traffic signal/ITS communications, street lighting or other electrical systems or facilities.

Traffic control to direct traffic during the shutdown of a traffic signal system must be provided by the Contractor at the Contractor's expense. The Contractor must submit a traffic control plan to the Agency for review and approval a minimum of 5 Working Days prior to a shutdown of a traffic signal. Traffic signal shutdowns are limited to Monday through Thursday, excluding holidays, from 9:00 a.m. to 3:00 p.m., or as specified in the Special Provisions.

Where a facility requires continuous lighting, the shutdown time must be limited to one-half (1/2) hour as scheduled by the Agency, unless otherwise specified in the Special Provisions or permitted by the Agency. The shutdown of lighting systems must not interfere with the regular lighting schedule, unless otherwise permitted by the Agency.

Traffic signal equipment, ITS equipment, traffic signal/ITS communications and other existing electrical systems taken out of service must be repaired or replaced within 24 hours, except as otherwise specified in the Special Provisions or as provided herein.

Vehicle detectors and pedestrian push buttons must remain in operation at all times during the progress of the Work on an existing actuated traffic signal system, except as otherwise specified in the Special Provisions or as provided herein.

Metal objects (such as manhole frames and lids, valve boxes, bore casings, etc.) must not be installed within 72 inches of a traffic loop.

Vehicle detectors taken out of service must be repaired or replaced within 72 hours. New vehicle detectors for rerouted traffic must be installed within 72 hours. Where work site conditions do not permit the installation of permanent vehicle detectors within the 72 hour period, temporary vehicle detectors that provide detection for every lane of every approach, must be installed, at the Contractor's expense, as directed by the Agency. Permanent vehicle detectors must be installed as soon as work site conditions permit.

If the Contractor does not restore vehicle loop detector operation within a 72 hour period,

the County may perform the repairs and deduct the cost of the repairs from payments due the Contractor.

Unplanned disruptions to the traffic signal system will result in impacts to the traveling public, increase fuel consumption, vehicle operating costs, pollution, and other inconveniences and harm. If the Contractor fails to maintain existing electrical systems, including damage to existing vehicle loop detection, in accordance with the Contract and these Specifications within the time frame specified above, the Agency reserves the right to perform maintenance and emergency service necessary to ensure continuous traffic signal operation. All expenses incurred by the Agency in implementing this option will be deducted from payments due the Contractor.

49-1.07 Scheduling of Work

Scheduling of work must conform to Section 86-1.07, “Scheduling of Work”, of the State Specifications, except that paragraph 9 does not apply.

Functional tests can start on any Working Day except Monday, Friday, or the day preceding or following a legal holiday.

49-1.08 Safety Precautions

Attention is directed to Section 6, "Legal Relations and Responsibilities”, of these Specifications. Before starting work on existing series street-lighting circuits, the Contractor must obtain daily a safety circuit clearance from SMUD. By-pass switch plugs must be pulled, "Men at Work" and other required construction signs posted, and lockouts installed at switch boxes before any work is done.

49-1.09 Inspection

Prior to backfilling conduit trenches or placing concrete foundations, the Contractor must notify the Agency and request inspection of all conduits and foundation forms.

All conduits, conduit couplings, conduit bends and ground bushings must be in place and properly tightened and secured, and all anchor rods, anchor bolts and ground rods must be in place in the foundation form prior to the request for inspection. Wire must not be pulled in conduits until inspection, backfilling and foundation concrete placement are completed. Stub ends of all conduits must have approved caps and ground bushings installed prior to backfilling or placing concrete for foundations.

The Contractor must not backfill, enclose, or otherwise cover up any electrical work prior to inspection or testing. Should any of the work be backfilled, enclosed or covered up, the work must be exposed by the Contractor, at the Contractor’s expense, for such inspection or testing.

49-1.10 Signal Turn-On

Traffic signals must not be turned on until all signal heads, pedestrian heads, backplates, luminaries, detectors, push buttons, signs, and striping have been installed. The Contractor must give written notice of intentions of signal turn-on at least 3 Working Days prior to actual turn-on time so that Agency forces can accomplish the proper signing. The written notice must be given to both the Traffic Signal and Street Light Manager (875-5327) and the Signs and Markings Manager (875-5133), and is to allow for a review of the signal prior to turn-on. Agency personnel may request, and must be granted, a new turn-on date and review, pending the results of their initial review.

Prior to actual turn-on time, the Contractor must uncover all Agency-installed signs that have been installed prior to signal turn-on and are covered. Turn-ons must take place between 11:00 a.m. and 2:00 p.m., Monday through Thursday, except that signal turn-ons are not to be scheduled for the day before a holiday and no two-signal turn-ons on the same Contract are to be scheduled for the same day. All work done by the Contractor to accomplish these objectives is included in the price paid for the intersection, and no additional compensation will be allowed.

49-1.11 Contractor Supplied Equipment

The Contractor must supply all traffic signal poles, the service can with battery backup, all detector equipment external to the wired traffic signal cabinet and all other material and equipment not specifically identified as "County Supplied" on the contract plans or in the Special Provisions. The Contractor must supply all of the equipment specified in Section 49-5.02, "Emergency Vehicle Detector Cable, Detectors, and Phase Selectors" of these Specifications.

49-2 MATERIALS AND INSTALLATION

49-2.01 Trench Excavation and Backfill

Unless otherwise shown or specified in the Contract, trench excavation and backfill must conform to Section 19, "Trench Excavation, Bedding, and Backfill", of these Specifications, and restoration of surfaces must conform to Section 14, "Restoration of Surfaces", of these Specifications. Trenching for signals, lighting and electrical systems may be made by earth saw trenching in accordance with the provision of Section 49-2.02, "Earth Saw Trenching", of these Specifications.

Unless otherwise permitted in writing by the Agency, all surplus excavated material must be removed and disposed of the same day the surplus material is excavated.

The Contractor must contact Underground Service Alert a minimum of 48 hours before any excavation work begins. The Contractor must outline the excavation area in white.

49-2.02 Earth Saw Trenching

Trenching for signals, lighting, and electrical systems may be made by earth saw trenching. Trenches to be made by this method must be cut by a machine that will produce smooth edge cuts in the pavement and will move at a speed in excess of 4 feet per minute while cutting pavement. The trenching machine must be shielded to prevent loose material from being thrown away from the machine.

The minimum trench depth must be that which is necessary to provide for 9 inches minimum cover between the top of the conduit and the finished pavement grade and extend through the pavement structural section. The trench section must conform to Standard Drawing 4-64.

Loose material deposited on the pavement behind the cutting machine must be removed from the pavement immediately and the pavement cleared to allow the passage of traffic. Only those traffic lanes occupied by the cutting machine and the cleanup operation can be closed and they must be opened as soon as the work has moved sufficiently to clear them.

The conduit must be placed in the bottom of the trench and the trench must be backfilled with portland cement concrete to match the existing pavement surface within areas that are to receive an asphalt concrete overlay as part of the same contract, and to within 1 inch of the pavement surface of existing pavements that are not to receive an asphalt concrete overlay as part of the same contract.

The concrete must be Class "C" concrete conforming to Section 50-5, "Portland Cement Concrete", of these Specifications, with 1-inch maximum size aggregate and 1-inch slump, with a maximum calcium chloride content of 3 percent of the cement content. For electrical work, concrete must be Class "B" concrete conforming to said Section 50-5, "Portland Cement Concrete", of these Specifications. The concrete must be tamped or vibrated to provide a dense material free of voids and rock pockets.

The sides of the trench above the concrete backfill must be coated with an asphaltic emulsion and the remaining depth of the trench must be backfilled with asphalt concrete placed in one layer. The asphalt concrete must conform to Section 23, "Asphalt Concrete", of these Specifications, and must be manufactured with 1/2 inch maximum-sized rock. The asphalt concrete must be compacted to produce a uniform dense mixture with a surface elevation slightly higher than the adjacent pavement.

Once work is started on a trench, all work necessary to complete that trench, with the exception of the 1 inch permanent asphalt concrete surfacing, must be completed the same day. This includes cutting, placing of conduit or cable, removing all spoils from work site, barricades, maintaining a clean road surface for the safety of vehicular and pedestrian traffic, and backfilling trench with concrete.

The permanent asphalt concrete pavement replacement must be completed no later than 1 Working Day following placement of the concrete backfill. Seal coats in accordance with Section 14-3.03, "Seal Coats", of these Specifications must be placed to the full width of the pavement replacement plus 12 inches on each side of trench, except that seals must not overlap concrete curb and gutter.

Trenching in the medians must be as specified above, except that the requirement to complete the trench on the same day does not apply. In addition, median trenches may be backfilled to the surface of the median with concrete colored to match the color of the median surface.

49-2.03 Removing and Replacing Improvements

Sidewalks, sprinklers and irrigation systems, curbs, gutters, portland cement concrete and asphalt concrete pavement, underlying material, lawns and plants, and any other improvements removed, broken or damaged by the Contractor's operations, must be replaced or reconstructed with the same kind of material as found on the Work or with materials of equal quality. The new work must be left in a serviceable condition.

Whenever a part of a square or slab of existing concrete sidewalk, curb, gutter, or driveway is broken or damaged, the entire square, section, or slab must be removed or as directed by the Agency and the concrete reconstructed as above specified or as directed by the Agency.

The outline of all areas to be removed in portland cement concrete sidewalks, curbing, and driveways must be cut to a minimum depth of 2 inches with an abrasive type saw prior to removing the material. Cuts must be neat and true along score lines or constructed joints, with no shatter outside the removal area. Cuts must not extend beyond the limits of the removal area.

49-2.04 Foundations

Foundations must conform to the State Specifications, and these Specifications. Foundations must conform to the sizes and shapes shown on the Plans, the Standard Drawings, or the State Plans, or as otherwise detailed in the Contract, as applicable. The Contractor must provide anchor bolts for all foundations unless otherwise specified in the Special Provisions. Anchor bolts must be positioned so that between 2 and 4 threads will be visible above the top nuts after the pole has been erected and plumbed. Rigid non-metallic conduit is allowed in traffic signal and street light foundations.

All traffic signal poles and street light poles and pull boxes must be located outside the limits of sidewalk ramps, unless shown on the plans to be located on a wider than standard curb incorporated into the rear portion of the sidewalk ramp. All traffic signal pole and street light foundations must be located so that no existing conduit, pipe or other underground utility facility conflicts with the entire volume of the pole foundation. If a conflict with an existing street light conduit or an existing traffic signal conduit exists, the Contractor must relocate the existing conduit out of the area of conflict. If a potential conflict with any underground utility facility other than street light or traffic signal conduit exists, the Contractor must bring the potential conflict to the attention of the Agency. The Agency may direct the adjustment of the signal foundation location in accordance with Section 49-2.05 of these Specifications. Conformance with these provisions as required to complete the Work, including relocation of existing street light and/or traffic signal conduits, is considered incidental to and included in the payment for traffic signal or street light installation and no additional compensation will be made.

All traffic signal poles with pedestrian push buttons must be located in sidewalk or pedestrian pad areas. Poles located in sidewalk areas must be located such that the back of the pole's base flange must be within the sidewalk area and within one inch of the back of the sidewalk.

All traffic signal and street light poles and pull boxes must be located outside the limits of sidewalk ramps.

49-2.05 Standards, Steel Pedestals and Posts

Standards, steel pedestals, and posts must conform to the State Specifications, and these Specifications. Standards with an outside diameter greater than 12 inches must be round. Street light standards must be galvanized steel and must conform to Standard Drawing 5-16 (Type B) or 5-3 (Type A). The type of street light standard will be indicated in the Contract.

49-2.05.A NOT USED

49-2.05.B Placement of Standards, Enclosures, Posts and Associated Devices

The Contractor is advised that traffic signal and pedestrian facilities in corner rounding areas are difficult to describe accurately on the Plans. These traffic signal and pedestrian facilities must be field adjusted to conform to the following rules:

1. Pedestrian heads and crosswalks must be located such that pedestrian heads are **not** located behind the respective stop bar.
2. Pedestrian push buttons must be located within 5 feet of their respective crosswalks, measured perpendicular to the crosswalk lines.
3. Sidewalk ramps and crosswalks must be located such that the ramp pan falls entirely within the crosswalk lines.
4. Poles, push button posts, controller cabinets, interconnect terminal cabinets, and service enclosures must be located to leave a minimum of 4 feet of clear sidewalk width.
5. High (mast arm mounted) signal heads with all-left arrow indications must be located at least 2 feet into the controlled left turn only lane. If field conditions make this impossible, a programmed visibility head may be used and the extra cost compensable.

Any field adjustment needed to meet the above described criteria of location of crosswalks, signal poles, ramps, and pull boxes is incidental and no additional payment will be made. All field adjustments must be coordinated with the Agency in the field.

49-2.05.C Final Location of Traffic Signal Poles

The Contractor must pothole the pole location area for utility conflicts. If the site is found to be unsuitable, the Contractor must re-pothole in the vicinity, as approved by the Agency, until a suitable location is found. Unused pothole areas must be restored to their original or better conditions. The pothole and restoration work is included in the contract lump sum price paid for individual traffic signal and no additional payment will be made.

49-2.06 Conduit

Conduit must conform to the State Specifications, and these Specifications. Unless otherwise shown or specified in the Contract, conduit must be rigid non-metallic. Rigid non-metallic conduit must be electrical grade and be Schedule 40 or better.

Traffic signal conduits, including traffic interconnect conduits, are shown on the Contract Plans to scale, unless otherwise noted on said Plans. Conduit shown to be installed out of paved areas must be installed out of paved areas. Any conduit shown on the plans to be placed at a specific location, either by dimensions, offsets, or by other means, must be installed at the specified location. Conduits shown to be installed across any street, or across any portion of any street, must be installed such that the alignment of the conduit between the pull boxes and/or cabinets at either end of the conduit run must be a straight line.

Pole risers must be 2-inch Schedule 80 rigid non-metallic conduit unless otherwise specified.

Schedule 40 rigid non-metallic conduit must be used in signal, street light, controller, and service enclosure foundations. Install end bell fittings on all non-metallic conduits of 1 inch and larger trade size.

All conduit systems, new or existing, must be blown out with compressed air.

Conduits terminating in standards or enclosures must emerge from the foundation vertically, ± 5 degrees in any direction.

A solid No. 10 THW copper wire with green insulation must be installed in all conduits that are to receive future conductors. All wires placed in conduits for future use at any one traffic signal location and for any traffic signal interconnect system must be spliced to be electrically continuous.

All rigid non-metallic conduit must be connected with the appropriate adhesive.

After conductors have been installed, the ends of conduits terminating in pull boxes, interconnect cabinets, controller cabinets, and service enclosures must be sealed with an approved sealing compound.

All empty conduits must be identified with their destination/termination point, and sealed with plugs approved for the purpose.

Conduit placed under sidewalks may have 6 inches of cover, if the conduit trench is backfilled with concrete.

Conduit may be installed in paved areas of streets as specified in Section 49-2.02, “Earth Saw Trenching”, of these Specifications. Conduit placed in existing paved areas must be placed in a trench 2 inches wider than the outside diameter of the conduit to be installed, but no wider than 6 inches. Conduit depth must not exceed 14 inches or conduit trade diameter plus 10 inches, whichever is greater, except that at pull boxes the trench may be hand dug to the required depth. The top of the installed conduit must be a minimum of 9 inches below finish grade. Provide 4-inch minimum width warning tape at least 6 inches above buried conduit.

49-2.07 Pull Boxes

Pull boxes must conform to the State Specifications, these Specifications, and the Standard Drawings.

As required on Standard Drawings 5-20B and 5-34, covers must be factory-marked to indicate the contents of the pull box. Metal covers must be marked by method “c” as described in the State Specifications

Pull boxes must be installed at the locations shown on the Plans and as required by these Specifications. With the exception of traffic signal interconnect conduit for conduit runs exceeding 200 feet, pull boxes must be spaced at maximum 200-foot intervals unless indicated otherwise. The maximum spacing of pull boxes for traffic signal interconnect conduit is 500 feet. The Contractor, at the Contractor’s expense, may install additional pull boxes to facilitate the Work.

The bottom of pull boxes installed in unimproved areas or in sidewalk areas must be bedded on 6 inch minimum layer of 3/4 inch crushed rock.

The maximum allowable depth of pull boxes 26 inches as shown on Standard Drawings 5-20B and 5-34.

49-2.08 Conductors

Conductors must conform to Section 86-2.08, “Conductors and Cables”, of the State Specifications, and these Specifications. Section 86-2.08B, “Conductor Identification”, of the State Specifications is amended to require the Contractor to use a different color-coded wire for each street lighting circuit with continuous color maintained throughout each circuit. The "Conductor Table" of said Section 82-2.08B is amended to include the following:

CONDUCTOR TABLE					
Conductor Use	Signal Phase Or Function	Identification			
		Insulation Color		Label Designation	Conductor Size
		Base	Stripe		
Irrigation Control	Underground-Line 1	Black	None	IR1	As Req'd.
	Neutral	White	None	IRN	As Req'd.
Neutral	Traffic Signals	White	None	TSN	As Req'd.
Neutral	Street Lighting	White	None	None	As Req'd.
Traffic Signal Communications	As Required	As Req'd.	As Req'd.	Per Special Provisions	As Req'd.
Highway (Street) Lighting Pull Box to Luminaire	As Required	As Req'd.	As Req'd.	None	As Req'd.
Multiple Highway (Street) Lighting	As Required	As Req'd.	As Req'd.	None	As Req'd.
Emergency Vehicle Preemption	As Required	Black or As Req'd.	As Req'd.	Per Special Provisions	As Req'd.
Inductive Loop Detector Circuits	Vehicle Detection	As Req'd.	None	Per Section 86-5.01A of State Specifications	As Req'd.

The second paragraph of Section 86-2.08C, "Circuit Conductors" of the State Standard Specifications is deleted and replaced with the following:

At any point, the minimum thickness of any TW, THW, USE, RHH or RHW insulation must conform to the requirements of the latest edition of the National Electrical Code.

49-2.08.A Signal Interconnect Cable

Signal interconnect cable must conform to the "International Municipal Signal Association, Specification No. 20-2, Polyethylene-Insulated, Polyethylene Jacketed Communication Cable", except that the signal interconnect cable must be supplied without electrical shielding. The cable must consist of 20 twisted pairs of No. 20 AWG solid copper conductors.

Prior to delivery of the cable, the Contractor must furnish the Agency with a certified report, in an Agency-approved form, of the tests made on the cable to show compliance with the Contract. In addition, the Agency may request samples for testing upon delivery of the cable to the work site, and, at Agency expense, test the samples for compliance with the Contract.

Cables are only to be installed under dry conditions. Each end of the cable must be properly sealed against moisture intrusion and must be protected against damage.

Cable must be installed in conduit between termination points. Termination points are identified as controller cabinets, interconnect terminal cabinets, or master controller building. A minimum of 5 feet of slack cable must be left coiled at each termination point and in each pull box. The ends of all cables must be taped and made waterproof by dipping in an approved sealer prior to being installed in conduit and prior to being left overnight. Unless otherwise specified or directed by the Agency, splicing of interconnect cable is not allowed.

After field testing of the cable by the Contractor, termination of cable will be made by Agency forces unless otherwise specified.

49-2.08.B Interconnect Cable Testing After Installation

Signal interconnect cable must be tested in accordance with these Specifications.

The interconnect cable must be installed and ready for cable testing 20 Working Days prior to anticipated use of said cable.

Each insulated conductor in each length of completed cable, with all other insulated conductors grounded, must have an insulation resistance of not less than the following:

Cable Lengths, Feet	500	1000	1500	2000
Megohms	500	250	160	125

The tests must be made using a 500-volt megohm meter applied for 1 minute. The test may be terminated as soon as the measurement demonstrates that the specified value has been met or exceeded for a period of 1 minute.

The direct current (D.C.) resistance of each pair must be measured by connecting each pair together at one end of the cable and measuring loop resistance at the other end. The maximum allowable resistance is 0.01012 OHMS per linear foot ±10 percent for a single #20 AWG conductor.

If the cable being tested fails any one or more of the above tests, the Contractor must replace the defective cable. No extension of time or compensation will be allowed for replacement of cable. All tests and corrections of failures must be documented and must be available for future reference.

All electrical tests must be made after the cable has been installed in the conduit. The conduit must also be filled with water.

49-2.09 Wiring

Wiring must conform to Section 86-2.09, “Wiring”, of the State Specifications, except that the first sentence of Section 86-2.09 and the first paragraph of Section 86-2.09F, “Fused Splice Connectors”, do not apply, and these Specifications.

Conductors must not be pulled into and through conduits until after pull boxes are set to grade, drain rock sumps installed, and the conduits bonded and cleaned out with the appropriate size swab or blown out with compressed air.

On 600-volt conductor splices of solid or stranded conductor sizes #14 AWG to #6 AWG, the Contractor has the option to use either crimp-type connectors or spring-type connectors of three-part construction. The three-part construction must consist of a zinc-coated free expanding steel spring enclosed in a steel shell, with an outer jacket of polyvinyl chloride. The outer jacket must have a flared skirt, be flexible, and be able to withstand 105 degree C temperature continuously. Each splice must have the spring connector sized in accordance with the manufacturer's recommendations for the number of conductors and gages being spliced. Wire strip lengths must be in accordance with the manufacturer's recommendations. After the spring connector has been applied to the connection, the splice must be coated by submersion with a corrosive-resistant, solvent-resistant, sealing, bonding and flexible electrical coating, having at least 100-volt/mil electrical strength. Upon coating of the splice, the flared skirt end must be positioned in an upright alignment and maintained in place until the electrical coating is dry.

The use of heat shrinkable tubing will only be permitted for splicing of detector loop conductors and detector lead-in cables in accordance with Section 49-5.01.C, “Splicing Details”, of these Specifications.

In the handhole section of each luminaire pole, a fused disconnect splice connector must be installed in each ungrounded conductor between the line and the ballast.

Luminaires with up to 200-watt bulbs must have 6 amp fuses installed. Luminaires with 250 to 400 watt bulbs must have 10 amp fuses installed. All fuses must be midget ferrule type, rated at 600 volts, and fast blowing.

49-2.10 Bonding and Grounding

Bonding and grounding must conform to Section 86-2.10, "Bonding and Grounding", of the State Specifications.

For bonding purposes in all non-metallic type conduits, a No. 6 copper wire must be run continuously in circuits used for series lighting, and a No. 10 copper wire must be run continuously in all other circuits. Where non-metallic conduit is to be installed for future conductors, a green No. 10 THW copper wire must be installed in these conduits. Equipment bonding and grounding conductors are not required in conduits that contain only loop lead-in cable or signal interconnect cable or both.

Grounding jumper must be attached by a 3/16 inch or larger brass bolt in the standard or pedestal and must be run to the metallic conduit, ground rod, or bonding wire in the adjacent pull box. The grounding jumper must be visible and accessible after the cap has been poured on the foundation.

49-2.11 Service

Electrical service installation and materials must conform to these Specifications.

Each service enclosure (or "can") must be fabricated from 14 gauge Type 304D stainless steel and must conform to the requirements for cabinets fabricated from stainless steel as specified in the State Specifications, and these Specifications.

The mounting brackets must be 10 gauge Type 304D stainless steel. All welds must be of highest quality and ground smooth and finished so that grind marks are not visible.

The enclosure must be rain-tight and dust-tight. For new construction, anchor bolts must be inside the service enclosure. For modification construction, anchor bolts must be inside or outside the service enclosure as shown on the Plans.

A hinged dead front plate with cutouts for the handles of the breakers and the switch must be provided. A hinged outside door equipped with a heavy duty draw latch and 2 heavy duty hasps suitable for padlocking must be provided for the service section. The dead front panel on the service enclosure must have a continuous stainless steel piano hinge.

The enclosure must have no screws, nuts, or bolts on the exterior, except utility sealing screws. All screws, nuts, bolts, and washers must be stainless steel. All hinges and hinge pins must be stainless steel.

No surface of the enclosure can be deflected inward or outward more than 1/16 inch, measured from the intended plane of the surface.

Service enclosures must be factory wired and conform to NEMA Standards. All control wiring must be stranded copper, No. 14 AWG THHN/THWN rated for 600 volts. Wiring must be arranged so that any piece of equipment can be removed without disconnecting any wiring other than the leads to the equipment being removed. All wiring must be marked with permanent clip sleeve wire markers. Felt, pencil, or stick back markers will not be acceptable. A copy of the wiring diagram for the service enclosure and a typewritten circuit directory must be enclosed in plastic and mounted on the inside of the front door.

All circuit breakers, contactors, and wire must be listed by UL or ETL. The enclosure must conform to the NEMA 3-R standard.

The terminal lugs or strips must be copper or alloyed aluminum. All terminals must be compatible with either aluminum or copper conductors.

The service enclosure must have provisions for the installation of up to a total of 16 single-pole circuit breakers, including brass links and mounting hardware. Branch circuit panel must use loop wiring rated for 125 amperes with THHN/THWN insulation. All copper wiring used for main bussing must be No. 2 AWG THHN/THWN and rated for 125 amperes.

Nameplates of a reasonable size identifying the control unit therein must be installed on the dead front panel. Nameplates must be black laminated plastic with white characters, and must be fastened by screws.

The entire service enclosure must be constructed with the highest quality workmanship and must meet all applicable codes, and must bear a factory applied label of approval by a recognized testing laboratory.

Complete shop drawings on all substitutions must be submitted to the Agency for approval prior to fabrication. If the proposed substitute is rejected or if the submittal is not made within a reasonable time, the specified equipment must be furnished.

The Contractor must protect and lock the service enclosure during construction. When the Work has been accepted for maintenance, each enclosure must be locked with a Contractor-supplied master lock that will accept a Type 2214 key.

Street light "ON" and "OFF" control will be by photoelectric cell. All conduits and wires must be furnished and installed by the Contractor.

49-2.11.A Metered Service (120/208 Volt, 120/240 Volt)

The metered electrical service will be served from SMUD facilities as shown on the Plans. Unless otherwise specified, service must be wired for 120/208 volts or 120/240 volts, three-wire and single phase as shown on the Plans.

New service enclosures must be supplied and installed as shown on the Plans.

The service enclosure must consist of a separate metering section and a service section. The metering section must be complete with SMUD approved meter socket, steel socket cover, and manual circuit closing device.

The meter section must have a removable cover with the top and front sections welded together so that it is rain-tight and padlockable. The meter section must include provisions to allow SMUD to lock and seal the meter section.

The service enclosure must be fabricated in accordance with the dimensions shown on Standard Drawing 5-32.

The following equipment must be mounted in each metered service enclosure:

1. Two 2-pole, 120-volt alternating current main breakers with 100-ampere trip and a rating of 10,000 amperes AIC at 120/240 volts. Each main breaker must have an internal common trip. Each pole must have individual "ON-OFF" control and handle tie for common operation. Breakers must be Westinghouse Quicklag C or approved equal.
2. One single-pole, 120-volt alternating current branch circuit breaker for control circuit with 15-ampere trip and a rating of 10,000-amperes AIC at 120/240 volts. Breaker must be Westinghouse Quicklag C or approved equal.
3. Two single-pole, 120-volt alternating current branch circuit breakers for traffic signals, each with 60-ampere trip and a rating of 10,000 amperes AIC at 120/240 volts. Breakers must be Westinghouse Quicklag C or approved equal.
4. Minimum six, single-pole, 120-volt alternating current branch circuit breakers for street lighting, each sized per the Special Provisions and the Standard Drawings (minimum 30-ampere trip), and with a rating of 10,000 amperes AIC at 120/240 volts. Breakers must be Westinghouse Quicklag C or approved equal.
5. Minimum two, 3-pole, normally open, 60-ampere mercury displacement lighting contactors. Coil voltage must be 120 VAC, 60 cycle. Mercury displacement lighting contactors must be Dayton Electric Manufacturing Co., Model Number 3X753E, or approved equal.
6. One oil tight "Hand-Off-Auto" selector switch.
7. One solid copper neutral bus.
8. Incoming terminals (landing lugs).
9. Solid neutral terminal strip.

10. Terminal strips for conductors within the cabinet.

49-2.11.B Metered Service with Encapsulated Step-Down Transformer (277/480 Volt to 120-240 Volt)

The metered electrical service will be served from SMUD facilities as shown on the Plans. Unless otherwise specified, service must be wired for 277/480 volts, four-wire and three phase as shown on the Plans.

New service enclosures must be supplied and installed as shown on the Plans.

The service enclosures must consist of a separate metering section and a service section. The metering section must be complete with SMUD-approved three-phase meter socket, steel socket cover and manual circuit closing device.

The meter section must have a removable cover with the top and front sections welded together so that it is rain tight and padlockable. The meter section must include provisions to allow SMUD to lock and seal the meter section.

The service enclosure must be fabricated in accordance with the dimensions shown on Standard Drawing 5-33.

Mounted in each metered service enclosure must be the following equipment:

1. One 2-pole, 277/480-volt alternating current main breaker with 100-ampere trip and a rating of 14,000 amperes AIC at 277/480 volts. The main breaker must have an internal common trip. Each pole must have individual "ON-OFF" control and handle tie for common operation. Breaker must be Westinghouse Quicklag GHC or approved equal.
2. Minimum six, single-pole, 277/480-volt alternating current branch circuit breakers for street lighting, each sized per the Special Provisions and the Standard Drawings (minimum 30-ampere trip), and with a rating of 14,000 amperes AIC at 277/480 volts. Breakers must be Westinghouse Quicklag GHC or approved equal.
3. One single-pole, 120-volt alternating current branch circuit breaker for control circuit with 15-ampere trip and a rating of 10,000 amperes AIC at 120/240 volts. Breaker must be Westinghouse Quicklag C or approved equal.
4. One single-pole, 120-volt alternating current branch circuit breaker for traffic signals, with 50-ampere trip and a rating of 10,000 amperes AIC at 120/240 volts. The breaker must be Westinghouse Quicklag C or approved equal.
5. One 2-pole, 120-volt alternating current branch circuit breaker for intersection safety lighting, with 15-ampere trip and a rating of 10,000 amperes AIC at 120/240 volts. The breaker must have an internal common trip. Each pole must have individual “ON-OFF” control and handle tie for common operation. The breaker must be Westinghouse Quicklag C or appproved equal.
6. Minimum three, 3-pole, normally open, 60-ampere mercury displacement lighting contactors. Coil voltage must be 120 VAC, 60 cycle. Mercury displacement lighting contactors must be Dayton Electric Manufacturing Co., Model Number 3X753E, or approved equal.
7. One oil tight "Hand-Off-Auto" selector switch.
8. One solid copper neutral bus.
9. Incoming terminals (landing lugs).
10. Solid neutral terminal strip.
11. Terminal strips for conductors within the cabinet.
12. One single-phase transformer rated at 5KVA. Primary must be 277 volts and secondary must be 120volts. This transformer to be metered and must supply the traffic signal power.
13. One single phase transformer rated at 2 KVA. Primary must be 480 volts and secondary must be 120/240 volts. This transformer to be unmetered and must provide the power for intersection safety lighting and the control circuit.

14. Provide primary transformer protection per the NEC.

49-2.11.C Unmetered Service (120/208 Volt, 120/240 Volt)

The unmetered electrical service will be served from SMUD facilities as shown on the Plans. Service must be wired for 120/208 volts or 120/240 volts, three-wire and single phase as shown on the Plans. The Contractor must connect the luminaires to the circuits shown on the Plans.

New service enclosures must be supplied and installed as shown on the Plans.

The service enclosures must be fabricated in accordance with the dimensions shown on Standard Drawing 5-30.

The following equipment must be mounted in each unmetered service enclosure:

1. One, 2-pole, 120-volt alternating current main breaker with 100-ampere trip and a rating of 10,000 amperes AIC at 120/240 volts. The main breaker must have an internal common trip. Each pole must have individual "ON-OFF" control and handle tie for common operation. Breaker must be Westinghouse Quicklag C or approved equal.
2. One single-pole, 120-volt alternating current branch circuit breaker for control circuit with 15-ampere trip and a rating of 10,000 amperes AIC at 120/240 volts. Breaker must be Westinghouse Quicklag C or approved equal.
3. Minimum six single-pole, 120-volt alternating current branch circuit breakers for street lighting, each sized per the Special Provisions and the Standard Drawings (minimum 30-ampere trip), and with a rating of 10,000 amperes AIC at 120/240 volts. Breakers must be Westinghouse Quicklag C or approved equal.
4. Minimum two 3-pole, normally open, 60-ampere mercury displacement lighting contactors. Coil voltage must be 120 VAC, 60 cycle. Mercury displacement lighting contactors must be Dayton Electric Manufacturing Co., Model Number 3X753E, or approved equal.
5. One oil tight "Hand-Off-Auto" selector switch.
6. One solid copper neutral bus.
7. Incoming terminals (landing lugs).
8. Solid neutral terminal strip.
9. Terminal strips for conductors within the cabinet.

49-2.11.D Unmetered Service (277/480 Volt)

The unmetered electrical service will be served from SMUD facilities as shown on the Plans. Service must be wired for 277/480 volt, four-wire and three phase as shown on the Plans. The Contractor must connect the luminaires to the circuits shown on the Plans.

New service enclosures must be supplied and installed as shown on the Plans.

The service enclosures must be fabricated in accordance with the dimensions shown on Standard Drawing 5-30.

The following equipment must be mounted in each unmetered service enclosure:

1. One 2-pole, 277/480-volt alternating current main breaker with 100-ampere trip and a rating of 14,000 amperes AIC at 277/480 volts. The breaker must have an internal common trip. Each pole must have individual "ON-OFF" control and handle tie for common operation. Breaker must be Westinghouse Quicklag GHC or approved equal.
2. One single-pole, 277-volt alternating current branch circuit breaker for control circuit with 15-ampere trip and a rating of 14,000 amperes AIC at 277/480 volts. Breaker must be Westinghouse Quicklag GHC or approved equal.
3. Minimum six single-pole, 277-volt alternating current branch circuit breakers for street lighting, each sized per the Special Provisions and the Standard Drawings (minimum 30-ampere trip), and with a rating of 14,000 amperes AIC at 277/480 volts. Breakers must be Westinghouse Quicklag GHC or approved equal.
4. Minimum two 3-pole, normally open, 60-ampere mercury displacement lighting contactors. Coil voltage must be 277 VAC, 60 cycle. Mercury displacement lighting

contactors must be Mercury Displacement Industries (MDI), Part Number 360NO-277V, or approved equal.

5. One oil tight "Hand-Off-Auto" selector switch.
6. One solid copper neutral bus.
7. Incoming terminals (landing lugs).
8. Solid neutral terminal strip.
9. Terminal strips for conductors within the cabinet.

49-2.11.E Unmetered Service with Encapsulated Step-Down Transformer (277/480 Volt to 120/240 Volt)

The unmetered electrical service will be served from SMUD facilities as shown on the Plans. Unless otherwise specified, service must be wired for 277/480 volts, four-wire and three phase as shown on the Plans.

New service enclosures must be supplied and installed as shown on the Plans.

The service enclosure must be fabricated in accordance with the dimensions shown on Standard Drawing 5-31.

Mounted in each unmetered service enclosure must be the following equipment:

1. One 2-pole, 277/480-volt alternating current main breaker with 100-ampere trip and a rating of 14,000 amperes AIC at 277/480 volts. The main breaker must have an internal common trip. Each pole must have individual "ON-OFF" control and handle tie for common operation. Breaker must be Westinghouse Quicklag GHC or approved equal.
2. One single-pole, 120-volt alternating current branch circuit breaker for control circuit with 15-ampere trip and a rating of 10,000 amperes AIC at 120/240 volts. Breaker must be Westinghouse Quicklag C or approved equal.
3. Minimum 10 single-pole, 120-volt alternating current branch circuit breakers for street lighting, each sized per the Special Provisions and the Standard Drawings (minimum 30-ampere trip) and with a rating of 10,000 amperes AIC at 120/240 volts. Breakers must be Westinghouse Quicklag C or approved equal.
4. One single-pole, 120-volt alternating current branch circuit breaker for receptacle with 20-ampere trip and a rating of 10,000 amperes AIC at 120/240 volts. Breaker must be Westinghouse Quicklag C or approved equal.
5. Minimum three, 3-pole, normally open, 60-ampere mercury displacement lighting contactors. Coil voltage must be 120 VAC, 60 cycle. Mercury displacement lighting contactors must be Dayton Electric Manufacturing Co., Model Number 3X753E, or approved equal.
6. One oil tight "Hand-Off-Auto" selector switch.
7. One solid copper neutral bus.
8. Incoming terminals (landing lugs).
9. Solid neutral terminal strip.
10. Terminal strips for conductors within the cabinet.
11. One single-phase transformer rated at 10KVA. Primary must be 480 volts and secondary must be 120/240 volts.
12. Provide primary and secondary transformer protection per the NEC.

49-2.11.F Service Can and Battery Backup Unit (BBU)

At each location for which a new traffic signal service can is shown to be installed, the Contractor must supply and install a Metered Service Enclosure with Battery Backup (120/240 V) in accordance with Standard Drawing 5-41 and as specified in this section.

49-2.11.F.(1) Enclosure Specifications:

Anodized 1/8 inch aluminum, weatherproof enclosure must house Uninterrupted Power Supply (UPS) and batteries. Enclosure must be TIG welded construction with welding materials

specifically designed for the material to be welded. Enclosure must have fully framed side hinged outer doors with swaged close tolerance sides for flush fit with drip lip and closed cell neoprene flange compressed gaskets. Front door must incorporate a full-length piano hinge, pad-lockable draw latch (center area on door-latch side), and two pad lockable welded-in place vandal-proof tabs (one upper area, one lower area on door-latch side, rated at 2000 lbs. each). There must be no exposed nut, bolts, screws, rivets or other fasteners on the exterior of the enclosure. Maximum cabinet dimensions 46 inches high by 20 inches wide by 9 inches deep. Weight 250 pounds with batteries. UPS must be mounted in an interior tilt out housing with 800 pound rated stops. Battery connectors must be Anderson Connectors with silver plated contacts. Batteries must be installed in fixed position framed trays for seismic safety and be readily accessible for maintenance. Batteries must be mounted allowing airflow front and back. Enclosure can include two transfer bypass switches, one for UPS bypass the second for auxiliary generator (optional). All switches must be panel mounted on interior dead front panel board. UV resistant plastic laminated nameplates must identify all controls and major components. A plastic covered wiring diagram will be attached to the inside of the front door. All components must be factory wired and conform to required NEMA, NEC, and UL standards. A chassis ground point must be provided. Panel must be UL 508 Industrial Control Panel rated.

49-2.11.F.(2) UPS Panel Minimum Features:

- The UPS system must be Tesco 27-000/22-000BBS1400XI-22UPS or approved equal.
- UPS bypass and UPS isolation switch.
- Deadfront safety panel board with all switches, indicating fuses, plugs, and isolation fuses for each battery pre-wired with phenolic nameplates.
- All nameplates must be screwed on phenolic engraved type.
- All wire terminating lugs must be full wrap around type.
- All batteries must be captive spaced from external captive sides in earthquake proof buckets.
- Cabinet ventilation must be by (qty. 4) 4 inch by 1/4 inch louvers top and bottom with encapsulated bug screens, cleanable filters and a 100 cfm fan to completely exchange air 25 time minimum per minute.
- All DC terminals and connections must incorporate safety covers such that the safety covers are in place for every normal maintenance mode.
- Event Counters & Total Run Time Counter.

49-2.11.F.(3) UPS Unit Minimum Specifications:

UPS unit must provide a true sine-wave output with minimum 1400 Volt-Amp continuous capacity. UPS must provide for utility service isolation when in operation. The minimum rating for wattage output will be 950 watts. The UPS must be capable of running an intersection with LED lights (for Run Time consult manufacturer). The unit must operate off-line, with transfer time of 2 ms or less, with battery condition indicator, with automatic test provisions, and with hot-swappable batteries (all batteries in system). UPS will automatically recharge batteries from full discharge to 95% capacity within 6 hours. UPS will provide on-line operation for a minimum input of 92 to 145 VAC, provide full load output of 120VAC – 10% / +4% at 60 Hz +/- 0.05% over a temperature range of -37 degrees C (optional adder) to +74 degrees C and be a UL Approved Design. The UPS unit must be delivered with maintenance manuals and schematic diagrams.

49-2.11.F.(4) UPS Unit Minimum Features:

- 1400VA 950 Watts
- Surge energy withstand 480 Joules, 6.5kA
- Common mode clamping 0 ns < 5ns typical UL 1449
- Conditioned power – Computer quality

- Transient lighting protection – 160 Joules
- Transfer to battery time – 2 ms
- Retransfer to utility – 2 ms
- Each battery must be 24 volts @ 18 AH with heavy duty Anderson plugs and isolated fused (deadfront panel mounted 30 amp) connections to the UPS for greater system reliability and ease of maintenance. Series wiring is unacceptable.
- Fan cooling must be fused for locked rotor current.
- Cooling air must be ducted to cool the front and back of each battery with air space on all four sides and top of battery.
- UPS covers must be 60% open on both sides to diminish the environmental effects of extreme temperatures.
- Includes a RS232, DB9 Computer Interface Port.
- Low voltage safety design at 24v DC. (Higher voltage DC systems are unacceptable).

49-2.11.F.(5) UPS Communications Module:

Smart Slot Relay I/O Module:

Input #1 Turn the UPS on.
Input #2 Turn the UPS off.
Input #3 Start the UPS self-test.
Input #4 Shut down the UPS (when on battery).

Output #1 The UPS is on-battery (during a power failure, self-test or run time calibration).
Output #2 UPS has a low battery – Programmable.
Output #3 The protected load is not receiving power from the UPS.
Output #4 Replace the UPS batteries.
Output #5 The UPS is overloaded.
Output #6 Any UPS fault or self-test failure.

49-2.11.F.(6) Batteries:

Batteries must be maintenance-free, type AGM/VRLA (Absorbed Glass Mat / Valve Regulated Lead Acid), such as APC Smart-UPS RMXL or approved equal. Batteries must be independently pre-wired and individually fused. Batteries must be furnished with heavy-duty 50-amp rated silver-plated Anderson connectors. Batteries must be equipped with a 100-amp internal fuse. Batteries must be lightweight for personnel safety and protection plus ease of installation and maintenance. Batteries with a weight of over 26lbs are not acceptable.

49-2.11.F.(7) Enclosure Temperature Compensation:

Operating temperature must be between -37 and +74 degrees C.

49-2.11.F.(8) Power System Analyzer and Conflict Resolution Module:

The UPS must incorporate an integrated Power System Analyzer and Conflict Resolution Module. The Analyzer must evaluate and make limited adjustments to the incoming utility power and will automatically transfer load to the UPS battery back-up power if utility power is lost. When utility power becomes available, the system must provide automatic UPS failure detection and automatically isolate the failed UPS and transfer the load back to utility power. Once the failure has been corrected, the system must return to the normal operation. At a minimum, the system must include the following:

Triple Bypass System for Offline UPS:

1. SPACT – Smart Power Analyzer with Conflict Monitor Isolation and Transfer Module.
2. PCM – Power Conflict Monitor

3. The PCM is a totally redundant failsafe system. The PCM monitors load bus power available continuously. If load bus power fails for 5ms the PCM will transfer and isolate the UPS and guarantee that commercial power will be locked on.
4. Watchdog Timer – Redundant 5 ms delay and hard transfer to utility power.
5. The outboard Smart Transfer Switch must not interrupt the normal controller function. Transfer time must be 2ms.
6. Onboard Smart I/O module will execute lockout of battery back up system upon Smart detection of any inverter UPS fault. If UPS resets itself, it will automatically be available for backup.

Smart Battery Charger:

Must charge from shut off discharge to 95% fully charged in less than 6 hours. Batteries must be ambient enclosure compensated to less than 120 degrees F. The battery charger must utilize Smart Cell Technology to extend battery life.

49-2.11.F.(9) Warranty:

Manufacturers must provide a 2 year factory-replacement parts warranty on the Battery Backup System. Batteries must be warranted for full replacement for 2 years. The warranty is included in the total lump sum price paid for the traffic signal modification.

Supply and installation of service can with battery backup unit is included in the lump sum price paid for traffic signal installation and no additional payment will be made.

49-2.12 Testing

Testing must conform to Section 86-2.14, "Testing", of the State Specifications, except that the third paragraph of Section 86-2.14C, "Functional Testing", does not apply, and these Specifications.

Any fault in any material or in any part of the installation revealed by testing must be replaced or repaired by the Contractor, at the Contractor's expense, in a manner approved by the Agency, and the same test must be repeated until no fault appears.

Attention is directed to the additional requirements in the Contract regarding notifications, scheduling, and approval of testing for traffic signal and street lighting work.

New or modified street lighting work must be tested with lamps being energized for 24 hours continuously. The tests of the street lighting are to identify the light distribution patterns, determine the acceptability of the ballasts, fixtures and lamps for electrical and noise standards, verify that all connections are electrically and mechanically sufficient, and other purposes as directed by the Agency or stated in the Special Provisions. The Contractor must furnish all material and equipment for the testing at the Contractor's expense.

49-2.13 Painting

Unless otherwise specified or shown in the Contract Documents, painting must conform to the State Specifications and these Specifications. Painting of existing steel street light poles, decorative street light poles, signal appurtenances, and bridges must conform to the Special Provisions.

Painting of newly installed decorative street lights consisting of a steel pole and cast iron decorative base cover must conform to the following specifications.

A. Painting must conform to Section 59, "Painting", of the State Specifications, with the following additions and modifications:

1. Paint materials, unless otherwise specified, must conform to Section 91, "Paint", of the State Specifications.

2. A Certificate of Compliance must be furnished in conformance with the provisions in Section 6-3.05E, "Certificates of Compliance", of the State Specifications, certifying that the coating system furnished complies in all respects with the Contract. Coatings may be applied

before Certificates of Compliance have been received. The Certificates of Compliance must accompany the order when shipped and be supplied to the Agency.

3. The steel street light pole, cast iron base, and light fixture must be painted and fully cured at the time of manufacture and shipped to the job site ready for installation.

4. Light fixtures must be powder coated. Surface preparation and coating application must be in conformance with both light fixture manufacturer's specifications and coating manufacturer's recommendations. Color will be a Federal Standard 595B color number as specified in the Contract.

B. Surface Preparation (steel pole & cast iron base)

1. All surfaces to be painted must be cleaned in conformance with the requirements in Surface Preparation Specification No. 6, "Commercial Blast Cleaning", of the Steel Structures Painting Council (SSPC-SP6).

2. Cleaning must leave all surfaces with a blast profile consisting of a dense, uniform, angular anchor pattern of 1.5 to 2.5 mils as measured in conformance with the requirements in ASTM D4417.

3. All burrs and weld splatter must be completely removed.

4. All surfaces must be clean, dry, and free of any dirt, chalk, dust, oil, grease, salts, curing compounds, release agents, preservatives and other detrimental foreign matter before coating application is performed.

C. Coating Application (steel pole & cast iron base)

1. All paint must be applied in accordance with the manufacturer's recommendations and these Specifications. Manufacturer's recoat windows must be adhered to.

2. Apply one prime coat of an epoxy coating. Coating manufacturer and product identification will be indicated in the Contract, and approved by the Sacramento County Department of Transportation Street Light Operations Section. Dry film thickness must be between 4 and 8 mils.

3. Apply one intermediate color coat of polyurethane. Coating manufacturer and product identification will be indicated in the Contract, and approved by the Sacramento County Department of Transportation Street Light Operations Section. Dry film thickness must be between 2 and 3 mils.

4. Apply one finish clear coat of polyurethane. Coating manufacturer and product identification will be indicated in the Contract, and approved by the Sacramento County Department of Transportation Street Light Operations Section. Dry film thickness must be between 2 and 3 mils.

5. Total system dry film thickness must be a minimum of 9 mils.

6. The bottom of the base plate and the interior of the steel street light pole up to the handhole must be coated with one coat of the epoxy primer (6 to 8 mils dry film thickness). The top and edges of the base plate and the exterior of the pole must be multi-coated as detailed above.

7. The interior of the cast iron base, including the access doors, must be coated with one coat of the epoxy primer (between 6 and 8 mils dry film thickness). The exterior and edges of the cast iron base, including the access doors, must be multi-coated as detailed above.

8. The access doors on the cast iron base must be removed during the painting process.

9. The color coat polyurethane will be a Federal Standard 595B color number as indicated in the Contract, or as directed by Agency.

D. All coatings must comply with Proposition 65 regarding cancer-causing agents.

E. All street light components must be packaged for shipping to prevent damage to the coatings during loading, transport, and unloading.

F. An appropriate quantity of touch–up paint (epoxy primer, color polyurethane, and clear polyurethane) must be supplied with each shipment.

G. After installation of the street light (pole, decorative base cover, and fixture), any damaged coatings must be repaired with the supplied touch-up paint. Clean and prepare the damaged area by abrading with 100 grit sandpaper.

49-3 CONTROLLER ASSEMBLIES

All controller assemblies will be furnished by the Agency unless otherwise shown or specified in the Contract.

The controller assemblies must be installed complete by the Contractor. The Contractor must construct the foundation and install the controller cabinet on the constructed foundation as shown on the Plans and as designated by the Agency. Seams where the controller cabinet rests on the foundation must be sealed with an approved joint sealing compound. The Contractor must make all wire connections to the appropriate terminals in the cabinet. All detector equipment external to the wired cabinet must be furnished and installed by the Contractor. The Contractor must provide anchor bolts for each controller cabinet.

Upon the receipt of a written request to the Agency at least 2 Working Days in advance, equipment and materials will be made available to the Contractor for pick up. The Contractor is responsible for the safe pickup and delivery of the Traffic Controller Assemblies to the work site. Traffic Controller Assemblies must be delivered directly to the work site and installed the same day they are acquired by the Contractor. See Section 49-7, "Agency-Supplied Equipment", of these Specifications for time, place, and person to contact for pick up arrangements.

49-4 TRAFFIC SIGNAL FACES AND FITTINGS

Traffic signal faces and fittings must conform to the State Specifications, and these Specifications.

49-4.01 Vehicle Signal Faces

All vehicle signal sections, housings, and visors must be metal. The Contractor must remove all manufacturing labels from the traffic signal head lenses prior to installation.

All vehicle signal heads supplied by the Contractor must have 12-inch (300mm) signal faces. All vehicle signal heads must be illuminated by light emitting diode (LED) units that are Caltrans-approved. The LED modules must be Gelcore or Dialight or County approved equal.

49-4.02 Programmable Directional Louvers

Plastic programmable directional louvers are only permitted where shown or specified in the Contract. Plastic programmable directional louvers must be Pelco Brand GPL (Geometrically Programmed Louver) or approved equal.

49-4.03 Backplates

Backplates must be furnished and installed on all vehicle signal faces. All backplates must be metal.

49-4.04 Pedestrian Signal Faces

Pedestrian signal heads must be of the "countdown" variety and must conform to the following specifications:

1. The design of pedestrian signal heads must conform to Sections 4E.04, "Size, Design, and Illumination of Pedestrian Signal Head Indications" and 4E.07, "Countdown Pedestrian Signals", of the current edition of the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), including approved errata, revisions, and California supplements, the State Specifications, and these Specifications.
2. The housing, finish, control, and terminal blocks of pedestrian signal heads must conform to the State Specifications, except that the housing must be metal.

3. The display of pedestrian signal heads must consist of integrated WALKING PERSON and UPRAISED HAND symbols on the left side and a countdown timer display on the right side. The integrated WALKING PERSON and UPRAISED HAND symbols portion of the display must conform to the documents listed in item 1 above. In addition, the WALKING PERSON and UPRAISED HAND symbols must be Caltrans-approved LED type and must be solid. Outline style symbols must not be used. The countdown timer portion of the display must conform to the documents listed in item 1 above and the specifications in item 4 below.
4. The countdown timer portion of the display must consist of Portland orange numbers that are 9 inches in height on a black opaque background. The display must be capable of indicating the numbers 0 through 99 inclusive. The numbers 0 through 9 inclusive must be displayed as a single digit (i.e. without a leading zero, the left digit dark). The display must be high-intensity LED type in conformance with Caltrans specifications for LED modules. The display must be legible, day or night, from a minimum distance of 120 feet from the signal. The timer must calculate and display the appropriate Flashing Don't Walk time, as programmed on the signal controller, after one cycle of Flashing Don't Walk operation. The timer must continuously recalculate Flashing Don't Walk time each cycle so that the unit will display the proper Flashing Don't Walk time after any change in the settings for that phase on the traffic signal controller. If the Flashing Don't Walk timing is interrupted or shortened (e.g. transition into a preemption sequence or transition to flashing mode), then the countdown timer portion of the display must be discontinued and go dark immediately.
5. Each pedestrian signal head must have an egg crate or Z-crate type screen as specified under number 2 of Section 86-4.03B, "Front Screen", of the State Specifications, modified as follows:
    a. The screen must be fabricated from aluminum anodized flat black or finished with lusterless black exterior grade latex paint formulated for application to properly prepared metal surfaces, or must be fabricated from flat black plastic.
    b. The frame for the screen must be aluminum alloy; polycarbonate will not be allowed.
    c. The only alternate method of screening allowed is to eliminate the screen completely and design the pedestrian signal head display so the results are at least equal to those obtained with the use of the egg crate or Z-crate type screen as determined by the Agency.
    d. Visors are not required for pedestrian signal faces.

The Contractor must mount the framework for all pedestrian signals so the terminal section is positioned on the back side of the associated traffic signal poles, i.e., the side furthest from the public roadway.

The following meet the standards for Pedestrian Signal Heads and are approved for use on Sacramento County signals:

- Countdown module model LEDP-HMC-001 manufactured by US Traffic;
- Gelcore countdown module PS7-CFF1-01; and
- Signal housing model 4302OG, painted olive green, manufactured by US Traffic.

49-4.05 Audible Pedestrian Signals

In addition to each standard pedestrian signal shown on the Plans, the Contractor must supply and install audible pedestrian signals. One audible pedestrian signal unit must be supplied and installed for each standard pedestrian signal head installed under the Contract. Audible pedestrian signal units must be model APS-10 by Indicator Controls Corporation, or approved equal. Unit output volume must be field adjustable and must be capable of output of not less than 90db at 1 watt/1 meter. Units must be capable of automatic self-adjustment of

output volume depending on ambient noise conditions. The type of signal output must be field-selectable, with each unit capable of emitting both a “cuckoo” signal and a “peep-peep” signal.

Audible pedestrian signal units must be mounted on top of the standard pedestrian signal heads with the face of the units tipped downward such that they are directed toward a point 5 feet above the roadway surface in the center of the crosswalk at the edge of pavement on the opposite side of the associated crosswalk. Mounting of audible pedestrian signal units must conform to manufacturer’s recommendations and as directed by the Agency in the field.

49-5 DETECTORS

Detectors must conform to the State Specifications, and these Specifications.

Traffic signal loop detectors must be installed as shown on the plans and as detailed on Standard Drawings 5-24 and 5-44.

At locations where existing loop detectors are damaged, the Contractor must replace the damaged loop detectors with new loop detectors meeting the Agency’s current standards. At advanced detector locations, loop detectors that are more than 100 feet from the associated stop bar at the signalized intersection, the Contractor must replace any damaged loop detector with a new Type A loop detector (one per lane). If there is no existing detector handhole in the vicinity of the new loop detector, a new detector handhole and conduit connecting to the associated pull box must be supplied and installed. At presence detection locations, loop detectors that are less than 100 feet from the associated stop bar at the signalized intersection, the Contractor must replace any damaged loop detector with one or more Type A loop detectors as needed so that there are 4 working loop detectors per lane, spaced as shown on Standard Drawing 5-24 and 5-44. If there is no existing detector handhole in the same lane as the new loop detector(s), a new detector handhole and conduit connecting to the associated pull box must be supplied and installed. Unless otherwise indicated on the plans, all costs associated with the replacement of damaged loop detectors, including the supply and installation of detector handholes and connecting conduits, will be borne by the Contractor.

49-5.01 Vehicle Detectors

Unless otherwise specified in the Contract, all vehicle detector sensor units in the controller cabinet will be provided by the Agency.

Splices must be insulated as specified in these Specifications.

Detector lead-in cables must be continuous, without splices, from the controller cabinet detector panel terminal block to the loop termination pull box unless otherwise shown on the Plans.

49-5.01.A Construction Materials

Each inductive detector loop conductor must be continuous, unspliced, Type RHW-USE neoprene-jacketed or Type USE crosslinked polyethylene insulated No. 12 stranded copper wire. Conductor insulation thickness must be a minimum of 40 mils.

Loop detector lead-in cable must consist of 4 No. 18 AWG stranded copper conductors insulated with 9 mils minimum of polypropylene, color coded, parallel laid, twisted together with 4 to 6 turns per foot. An amorphous interior moisture penetration barrier must be provided to prevent hosing, siphoning, or capillary absorption of water along cable interstices. Aluminum-polyester shielding must be applied around the conductors. The outer jacket must be 32 mils minimum thickness, high density polyethylene conforming to ASTM D1248, 65T for Dielectric Material, Type I, Class C, Grade 5, J3. The diameter of the lead-in cable must be approximately 1/4 inch.

49-5.01.B Installation Details

Installation and testing must conform to the details and notes shown in the Standard Drawings and these Specifications.

Unless otherwise indicated in the Contract, loop detectors must be installed after the construction of all lower lifts of paving and after construction of pavement leveling courses but prior to the placement of the final lift of asphalt concrete for the affected portion of the roadway. Inductive loop detectors must be installed as shown on Standard Drawing 5-24, 5-44 and as specified in these Specifications. The Contractor must place all loop detectors in left turn lanes that adjoin a through traffic lane so that the loop detectors are 3.5 feet from the channelizing stripe that separates the left turn lane from the through traffic lane. Detector handholes must be centered in the associated vehicle lane and must be located approximately 4 feet clear of the nearest traffic signal loop detector. Loop detectors that are installed in the vehicle lane closes to the edge of pavement, either with our without curbs and gutters, must be constructed such that the wires connecting the loops to the associated detector handhole run on the side of the loops further from the edge of pavement.

Unless otherwise shown or specified in the Contract or directed by the Agency in the field, each new detector loop must be 5 feet by 5 feet and must be centered in the traveled lane. All detector loops must be field marked by the Contractor and their location approved by the Agency prior to pavement cutting. For installations that will serve lanes that are not parallel or concentric to lane markings existing at the time of loop installation, the Contractor must accurately mark the future lane lines prior to pavement cutting.

Sawcut slots must be cut into the pavement to the depth and width shown on the Standard Drawings. Slots cut in the pavement must be blown out with compressed air, then dried and inspected for any sharp objects or corners, which must be removed prior to installation of loop conductors. All conductors and conductor loops installed in the traveled way must be installed so that the top of the conductor is a minimum of 5/8 inch below the surface grade of the street.

Unless specified otherwise, each loop must consist of the 3 turns of conductors for each detector loop. All detector loops located two hundred 250 feet or farther from the stop line must consist of 4 turns of conductors for each detector loop.

The loop conductors must be installed in the slots using a 5/16 to 1/4 inch wooden paddle. As it is installed, the wire must be kept under slight tension and must be kept in the slots with suitable cardboard wedges. The cardboard wedges must not be removed until the loop sealant operation requires removal.

Loop conductors must be installed without splices and must terminate in the nearest pull box. Detector loops must be joined, in series, in the nearest pull box. See the Standard Drawings for typical loop connection details.

Each detector loop must be identified and tagged by loop number, start (S), and finish (F). Loop lead-ins must be individually identified as shown on the Plans. Identification must be by means of bands placed on the lead-in cable.

Each detector loop circuit must be tested for continuity, circuit resistance, and insulation resistance at the controller location. The loop circuit resistance must not exceed 0.50 ohms plus 0.35 ohms per 100 feet of lead-in cable. The insulation resistance must be performed between each circuit conductor and ground. The meggared insulation resistance must not be less than 200 megohms. The Contractor must replace any detector loop that fails this test at the Contractor's expense. All test results and corrections of failures must be documented. Test documentation must be provided to the Agency to become a permanent record for future reference. All testing must be completed to the satisfaction of the Agency prior to traffic signal turn-on.

All loop conductors must be spliced to a lead-in cable, which must be run from the pull box adjacent to the loop detector to a sensor unit mounted in the controller cabinet. All splices between loops and the lead-in cable must be soldered.

If the conduit is not dry, the ends of all lead-in cable must be taped and waterproofed prior to installation. If splicing is not done immediately after installation, the ends of both the loop conductors and lead-in cable must be taped and waterproofed with an electrical insulating

coating. The insulating coating must be fast drying, resistant to oils, acids, alkalis and corrosive atmospheric conditions and must be compatible with the insulations used in the conductors and cables.

Sealant for inductive loop detectors must be supplied and installed by the Contractor in accordance with the State Specifications, and these Specifications.

Sealant for loop detectors must be as specified for Elastomeric Sealant. Epoxy sealant will not be permitted. The Agency might allow the use of Asphaltic Emulsion Sealant in areas scheduled for asphalt concrete overlay.

Detector handholes must be type "B." Detector handholes must be installed at the locations shown on the Plans, in the center of the lanes and in conformance with the Standard Drawings. The cement used to join the ABS sweep "Y" to the PVC conduit must be capable of providing a solvent type weld between the two materials.

49-5.01.C Splicing Details

All splicing must be made in a dry environment. The splice between the lead-in cable and the loop conductors in the adjacent pull box must be a soldered waterproof type. This must be accomplished by stripping and cleaning ends of wires, twisting ends together, dipping twisted ends in flux, then soldering. Open flame soldering will not be permitted. Wire insulation must not be damaged while soldering. The soldered splice must be protected with an electrical spring connector of 3-part construction.

The 3-part construction spring connector must consist of a zinc-coated, free-expanding steel spring enclosed in a steel shell with a jacket of polyvinyl chloride. The outer jacket must have a flared skirt, be flexible, and be able to withstand 105 degrees C temperature continuously. Each splice must have the spring connector sized in accordance with the manufacturer's recommendations for the number of conductors and gauges being spliced. Wire strip lengths must also be in accordance with the manufacturer's recommendations.

After the spring connector has been applied to the splice, the Contractor must apply tape sealant to the splice. The tape sealant must be applied over the entire area of the splice and overlap the spring connector and detector lead-in cable at least 1-1/2 inches. The tape sealant must be Thomas and Betts Catalog No. HSTS25 or approved equal.

The Contractor must then apply heat-shrink tubing over the splice. Heat shrink tubing must be medium or heavy wall thickness irradiated polyolefin tubing containing an adhesive mastic inner wall. Minimum wall thickness prior to contraction must be 0.04 inch. When heated, the inner wall must melt and fill all crevices and interstices of the object being covered while the outer wall shrinks to form a waterproof insulation. Each end of the heat-shrink tube or the open end of the end cap of heat-shrink tubing must, after contraction, overlap the conductor insulation at least 1-1/2. Heat shrink tubing must conform to the requirements of UL Standard 468D and ANSI C119.1, for extended insulated tubing at 600 volts. The Contractor must use the appropriate size heat-shrink tubing from the following Thomas and Betts Catalog Numbers HS6-1, HS6-1L, HS4-30, HS40-400 or equal product if approved by the Agency.

All heat shrink tubing must meet the following requirements:

Shrinkage Ratio:	33 percent, maximum, of supplied diameter when heated to 125°C and allowed to cool to 25°C
Dielectric Strength:	350 kilovolts per inch, minimum
Resistivity:	10^{14} ohms - centimeter, minimum
Tensile Strength:	2,000 lbs. per square inch, minimum
Operating Temperature:	-40°C to 90°C (135°C Emergency)
Water Absorption:	0.5 percent, maximum

When 3 or more conductors are to be enclosed within a single splice using heat-shrink tubing, mastic must be placed around each conductor, prior to being placed inside the heat-shrink tubing. The mastic must be the type recommended by the manufacturer of the heat-shrink tubing.

Heat-shrink tubing must not be heated with an open flame. A heating device designed for the purpose is required. Immediately after heating the splice and while the internally-applied sealant is still liquid, the open end of the splice must be clamped together until the sealant dries.

If any detector lead-in splice fails within 1 year due to poor workmanship, the Contractor must replace all detector lead-in splices made by the Contractor within the intersection.

Where shown on the Plans, detector loops must be sawcut into detector handholes. Detector handholes must be installed in accordance with these Specifications and as shown on the Standard Drawings unless otherwise specified or directed by the Agency. Splicing in the detector handholes is not permitted.

Conduit from the detector handhole to the adjacent pull box must be sized as shown below:

Conduit Size	Loop Conductors
1-1/2" minimum	1-4 pairs
2" minimum	5 or more pairs

49-5.01.D Video Detector System

A video detection system must be supplied and installed for those locations indicated in the Contract. Unless there is a bid item for video detection system, the video detection system, including but not limited to specified hardware, software, warranty, maintenance, and support, is included in the lump sum price paid for the traffic signal installation, and no additional payment will be made.

This video detection specification is the minimum requirements for a system that detects vehicles on the roadway using monochrome or color video images of the vehicle traffic and provides detector outputs to a traffic signal controller. The system must consist of one or two video cameras, a video detection processor (VDP), extension module/s (EM) appropriate for the installation, and a pointing device. The VDP and EM/s must be designed to function in a standard Detector Input File. The VDP and EM must meet the Type 170, 170E, 2070, NEMA TS1 and TS2, and ATC environmental specifications. The system must be Iteris' Vantage Edge II ™, Traficon VIP3D.2 ™, or approved equivalent.

49-5.01.D.(1) Functional Capability:

The system must use NTSC or PAL composite video from a camera(s) to detect vehicles on the roadway. The video signal must be digitized and analyzed in real time. The dual camera VDP must process the video from two cameras simultaneously. The VDP must support a minimum of 24 detection zones within a camera field-of-view (FOV). Each zone must be individually capable of detecting a licensed motor vehicle, bicycles, or pedestrians. Supported detection types must include pulse, presence count extend and delay. Logical operations of 'AND' and 'OR' must be supported. The VDP must also support delay inhibit inputs. The VDP must provide a 'failsafe' output in the event of loss of video or internal failure. System programming must be accomplished via a standard pointing device using a menu overlaid on the monitor screen. System setup or operation must not require a computer.

49-5.01.D.(2) VDP and EM Hardware:

The system must employ plug-in based units compatible with a standard Type 170/332, 2070, NEMA TS1 and TS2, and ATC systems. The VDP must be 2 units wide. The EM must be available in both single unit wide (2 Channel) and two unit wide (4 Channel) forms. EM must be automatically recognized and addressed by the VDP when connected. The VDP must

support sufficient EM's to provide a minimum of 24 outputs per camera input. Both the VDP and EM will provide front panel LED indicators for each output channel and a miniature 3-position switch to provide temporary detection activation. Video input and output must be by means of standard BNC type connectors. Provision for input video impedance matching must be provided by means of a simple jumper arrangement. The units must be addressable and capable of multi-drop communications.

49-5.01.D.(3) Video Detection Camera:

The camera must be housed in a sealed environmental enclosure with integral thermostatically controller heater. The enclosure must be provided with an adjustable sunshield. The camera bracket must be included and provide for full 360-degree pan adjustment using simple hand tools. The enclosure must provide for separate connectors for the power and video signal. Video surge suppression should be provided for each video input.

49-5.01.D.(4) Video Camera Cabling:

Video camera cable must be per the Manufacturer's Specifications and must be provided by the Contractor for each camera between the camera mounting location and the controller cabinet.

49-5.01.D.(5) Firmware:

The detection algorithms must be stored in FLASH memory and be upgradeable by using a manufacturer supplied floppy disc or CD ROM. Upgrading must be by means of a laptop computer connected directly to the front panel RS-232 connector. Upgrades must be provided on a periodic basis at no cost to the user.

49-5.01.D.(6) Remote Access Software:

Included at no additional cost must be full-function remote access system software, which will support both local and remote configuration.

49-5.01.D.(7) Installation:

The product supplier of the video detection system must supervise the installation and the testing of the video equipment. A factory certified representative from the manufacturer must be on-site during installation, and is responsible for determining the final locations of the video detection cameras. The factory representative must install, make fully operational, and test the system per the manufacturer's recommendations, the Contract, and these Specifications.

49-5.01.D.(8) Warranty:

The supplier must provide a limited 2-year warranty of the video detection system. During this period technical support must be available from factory-certified supplier personnel via telephone within 4 hours of receipt of your request.

49-5.02 Emergency Vehicle Detector Cable, Detectors, and Phase Selectors

The Contractor must supply and install 3M Opticom cable model 138, or approved equal, where emergency vehicle detector (EVD) conductors are shown on the Plans. Opticom cable must be installed to the EVD installed on the traffic signal mast arms, as shown on the Plans.

The Contractor must supply and install EVD's for each mast arm signal installation and at locations shown on the Plans. Unless otherwise shown on the Plans, EVD's must be 3M Opticom model 721, or approved equal. EVD's must be installed on the top of the signal mast arm at the locations indicated on the Plans or at the location on the mast arm as directed by the Agency in the field. For each EVD installation, the associated cable must be continuous and unspliced from the detector to the controller cabinet. The Contractor must provide for 5 feet of conductor slack in the pull box at the base of each pole with an EVD installation.

Unless otherwise shown or specified in the Contract, the Contractor must supply two (2) EVD phase selectors for each new traffic signal controller cabinet installed under the Contract.

EVD phase selector(s) must be 3M Opticom model 752 or approved equal. The Contractor must supply the phase selector(s) to the Agency a minimum of 2 weeks prior to the date of traffic signal controller cabinet installation.

49-5.03 Pedestrian Push Buttons

The Contractor must supply and install push buttons that provide accessible pedestrian signals to users. The push buttons must have the following features integrated into the devices:

1. an audible push button locator tone,
2. an audible walk signal and
3. a tactile arrow.

Operation of the push button must activate both the "walk" interval and the accessible pedestrian signals. During the "walk" phase of signal operation the associated pedestrian push button must have both audible and vibrotactile indications. The vibrotactile indication must be provided by a tactile arrow on the push button that has high visual contrast (light on dark or dark on light), must be aligned parallel to the direction of travel on the associated crosswalk, and must vibrate during the "walk" interval.

The audible "walk" indication must be a tone that repeats at 8 to 10 ticks per second during the entire "walk" phase. The audible tone used as a "walk" indication must consist of multiple frequencies with a dominant component at 880 Hz.

The unit must be able to produce a speech message that can be used instead of the above described audible "walk" indication. The speech message must be customizable for the location where the device is installed. For example, a unit installed at a crosswalk that crosses Main Street must be able to produce a speech message that says, "Main Street. Walk sign is on to cross Main Street.".

The volume of the "walk" indication, the speech message, and of the locator tone, must be set to a maximum of 5dBA louder than ambient sound. The device must provide for automatic volume adjustment in response to changes in ambient traffic sound levels up to a maximum volume of 100dBA.

Following the audible walk indication, the accessible pedestrian signal must revert to the push button locator tone during the pedestrian change interval. The push button locator tone must have a duration of 0.15 seconds or less and must repeat at 1 second intervals. The locator tone must be deactivated when the traffic signal is operating in a flashing mode. The locator tone must be intensity responsive to ambient sound, and must be audible six to twelve feet from the installed location of the push button.

The housing for the accessible pedestrian signal device must incorporate mounting space for the pedestrian push buttons signs described below.

The County has preapproved the use of the following accessible pedestrian push button signal devices:

- Navigator Accessible Pedestrian Signal by Polara Engineering, Inc. (four wire system)
- Advisor Accessible Pedestrian Signal by the Campbell Company

Use of other devices that meet the requirements above might be allowed upon review and approval by County of Sacramento's Department of Transportation. The Contractor may propose use of a device other than one of the ones listed above by supplying manufacture's information about the proposed device a minimum of 3 weeks prior to the date planned for ordering the equipment. The Agency may request submittal of a sample device for testing.

In addition to the pedestrian push buttons shown on the Plans, the Contractor must provide the Agency with one additional push button unit including control module. The push button unit must match the ones installed on the project and must meet all of the above requirements.

Pedestrian push button signs must be 5 inch by 7-3/4 inch metal as manufactured by Pelco

Products Inc., model SF-1017-05 (left arrow) and model SF-1018-05 (right arrow), or approved equal.

Each pedestrian push button unit must be mounted on traffic signal poles so the center of the portion of the unit that is intended to be pushed is located no lower than 42 inches above the surface of the sidewalk or walkway adjacent to the pole. At locations where installation of the pedestrian push button is not practical at 42 inches, the unit must be placed so the portion of the unit that is intended to be pushed is located between 42 and 48 inches above the surface of the sidewalk or walkway adjacent to the pole.

49-6 LIGHTING

Lighting must conform to the State Specifications, and these Specifications.

49-6.01 NOT USED

49-6.02 Photoelectric Controls

The control circuit wiring between the photoelectric unit and the contactor must be installed as shown on the Standard Drawings.

Unless otherwise shown or specified in the Contract, the photoelectric controls must be Type II as modified herein. Type II photoelectric control must consist of a luminaire mounted EEI-NEMA twist-lock type photoelectric unit in a weatherproof housing, a separate contactor and a test switch located in the service enclosure.

Switches must be furnished with an nameplate reading "Hand-Off-Auto" and must be connected as specified in Section 49-2.11, “Service”, of these Specifications and as shown on the Standard Drawings. Test switch must have an "OFF" position.

49-6.02.A Photoelectric Unit

The photoelectric unit will be supplied by the Contractor. The photoelectric unit must be compatible with Light Emitting Diode (LED) street light luminaires. Photoelectric units must be Dark to Light DLL Elite long life LED photocell – DLL127 F 1.5, or approved equal.

The photoelectric unit receptacle must be an EEI-NEMA twist-lock type and must be provided on the luminaire(s) as shown on the Plans. If approved by the Agency, mounting brackets must be used where luminaire mounting is not possible.

49-6.02.B Contactors

Contactors must be as specified in Section 49-2.11, “Service”, of these Specifications and as shown on the Standard Drawings.

49-6.02.C Contactor and Test Switch Housing

Contactor and test switch housing must be as specified in Section 49-2.11, “Service”, of these Specifications and as shown on the Standard Drawings.

49-6.02.D Wiring

Wiring must be as specified in Section 49-2.11, “Service”, of these Specifications and as shown on the Standard Drawings.

49-6.03 Light Emitting Diode (LED) Luminaires

LED luminaires must be of the wattage and ANSI light distribution pattern shown on the plans and specified in the Special Provisions. Safety light luminaires for use at signalized intersections must be on the list prepared by the State of California Department of Transportation titled “Pre-Qualified Product List LED Luminaires”, latest version

The luminaire must consist of a housing, LED array, and electronic driver (Power supply). Each luminaire must be rated for a minimum operational life of 70,000 hours, and must be designed to operate at an average nighttime operating temperature of 70 degrees F. The

individual LEDs must be connected so that a catastrophic loss or failure of one LED will not result in the loss of the entire luminaire. The luminaires must be listed with Underwriters Laboratory, Inc., under UL1598 for luminaires, or an equivalent standard from a recognized testing laboratory.

The luminaires must operate at 60 Hz AC line over a voltage range of 95 to 250 Volts AC, and must have a power factor of 0.90 or greater. The on-board circuitry must include surge protection, and must prevent perceptible flicker to the unaided eye. The luminaire must be compatible with currently utilized lighting control systems and photocell controls as detailed these Specifications

The luminaire must have a correlated color temperature of 4,000K $\pm$300, and a color rendition index of 65 or greater. The luminaire must have a BUG (Backlight, Uplight and Glare) rating of B2 U0 G2.

The heat sink material must be aluminum, and thermal management must be passive by design. The luminaire must contain circuitry that will automatically reduce the power to the LEDs to 50% of normal operating power, or to a level that will insure that the maximum junction temperature is not exceeded, when the ambient, outside air temperature is 100°F or greater.

The maximum weight of the LED luminaire must be 35 pounds, and the maximum effective projected area must be 1.4 square feet. The housing must be light grey in color. The housing must be constructed of materials that are designed to withstand a 1,000-hour salt spray test as defined in ASTM Designation B117. Each housing must be provided with a slip fitter, clamping bracket, and two or four bolts capable of mounting on mast arms from 1-5/8 to 2-3/8 inch outside diameter.

The optical assembly of the luminaire must be protected from dust and moisture intrusion per the requirements of IP-66. The electronics/power supply enclosure must be protected per the requirements of IP-43 (Minimum).

Each luminaire must be supplied with a photoelectric unit receptacle and rain tight shorting cap.

Field wires connected to the luminaire must terminate on a barrier type terminal block secured to the housing. When components are mounted on a down-opening door, the door must be hinged and secured to the housing. A safety cable must mechanically connect the door to the housing.

Luminaires must be vibration tested in conformance with California Test 611, or other internationally recognized vibration test standard.

Each luminaire must have the manufacturer's name, trademark, model number, serial number, and date of manufacture (Month-Year) permanently marked inside each luminaire and outside of each box. Each luminaire must be marked on the underside with a suitable decal visible from the ground that includes the fixture's system wattage and identifies the luminaire as an LED type.

The manufacturer must provide a warranty against loss of performance and defects in materials and workmanship for the luminaires for a period of 84 months after acceptance of the luminaires. The warranty must include language indicating that replacement luminaires must be provided promptly after receipt of luminaires that have failed, at no cost to the County.

49-7 AGENCY-SUPPLIED EQUIPMENT

All equipment and materials supplied by the Agency will be available to the Contractor at the County Corporation Yard at 4135 Traffic Way near the intersection of Bradshaw Road and Kiefer Boulevard. The Contractor must inform the Agency and the Traffic Signal and Street Light Manager (875-5327) at least 2 Working Days in advance of date equipment pickup is required. The hours for pickup are 9:00 a.m. to 3:00 p.m. Monday through Thursday. Full

compensation for pick-up and transport to the job site is considered as included in the lump sum price for the traffic signal work.

49-8 REMOVING AND SALVAGING ELECTRICAL EQUIPMENT

All traffic signal and street lighting equipment shown on the Plans as "Salvaged to the County", including but not limited to such items as controller units, cabinets, signal heads, luminaires, standards, mast arms, ballasts, service equipment, conduit, conductors, cables, and detector contact items, must be delivered, in the same condition as before removal, by the Contractor to the County Corporation Yard located at 4135 Traffic Way.

All poles, signal arms, luminaire arms, tie rods, and appurtenances must be tagged with a suitable waterproof tab and marking pen before removal from the work site. The tag must give the date, the intersection name, corner, and location from which the equipment was removed as shown on the Plans.

The Contractor must inform the County Traffic Signal Shop (875-5327) at least 2 Working Days in advance of the date equipment drop-off is required. The hours for drop-off are 9:00 a.m. to 3:00 p.m., Monday through Thursday. The Contractor must be responsible for unloading the equipment at the County Corporation Yard, including providing any necessary cranes or other lifting devices. Full compensation for transport to and drop-off at the County yard is considered included in the lump sum price paid for the traffic signal work. All other traffic signal and street lighting equipment shown on the Plans as salvaged become the property of the Contractor and must be removed from the right-of-way by the Contractor.

49-9 PAYMENT

The lump sum price or prices paid for signal, lighting, electrical system, or combinations thereof; for modifying or removing such systems; for temporary systems; or the lump sum or unit prices paid for various units of said systems include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing and installing, modifying, or removing the systems, combinations or units thereof, as shown or specified in the Contract, these Specifications, and directed by the Agency. The price also includes pull boxes; excavation and backfill; concrete foundations (except when shown as a separate contract item); pedestrian barricades; furnishing and installing illuminated street name signs; installing Agency-furnished sign panels and equipment; salvaging existing materials; and performing required tests.

Full compensation for all additional materials and labor, not shown or specified in the Contract or these Specifications, which are necessary to complete the installation of the various systems, is included in the prices paid for the systems, or units thereof, and no additional compensation will be paid.Full compensation for pick up and safe and direct transport of controller assemblies and other Agency-furnished materials and equipment to the Work is included in the price paid for the various items of work and no additional compensation will be paid.

Full compensation for loading and transporting the salvaged equipment to the stockpile location is included in the price paid for the various items of work and no additional compensation will be paid.

SECTION 50 - CONSTRUCTION MATERIALS

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SECTION 50 CONSTRUCTION MATERIALS

This Section indicates the requirements for various classes and types of materials used in construction. Materials not included in this Section must be as described and specified in other Sections of these Specifications or in the Special Provisions.

All sewer facilities constructed within the Sacramento Area Sewer District service area (http://www.sacsewer.com/pdf/map-servicearea.pdf) must be constructed in accordance with the Sacramento Area Sewer District Standards and Specifications available at http://www.sacsewer.com/pdf/ord/2011-SASD-Standards-and-Specifications-v1.pdf

50-1 PORTLAND CEMENT

Unless otherwise specified in the Special Provisions, all cement used in concrete must conform to ASTM C150, Type II.

Type III portland cement may be substituted for Type II when Special Provisions require high early strength.

All portland cements must be "low alkali", containing not more than 0.60 percent by weight of alkalis, calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O.

Unless otherwise specified in the Special Provisions, calcium chloride must not be used in any concrete containing steel reinforcement or other embedded metals.

When directed by the Agency, the Contractor must furnish certificates of compliance stating that the cement delivered to the work complies with these Specifications.

50-2 CONCRETE AGGREGATES

Unless otherwise specified in the Special Provisions, concrete aggregates must conform to ASTM C33, except that grading requirements must be as specified in the State Specifications.

50-3 WATER FOR CONCRETE

Water used for mixing and curing concrete must be clean, free from oil, acid, alkalis, vegetable matter, or other deleterious matter. No water containing excessive amounts of salts, sulfates, or chlorides must be used.

50-4 PREMOULDED EXPANSION JOINT FILLER

Unless otherwise specified in the Special Provisions, premoulded expansion joint filler material must conform to ASTM D1751.

50-5 PORTLAND CEMENT CONCRETE

50-5.01 Composition

Portland cement concrete must be composed of portland cement, fine aggregate, coarse aggregate, admixtures (if used), water; and conform to the State Specifications.

Should the quantity of ingredients designed to produce a cubic yard of finished concrete result in a yield greater than 1 cubic yard, the relative proportions of fine and coarse aggregates must be adjusted as necessary to maintain a consistent quantity of portland cement in each cubic yard of concrete.

A mix design must be submitted to the Agency for approval at least 7 Working Days prior to the proposed portland cement concrete being incorporated into the Work. Mineral admixture, when approved by the Agency, must conform to the State Specifications.

50-5.02 Proportioning

The Contractor must determine the mix proportions for all portland cement concrete to be used in the Work. The coarse and fine aggregates must be combined in such proportions that the percentage composition by weight of the individual and primary aggregate sizes, as determined by laboratory screens and sieves, conforms to the State Specifications.

Exact proportions of primary aggregate sizes used in the concrete mix must be as designated or approved by the Agency. The Agency may adjust the mix to accommodate changes in aggregate and moisture contents, to improve mixing and placing characteristics or to secure maximum quality of the finished concrete.

50-5.03 Mixing

Concrete must be from an approved plant. All concrete mixing must be done in machine batch mixers of an approved type, having a capacity of not less than that which utilizes a full sack of cement, unless, in the opinion of the Agency, the quantity to be mixed is too small to justify the use of a batch mixer. Sacks of cement must be completely emptied by dumping directly upon other materials previously measured into the mixer. No splitting of sacks of cement is allowed. The cement may be weighed into the batch from bulk storage if the Contractor provides suitable equipment approved by the Agency.

Mixing must continue for a minimum of 1 minute. In mixers larger than 1 cubic yard capacity the mixing time must be increased so minimum mixing time is not less than 1 minute for each cubic yard, or part thereof, of the mixer capacity. Where transit mixers are used, the mixing period must conform to the requirements of ASTM C94.

The total volume of material mixed per batch must not exceed the rated capacity of the mixer as determined by the standard requirements of the Associated General Contractors of America. Mixing equipment not indicated in this Section must be operated at the speeds recommended by the manufacturer. Revolving drum mixers, except transit mixers, must not make less than 14 nor more than 18 revolutions per minute. The rotation rate of transit mixers must produce a peripheral speed of approximately 200 feet per minute.

Each paving mixer or stationary mixer must be equipped with an acceptable timing device.

Should the Contractor elect to utilize transit-mixing equipment, the Contractor must make adequate advance arrangements for preventing delays in delivery and placing of the concrete. If there is an interval of more than 45 minutes between any 2 consecutive batches or loads, or a delivery and placing rate of less than 8 cubic yards of concrete per hour, the Agency may shut down the work for the remainder of the day. If the work is shut down, the Contractor, at the Contractor's expense, must make a construction joint in the concrete already placed at the location and of the type directed by the Agency.

Transit-mixed concrete must be delivered to the site of the Work and discharge must be completed within 90 minutes after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever comes first. In hot weather or under conditions contributing to quick stiffening of the concrete or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge must not exceed 45 minutes.

Batch or transit-mixed concrete delivered to the Work must be accompanied by a ticket showing the volume of the concrete, the weight of cement in pounds, and the total weight of all ingredients in pounds. The ticket must also show the time of day the materials were batched and the approved mix number.

The Agency may stop concrete pouring if the placing of the concrete is causing separation of constituent materials of the concrete.

Transporting of concrete in non-mixing trucks or trailers will not be permitted.

50-5.04 Water Control

Within the limits hereinafter specified, the amount of water required for the proper consistency of concrete will be determined by the slump test, in accordance with ASTM C143.

The Allowance for slump, unless otherwise directed by the Agency, is as follows:

Concrete paving and unreinforced structures—Not more than 3 inches
Reinforced structures and columns—Not more than 4 inches
Concrete placed under water—Not less than 6 nor more than 8 inches

Do not add water into the concrete mixture during hauling or after arrival at the delivery point, unless authorized by the Agency. If the Agency authorizes additional water to be incorporated into the concrete, the drum must be revolved at least 30 revolutions at mixing speed after the water is added and before discharge is commenced.

If the concrete is mixed in transit, the control equipment must be at the proportioning plant and there must be no water added after the mixture leaves the plant, unless directed by the Agency.

The Contractor must furnish, without charge, materials required for making tests of concrete during the progress of the Work. The tests will be made at the Agency's expense.

50-6 CURING COMPOUNDS FOR CONCRETE

Concrete curing compounds must be used where specified in these Specifications and the Special Provisions.

The compounds must meet the requirements of the State Specifications.

50-7 AGGREGATE BASES

Aggregate bases must conform to the requirements of the State Specifications, and these Specifications.

The combined aggregate must conform to the gradation requirements specified for the 3/4-inch maximum aggregate for Class 2 aggregate base, unless otherwise specified in the Special Provisions.

50-8 PIT RUN BASE (GRADED)

Pit run base is a processed pit run material from local sources that might be specified on the Plans or in the Special Provisions for work where ordinary earth fill may not be satisfactory.

Pit run material must have a minimum sand equivalent of 25, as determined by California Test 217.

Pit run base must have the following limits of gradation:

Sieve Size	Percentage Passing
2-1/2"	100
2"	75-100
1"	50-75
No.4	20-50
No. 200	0-10

50-9 COBBLES

Cobbles must measure a minimum 4 inches in the least dimension and a maximum of 12 inches in the greatest dimension.

50-10 GEOTEXTILE FABRIC

50-10.01 Nonwoven Geotextile Fabric

Nonwoven geotextile fabric must be of nonwoven construction and consist of long-chain polymeric fibers composed of polypropylene, polyethylene, or polyamide. The fibers must be oriented into a random web and stabilize so they retain their relative positions. The geotextile must be free of any chemical treatment or coating and must be inert to chemicals commonly found in soil.

The geotextile must conform to the physical property requirements listed in the table below:

TABLE 50-1
REQUIRED NONWOVEN GEOTEXTILE PROPERTIES

Physical Property	Test Method	Acceptable Minimum Test Results
Tensile strength, lb	ASTM D 4632	200 lbs.
Elongation, %	ASTM D 4632	50%
Permittivity, sec^{-1}	ASTM D 4491	1.5 sec^{-1}
Puncture strength, lb	ASTM D 4833	120 lbs.
Mullen Burst strength, psi	ASTM D 3786	380 psi
Note: Tension testing machine with ring clamp, steel ball replaced with a 5/16-inch-diameter solid steel cylinder, with flat tip and beveled edges, centered within the ring clamp.		

50-10.02 Woven Geotextile Fabric

The woven geotextile fabric must be a high modulus woven fabric consisting of long chain polymeric monofilaments, slit film tapes, or multifilaments of tape and nonwoven yarn of polypropylene, polyester or nylon, and must be inert to commonly encountered chemicals, rot-proof and resistant to ultraviolet light exposures, insects, and rodents. The fabric must be woven into a stable network and the edges of the fabric must be selvedged or surged in such a way that fabric will not unravel or fray during installation or usage.

The geotextile must conform to the physical property requirements listed in the table below:

TABLE 50-1
REQUIRED WOVEN GEOTEXTILE PROPERTIES

Physical Property	Test Method	Acceptable Minimum Test Results
Grab tensile strength (any direction), lb	ASTM D 4632	200 lbs.
Weight, oz/yd^3	ASTM D 5261	6.0 oz/yd^3
Permittivity, sec^{-1}	ASTM D 4491	0.5 sec^{-1}
Mullen Burst strength, psi	ASTM D 3786	400 psi

The fabric must have an Equivalent Opening Size no larger than U.S. Standard Sieve Number 50 as determined by U.S. Corps of Engineers Specification CW-02215. Geotextile fabric must be Mirafi 600X, or equal.

Each roll of fabric used must be labeled in accordance with ASTM D 4873. Sampling and testing of geotextile fabric must conform to the requirements of ASTM D 4354. Specification conformance for geotextile fabric must conform to the requirements of ASTM D 4759. Storage and handling of the geotextile fabric must conform to the requirements of ASTM D 4873. Geotextile fabric must be handled and placed in accordance with the manufacturer's recommendations.

50-11 CEMENT-TREATED BASES

Road-mixed and plant-mixed cement treated base must comply with the State Specifications.

50-12 LIME TREATED BASE

Lime treated base must be constructed by mixing lime and water with existing subgrade materials. The lime must be a commercial hydrated lime conforming to the requirements of ASTM C51. When sampled by the Agency at the point of delivery, the sample of hydrated lime must contain at least 85 percent of calcium hydroxide as determined by California Test 414.

A Certificate of Compliance and certified weight slips for each delivery must be submitted to the Agency.

50-13 SAND

50-13.01 River Sand

River sand must be free from vegetable matter, lumps, balls of clay, or adherent films of clay. The material must not have more than 20 percent passing a 200 hundred mesh screen.

50-13.02 Graded Sand

Graded sand must be free from vegetable matter, lumps, balls of clay, or adherent films of clay, and must have a minimum Cleanliness Value of 60 as determined by California Test 227. The percentage composition by weight of graded sand must conform to the following gradations:

Sieve Size	Percentage Passing by Weight
9.5 mm (3/8")	100
4.75 mm (#4)	92-100
2.36 mm (#8)	90-100
1.18 mm (#16)	80-100
600 µm (#30)	65-100
300 µm (#50)	40-80
150 µm (#100)	0-40
75 µm (#200)	0-12

If approved in writing by the Agency, sand bedding in accordance with Section 19-3.02E(2) of the State Specifications may be substituted for graded sand. Contractor must provide written notification in accordance with Section 5-14 of these Specifications. The written notification must include documentation that the graded sand specified herein is not available at the time or in the quantities required to complete the Work. No additional payment will be made for the substitution.

50-14 CRUSHED ROCK

See Section 50-16.

50-15 CONTROL DENSITY BACKFILL/CONTROLLED LOW STRENGTH MATERIAL

50-15.01 Control Density Backfill

Control density backfill is a workable mixture of aggregate, cementitious materials, and water.

Prior to excavation, the Contractor must submit to the Agency for approval a mix design and test data that demonstrate that the mix design complies with the following:

- Portland cement must be Type II conforming to the requirements in Section 50-1, "Portland Cement", of these Specifications.
- Admixtures, including mineral admixtures (pozzalan), must conform to the State Specifications. Chemical admixtures containing chlorides such as Cl in excess of 1 percent by mass of admixture, as determined by California Test 415, must not be used. The amount of air-entraining admixture added must be between 8 and 20 percent.
- Course aggregate must be a well-graded mixture of crushed rock with a maximum size aggregate of 3/8 inch. One hundred percent must pass the 1/2 inch sieve. Not more than 30 percent can be retained by the 3/8 inch sieve and not more than 12 percent can pass the No. 200 sieve. All material must be free of organic matter and not contain more alkali, sulfates, or salts than the native materials at the site of work.
- The 28-day compressive strength must be between 100 and 200 psi.

Water must conform to Section 50-3, "Water for Concrete", in this Section of these Specifications.

Materials for control density backfill must be thoroughly machine-mixed in a pugmill, rotary drum, or other approved mixer. Mixing must continue until the cementitious material and water are thoroughly mixed. Control density backfill must be placed within 90 minutes of introduction of the cement to the aggregates.

Control density backfill must be placed in a uniform manner that will prevent voids in or segregation of the backfill. Foreign material that falls into the trench prior to or during placing of the control density backfill must be immediately removed.

When control density backfill is to be placed within the traveled way or otherwise to be covered by paving, the material must achieve a maximum indentation diameter of 3 inches prior to covering and opening to traffic. Penetration resistance must be as measured by ASTM C6024.

50-15.02 Controlled Low Strength Material (CLSM)

All CLSM must conform to ACI report 229R-99, and have a 28-day unconfined compressive strength of between 50 and 125 psi. Cement must be Type I or Type II Portland cement conforming to ASTM C150. Blended cements conforming to ASTM C595 may be used with the written approval of the Agency after submittal of test results. Fly Ash must be Class F per ASTM C618. Air-entraining admixtures and foaming agents are permitted. Water-quality must conform to ASTM C94. Aggregates must comply with ASTM C33. Aggregates must be sand with no more than 10 percent passing a No. 200 sieve. If Fly Ash is not used in the mix design the amount passing the No. 200 sieve can be increased to 20 percent. Soils with clay fines are prohibited. The Contractor must submit a mix design and test results to the Agency for approval prior to commencing excavation.

50-15.02.A Properties

Flowability: High flowabilty: Between 8 and 10 inches per ASTM C143 (slump cone) method.

Segregation: The separation of constituents in the mixture during fluid movement is not permitted.

50-15.02.B Mixing, Transporting And Placing

The mixing, transporting and placing of CLSM must be in accordance with the methods and procedures given in ACI 304 and ACI 304.6R.

Prior to placement of the CLSM:

- The trench must be free of loose soil
- The trench bottom must be stable and non-yielding
- There must be no excess moisture present
- The pipe bells must be supported so they maintain a minimum 3 inch separation from the bedding material
- All bedding material must be removed from the pipe haunches

The CLSM must be placed the full width and length of the trench and must cover the top of the pipe bell. The CLSM must be placed on both sides of the pipe simultaneously to minimize the potential for lateral displacement of the pipe

The pipe sections may need to be secured against floatation during CLSM placement. The CLSM may be placed in lifts to reduce the potential for flotation to occur.

50-15.02.C Backfill

Backfill above the CLSM can commence only when placement and compaction of the backfill will not cause deformation of the CLSM, or at the direction of the Agency.

50-15.02.D Quality Control

Sampling must be in accordance with ASTM D 5971. The testing of CLSM cylinders must be per ASTM D 4832, “Preparation and testing of soil-cement slurry test cylinders.”

Protect the area where the CLSM has been placed. The liquid CLSM will have characteristics similar to quick sand, until solidification occurs.

50-16 CLEAN CRUSHED ROCK

Clean crushed rock of the type shown or specified in the Contract must be the product of crushing rock or gravel. The percentage composition by weight of clean crushed rock must conform to the following gradations for the Type specified:

Sieve Size	Type A (1/2" crushed)	Type B (3/4" crushed)	Type C (1" crushed)	Type D (1-1/2" crushed)
2"	--	--	--	100
1-1/2"	--	--	100	--
1"	--	100	90-100	--
3/4"	100	70-100	30-60	0-17
1/2"	70-100	5-55	0-20	--
3/8"	10-	0-15	--	0-7
No.4	0-15	0-5	0-5	0-10
No.8	0-5	0-2	--	0-2

Clean crushed rock must have a minimum Cleanliness Value of 60 as determined by California Test 227. At least 75 percent of the crushed rock particles must have 2 or more fractured faces.

50-17 ASPHALT, LIQUID ASPHALT, AND ASPHALTIC EMULSION

Asphalt as required by these Specifications or by the Special Provisions means asphalts as specified in the State Specifications. Liquid asphalts as required by these Specifications or by the Special Provisions, means liquid asphalts as specified in Section 93, "Liquid Asphalts", of the State Specifications.

Asphaltic emulsion must conform to the State Specifications and these Specifications. Emulsified asphalt must be Cationic type polymer modified grade PMCRS-2H.

Test results of the proposed emulsified asphalt and aggregate, including date of testing, must be submitted in writing to the Agency. Samples of the proposed emulsions and aggregate must be provided to the Agency upon request. The required tests must conform to those specified in the State Specifications, and the following:

TEST	TEST METHOD	REQUIREMENT
Viscosity @ 122°F	AASHTO T-59	100-250 sec.
Demulsibility	AASHTO T-59	60% - 95%
Penetration @ 77°F (100g 5 sec)	AASHTO T-49	40-65
Ductility @ 77°F (5 cm/min.)	AASHTO T-51	60 cm/min.
Percent Residue	Cal Test 331	65% min.
Torsional Recovery	Cal Test 332	18% min.
Oil Distillate (by volume of emulsion)	AASHTO T-59	3% max.
Solid Polymer Content (by weight)	Cal Test 401	2.5%
Ring and Ball Softening Point	AASHTO T-53 1-2	125°F min.

The binder must conform to the aggregate with a 10 percent minimum film stripping as tested by California Test 302.

The laboratory used to develop the job mix formula and to perform quality control must meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements must be submitted to the Agency prior to the start of work.

At the option of the Contractor, polymer can be Neoprene, Ultrapave, or SBR. The polymer must be added to either the asphalt or the emulsion at their locations of manufacture. The temperature of the polymer modified asphaltic emulsion at the time of application must be between 130°F and 180°F.

The Contractor must maintain a quality control system that will provide reasonable assurance that all materials submitted for use conform to these Specifications. The Contractor must perform 2 random samples each day to verify compliance with the operation's quality control. Samples must be taken from the spray bar of the distributor truck at mid-load. The tests shown above must be performed on each sample taken. The Agency reserves the right to suspend Contractor activities and reject material until it can be shown that the material is in compliance with these Specifications.

Penalties will be assessed for nonconformities as follows:

TABLE 50-9	
Nonconformity	**Penalty**
Viscosity is between 75 and 100 seconds or between 250 and 300 seconds.	5 percent deduction from the bid price per ton for emulsified asphalt
Torsional recovery exceeds 11 percent but is less than 18 percent.	5 percent deduction from the bid price per ton for emulsified asphalt
Torsional recovery is less than 11 percent.	10 percent deduction from the bid price per ton for emulsified asphalt

Test results must be identified by the production date and time of sample and must be submitted in writing to the Agency within 2 Working Days of the sample date. The Agency reserves the right to witness the quality control testing performed by the testing lab and to test any material at any time during the course of the Work.

Each distributor truck must be equipped with a proper measuring stick and calibration card. On-site calibration of distributor trucks, for determining actual spread rate of asphaltic emulsion, must be performed when directed by the Agency. The asphaltic emulsion must be stored in heated circulation tanks at controlled temperatures, between 140 and 180 degrees F, for a period not to exceed 7 Calendar Days. The temperature of the asphaltic emulsion must be between 130 and 180 degrees F at the time of application.

50-18 VITRIFIED CLAY PIPE (VCP)

Vitrified clay bell and spigot pipe and fittings must conform to ASTM C700 and Section 207-8.5.3 of the latest version of the "Standard Specifications for Public Works Construction" ("Greenbook"). A Certificate of Compliance must be furnished by the pipe manufacturer.

Joints must be factory-applied resilient-type, polyurethane, mechanical compression joints conforming to ASTMC425.

Field repair of vitrified clay pipe segments, joints and fittings must be limited to removal and replacement of the unacceptable portions of the pipeline.

50-19 SUBSURFACE DRAINS

Subsurface drains must comply with the State Specifications.

50-20 NONREINFORCED CONCRETE PIPE (CP)

Nonreinforced concrete pipe must conform to ASTM C14.

50-21 REINFORCED CONCRETE PIPE, DRAINAGE (RCPD)

Reinforced concrete pipe must conform to ASTM C76 for Class I, II, III, IV, or V. The class of pipe will be specified in the Contract.

Sections of circular pipe with elliptical reinforcing must have the location of the minor axis of the reinforcing indicated by 3-inch wide waterproof painted stripes on the inside and outside of the pipe at the top and bottom, at least 12 inches long at each end of the pipe section.

Unless otherwise indicated in the Contract, joints for concrete pipe must be bell and spigot and must be of a design that, when properly laid, has a smooth and uniform interior surface. Each joint must be sealed to prevent leakage. Unless otherwise indicated in the Contract, joints must be sealed with a rubber profile gasket conforming to ASTM C443. Compression couplings

capable of the same performance are allowed where splices are needed. RCPD must be Wall C and each piece of pipe must successfully pass a vacuum test as a part of its manufacturing process to a pressure of 25 feet of head (11psi) for a minimum of ten seconds.

50-22 NOT USED

50-23 CONCRETE CYLINDER PIPE (CCP) AND CEMENT MORTAR LINED AND COATED STEEL PIPE (CLCS)

Concrete cylinder pipe must conform to Federal Specifications SS-P-381a and cement mortar lined and coated steel pipe must conform to Federal Specifications SS-P-385a, each subject to the following modifications:

a. Minimum steel cylinder thickness is 0.109 inch.
b. Mortar coating must provide a minimum of 3/4 inch cover over all structural steel.
c. Cement mortar lining must be of Type II portland cement and must be centrifugally applied. Minimum lining thickness is 1/2 inch. The finished inside diameter of the lined pipe must be the diameter shown on the Plans and must match the inside diameter of the adjoining pipe sections to within 1 percent, or 1/4 inch, whichever is greater.
d. Pipe must be Class 100, unless otherwise shown or specified in the Contract.
e. Deflection of the pipe cross section is limited to 1 percent of the inside diameter when the pipe is placed under full external design load.
f. Pipe sections of less than standard length are only allowed with the written approval of the Agency.

Joints for concrete cylinder pipe and cement mortar lined and coated steel pipe must be O-ring rubber gasket type with grout “diaper” finish, bolted flange type, “Dresser” or “Victaulic” couplings.

50-24 ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PIPE

Four-inch and 6 inch ABS pipe and fittings must conform to ASTM D2680. Joints must be solvent cemented in accordance with ASTM D2235.

50-25 DUCTILE IRON PIPE (DIP), AND CAST IRON AND DUCTILE IRON FITTINGS

50-25.01 General (Does not Apply to Water Pipe)

Ductile iron pipe must conform to ANSI A21.51 (AWWA C151) for a minimum working pressure of 150 psi unless otherwise specified. Ductile iron casting must conform to and be tested in accordance with ASTM A536. Casting grade for pipe must be 60-42-10. Laying length must be the manufacturer’s standard length, normally 18 feet. Shorter lengths may be used for closures and proper location of special sections.

The interior surface of all ductile iron pipe must be cement-mortar lined and seal coated in conformance with AWWA C104 and the exterior surface must have a bituminous coating of either coal tar or asphalt base, approximately 1 mil thick or as directed by the Agency or specified in the Special Provisions.

Fittings must have push-on, mechanical joints or flanged ends. Four-inch through 12-inch fittings must be ductile iron, fittings larger than 12 inches must be cast iron or ductile iron. All fittings must conform to ANSI 21.10 (AWWA C110), ANSI 21.11 (AWWA C111), or AWWA C153 designed for a working pressure of 250 or 350 psi. Coating and lining requirements must be the same as specified for the pipe.

Joints must be push-on or mechanical type and must conform to ANSI 21.11 (AWWA C111) with rubber gaskets unless otherwise specified. Gasket lubricant must be minimum required plus 10 percent.

50-25.02 NOT USED

50-25.03 Water Pipe, Fittings, and Joint Restraints

50-25.03.A Water Pipe

Pipe must be the regular product of a firm that has successfully manufactured comparable pipe for at least 3 years, and must be certified by the manufacturer.

The material, manufacturing, fabrication, testing, and inspection of pipe must comply with the requirements of AWWA C151, as modified herein. Except for specials required to meet the laying conditions, pipe must be furnished in standard lengths suiting the manufacturer's shop practice and in accordance with Section 51-4.2 of AWWA C151.

Joints must be push-on or mechanical joint, except where flanged spools are called out in the Plans or Standard Drawings. Push-on and mechanical joints must conform to ANSI 21.11 (AWWA C111) with rubber gaskets. Gasket lubricant must be the minimum required plus 10 percent. Flanged spools must comply with the requirements of AWWA C115.

The interior surfaces of all ductile iron pipe must be cement-mortar lined in conformance with AWWA C104. The interior surfaces of all ductile iron pipe must receive the seal coat listed as “optional” in Section 4.12 of AWWA C104. The exterior surface must have a bituminous coating of either coal tar or asphalt base, approximately 1 mil thick, unless the pipe will be installed above ground or partially above ground, in which case the pipe must be furnished without an exterior bituminous coating. The exterior surfaces of pipes installed above ground or partially above ground must be prepared in accordance with SSPC SP-6 (Commercial Blast Cleaning) and coated with 2 coats of red oxide primer.

50-25.03.B Water Fittings

This Section specifies fittings for ductile iron pipe and C900 PVC pipe.

Fittings must be ductile iron. Fittings must have mechanical joint or flanged ends, and must comply with the requirements of the Plans and Standard Drawings, and must comply with the following requirements:

- Valve Connections: The end of a tee, cross, reducer, elbow, or adapter facing an adjacent valve must be flanged and bolted directly to the valve.
- Elbow Connections to Plain-End Pipe: Elbows that are not adjacent to a tee, cross, reducer, or valve must be MJ x MJ.
- Other Connections to Plain-End Pipe: Other connections to plain-end pipe must be made by use of a fitting with an MJ end, or by use of a FL x MJ adapter.
- Reducers: The end of a reducer facing an adjacent tee, cross, elbow, flange adapter, or valve must be flanged and bolted directly to the tee, cross, elbow, flange adapter, and valve.
- Above-Ground Fittings: Above-ground fittings must have flanged ends only.
- Plain-End Fittings: Plain end fittings are not permitted.
- Special Order Fittings: Unless otherwise specified, fittings that are normally available only by special order must not be used.

Fittings must conform to ANSI 21.10 (AWWA C110), ANSI 21.11 (AWWA C111), or AWWA C153 designed for a working pressure of 250 or 350 psi. Coating and lining requirements must be the same as specified for ductile iron pipe in Section 50-25.03.A, “Water Pipe,” of these Specifications. As an alternate, at the Contractor’s option, fittings may be coated with a 6 to 8 mil nominal thickness fusion bonded epoxy conforming to the requirements of ANSI/AWWA C550 and C116/A21.16 and certified to ANSI/NSF Standard 61.

Flange gaskets must be no older than 1 year from the date of manufacture at the time of delivery to the job site and must have been continuously protected from sunlight and ozone degradation up to the time of installation.

All buried metal must be encased with 8 mil polyethylene so that no soil is in contact with metal, in compliance with Section 41-5.03, "Polyethylene Encasement."

50-25.03.C Joint Restraints for Ductile Iron Water Pipe

Joint restraints must be rated for a water working pressure of not less than 350 psi with a minimum of 2:1 safety factor. Joint restraining devices must be listed by Underwriters Laboratories (UL) and approved by Factory Mutual (FM).

Push-On Joints: Restrained push-on joints must be a single gasket push-on type joint meeting applicable requirements of ANSI/AWWA C111/A21.11 and must be bell and spigot joints with U.S. Pipe Field Lok Gaskets, or U.S. Pipe TR Flex joint pipe, or approved equal. Only factory spigot ends of pipes or "greenlined" O.D. pipe must be placed into the gasket restraints; field cut pipe exceeding the O.D. tolerances for spigot ends of ductile iron pipe must not be inserted into gasket type restraints.

Mechanical Joints: Restrained mechanical joints must utilize pipe and pipe fittings conforming to ANSI/AWWA C151/A21.51. A retaining gland must provide restraint with lugs that embed 'teeth' into the pipe. Restrained mechanical joints for ductile iron pipe must be EBAA Megalug 1100, Star Pipe Products StarGrip 3000, or approved equal only.

50-26 POLYVINYL CHLORIDE (PVC) WATER AND DRAINAGE PIPE

50-26.01 NOT USED

50-26.02 PVC Pipe for Drainage

Polyvinyl Chloride Pipe for drainage must conform to one of the following Standards:

Diameter (inches)	Standard Designation
12 – 36	ASTM D2241 SDR 32.5
12 – 15	ASTM D3034 SDR 35
18 – 48 (Solid Wall)	ASTM F679
12 – 36 (Profile Wall)	ASTM F949
18 – 60 (Profile Wall)	ASTM F1803
12	AWWA C900 DR 25
14 - 48	AWWA C905 DR 25
12 - 24	AWWA C909

Substitution (at no extra cost to Agency) of a thicker walled pipe (lower SDR number) is acceptable.

Joints of PVC pipe must consist of either an elastomeric gasket coupling or an integral bell and spigot with an elastomeric gasket. The elastomeric gasket seal must conform to ASTM F679. The assembly of joints must be in accordance with the pipe manufacturer's recommendations and the requirements of ASTM D3212. The quality of material and

installation of all PVC pipe must meet or exceed the requirements of Section 38-10, "Testing of Pipe", of these Specifications.

PVC pipe is not allowed downstream of the last manhole or junction structure to an open channel, detention facility or a daylight condition.

50-26.03 PVC Water Pipe, Fittings, and Joint Restraints

50-26.03.A PVC Water Pipe

Pipe must be the regular product of a firm that has successfully manufactured comparable pipe for at least 3 years, and must be certified by the manufacturer.

The material, manufacturing, testing, and inspection of PVC water pipe must comply with AWWA Standard C900. Pipe must be furnished in minimum standard lengths of 20 feet.

Polyvinyl chloride pipe must have integral wall-thickened bell ends designed for joint assembly using elastomeric gasket seals. The minimum wall thickness of the integral wall-thickened bell, at any point between the ring groove and the pipe barrel, must conform to the DR requirements for the pipe barrel. The minimum wall thickness in the ring-groove and bell-entry sections must equal or exceed the minimum wall thickness of the pipe barrel. The pipe must have a pipe stop indicated on the barrel that will accurately position the pipe end within the joint.

Pipe for potable water must be listed by Underwriters Laboratories (UL).

Pipe Color: Pipe for potable water mains must be blue or white. Pipe for recycled, reclaimed, and non-potable water mains must be purple. Pipe for raw water must be green or white.

50-26.03.B Fittings for PVC Water Pipe

Fittings for C900 PVC water pipe must be ductile iron and must comply with Section 50-25.03.B, "Water Fittings," of these Specifications.

50-26.03.C Joint Restraints for PVC Water Pipe

Restrained joints must be rated for a working pressure of not less than 150 psi with a minimum of 2:1 safety factor. Joint restraining devices must be listed by Underwriters Laboratories (UL) and approved by Factory Mutual (FM).

50-26.03.C.(1) Restrained Push-on Joints

PVC-to-PVC push-on joint restraints are not permitted. Where a push-on joint is required to be restrained, ductile iron pipe must be used.

50-26.03.C.(2) Restrained Mechanical Joints

Restrained mechanical joints for PVC C900 pipe must utilize pipe and fittings having mechanical joint bells conforming to ANSI/AWWA C110/A21.10 or AWWA C153. A retaining gland must provide restraint with lugs that embed 'teeth' into the pipe. Restrained mechanical joints for PVC pipe must be EBAA Megalug 2000PV, or approved equal only.

50-27 CORRUGATED STEEL PIPE (CSP)

Corrugated steel pipe must conform to the material and fabrication methods of the State Specifications, except as modified in these Specifications. Corrugated steel pipe can only be used for driveway culverts and when specified in the Contract. CSP may not be used for mainline drainage facilities. All corrugated steel pipe must be fabricated with helical corrugations and with a continuous lock or weld seam extending from end to end of each length of pipe. Steel must be zinc coated unless otherwise specified. Helically corrugated steel pipe must be fabricated using corrugation profiles as shown in the following table:

TABLE 50-3
CORRUGATION PROFILE

Diameter (Inches)	Normal Pitch (Inches)	Maximum Pitch (Inches)	Minimum Depth (Inches)
8 and 10	1-1/2	1-7/8	1/4
12 through 96	2-2/3	2-3/4	1/2
48 through 120	3	3-1/4	1

Note: The corrugation profile of 2-2/3" x 1/2" must be used for all pipes from twelve-inch (12") through ninety-six-inch (96") diameter, unless otherwise shown on or specified in the Contract.

Lock or welded seams must develop the full strength of the pipe in accordance with the herein referenced Specifications.

Pipe that has been patched will be rejected.

The pipe must have a minimum maintenance-free service life of 50 years in accordance with the methods specified in Sections 854.3 and 854.4 of the latest version of the California Department of Transportation Highway Design Manual.

Corrugated steel products must be shipped, handled, and placed in such a manner as to prevent scaling, bruising, or breaking of the galvanized surface or protective coating.

Couplings for corrugated steel pipe must be of durable gasket design. Couplings must be galvanized steel coupling bands fitted with gaskets fabricated from neoprene or butyl rubber or other durable resilient material approved by the Agency, and assembled to form a sealed joint. The Agency might require that the coupling design be submitted for approval prior to placing, and might require supporting data showing that the coupling is tight and durable. Heat-shrinkable plastic couplings are not permitted.

Corrugated steel pipe fittings must be constructed of the thickness of steel called for in the Contract.

The fittings must conform to the details shown on the Plans or Standard Drawings.

Mitered joints must be welded from the inside where practicable. Welded joints must be as smooth and even as practicable. Welded joints must be repaired according to the State Specifications.

All fabrication must be done in accordance with generally accepted practice for good workmanship. The Contractor must notify the Agency at least 48 hours before delivery of the fittings so the Agency may inspect the fittings at the fabrication plant.

Diameter of fittings depends on the pipe option selected by the Contractor. Upstream diameter of fittings must match upstream pipe diameter; downstream diameter of fittings must match downstream pipe diameter.

If the size of the corrugated pipe fitting is too large to conveniently fabricate or transport in 1 piece, the fitting may be fabricated in 2 or more pieces that will be jointed at the site with couplings. The joint must be located sufficiently distant from a welded joint so that there is no interference between the coupling and the welded joint.

50-28 RIBBED STEEL PIPE (RSP)

Ribbed steel pipe must meet the requirements for corrugated steel pipe in the State Specifications, except as modified in these Specifications. Ribbed steel pipe can only be used for driveway culverts and when specified in the Contract. RSP may not be used for mainline

drainage facilities. Steel must be zinc coated unless otherwise specified. Ribbed steel pipe must be fabricated to one of the following configurations:

a. The pipe must be fabricated to meet the requirements for Type IR pipe as specified in ASTM A760, Sections 4, 7, 8, and 10; or
b. The pipe must consist of pipe with 3/4 by 3/4 inch inside dimensions, outward projecting reinforcing ribs located on approximately 7-1/2 inch centers. The ribs must be located symmetrically between lockseams, which must be on approximately 22-1/2 inch centers. All ribs must be helical and continuous.

Ribbed steel pipe must be fabricated with a continuous helical lock seam in accordance with the State Specifications. Lock seams must develop the full strength of the pipe.

The pipe must be furnished with re-rolled ends to produce a profile for connecting with the approved coupling band.

Any pipe that has been damaged during fabrication, handling, or construction will be rejected or repaired to the satisfaction of the Agency.

Lateral field connections between metal pipes must be welded and any galvanizing damaged by welding must be repaired according to the State Specifications.

The pipe must have a minimum maintenance-free service life of 50 years in accordance with the methods specified in Sections 854.3 and 854.4 of the latest version of the California Department of Transportation Highway Design Manual.

Ribbed steel pipe must be shipped, handled, and laid in such a manner as to prevent bruising, scaling or breaking of the galvanized surface or protective coating.

Coupling bands for ribbed steel pipe must be manufactured from 0.064 inch thick galvanized steel conforming to the State Specifications. The coupling bands must be a hat shaped band, winged band, annular band, or other approved design, and must be fitted with gaskets fabricated from neoprene or butyl rubber or other durable, resilient material approved by the Agency, and assembled in such a manner as to form a sealed joint.

Hat shaped band and winged band couplers must conform to the following table:

TABLE 50-4
BAND COUPLER/RIBBED STEEL PIPE
(Dimensions in Inches)

Pipe Size	Band Type	Band Minimum Thickness	Flange Height	Band Width	Bolt Diameter
24 - 36	Hat	0.064	5/8	2-3/4	1/2
42 - 90	Winged	0.064	5/8	7-1/2	1/2* *(2 required)

Ribbed steel pipe fittings must conform to the requirements for corrugated steel pipe fittings specified in Section 50-27, “Corrugated Steel Pipe (CSP)”, of these Specifications, except that the material must be ribbed steel.

50-29 CORRUGATED ALUMINUM PIPE (CAP)

Corrugated aluminum pipe must conform to the material and fabrication methods of AASHTO M196 and as modified herein. Corrugated aluminum pipe can only be used for driveway culverts and when specified in the Contract. CAP may not be used for mainline drainage facilities. All corrugated aluminum pipe must be fabricated with helical corrugations and with a continuous lock seam extending from end to end of each length of pipe.

Helically corrugated aluminum pipe must be fabricated using corrugation profiles as shown in the following table:

TABLE 50-5
CORRUGATION PROFILE

Diameter (Inches)	Normal Pitch (Inches)	Maximum Pitch (Inches)	Minimum Depth (Inches)
8 and 10	1-1/2	1-7/8	1/4
12 through 96	2-2/3	2-3/4	1/2
48 through 120	3	3-1/4	1

Note: The corrugation profile of 2-2/3" x 1/2" must be used for all pipes from twelve-inch (12") through ninety-six-inch (96") diameter, unless otherwise shown on or specified in the Contract.

Couplings for corrugated aluminum pipe must be of a durable, tight design. Couplings must be aluminum coupling bands fitted with gaskets fabricated from neoprene or butyl rubber, or other durable resilient material approved by the Agency and assembled to form a tight joint. The Agency might require that the coupling design be submitted for approval prior to placing, and might require supporting data showing that the coupling is tight and durable. Heat-shrinkable plastic couplings are not permitted.

Corrugated aluminum pipe fittings must be constructed of the gauge aluminum indicated on the Plans.

The fittings must conform to the details shown on the Plans or Standard Drawings.

All fabrication must be done in accordance with generally accepted practice for good workmanship. The Contractor must notify the Agency at least 48 hours before delivery of the fittings so that the Agency may inspect the fittings at the fabrication plant.

Diameter of the fittings will depend on the pipe option selected by the Contractor. Upstream diameter of the fittings must match upstream pipe diameter; downstream diameter of fittings must match downstream pipe diameter.

If the size of the corrugated pipe fitting is too large to conveniently fabricate or transport in one piece, the fitting may be fabricated in 2 or more parts, which will then be jointed at the site with couplings. The joint must be located sufficiently distant from a welded joint so that there is no interference between the coupling and the welded joint.

50-30 Polypropylene Pipe (PP)

Add "Polypropylene Pipe (PP) must conform to ASTM F2736 for 12-30 inch diameter pipe and ASTM F2764 for greater than 30 inch up to 60 inch diameter pipe. PP joints must be watertight in accordance with ASTM D3212 with gaskets conforming to ASTM F477. Maximum cover exceeding 20 feet must be reviewed and approved on a case-by-case basis by the Agency."

50-31 FIELD ASSEMBLED PLATE CULVERT

Field assembled plate culverts must conform to the State Specifications, and can only be used for driveway culverts or if specified in the Contract. They cannot be used for mainline drainage.

50-32 REINFORCING STEEL

Reinforcing steel must conform to the State Specifications. Unless shown or specified in the Contract, bar reinforcement must be deformed Grade 60 conforming to ASTM A615.

Welded steel wire fabric for concrete reinforcement must conform to ASTM A185. The gauge of the wire and the dimensions of the mesh will be as shown or specified in the Contract.

50-33 CURB DOWEL AND TIE BARS

Dowel and tie bars for curbs must be bar reinforcement conforming to Section 50-32, “Reinforcing Steel”, in this Section of these Specifications. At the Contractor's option, either Grade 60 or Grade 40 may be used.

50-34 STORM DRAIN CASTINGS

Castings for manhole frames and covers, drop inlet frames, gutter drain frames, open-back hoods, or other purposes must be tough gray iron, free from cracks, holes, swells, and cold sheets, and be of workmanlike finish. A "Certificate of Compliance" signed by an authorized agent of the manufacturer or supplier is required and must be provided to the Agency. Each certificate must be accompanied by a copy of test results stating that the material has been sampled, tested, and inspected in accordance with the provisions of ASTM A48, Gray Iron Castings Class 35B.

Test bars must be cast and tested for the first lot of casting and every 4 months thereafter. If production is interrupted for any period longer than 4 months, test bars must be cast and tested from the initial lot after production is resumed and every 4 months thereafter. The first lot is defined as the first castings produced after January 1 every year. The tension tests specified must be performed and the results certified by an independent testing laboratory.

The cast iron must meet the requirements of ASTM A 48, Class 35. The seating faces of manhole covers and frames must be machined as shown on the Standard Drawings or Plans to assure a tight fit and prevent rocking. The name of the manufacturer and the day, month, and year of manufacture must be cast on the manhole cover and frame.

Twenty-four inch diameter manhole frames and covers must conform to Standard Drawings 9-9A, 9-9B and 9-11, unless otherwise shown on the Plans or specified in the Special Provisions.

Thirty-six inch diameter manhole frames and covers must conform to Standard Drawings 9-9B and 10, unless otherwise shown on the Plans or in the Special Provisions.

When required by the Agency, proof-load tests must be performed on manhole frames and covers in accordance with Section 3.3 of Federal Specification A-A-60005.

When locking type covers are specified for storm drain manholes, they must be standard covers drilled and tapped on 120 degree centers and bolted to the frame with 7/16 by 1-1/4 inch brass hex head cap screws.

Exposed edges of castings must be chamfered or rounded, and exposed surfaces must be smooth unless otherwise shown.

Manhole frames and covers must be clearly marked with the country of origin as specified in the Trade of Tariff Act of 1984.

At the Contractor's option, drop inlet frames and open back hoods may be fabricated from steel plate as structural shapes in lieu of cast iron. If the Contractor elects to use fabricated steel drop inlet frames or open back hoods, the Contractor must submit Working Drawings to the Agency for approval prior to fabrication. This submittal requirement does not apply to the drop inlet frame shown on Standard Drawing 9-14.

50-35 WATER PIPE

Water distribution system pipe must be of the material type as shown or specified in the Contract and must conform to these Specifications.

All pipes must be the regular product of a firm that has successfully manufactured comparable pipe for at least 3 years.

All pipe, valves, fittings, connections, and appurtenances must conform to the provisions of these Specifications or the Special Provisions. The Agency maintains a list of approved hydrants and water service material and fittings, and material used in the Work must be limited to those listed. Alternative material items may be added to this list upon review and testing by the Agency.

All testing requirements of the ASTM and AWWA specifications must be conducted by the pipe manufacturer or the manufacturer's representative within the State of California. The resulting tests must be certified by an established reputable firm operating in the testing materials field. The certification must accompany the delivery of the materials to the work site.

Joints must be push-on or mechanical type and must conform to ANSI 21.11 (AWWA C111) or ASTM D3139 with elastomeric gaskets unless otherwise specified in the Contract. Gasket lubricant must be minimum required plus 10 percent.

Ductile iron pipe must conform to the requirements of Section 50-25, "Ductile Iron Pipe (DIP), and Cast Iron Pipe and Ductile Iron Fittings", of these Specifications, unless specified otherwise in the Contract. Ductile iron pipe must be encased in 8-mil polyethylene in accordance with AWWA C105.

Polyvinyl Chloride (PVC) Pipe for water distribution systems must conform to Section 50-26 "Polyvinyl Chloride (PVC) Water and Drainage Pipe", of these Specifications, unless specified otherwise in the Contract.

50-36 WATER PIPE FITTINGS

Fittings for ductile iron and C900 water pipe must be ductile iron and must comply with Section 50-25.03, "Water Fittings", of these Specifications.

50-37 FIRE HYDRANTS

Fire hydrants must comply with Standard Drawings 8-2A and 8-2B. Fire hydrants must be wet barrel type meeting the requirements of AWWA Standards C503. Wet barrel hydrants must have a replaceable flanged spool "breakable" section to be installed 2 inches above the ground. Use solid bolts on "breakable" spool sections.

Delivery classification is two-hose and one-pumper nozzle, having "National Standard Fire Hose Coupling Screw Threads" conforming to NFPA 194 and ANSI B 26. Hose nozzles must be for 2-1/2 inch hose and pumper nozzle must be for 4-1/2 inch hose. The operating nuts and nozzle caps must be National Standard pentagon dimensions, open left (counter clockwise).

Hydrants must be furnished with two layers of factory-applied white coatings. Coatings must be polyurethane epoxy, Alkyd, or epoxy base coat with Acrylic topcoat. Coating thickness must be in accordance with coating manufacturer's requirements. Epoxy topcoats must not be allowed.

Field touch-ups of damage to coating must be done with coating sample provided by the manufacturer, and must be the same type and color as the factory applied coating.

50-38 VALVES

Types of valves to be installed will be specified on the Plans. Unless otherwise shown on the Plans, valves provided must open to the left (counter-clockwise), and be furnished with flange, mechanical or push-on joint. Valves must bear the registered certification mark of the

AWWA, be NSF certified, and be listed by Underwriters Laboratories (UL), and approved by Factory Mutual (FM). All installed valves must operate smoothly with no more than 25 foot-pounds. torque. Valves operating at torques greater than 25 foot-pounds require approval by the Agency. Valves 3" through 8" must be gate valves. Ten-inch valves may be gate or butterfly valves. Valves 12" and larger must be butterfly valves. Valves with an operating nut deeper than 10 feet below grade must be provided with an extension stem with operating nut and centering disk. Gaskets for flanged valve connections must be type SBR elastomer per ANSI/AWWA C111/A21.11 and 1/8-inche thick. Gaskets for mechanical joint connections must be type SBR elastomer per ANSI/AWWA C111/A21.11. Gaskets must not be any older than one year from the date of manufacturer.

50-38.01 Gate Valves

Gate Valves must be ductile iron body, with bronze stem nuts, glands and bushings, non-rising stem (NRS), working water pressure of 200 psi, conforming to the requirements of AWWA Standard C509 or C515. Resilient-seated gate valves must have resilient seats bonded or mechanically attached to the gate. The valve must have a 2-inch square operating nut. Unless otherwise specified or shown on the Plans, valves must be furnished with ends flanged or mechanical joint, using an elastomeric-gasket seal, and must conform in dimensions and style to the pipe and/or fitting requirements. All gate valves must be coated and lined with a fusion bonded epoxy in accordance with AWWA Standard C550. Metal surfaces to be coated or lined must be sandblasted in accordance with SSPC-SP10. Finished or bearing surfaces must not be painted. Exposed machined surfaces must be covered with slush grease or other readily removable protective coating before shipment.

50-38.02 Butterfly Valves

Butterfly valves must meet AWWA Standard C504 Standard for Rubber-Seated Butterfly Valves, Class 150B, Short Body and the requirements of this Section. Butterfly valves must be rated at 150 psi working pressure and provide drip tight shut-off at 150 psi of pressure. Butterfly valves must have flanged ends that meet the requirements of AWWA C207 Class D flanges. Valves must be provided with manual actuators, sized for bi-directional 150B service and must open counter-clockwise.

Butterfly valves must be constructed of the following materials:

Shaft—Type 304 Stainless Steel, ASTM A276
Disc—Cast Iron, ASTM A-126 Class B or ASTM A-48 Class 40
Disc Edge—Type 316 Stainless Steel
Rubber Seat—Neoprene or Buna-N
Body—Cast Iron, ASTM A126, Class B
Lining and Coating—Polyamide epoxy, minimum dry thickness six (6) mils, NSF approved for potable water

Valve body must be a one-piece casting and must include two integral B16.1 Class 125 flat-face flanges, two bearing trunnions and a pad for mounting bonnet with actuator. Raised marking plate must be welded or riveted to the valve body showing the manufacturer's name or mark, the year of valve casting, the valve diameter and the AWWA class rating.

Valves seats must be mechanically retained in or suitably cemented to the valve body so as to adhere without leakage under all conditions of service. Valve seats must be Buna N rubber or Neoprene located on the valve body. For valve sizes 20 inches and smaller, valves must have bonded seats that must withstand a 70 pound pull under ASTM D429 test procedure. Bonded seats must be located in recessed groove in the valve body. Seating edge must be 316 stainless steel metal, ground smooth and polished. Seating edge must be located on the valve disc. Rubber seats must be no older than 1 year from date of manufacturer at the time of delivery to the job site and must be protected from sunlight and ozone degradation prior to installation.

Since the entire valve and actuator will be coated for corrosion resistance, a cast-iron spacer will be provided between the actuator and valve body, which will completely seal off their interconnecting shaft and the main valve shaft stuffing box, if present.

The valve shaft seals must be self-adjusting, Chevron V-Type packing seals. Shaft seals must be designed to allow replacement of the seals without having to remove the valve shaft.

Valve actuator must be of the buried and submersible, permanently lubricated traveling nut type for valves 12 inches and smaller terminating in a water works standard 2 inch square operating nut marked for direction of opening. The manual actuator must be designed to produce the required maximum torque at the operating nut of 150 foot-pounds.

The valve actuator must be fully greased-packed and have stops in the open/close position. The actuator must have a mechanical stop that will withstand an input force of 450 foot-pounds. The mechanism must be inherently self-locking and must hold the valve disc rigidly in position, free of flutter, for any degree of valve opening.

Machining and fitting of each part must be held to a close tolerance to minimize backlash and lost motion. The mechanism must be totally enclosed in a rugged lubricant tight and watertight case. The actuator must have a bleed-off connection to protect against leakage past the shaft packing from entering the actuator housing. A gasketed removable cover plate must be provided for maintenance purposes. All moving parts must work completely submerged in a petroleum based grease. The case must be filled with the proper lubricant and sealed before shipment.

The operating screw rod must be high strength steel. External bolts and nuts on the actuator housing must be cadmium plated high strength steel.

Butterfly valves must be coated and lined with a two-part polyamide epoxy in accordance with AWWA Standard C550. Metal surfaces to be coated or lined must be sandblasted in accordance with SSPC-SP10. Finished or bearing surfaces must not be painted. Exposed machined surfaces must be covered with slush grease or other readily removable protective coating before shipment.

50-38.03 Air Release/Vacuum Valves

Air valves must be air release/vacuum type valves. The body and cover of the valve must be cast iron unless otherwise approved by the Agency. All interior parts must be stainless steel. Air release/vacuum valves must be fully automatic and requiring no regular maintenance.

Air release/vacuum valves must be capable of automatically releasing accumulated air from a water system while that system is in operation and under pressure. Also, the valve must automatically allow air to reenter the pipeline when the internal pressure of the pipeline becomes negative due to draining of the pipeline, a power outage, pipeline break, etc.

Air release/vacuum valves must be set plumb, and properly fitted to the high points on the water main. Air release/vacuum valves will be required at other locations on long stretches of pipe as shown on the plans. A vault with adequate venting and drainage must be provided as required. The air release/vacuum valve and appurtenances must be of material listed and must be installed as shown in Standard Details 8-14A or 8-14B.

50-39 VALVE BOXES, COVERS, DROP CAPS, AND SERVICE VALVE BOXES

Valve boxes for traffic service must be precast concrete, and must have a cast iron face and a cast iron traffic lid. Valve boxes out of traffic areas must be precast concrete, with a cast iron lid. Covers must be marked "WATER" and must have a loose fit in the box. Valve box risers must be PVC C900 (blue or white for potable water mains). Materials must be provided and installed in accordance with Standard Drawing 8-5.

50-40 WATER SERVICE CONNECTION MATERIALS

50-40.01 General

Water services and meters must conform to Standard Drawings 8-1 and 8-6A, 8-6B or 8-6C, depending on size and type of service. Residential water service lines must be 1-1/2 inches in diameter with a 1 inch water meter unless otherwise specified.

Water service pipe material up to and including 2 inches in diameter must be polyethylene pressure pipe meeting standards of AWWA C901, or copper water tubing, "Type K", soft tempered, meeting ASTM B88 and AWWA C800. Polyethylene pipe must be high density, ultra-high molecular weight and meet all applicable requirements, including testing, of Type III, Grade P33 or P34, Class C, designated as PE 3408 in ASTM D2239 and D1248. The polyethylene pipe must have a minimum pressure rating of 200 psi, must be homogeneous throughout and free of cracks, holes, foreign inclusions or other defects, must be uniform in color, opacity, density and other physical properties. Polyethylene pipe must be supplied with markings, at intervals of not more than 5 feet, indicating nominal pipe size, designation, pressure class, and manufacturer's name or trademark. Polyethylene must be manufactured to iron pipe size (IPS).

Material for service lines 3 inches in diameter or larger must be must be “Type K” copper or ductile iron. Material for service lines 4 inches in diameter and larger must be ductile iron between the water main and the meter. Hot tap materials for services connections 3 inches and larger must comply with Section 41.14, “Connection to Existing Water Mains”, of these Specifications. All buried metal must be wrapped in 8 mil polyethylene so that no soil is in contact with metal in compliance with Section 41-5.03, “Polyethylene Encasement”, of these Specifications.

The Agency maintains a listing of approved water service connection fittings that establish a standard of material quality. Only fittings from the list are allowed to be used.

50-40.02 Water Meters and Meter Boxes

Water meters, boxes, and appurtenances must comply with Standard Drawings 8-6A, 8-6B, and 8-6C. The size of the meter must be as specified in the Plans. If not specified in the Plans, the size of the meter must be the same size as the service line at the connection to the main.

50-41 JOINT MATERIALS FOR MANHOLES

Joint materials for precast reinforced concrete manhole sections must conform to one of the following:

1. Mortar proportioned as 1 cubic foot of portland cement to 2 cubic feet of concrete sand. All mortar must be used within 30 minutes after the mixing water has been added.
2. Preformed plastic sealing compound must conform to Type 1 - Rope Form, one and 1-1/2-inch diameter, Federal Specification SS-S-210A.
3. Pre-Extruded concrete joint sealant per ASTM C-990 (RAM-NEK (K.T. Snyder), QUIKSEAL (Associated Concrete Products), or equal).
4. Rubber Gaskets, ASTM C443

50-42 FENCING - CHAIN LINK

Chain link fence and gate materials must conform to the State Specifications, and these Specifications.

The carbon content of steel posts must not exceed 0.82 percent.

Chain link fence fabric must meet the requirements of zinc-coated steel chain link fence fabric, ASTM A392 with Class 1 zinc coating. Unless otherwise shown on the Plans or specified

in the Special Provisions, the fabric must be a 2-inch mesh of 9 gauge wire, with a minimum breaking strength of 1,290 pounds.

Vinyl coated chain link fence fabric, when shown on the Plans or specified in the Special Provisions, must be black polyvinyl chloride coated steel link fabric and fittings. Polyvinyl chloride must be applied by the thermal extrusion process.

Slats must be as specified in the Special Provisions.

Base material for the manufacture of steel pipe used for posts, braces, rails and gate frames must be commercial quality, or better, weldable steel, conforming to the specifications of ASTM A120. At the option of the Contractor, and upon approval of the Agency; high-strength tubing fabricated by cold rolling and radio frequency welding from steel conforming to ASTM A446, Grade D, may be used provided that the product of the yield strength and the section modules is not less than that of pipe conforming to ASTM A120.

The base material for the manufacture of other steel sections used for posts and braces must conform to ASTM A572, Grade 45, with a minimum yield strength of 40,000 psi. All posts, braces, rails and gate frames must be hot dipped galvanized in accordance with ASTM A123, or ASTM A525, Coating Designation G235 plus chromate conversion coating and 0.4 mils minimum thickness finish coat of clear, cross-linked acrylic.

Posts and rails for vinyl coated chain link fence must be hot dipped galvanized and covered with 2 coats of black metal paint applied over a metal primer.

Posts and rails must be as specified in the following Table 50-7, unless otherwise shown or specified in the Contract. The Contractor has the option of section types to be used with the condition that the option exercised must be uniform throughout the Work.

TABLE 50-7
CHAIN LINK FENCING – POSTS AND RAILS

Fence Member		Section Type	Dimension O.D.	Minimum Weight (Pounds Per Linear Foot)
Line Posts		C-Section	1.875"	2.15
		Sch. 40 pipe	2.375"	3.65
		Hi-Strength tubing	2.375"	3.12
Terminal, Corner & Latch Posts		Sch. 40 pipe'	2.875"	5.79
		Hi-Strength tubing	2.875"	4.64
Horizontal & Diagonal Braces, Top Rails		C-Section	1.825"	1.35
		Sch. 40 pipe	1.660"	2.27
		Hi-Strength tubing	1.660"	1.82
Gate Frames		Sch. 40 pipe	2.375"	3.65
		Hi-Strength tubing	2.375"	3.12
Gate Posts	Gate width up through 6’	Sch. 40 pipe	2.875"	5.79
	Gate width over 6’ through 12’	Sch. 40 pipe	4.500"	10.79
	Gate width over 12’ through 18’	Sch. 40 pipe	5.563"	14.62
	Gate width over 18’ to 24’ max	Sch. 40 pipe	6.625"	18.97

Fittings must be hot-dip galvanized malleable iron, wrought iron, or pressed steel.

A Certificate of Compliance must be furnished to the Agency prior to the installation of any chain link fencing, gates, or components.

50-43 LANDSCAPING MATERIALS

50-43.01 Topsoil

Topsoil must be sandy loam of an even texture and must pass through a 1/2-inch screen.

The topsoil must be reasonably free refuse, roots, heavy or stiff clay, stones larger than one-inch in diameter, coarse sand, noxious weed seeds, sticks, litter, insects, animal life, and other deleterious substances or any toxic substances that may be detrimental to the growth of vegetation. Topsoil must be capable of sustaining healthy plant life.

Soil sterilizers or weed killers must permit growth of nursery stock planted 3 weeks after application. Compounds containing cyanide or arsenic are not be allowed.

The Contractor must provide a soils report to the Agency for approval prior to placement of topsoil. The report must indicate the source and location of the topsoil, and the date the sample or samples were obtained and analyzed. The soils analysis report must be current and conducted no later than two months prior to placement of topsoil, unless otherwise approved by the Engineer. All topsoil imported must be uniform in nature and obtained from a single source, unless otherwise approved by the Agency. Topsoil must be in conformance with these Specifications and the following:

SOIL ELEMENTS	ACCEPTABLE RANGE
pH	6.6 - 8.0
CEC (Cation Exchange Capacity)	12.00 - 35.00 meg/100g
SAR (Sodium Absorption Ratio)	less than 5.00
ESP (Exchangeable Sodium Percentage)	less than 5.00
EC (Electronic Conductivity)	Less than 2.0 mmho/cm
SP (Saturation Percentage)	less than 45%
Percentage Organic Matter	2% - 5%

Soils analysis must include measurements in parts per million (ppm) of the following trace elements: nitrate, phosphorus, potassium, sulfur, chloride, carbonates, sodium, calcium magnesium, boron, copper, iron, manganese, and zinc. Topsoil found with trace element amounts excessive or at levels detrimental to plant health must be not be used.

Topsoil analysis and amendment recommendations must be performed by an approved agronomic soils lab. Soil sampling must be conducted in accordance with laboratory protocol, including industry practices regarding adequate sampling depth and quantity.

Topsoil must be delivered reasonably dry and in a workable condition.

Sandy loam of low fertility, even though mixed with leaf mold, manure, or other fertilizers, is not acceptable unless prior approval has been granted by the Agency. The Contractor must attach soil and plant lab reports for the Agency's approval.

50-43.02 Commercial Fertilizer

Commercial fertilizer must conform to the requirements of the California Food and Agricultural Code.

Plant tablets or packets for planting trees and shrubs must be non-burning, controlled slow-

release fertilizer, weighing between 5 and 21 grams of the following guaranteed analysis range:

Total Nitrogen	16.0 to 20.0 percent
Phosphoric Acid, available	8.0 to 10.0 percent
Potash, soluble	5.0 to 8.0 percent
other minor micronutrients	as approved by Agency

Quantities of planting tablets or packets per plant must be based on the manufacturer's recommendation unless otherwise specified in the Special Provisions.

Fertilizer used for planting maintenance must have a minimum guaranteed chemical analysis of 21 percent nitrogen, 0 percent phosphoric acid, and 0 percent soluble potash.

Fertilizer for turf installation, unless otherwise specified, must have a minimum guaranteed chemical analysis of 21 percent nitrogen, 10 percent phosphoric acid and 10 percent soluble potash.

Fertilizer for tree, turf, and shrub plantings must be in granular or pellet form, must conform to the standards of the Association of Official Agricultural Chemists, and must provide the minimum percentage of available nutrients specified in the Plans or Special Provisions. A liquid fertilizer may be used if specified in the Special Provisions.

Fertilizer used for erosion control work must be in a form that will readily disperse into the slurry, and must have a minimum guaranteed chemical analysis of 6 percent nitrogen, 20 percent phosphoric acid, and 20 percent soluble potash.

50-43.03 Soil Amendments

Soil amendments must be a ground wood product such as bark, redwood fortified with nitrogen and treated to absorb water quickly, or a relatively dry organic compost derived from sewage sludge. Soil amendments must be friable and free of weed seed, dust and other objectionable materials. Soil amendments must pass a 1-inch sieve and must comply with the requirements in the California Food and Agricultural Code.

50-43.04 Iron Sulfate

Iron sulfate must be ferrous sulfate in pellet or granular form containing at least 18.5 percent iron expressed as metallic iron. Iron sulfate must conform to the requirements of the California Food and Agricultural Code.

50-43.05 Pre-emergent Herbicide

Selective pre-emergent herbicide must be in granular form and applied in the manner recommended by the manufacturer. Pre-emergent must be appropriate type for the control of annual grasses and broadleaf weeds in shrub, ground cover, and turf areas. Pre-emergent must conform to the requirements of the California Food and Agricultural Code.

50-43.06 Straw

Straw must be derived from wheat, rice, or barley. The Contractor must furnish to the Agency evidence that clearance has been obtained from the Sacramento County Agricultural Commissioner, as required by law, before straw obtained from outside the County is delivered to the site of the Work. Straw that has been used for stable bedding must not be used.

50-43.07 Fiber

Fiber used for hydroseeding must be wood fiber, or a combination of wood and cellulose fiber. Cellulose fiber, if blended with wood fiber, must not exceed 50% of the fiber mix. Fiber for bonded fiber matrix must be 100 percent wood fiber. Use of an alternate fiber material must be approved by the Agency.

Wood fiber must be a long strand, whole wood fiber thermo-mechanically processed from clean whole wood chips. Cellulose fiber must be made from natural or recycled pulp fiber, such as wood chips, sawdust, newsprint, chipboard, corrugated cardboard, or a combination of these

materials. Wood and cellulose fiber must be free of synthetic or plastic materials.

Fiber must contain three-quarter inch (3/4") strands for at least 25 percent by total volume; have at least 40 percent retained when passed through a no.25 sieve; contain less than 250 parts per million (ppm) of boron; and less than seven percent (7%) ash, as tested under Technical Association of the Pulp and Paper Industry (TAPPI Standard T413). Fiber must disperse uniformly into slurry when mixed with water. Fiber must be colored to contrast with the area on which the fiber is to be applied, must not stain concrete or painted surfaces, and must be biodegradable, nontoxic, and free from copper, mercury and arsenic. The slurry, when hydraulically applied to the ground, must form an absorptive mat of mulch uniformly impregnated with seed and other ingredients. No materials that inhibit growth or germination must be present in the mixture. Material must be nontoxic to plants and animal life.

50-43.08 Mulch

Unless otherwise specified in the Special Provisions or shown on the Plans, mulch must consist of wood chips, tree bark, or shredded bark, or any combination thereof, at the Contractor's option. Shredded redwood bark ("gorilla hair") or materials deemed highly flammable or a potential fire hazard by the Agency must not be used.

Wood chips must be manufactured from clean wood. The must be between 1/2 and 3 inches long, at least 3/8 inch wide, and 1/16 inch thick. At least 85 percent, by volume, of the chips must conform to the sizes specified.

Tree bark must be between 1/2 and 1-1/2 inches and must be free of salt and foreign materials such as clods, coarse objects, sticks, rocks, weeds, or weed seeds.

Shredded bark must be a mixture of shredded bark and wood; must measure between 1/8 and 1-1/2 inches thick and 1 to 8 inches long; and must be free of salt and deleterious materials such as clods, coarse objects, and rocks. At least 75 percent, by volume, of shredded bark must conform to the sizes specified.

50-43.09 Planting Mix

Planting mix for backfilling planting holes must consist of 2 parts of soil excavated from the planting holes free of rocks over 1/2 inch in diameter and 1 part soil amendment, thoroughly mixed.

50-43.10 Seed

Seed must 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 or grass seed content for each kind of seed furnished and, in the case of a mixture, the proportions of each kind of seed.

The Contractor must furnish the Agency duplicate signed copies of a certificate of compliance from the vendor certifying that each lot of seed has been tested by a recognized seed testing laboratory within 6 months of date of delivery to the job site. The testing must 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 must include the name and address of the laboratory, the date of the test, the lot number for each kind of seed, and results of tests by name, percentages of purity and of germination, and percentage of wildflower or grass content for each kind of seed furnished and, in case of a mixture, the proportions of each kind of seed.

Seed with less than the specified purity or germination can be used under the following conditions:

a. The application rate for such seed must be increased to compensate for the less than specified purity or germination.
b. Prior to using such seed, the Contractor must submit to the Agency the purity and germination percentages, and the proposed increased application rate for such seed.

c. No such seed must be used before the Agency has approved, in writing, the use of such seed and the increased application rate.
d. The additional seed required because of the increased application rate must be furnished and applied at the Contractor's expense.

Seed specified without a purity or germination requirement must be labeled to include the name, date (month and year) collected and name and address of the supplier. Seed must be, at the time of sowing, from the previous or current year's harvest.

Seeds that become wet, moldy, or otherwise damaged in transit or in storage will be subject to retest at the discretion of the Agency.

50-43.10.A 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 must be as shown on the Plans or specified in the Special Provisions.

Lawn seed must be true to species or variety for the type as specified and must conform to the Agricultural Code of the State of California and the standards of the Association of Official Seed Analysts.

50-43.10.B Wildflower Seed for Hydroseeding

Wildflower seed type to be used for hydroseeding must be as indicated in the Plans or Special Provisions.

Seed must be labeled in accordance with the California Department of Agriculture, State Seed Law requirements, effective on the date of invitation for bids. The seed must be supplied in unopened containers from a commercial seed dealer and may either be mixed or in separate containers for each lot. Tags must be given to the Agency. Final acceptance will not be considered unless all tags are produced and verified.

50-43.11 Tackifier

Tackifier must be a concentrated liquid chemical stabilizing emulsion that forms a plastic film upon drying and allows water and air to penetrate. The film must be nonflammable and must have an effective life of at least one year.

Stabilizing emulsion must be nontoxic to plant and animal life and non-staining to concrete and painted surfaces. In the cured state, the tackifier shmustall not be re-emulsifiable. Tackifier must be miscible with water at the time of mixing and application.

50-43.12 Lumber

Lumber must be construction grade cedar, pressure treated Douglas fir, or heart redwood, rough cut, from sound timber. It must be straight and free from loose or unsound knots, shakes in excess of 1/3 the thickness of the lumber, splits longer than the thickness of the lumber, or other defect that would render the lumber unfit structurally for the purpose intended. Knots in lumber must be sound, tight, well spaced, and must not exceed 2 inches on any face. Sweep must not exceed 0.08 foot in 6 feet.

50-43.13 Tree Stakes and Ties

Stakes for support of trees must be lodge-pole pine, unless otherwise specified in the Special Provisions. Stakes for trees up to 15 gallon must be 2-inch diameter by 10 feet long. Stakes for 24-inch box trees or larger must be 2-inch diameter by 12 long. Tree ties must be black rubber cinch ties, unless otherwise specified in the Special Provisions.

50-43.14 Root Control Barrier

Root control barrier must be an injection molded or extruded modular component made of high density polypropylene or polyethylene plastic with ultraviolet inhibitors. Panels must have a minimum thickness of 0.080 inch (2.032 mm). Each panel must have molded vertical ribs (4

minimum) and locking strips or integral male/female sliding locks. Locking strips or integral self slide locks must have a close tolerance to restrict any slippage between panels. Vertical root deflecting ribs or channels must be 1/2 to 3/4 inch high on one side, perpendicular to the panel, and not more than 8 inches apart. Panels must be 24 by 24 inches unless otherwise specified in the Contract.

50-43.15 Plants

Plants must be of the variety and size shown on the Plans or specified in the Special Provisions and must conform to the requirements of these Specifications.

Plants must be vigorous, first class representations of the species and cultivars specified, and must conform to State and local laws governing the sale and transportation of plant materials. Only plants of the size and type shown on the Plans or designated in these Specifications or the Special Provisions with normal plant and root structures will be accepted.

All plants must be nursery grown in containers, unless otherwise shown on the Plans or designated in the Special Provisions, and must have been grown in the specified containers for at least 6 months. They must have straight, single trunks, unless otherwise specified on the Plans. No pruning must be undertaken before planting. Plants specified as multi-trunk must have at least 3 main leaders from the base.

Plants that have encircling roots (not rootbound) must have root balls lightly slashed on a minimum of 3 sides to stop encircling root growth. Plants must have well developed root systems and not be rootbound or show sunscald, injuries, abrasions or other objectionable disfigurements. Plants must be free of disease, insects, pests, eggs, or larvae. Tree trunks must be sturdy and well "hardened off". Plants not meeting these specifications must be rejected.

Plants must be of the species, variety, size, age, and condition as specified herein or as shown on the Plans or described in the Special Provisions. Substitution of plants or sizes for those listed on the Plans are not allowed except with prior written consent of the Agency. Plants delivered to the work site that are found to be not true to name or unsuitable in growth or conditions must be removed from the site and replaced with acceptable plants. In the event tags are not present, and/or tags and load slip do not match, Contractor must provide written confirmation of species from the supplying nursery.

Plants that are not thoroughly wet throughout the root ball must not be transported to the planting area. Any plant that, in the opinion of the Agency, has a damaged root ball or is dry or in a wilted condition when delivered to the planting area will be rejected and must be replaced by the Contractor at the Contractor's expense. Trucks used for transporting plants must be equipped with covers to protect plants from windburn.

One plant of each bundle or lot must 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 must meet the specifications of Federal, State, and County laws requiring inspection for plant disease and insect infestations. Inspection certifications required by law must accompany each shipment, invoice, or order for stock, and when the plants arrive at the site of the Work, the certificate of inspection must be provided to the Agency.

Inspection of plant material for acceptance will be made by the Agency at the project site at time of delivery. Plant material must be approved by the Landscape Architect prior to installation. Rejected plant material will be marked as such and must be removed from the project site immediately.

The Contractor must notify the Agency at least 2 Working Days prior to the delivery of each shipment of plant materials. Plant materials must be protected and maintained in good condition. Bare root and balled materials must be watered regularly and placed in a cool area protected from sun and wind.

Plants must 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.

50-43.15.A Turf

Grass sod must be well established mown lawn grass turf and must be free of weeds and other harmful or deleterious matter.

At least 80 percent of the grass plants in the cut sod must be composed of the species or varieties specified in the Special Provisions.

Grass sod must be grown, inspected, and shipped in accordance with the provisions of the Agricultural Code of the State of California.

Sod must be machine stripped or cut of a uniform soil thickness of 1 inch plus-or-minus 1/4-inch. The measurement for thickness excludes top growth and thatch and must be determined at the time of cutting in the field.

50-43.15.B Trees

Trees are classified by genus, species, and variety as well as common name. The tree varieties to be planted must be as shown on the Plans or described in the Special Provisions.

Trees will be specified by container size in the Contract, and must meet the height and caliper of trunk requirements indicated in Table 50-8 or they will be rejected. For shade trees of recognized slower growth, as identified by the Agency, the height and caliper must be not less than 2/3 the height and caliper indicated in Table 50-8.

TABLE 50-8
TREE CALIPER-HEIGHT RATIO

Container Size (gallons)	Caliper of Trunk (inches)	Average Height Range (feet)
5	3/8 to 1/2	4 to 5
5	1/2 to 5/8	5 to 6
7	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
15	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

In size grading of container grown trees, caliper measurements will take precedence over height measurement, unless otherwise specified in the Special Provisions.

Caliper measurement must be taken 5 inches above soil level. If the tree is budded or grafted to a root system, the measurement must be taken 2 inches above the bud or graft union.

Trees to be planted as street trees must be free of branches for approximately the lower half of their height.

Trees must have reasonably straight stems and must be well branched and symmetrical in accordance with their natural habits of growth. The branch system must be free from dead or dry wood or broken terminal growth.

If possible, container grown trees must be capable of standing upright without staking and must 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 must not be rootbound or show evidence of girdling or kinked root systems. Trees must not exhibit co-dominant trunks or branching with included bark. Trees must not be severely topped or headed. Trees must not have surface roots larger than 1/4-inch diameter. Trees must not exhibit evidence of sunscald or pest infestation. Upon inspection, trees not meeting these requirements will be rejected.

The container must be sufficiently rigid to protect the root mass during shipping.

At least one tree of each species or variety delivered to the work site must be identified by scientific name and size on a legible waterproof label securely attached to the tree.

Trees are subject to inspection by the Agency at any time during the Project—at the place of growth, upon delivery, or during planting operations. Such inspections are not final or conditional acceptance.

The Contractor must establish the necessary quality control and inspection practice to assure compliance with these specifications. The Contractor must furnish a California Nursery Stock Certificate for each shipment of trees.

50-43.16 Water

Water must be of such quality that it will promote germination of seeds and growth of plants.

50-43.17 Irrigation Pipe

Pipe and fittings for irrigation systems must be as specified in these Specifications and the Special Provisions.

Unless otherwise shown on the Plans, risers and threaded nipples for irrigation systems must be Schedule 80, PVC 1120 or PVC 1220, or PVC pipe conforming to the requirements of ASTM D1785.

50-43.17.A Steel Pipe

For installation of backflow preventers, steel pipe and couplings and wrought iron couplings must conform to AWWA standard C200 and the specifications of ASTM A53, standard weight, galvanized, except that the weight of zinc coating must be not less than 90 percent of the weight specified in said ASTM Designation. Fittings, except couplings, must be galvanized malleable iron, banded and threaded, conforming to ANSI Standard: B16.3, 150 pound class.

Steel pipe below grade must be wrapped with 6 mil plastic tape.

50-43.17.B Plastic Pipe

Plastic pipe for irrigation systems will be shown on the Plans as main line and lateral line (non-pressure).

Solvent cement and primer for PVC plastic pipe and fittings must be of commercial quality specifically manufactured for use with rigid PVC plastic pipe and fittings. The solvent cement and primer used must be made by the same manufacturer. The color of the primer must contrast with the color of the pipe and fittings.

The pipe must be furnished in minimum standard lengths of 20 feet.

Plastic pipe must be continuously and permanently marked with the following information—manufacturer's name, kind of pipe, material, size, NSF approved, schedule or type, and the date of extrusion. The extrusion date must agree with the manufacturer’s records, covering quality control tests, raw material batch numbers, and any other information deemed necessary by the manufacturer. The records must be held by the manufacturer for 2 years.

50-43.17.B.(1) Main Line

Main line must be PVC of the types and classifications shown on the plans or specified in the Special Provisions. Main line pipe must be approved by the National Sanitation Foundation,

and must conform to the requirements of either ASTM D2241 or D2672, except that main line with a bell socket formed as an integral part of the pipe for use with rubber ring gaskets must conform to the requirements of ASTM D2241. The belled portion of the pipe must conform to the requirements of ASTM D3139 (except for the dimensional ratio), must be formed to maintain uniformity in alignment and roundness and must be free of irregularities and defects.

The wall thickness of the bell must not be less than the specified minimum wall thickness of the pipe.

The wall thickness of the bell end of the pipe may exceed maximum allowable wall thickness of the pipe for a length not to exceed 24 inches from the end of the pipe.

Main line and fittings on the pressure side of control valves that are 2 inches or larger in diameter must be either the rubber ring gasket type or the solvent cemented type, except that all pipe and fittings installed in conduits or sleeves must be the solvent cemented type.

Threaded fittings and fittings to be solvent cemented to the main line must be injection molded PVC, Schedule 40. Fittings equipped with rubber ring gaskets for then main line must be either injection molded PVC plastic pipe fittings or machined pipe stock fittings.

50-43.17.B.(2) Lateral Lines

Lateral lines must be PVC of the types and classifications specified in the Contract. Lateral lines must be approved by the National Sanitation Foundation, and must conform to the requirements of ASTM D2241. PVC pipe must be solvent weld, minimum Class 200, and must be manufactured of Type 1, Grade I or II, 2000 psi design stress compound designated as PVC 1120 or 1220, and must conform to ASTM D1784 for rigid PVC compounds.

Fittings must be molded fittings manufactured of the same material as the pipe and must be suitable for either solvent weld or threaded connections. Solvent weld fittings must be of a pressure rating equal to or greater than that of the pipe.

50-43.18 Subsurface Dripperline

Subsurface dripperline must be 1/2 inch low density linear polyethylene tubing, with internal pressure compensating self-cleaning integral drip emitters.

The dripperline emitter spacing and discharge rates must be as specified in the Contract.

50-43.19 Irrigation Sleeve Conduit

Irrigation sleeve conduit must be Schedule 40 PVC pipe.

50-43.20 Sprinklers and Emitters

Sprinklers and emitters must be the type and model as specified in the Contract.

50-43.21 Automatic Irrigation Controllers

Automatic irrigation controllers must be the type and model specified in the Contract. Automatic irrigation controllers must be fully automatic, with solid state electronic components. The controller must be rated for 117 volt, 60 cycle AC input and 26.5 volt, 2.2 amp output for continuous operation of 24 volt valves, with 14-day programming capability.

The controller must have the following standard features: an electrical circuit to operate a master valve, a reset circuit breaker to protect the controller from damage due to excessive voltage surges, and a master "on-off" switch for turning controller "off" during rainy weather while allowing day and hour clocks to continue operation.

Irrigation controllers must be housed in pedestal or wall-mounted enclosures as specified in the Contract.

Irrigation controllers must conform to NEC Class 2 requirements. The controller output must be less than 110 volt-amps to qualify for direct burial of output wires.

The irrigation controller enclosure must be constructed of stainless steel and must be a minimum of 36 inches high by 24 inches wide and deep enough to house all required components. The enclosure must have a vented door and/or sides and must be lockable. The

enclosure must be mounted on a 6-inch thick concrete pad with minimum dimensions indicated on the plans or the Special Provisions.

50-43.22 Quick Coupling Valves

Quick coupling valves must be of brass or bronze construction with 1-inch IPS female pipe connections. The valve body must be of two-piece construction, consisting of an upper and a lower piece body. The upper valve body must be easily removable for replacement.

Quick coupling valves must have a durable locking rubber or vinyl cover, yellow in color for potable systems and purple in color for non-potable or reclaimed water systems. Covers must be marked with "Do Not Drink" warnings.

All quick coupling valve keys must be from the same manufacturer as the quick coupling valve, and must be the proper size to fit the valves. Valve key must be of brass or bronze construction with a replaceable stainless steel lug.

50-43.23 Control Valves

Control valves must be the electric remote control, battery-operated remote control or manual type straight or angle pattern globe valves, and must be of glass filled nylon, plastic, brass, bronze, or cast iron construction as specified in the Contract. All metal parts of glass filled nylon valves must be stainless steel or brass. Valves must be of the same size as the pipeline that the valves serve, unless otherwise specified in the Contract. Control valves must be capable of withstanding a cold water working pressure of 150 psi.

Automatic valves must have a manual flow control adjustment with shut-off provisions. The valves must also have an external “bleed” to enable manual operation. Automatic actuation must be by means of an encapsulated type solenoid with a minimum rating of 24 volts, 60 cycle and 2 to 5 watts.

50-43.24 Master Control Valve/Flow Sensor Assembly

The master control valve/flow sensor assembly must combine a turbine type (vertical impeller) water meter and a diaphragm actuated solenoid controlled valve mounted in a single globe style valve body. The master control valve must be an electric normally open valve with a 24V solenoid. The main valve must fully open and close drip tight in response to an electrical signal. The meter must power a gear mechanism that activates a reed switch that transmits a pulse at a pre-determined amount of flow. Pulse transmission must be 1 pulse per 10 gallons through the master valve and flow sensor unit. The unit should include integral flow guides to eliminate the need for straight pipe allowances before and after the valve.

Maintenance operations on the valve and meter must be feasible without removing the valve body from the line.

50-43.25 Valve Boxes

Valve boxes and valve box lids must be precast portland cement concrete when installed in concrete or other paving. Valve boxes and valve box lids must be reinforced green plastic when installed in turf or planter areas. Concrete valve box lids must be marked "IRRIGATION" in cast-in letters not less than 1 inch high.

Valve boxes for control valves must be at least 17 by 11-3/4 inches by 12 inches deep with 3 by 4 inch knock outs or as indicated in the Special Provisions.

50-43.26 Backflow Preventers

Backflow preventers must be reduced-pressure type as approved by the Sacramento County Environmental Health Division.

Backflow preventers must have a bronze main valve body and relief valve body. Backflow preventers must be factory-assembled and must consist of two independently operating, center-guided, spring-loaded, “Y” pattern check valves, one hydraulically dependent differential relief

valve, 2 shut-off valves and 4 test cocks. Pressure loss must not exceed 10 psi at 20 gallons per minute.

Backflow preventers must be the same size as the service line in which they are installed, unless otherwise specified in the Contract.

Insulated protection blankets must be provided for each device. Blankets must be the appropriate size to fit the backflow prevention assembly specified. Blanket fabric must be heavy-duty resin or vinyl coated 100 percent polyester plain weave. Fabric must be water, mildew and flame resistant. Insulation must be a layer of Radiant Barrier Foil (BF) consisting of a layer of polyethylene bubbles bonded to and sandwiched between two industrial strength foil sheets with a minimum R-value of R-9. This material is impervious to moisture and is unsuitable for rodent nesting material. Blanket must have a water repellent lining of nylon fabric to resist tearing from backflow parts. Blanket must be machine stitched with metal grommet reinforcement for installation of an individual lock. Blanket must be forest green in color and have a manufacturer's five-year warranty.

50-43.27 Concrete

Unless otherwise specified in the Special Provisions, concrete for irrigation facilities must be Class “B” concrete as specified in Section 50-5, “Portland Cement Concrete”, in this Section of these Specifications. Hand mixing of the concrete will be permitted.

50-43.28 Filter Assembly Units

Filter assembly units must be as specified in the Special Provisions.

50-43.29 IPS Flexible PVC Hose

IPS flexible PVC hose must be nonrigid polyvinyl chloride (nonrigid PVC) hose conforming to the specifications of ASTM D2287, Cell-type 66404006.

The hose must provide leak-free, non-separating connections suitable for the purpose intended when connected to the fittings specified herein. Flexible hose must be algae resistant.

Fittings for flexible hose must be injection molded PVC, Schedule 40, conforming to the specifications of ASTM D2466. Fittings must be solvent cemented type.

Solvent cement and primer for flexible hose and fittings must be of commercial quality as specified for use with rigid PVC pipe and plastic pipe fittings.

50-43.30 Gate Valves

Gate valves must be either flanged, threaded or ring type, iron or bronze body, bronze trimmed valves with rising (internally threaded) or non-rising stem, and must withstand a cold water working pressure of 150 psi. Gate valves must be of the same size as the pipeline that the valves serve, unless otherwise shown on the Plans.

Gate valves 3 inches and smaller must be bronze or brass. Gate valves 4 inches and larger must be cast iron.

Ball valves at control valve assemblies must be plastic.

Valve boxes for gate valves must be green heavy-duty 10 inch diameter with a bolt down lid.

50-43.31 Air Vacuum Relief Valve

Air vacuum relief valve must be non-corrosive plastic with 1/2 inch MPT threads. Maximum operating pressure of air vacuum relief valve must be 140 psi. Valve must eliminate negative pressure and vacuum within subsurface dripperline systems that may draw contaminants into the system.

50-43.32 Flush Valve Assembly

Flush valve must be non-corrosive plastic with 1/2 inch MPT threads. Maximum operating pressure of flush valve at ends of dripperline must be 57 psi. Valve must flush approximately 1 gallon per cycle. Valve must reduce sediment build-up within the dripperline system.

50-43.33 Unions

Unions must be brass or malleable iron. All unions must withstand the working pressure range requirements of the pipes with which they are used.

50-43.34 Irrigation Control Wires

Control wire for automatic control valves must be #10, #12, or #14 as necessary for operation, must be UL rated for direct burial, and must be underground feeder type identified as (UF). Control wire must have 4/64 inch (56 mils) minimum thickness of TW grade polyvinyl chloride insulation. Control wire must be able to withstand a crush test of 5000 psi. Common or neutral conductors must be white. The control wires to the automatic control valves must be red. The spare wires must be yellow.

Splices for control wire must be specifically designed to insure waterproof underground direct bury wire connection, and must be UL listed "Water Resistant Wire Connector Rated 60c, 600v for PVC insulated copper wires". Each connector must consist of a crimp sleeve, base socket, sealing plug, and inert sealer.

50-43.35 Pull Boxes

Pull boxes for irrigation control wiring must be No. 5 or larger unless otherwise shown on the Plans, and must conform to these Specifications.

Pull boxes must be precast portland cement concrete boxes with concrete covers, unless otherwise noted.

Pull box covers for pull boxes used solely for irrigation control wiring must be marked “IRRIGATION” or “IRRIGATION CONTROL” in cast-in letters. Cover markings must be clearly defined and uniform in depth and may be placed parallel to either the long or the short sides of the cover. Marking letters must be between 1 and 3 inches high.

50-43.36 Pressure Gauges

Pressure gauges must be liquid filled with silicone oil, hermetically sealed, water tight, and dust proof. Gauge must be a 2-inch bottom-connected gauge with 1/4-inch brass standard pipe thread and shatterproof face. Gauge must be rated for 100 psi.

50-44 ENGINEERING FABRICS

Engineering fabrics must conform to the State Specifications.

50-45 PAINT

Unless otherwise specified in the Special Provisions, paint must conform to the State Specifications. Colors must be as specified in the Contract.

50-46 NOT USED

50-47 NOT USED

50-48 EPOXY

Epoxy must conform to the State Specifications.

APPENDIX A
SAMPLE FORMS

Contract No.

AGREEMENT FOR

THIS AGREEMENT made and entered into this day of , , between , , hereinafter referred to as and , , hereinafter referred to as Contractor;

W I T N E S S E T H :

WHEREAS, the Governing Board of said heretofore caused plans and specifications for the work hereinafter mentioned to be prepared, and therefore did approve and adopt said plans and specifications; and

WHEREAS, the Governing Board of said did cause to be published for the time and in the manner required by law, a Notice inviting sealed bids for the performance of said work; and

WHEREAS, the Contractor, in response to such Notice, submitted to the Governing Board of said within the time specified in said Notice, and in the manner provided for therein, a sealed bid for the performance of the work specified in said plans and specifications, which said bid and proposal, and the other bids and proposals submitted in response to said Notice, the Governing Board of public opened and canvassed in the manner provided by law; and

WHEREAS, the Contractor was the lowest responsible bidder for the performance of said work, and said Governing Board of as a result of the canvass of said bids, did determine and declare Contractor to be the lowest responsible bidder for said work and award to a contract therefor.

NOW, THEREFORE, in consideration of the promises herein, it is mutually agreed between the parties hereto as follows:

I. CONTRACT DOCUMENTS

The following documents are by this reference incorporated in and made a part of this Agreement: The Standard Construction Specifications adopted by the Sacramento County Board of Supervisors on July 17, 2001, revised March, 2004; the Special Provisions; the

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contract drawings, all addenda; the Notice to Contractors; the Proposal; all required bonds; and all supplemental Agreements covering alterations, amendments, or extensions to the contract. The documents which describe the work to be performed are sometimes collectively referred to herein as the Plans and Specifications. In the case of conflicting documents this agreement takes precedent over all others.

II. SCOPE OF WORK

That the Contractor will furnish all labor, materials, services, transportation, appliances, and mechanical workmanship required for Contract No. , , as provided for and set forth in said plans and specifications, or in either of them, which said plans and specifications are hereby referred to and by such reference incorporated herein and made a part of this Agreement.

All of the said work done under this Agreement shall be under the supervision of and performed to the satisfaction of the Engineer of who shall have the right to reject any and all materials and supplies furnished by the Contractor which do not comply with said plans and specifications, together with the right to require the Contractor to replace any and all work furnished by the Contractor which shall not either in workmanship or material be in strict accordance with said plans and specifications.

III. COMPLETION

Said work shall be completed and ready for acceptance pursuant to Section 7 of the Standard Specifications,

IV. PAYMENT

Attached hereto as Exhibit “A” and by reference made a part hereof, is the bid and proposal of Contractor. Said bid and proposal containing, as required by the terms of said specifications, the full and complete schedule of the different items with the lump sums or unit prices as so specified. The agrees, in consideration of the work to be performed herein and subject to the terms and conditions thereof, to pay Contractor all sums of money which may become due to Contractor in accordance with the terms of the aforesaid bid and proposal, and this Agreement, to wit: (). Said sum shall be paid in accordance with Sections 8 of the

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Standard Specifications. With respect to that portion of the above sum as is based upon the estimated quantities specified for the general scope of the work to be performed herein, actual payment will be based upon the quantities as measured upon completion. No payment made under this Agreement shall be construed to be an acceptance of defective work or improper materials.

V. PREVAILING WAGES

Pursuant to the provisions of Articles 1 and 2 of Chapter 1, Part 7, Division II, of the Labor Code of the State of California, not less than the general prevailing rate of per diem wages, and not less than the general prevailing rate of per diem wages for holidays and overtime work, for each craft, classification or type of worker needed to execute the work contemplated under this Agreement shall be paid to all workers, laborers and mechanics employed in the execution of said work by Contractor, or by any subcontractor doing or contracting to do any part of said work. The appropriate determination of the Director of the California Department of Industrial Relations is filed with, and available for inspection at, the office of the Clerk of the Governing Board.

Contractor shall post, at each jobsite, a copy of such prevailing rate of per diem wages as determined by the Director for the California Department of Industrial Relations.

VI. INSURANCE

The Contractor shall carry and maintain during the life of this Agreement, such public liability, property damage and contractual liability, auto, workers' compensation and builders' risk insurance as required by the Section 3-9 of the Standard Construction specifications.

VII. WORKERS' COMPENSATION CERTIFICATION

By execution of this Agreement, the Contractor certifies as follows:

> "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."

VIII. PERFORMANCE AND PAYMENT BONDS

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The Contractor shall, before beginning said work, file two bonds with the , each made payable to the . These bonds shall be issued by a surety company authorized to do business in the State of California, and shall be maintained during the entire life of the Agreement at the expense of the Contractor. One bond shall be in the amount of one hundred percent (100%) of the Agreement and shall guarantee the faithful performance of the Agreement. The second bond shall be the payment bond required by California Civil Code Division 3, Part 4, Title 15, Chapter 7, and shall be in the amount of one hundred percent (100%) of the Agreement. Any alterations made in the specifications which are a part of this Agreement or in any provision of this Agreement shall not operate to release any surety from liability on any bond required hereunder and the consent to make such alterations is hereby given, and any surety on said bonds hereby waives the provisions of California Civil Code Sections 2819 and 2845.

IX. INDEMNIFICATION

The Contractor shall defend, indemnify and save harmless the and the Engineer (including their officers, agents, members, employees, affiliates, and representatives) as set forth in Section 6-2 of the Standard Specifications.

X. MISCELLANEOUS PROVISIONS

a. This Agreement shall bind and inure to the heirs, devisees, assignees, and successors in interest of Contractor and to the successors in interest of in the same manner as if such parties had been expressly named herein.

b. All times stated herein or in the contract documents are of the essence hereof.

c. As used in this instrument the singular includes the plural, and the masculine includes the feminine and the neuter.

d. This Agreement may create a possessory interest subject to property taxation, and Contractor may be subject to the payment of property taxes levied on such interest.

XI. TRENCH EXCAVATION: PLAN FOR PROTECTION FROM CAVING:

The excavation of any trench or trenches five feet of more in depth and involving estimated expenditures in excess of Twenty Five Thousand Dollars ($25,000) shall require, in

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advance of excavation, detailed plans showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection as prepared by a California registered civil or structural engineer.

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IN WITNESS WHEREOF, and Contractor have caused this Agreement to be executed as of the day and year first above written.

,

By_____

,

By_____
Authorized Representative

By_____
Authorized Representative

CONTRACTOR

Forms Approved by County Counsel

Documents Reviewed:

By _____
Contracting Staff

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ATTACHMENT 1

FHWA-1273 -- Revised May 1, 2012

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Nonsegregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Compliance with Governmentwide Suspension and Debarment Requirements
XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

Contract No.

AGREEMENT FOR

THIS AGREEMENT made and entered into this day of , , between , , hereinafter referred to as and , , hereinafter referred to as Contractor;

W I T N E S S E T H :

WHEREAS, the Governing Board of said heretofore caused plans and specifications for the work hereinafter mentioned to be prepared, and therefore did approve and adopt said plans and specifications; and

WHEREAS, the Governing Board of said did cause to be published for the time and in the manner required by law, a Notice inviting sealed bids for the performance of said work; and

WHEREAS, the Contractor, in response to such Notice, submitted to the Governing Board of said within the time specified in said Notice, and in the manner provided for therein, a sealed bid for the performance of the work specified in said plans and specifications, which said bid and proposal, and the other bids and proposals submitted in response to said Notice, the Governing Board of public opened and canvassed in the manner provided by law; and

WHEREAS, the Contractor was the lowest responsible bidder for the performance of said work, and said Governing Board of as a result of the canvass of said bids, did determine and declare Contractor to be the lowest responsible bidder for said work and award to a contract therefor.

NOW, THEREFORE, in consideration of the promises herein, it is mutually agreed between the parties hereto as follows:

I. CONTRACT DOCUMENTS

The following documents are by this reference incorporated in and made a part of this Agreement: The Standard Construction Specifications adopted by the Sacramento County Board of Supervisors on July 17, 2001, revised March, 2004; the Special Provisions; the

SAMPLE STANDARD AGREEMENT

contract drawings, all addenda; the Notice to Contractors; the Proposal; all required bonds; and all supplemental Agreements covering alterations, amendments, or extensions to the contract. The documents which describe the work to be performed are sometimes collectively referred to herein as the Plans and Specifications. In the case of conflicting documents this agreement takes precedent over all others.

II. SCOPE OF WORK

That the Contractor will furnish all labor, materials, services, transportation, appliances, and mechanical workmanship required for Contract No. , , as provided for and set forth in said plans and specifications, or in either of them, which said plans and specifications are hereby referred to and by such reference incorporated herein and made a part of this Agreement.

All of the said work done under this Agreement shall be under the supervision of and performed to the satisfaction of the Engineer of who shall have the right to reject any and all materials and supplies furnished by the Contractor which do not comply with said plans and specifications, together with the right to require the Contractor to replace any and all work furnished by the Contractor which shall not either in workmanship or material be in strict accordance with said plans and specifications.

III. COMPLETION

Said work shall be completed and ready for acceptance pursuant to Section 7 of the Standard Specifications,

IV. PAYMENT

Attached hereto as Exhibit “A” and by reference made a part hereof, is the bid and proposal of Contractor. Said bid and proposal containing, as required by the terms of said specifications, the full and complete schedule of the different items with the lump sums or unit prices as so specified. The agrees, in consideration of the work to be performed herein and subject to the terms and conditions thereof, to pay Contractor all sums of money which may become due to Contractor in accordance with the terms of the aforesaid bid and proposal, and this Agreement, to wit: (). Said sum shall be paid in accordance with Sections 8 of the

SAMPLE STANDARD AGREEMENT

Standard Specifications. With respect to that portion of the above sum as is based upon the estimated quantities specified for the general scope of the work to be performed herein, actual payment will be based upon the quantities as measured upon completion. No payment made under this Agreement shall be construed to be an acceptance of defective work or improper materials.

V. PREVAILING WAGES

Pursuant to the provisions of Articles 1 and 2 of Chapter 1, Part 7, Division II, of the Labor Code of the State of California, not less than the general prevailing rate of per diem wages, and not less than the general prevailing rate of per diem wages for holidays and overtime work, for each craft, classification or type of worker needed to execute the work contemplated under this Agreement shall be paid to all workers, laborers and mechanics employed in the execution of said work by Contractor, or by any subcontractor doing or contracting to do any part of said work. The appropriate determination of the Director of the California Department of Industrial Relations is filed with, and available for inspection at, the office of the Clerk of the Governing Board.

Contractor shall post, at each jobsite, a copy of such prevailing rate of per diem wages as determined by the Director for the California Department of Industrial Relations.

VI. INSURANCE

The Contractor shall carry and maintain during the life of this Agreement, such public liability, property damage and contractual liability, auto, workers' compensation and builders' risk insurance as required by the Section 3-9 of the Standard Construction specifications.

VII. WORKERS' COMPENSATION CERTIFICATION

By execution of this Agreement, the Contractor certifies as follows:

> "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."

VIII. PERFORMANCE AND PAYMENT BONDS

SAMPLE STANDARD AGREEMENT

The Contractor shall, before beginning said work, file two bonds with the , each made payable to the . These bonds shall be issued by a surety company authorized to do business in the State of California, and shall be maintained during the entire life of the Agreement at the expense of the Contractor. One bond shall be in the amount of one hundred percent (100%) of the Agreement and shall guarantee the faithful performance of the Agreement. The second bond shall be the payment bond required by California Civil Code Division 3, Part 4, Title 15, Chapter 7, and shall be in the amount of one hundred percent (100%) of the Agreement. Any alterations made in the specifications which are a part of this Agreement or in any provision of this Agreement shall not operate to release any surety from liability on any bond required hereunder and the consent to make such alterations is hereby given, and any surety on said bonds hereby waives the provisions of California Civil Code Sections 2819 and 2845.

IX. INDEMNIFICATION

The Contractor shall defend, indemnify and save harmless the and the Engineer (including their officers, agents, members, employees, affiliates, and representatives) as set forth in Section 6-2 of the Standard Specifications.

X. MISCELLANEOUS PROVISIONS

a. This Agreement shall bind and inure to the heirs, devisees, assignees, and successors in interest of Contractor and to the successors in interest of in the same manner as if such parties had been expressly named herein.

b. All times stated herein or in the contract documents are of the essence hereof.

c. As used in this instrument the singular includes the plural, and the masculine includes the feminine and the neuter.

d. This Agreement may create a possessory interest subject to property taxation, and Contractor may be subject to the payment of property taxes levied on such interest.

XI. TRENCH EXCAVATION: PLAN FOR PROTECTION FROM CAVING:

The excavation of any trench or trenches five feet of more in depth and involving estimated expenditures in excess of Twenty Five Thousand Dollars ($25,000) shall require, in

SAMPLE STANDARD AGREEMENT

advance of excavation, detailed plans showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection as prepared by a California registered civil or structural engineer.

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IN WITNESS WHEREOF, and Contractor have caused this Agreement to be executed as of the day and year first above written.

,

By_____

,

By_____
Authorized Representative

By_____
Authorized Representative

CONTRACTOR

Forms Approved by County Counsel

Documents Reviewed:

By _____
Contracting Staff

SAMPLE STANDARD AGREEMENT

Contract No. Escrow No. _____

ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF CASH RETENTION (PCC § 22300)

This Escrow Agreement for Security Deposits in Lieu of Cash Retention ("Agreement") is effective as of _____, and is made and entered into by and between the , (hereinafter referred to as "Owner"), and (hereinafter called "Contractor") and _____ (hereinafter called "Escrow Agent").

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

(1) Pursuant to Section 22300 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 the Contractor deposits the securities as a substitute for Contract earnings, the Escrow Agent shall notify the Owner within 10 days of the deposit (Exhibit A, is an example form for use in such notification). 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 those 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 the time that the escrow created under this contract is terminated. The Contractor may direct the

SAMPLE

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 only by written notice to Escrow Agent accompanied by written authorization from the 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 (containing the terms and substantially similar to the attached Exhibits B or C) 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 (such as Exhibits B & C) from the Owner pursuant to Sections (5) to (8), 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 as 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

SAMPLE

foregoing, and exemplars of their respective signatures are as follows:

On behalf of Owner:	On behalf of Contractor:
Title	Title
Name	Name
Signature	Signature
827 7th Street, 304C Address	Address
Sacramento, CA 95814 City, State & Zip	City, State & Zip
	Telephone

On behalf of Escrow Agent:

Title

Name

Signature

Address

City, State & Zip

Telephone

SAMPLE

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

Attached: Exhibits A, B & C

SAMPLE

Contract No. Escrow No. _____

EXHIBIT "A"

TO: COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY
AFS - Contract Desk
827-7TH Street, Room 304
Sacramento, California 95814

RE: CERTIFICATION OF DEPOSIT OF SECURITIES

_____, as Escrow Agent in that certain Escrow Agreement for Deposit of Securities in Lieu of Cash Retention on Municipal Services Project between the , (referred to as Owner), (referred to as Contractor) and

_____,

a state or federally chartered bank (referred to as Escrow Agent) dated _____, hereby certifies to the Owner that the said Escrow Agent has received from the specified Contractor, securities eligible for investment of not less than $_____. The said Escrow Agent agrees to hold said securities in accordance with the term of the aforesaid escrow agreement, and shall not release the said securities to the said Contractor until such time as the said Escrow Agent has received notification from the Owner's Engineer that the construction contract has been accepted and the Escrow Agent is authorized to release the securities. The Escrow Agent further certifies that upon written demand by the Owner's Engineer, the Escrow Agent shall cause sufficient securities to be sold from those so deposited by the said Contractor and shall pay to the County the amount specified in the demand, provided such demand does not exceed the amount specified as the minimum value of the securities herein.

Dated: _____ at _____, California.

By _____
ESCROW AGENT

_____
a state or federally chartered bank

Address of Bank _____
_____
_____

SAMPLE

Contract No. Escrow No. _____

EXHIBIT "B"

TO: Escrow Agent

RE: AUTHORIZATION TO RELEASE SECURITIES DEPOSITED BY CONTRACTOR

You, as Escrow Agent in that certain Escrow Agreement for Deposit of Securities in Lieu of Cash Retention on Public Works Project between the , (referred to as Owner), , (referred to as Contractor), and

_____,

a state or federally chartered bank (referred to as Escrow Agent), dated _____, are hereby authorized to release to the aforesaid Contractor all securities deposited with you with respect to the aforesaid escrow agreement, except that you shall be required to retain as security and pursuant to the terms of the said escrow agreement securities having a value of not less than $ _____, until such time as you may be further notified by the Owner's Engineer as to further release or as to sale.

Dated: _____

,

By _____
Owner's Engineer

SAMPLE

Contract No. Escrow No. _____

EXHIBIT "C"

RE: NOTIFICATION OF FAILURE OF PERFORMANCE, DEMAND FOR SALE OF SECURITIES AND DEMAND FOR PAYMENT

You, as Escrow Agent in that certain Escrow Agreement for Deposit of Securities in Lieu of Cash Retention on Municipal Services Project between the , (referred to as Owner), , (referred to as Contractor), and

_____,

a state or federally chartered bank (referred to as Escrow Agent), dated _____, are hereby notified that the said Contractor has failed to perform all or part of that certain construction contract described in the said escrow agreement after having been given written notice of lack of performance. You are hereby directed to cause to be sold securities deposited by the said contractor with you in accordance with the escrow agreement, said securities having a minimum value of $_____, and to deliver forthwith to the Owner's Engineer the sum of $_____. Any remaining securities deposited pursuant to the terms of the said escrow agreement shall be retained by you pursuant to further written notice by the Owner's Engineer.

Dated: _____ at _____, California.

,

By _____
Owner's Engineer

SAMPLE

DEPARTMENT OF GENERAL SERVICES
Michael M. Morse, Director

County of Sacramento

DIVISIONS
Administrative & Business Support Services
Construction Management & Inspection
Contract & Purchasing Services
Facility and Property Services
Fleet Services

DATE

BANK OF CHOICE
ADDRESS

SUBJECT: Release of Escrow Funds – ESCROW NO. CONTRACTOR. - CONTRACT NO. XXXX

To Whom It May Concern:

This letter is to confirm that the Exhibit B sent to you as signed by the authorized Owner Engineer is for the release of securities deposited with you with respect to the subject escrow agreement. Securities having a principal value of $XXYY.ZZ are hereby authorized to be released to the subject contractor. You are still required to retain as security and pursuant to the terms of the escrow agreement securities having a value of not less than $0.00, until such time as you may be further notified by the Owner's Engineer as to further release.

If you have any questions or concerns, please do not hesitate to contact TBD at (916) 874-XXXX.

Respectfully,

SAMPLE

DEPARTMENT OF GENERAL SERVICES
Michael M. Morse, Director

County of Sacramento

DIVISIONS
Administrative & Business Support Services
Construction Management & Inspection
Contract & Purchasing Services
Facility and Property Services
Fleet Services

December 9, 2015

SUBJECT: CONTRACT NO. -

Gentlemen:

Enclosed are four (4) copies of the escrow agreement for the above contract. Please sign and forward them to your bank so that they can sign and return them to us as soon as possible. After we have added our signature to the agreement, two (2) fully executed copies will be forwarded to you.

If you have any questions, please do not hesitate to call.

Sincerely,

AFS - Contract Desk

Attachments

SAMPLE

P A Y M E N T B O N D

BOND NO. _____ PREMIUM _____

KNOW ALL PERSONS BY THESE PRESENTS, that

WHEREAS, the Governing Board of the , , hereinafter designated as the "Obligee", has on , awarded to hereinafter designated as the "Principal," a contract for the construction of Contract No. - ; and

WHEREAS, said Principal is required to furnish a bond in connection and with said contract, providing that if said Principal, or any of its subcontractors, shall fail to pay for any materials, provisions, or other supplies used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor done thereon of any kind, the Surety on this bond will pay the same to the extent hereinafter set forth:

NOW, THEREFORE, WE, the Principal, and _____

_____

as Surety, are held and firmly bound unto the Obligee in the penal sum of () lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, or any of its subcontractors shall fail to pay any of the persons named in Section 3181 of the Civil Code of the State of California, or any amounts due under the Unemployment Insurance Code with respect to such work or labor performed under the contract, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department of the State of California, from the wages of employees of the Principal and subcontractors pursuant to Section 13020 of the Unemployment Insurance Code of the State of California with respect to such work or labor, as required by the provisions of Section 3225 and following of the Civil Code of the State of California, then said Surety will pay the same in or to an amount not exceeding the amount herein above set forth.

SAMPLE

P A Y M E N T B O N D

This bond is issued pursuant to Civil Code Sections 3247 through 3252 of the State of California and shall insure to the benefit of any and all persons, companies, and corporation names in Section 3181 of said Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall, in any way, affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the work or to the specifications. Said Surety hereby waives the provisions of Section 2819 and 2845 of the Civil Code of the State of California.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their seals this _____ day of _____ 2001, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Principal

By _____
Signature for Principal

_____
Title of Signatory

(SEAL)

_____

By _____
Signature for Surety

_____
Title of Signatory

(The signature of the Attorney-in-Fact for the Surety must be acknowledged by a Notary Public. These bonds must be accompanied by a current power of attorney appointing such Attorney-in-Fact.)

SAMPLE

P E R F O R M A N C E B O N D

BOND NO. _____ PREMIUM _____

KNOW ALL PERSONS BY THESE PRESENTS, that

WHEREAS, the Governing Board of the , , hereinafter designated as the "Obligee", has on , awarded to hereinafter designated as the "Principal," a contract for the construction of Contract No. - ; and

WHEREAS, said Principal is required under the terms of said contract to furnish a bond for the faithful performance of said contract:

NOW, THEREFORE, WE, the Principal, and _____

_____

as Surety, are held and firmly bound unto the Obligee in the penal sum of () lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the above bounden Principal, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and faithfully perform the covenants, conditions, and agreements in the said contract and any alterations made as therein provided, on their part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless, the Obligee, its officers and agents as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and virtue.

As a condition precedent to the satisfactory completion of the said contract, the above obligation in said amount shall hold good for a period of one (1) year after the completion and acceptance of the said work, during which time if the above bounden Principal, its heirs executors, administrators, successors or assigns shall fail to make full, complete and satisfactory repair and replacements or totally protect the said Obligee from loss or damage made evident during said period of one (1) year from the date of acceptance of the work, and resulting from or caused by defective materials of faulty workmanship in the prosecution of the work done, the above obligation in the said sum shall remain in full force and effect. However, anything in this paragraph to the contrary notwithstanding, the obligation of the Surety hereunder shall continue so long as any obligation of the Principal remains.

SAMPLE

P E R F O R M A N C E B O N D

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall, in any way, affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the work or to the specifications. Said Surety hereby waives the provisions of Section 2819 and 2845 of the Civil Code of the State of California.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their seals this _____ day of _____2001, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Principal

By _____
Signature for Principal

_____
Title of Signatory

(SEAL) _____

Surety Company

By _____
Signature for Surety

_____
Title of Signatory

(The signature of the Attorney-in-Fact for the Surety must be acknowledged by a Notary Public. These bonds must be accompanied by a current power of attorney appointing such Attorney-in-Fact.)

SAMPLE

(Owner/Department)

Contract No. XXXX - (Project Name)

Contract Change Order No. 1

To: (Contractor Name), Contractor:
You are hereby directed to make the herein described changes from the plans and specifications or do the following described work not included in the original plans and specifications of this contract.

Description of work to be done, quantities and prices to be paid. Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. Change requested by Resident Engineer.

1.	PC X; FI X	Description of change order item	INCREASE	$ Amount
		Total Cost:	**INCREASE**	**$ Total Amount**

Contract Summary:

Original Contract: **$** Change Order Totals: **$** New Contract Cost: **$**

By reason of this order the time of completion will be adjusted as follows: **No adjustment warranted (or Add xx working days).**

Submitted by: _____ Resident Engineer Date: _____

Approval Recommended: _____ Construction Manager Date: _____

Approved by: _____ Director, General Services Date: _____

We, the undersigned Contractor, have given careful consideration to the change proposed and all of its impacts, both direct and indirect, and hereby agree, if this proposal is approved, that we will provide all equipment, furnish all materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment therefor the prices and time extensions shown above.

Acceptance Date: _____ Contractor: **(Contractor Name)**

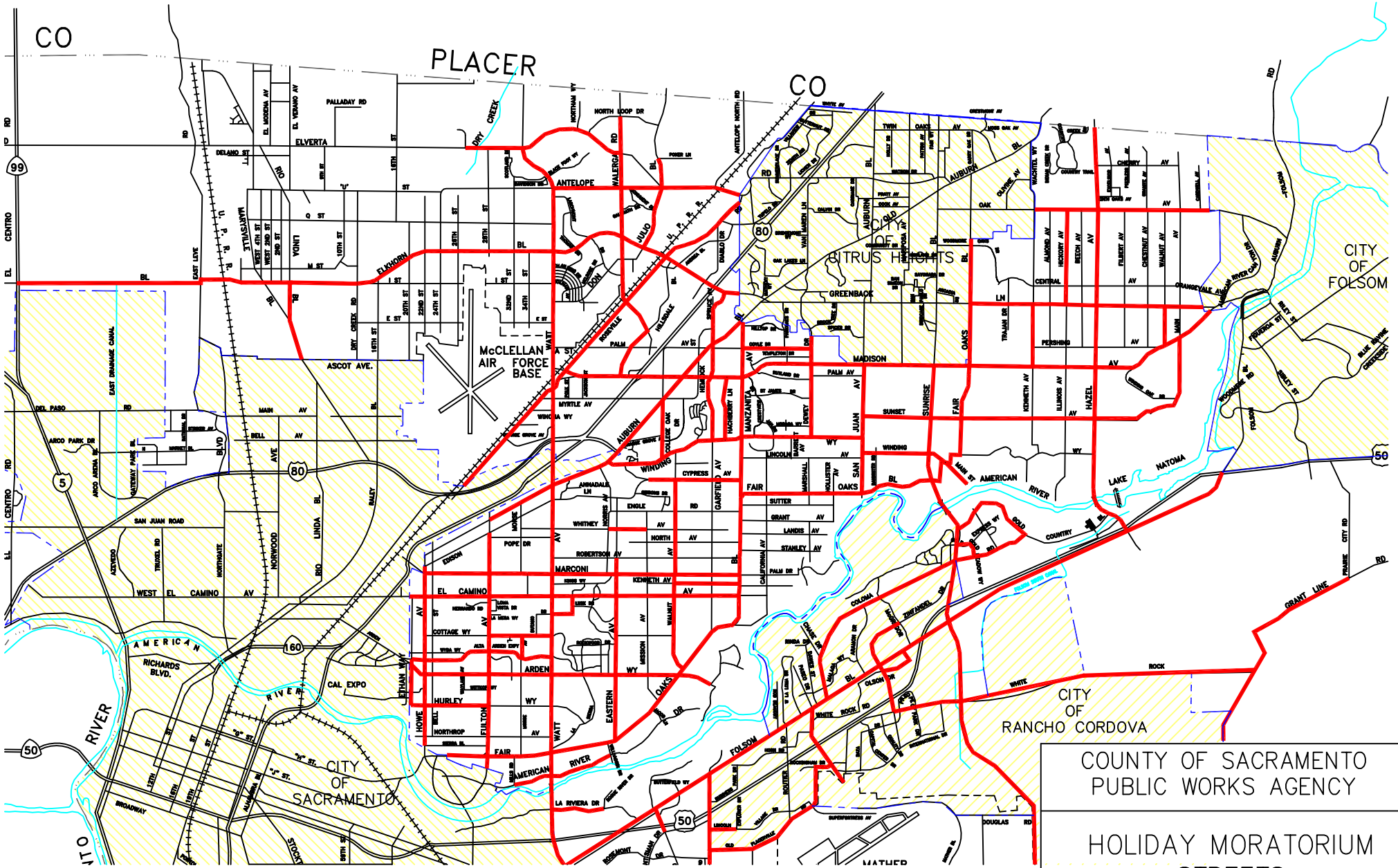
By: _____ Title: _____

If the Contractor does not sign acceptance of this order, his attention is directed to the requirements of the specifications as to proceeding with the ordered work and filing a written protest within the time therein specified.

cc: Contractor *Auditor's Office*
Contract Desk *Board of Directors*
Resident Engineer *Project Engineer*

_____
Chair of the Board

APPENDIX B
HOLIDAY MORITORIUM STREETS



COUNTY OF SACRAMENTO
PUBLIC WORKS AGENCY

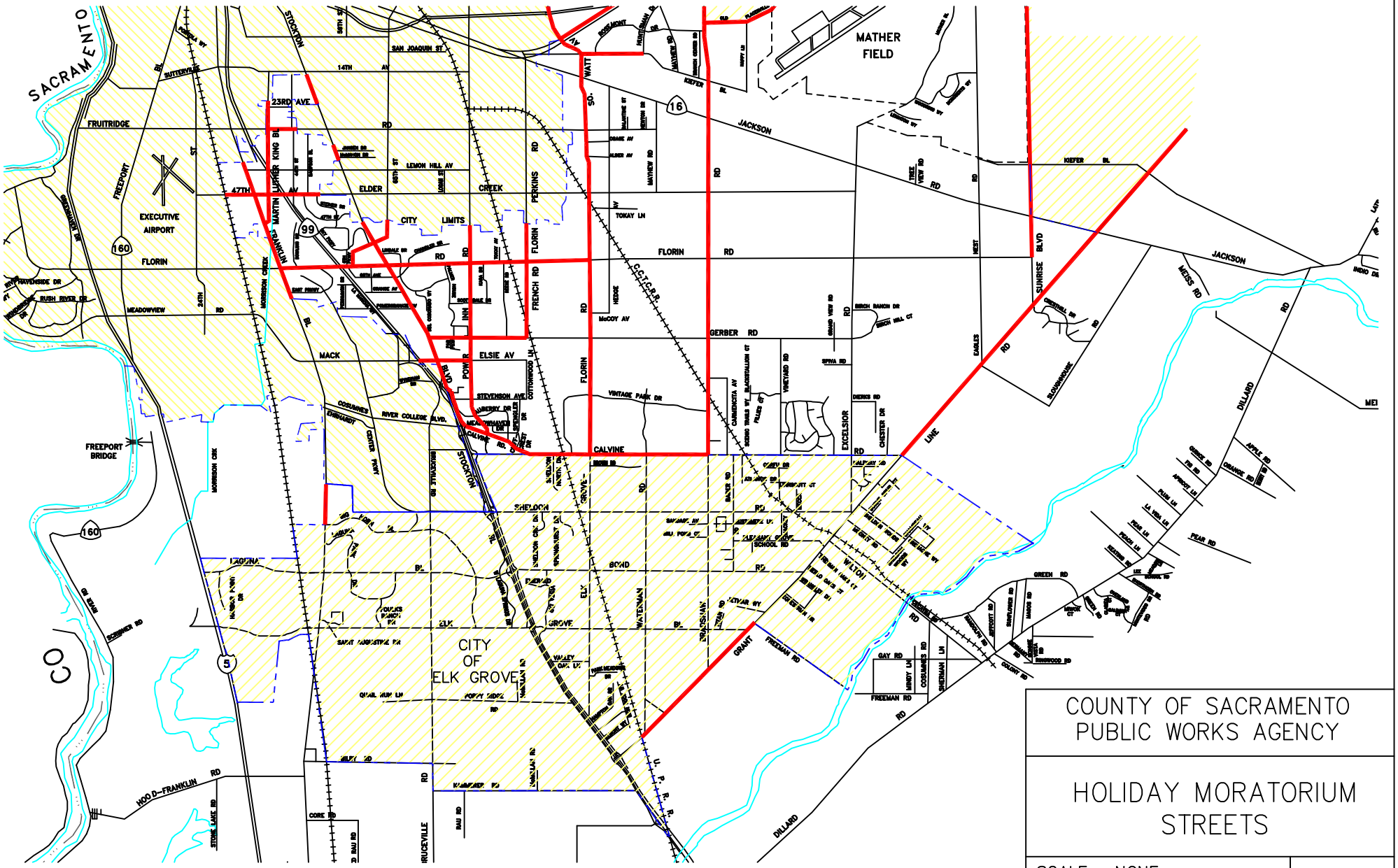
HOLIDAY MORATORIUM STREETS

SCALE: NONE
DATE: 10/01/05
DRAWN BY: LP

1A

STREETS INCLUDED IN HOLIDAY MORATORIUM

SEE FIGURE 1A FOR CONTINUATION NORTH



STREETS INCLUDED IN HOLIDAY MORATORIUM

COUNTY OF SACRAMENTO
PUBLIC WORKS AGENCY

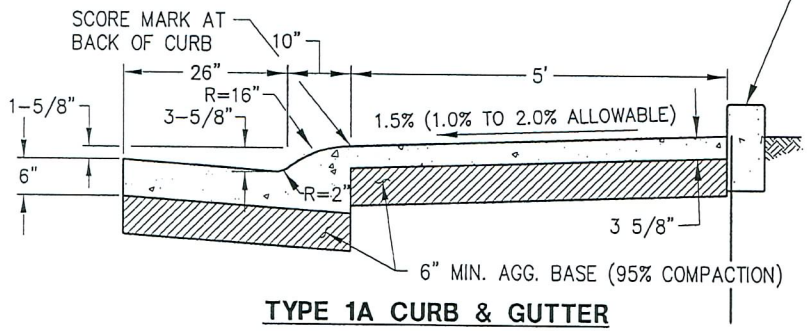
HOLIDAY MORATORIUM STREETS

SCALE: NONE
DATE: 10/01/05
DRAWN BY: LP

1B

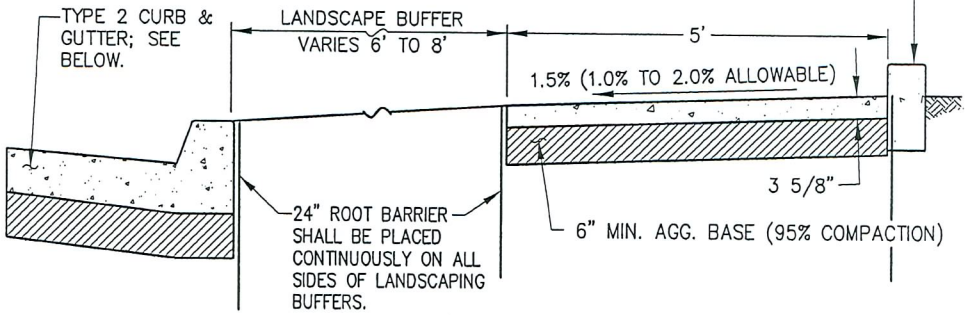
APPENDIX C
STANDARD DRAWINGS

DRAWING NUMBER	TITLE
4-30	SIDEWALK CURB AND GUTTER SECTION
4-31	MEDIAN DETAILS
4-32	CONCRETE JOINT DETAILS
4-33	BARRIER CURB DETAIL
4-34	UNDER SIDEWALK DRAIN
4-35	TYPE A DRIVEWAY
4-36	TYPE B DRIVEWAY
4-37	PEDESTRIAN REFUGE AREA
4-38	CLASS A, CLASS C AND D STREETS
4-40	CROSS GUTTER
4-42	PAVEMENT WIDENING DETAIL
4-43	BUS TURNOUTS
4-44	BUST STOP DETAILS
4-49	SIDEWALK RAMP INSTALLATION DETAIL – AC CONFORM IN EXISITNG PAVEMENT
4-50	SIDEWALK RAMP DETAILS, PLAZA STYLE
4-51	SIDEWALK RAMP DETAILS, PARALLEL STYLE
4-52	SIDEWALK RAMP PLACEMENT MAJOR STREET INTERSECTION
4-53	TYPICAL CURB EXTENSION FOR RESIDENTIAL AND COLLECTOR STREETS
4-54	SIDEWALK RAMP DETAILS FOR RETROFIT OF EXISTING 4' WIDE SIDEWALKS
4-55	SIDEWALK RAMPS AT "T"INTERSECTION FOR ARTERIAL STREETS & THOROUGHFARE STREETS
4-56	SIDEWALK RAMPS AT "T" INTERSECTIONS FOR RESIDENTIAL STREETS & COLLECTOR STREETS
4-57	PEDESTRIAN LANDINGS AT CLASS D STREETS
4-59	SIDEWALK CONFORM END OF SEPARATED SIDEWALK
4-60	SIDEWALK FLAIR AT UTILITY STRUCTURE OR OTHER MAJOR CONFLICT
4-61	SIDEWALK BARRICADE
4-62	SIGNING OF LOCATIONS WITH ABRUPT CHANGE OF PAVEMENT WIDTH
4-63	STREET CLOSURE BARRICADES
4-64	TRENCH SECTIONS
4-70	STREET NAME SIGNS
4-71	STREET NAME SIGN LOCATION REQUIREMENTS
4-72	STREET NAME SIGN PLACEMENT DETAILS ON WOOD POLE INSTALLATIONS
4-73	STREET NAME PLACEMENT DETAILS ON STREET LIGHT POLE INSTALLATIONS
4-74	STREET NAME SIGN INSTALLATION ON STREET LIGHT POLE
4-77	STRIPING AND PAVEMENT MARKING DETAILS
4-80	UTILITY POLE PLACEMENT LOCATIONS DETAILS
4-81	UTILITY POLE PLACMENT LOCATION NOTES

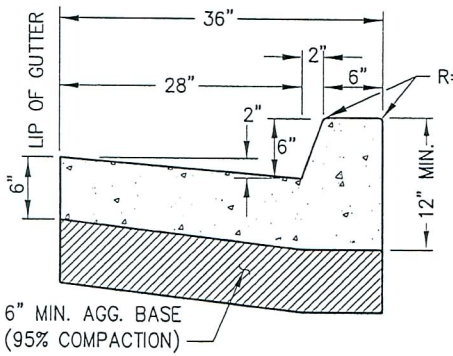


TYPE 1A CURB & GUTTER WITH ATTACHED SIDEWALK

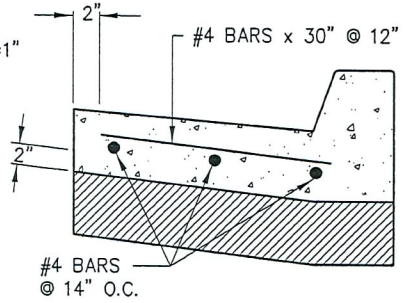
INSTALL TYPE 3 OR TYPE 4 CURB IF ABUTTING PARKING AREA OR LANDSCAPING (EXCEPT LAWN AREA). SEE DWG. 4-33.
USE ROOT BARRIER ALONG BACK OF SIDEWALK FOR A LENGTH OF TWENTY FEET WHERE TREE TRUNK IS WITHIN FIVE FEET OF SIDEWALK.



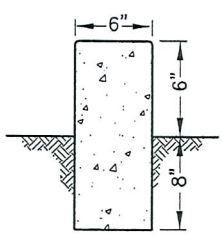
BIFURCATED SIDEWALK WITH TYPE 2 CURB & GUTTER



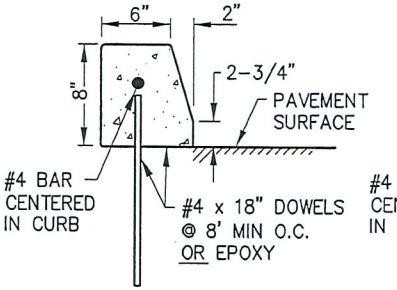
TYPE 2



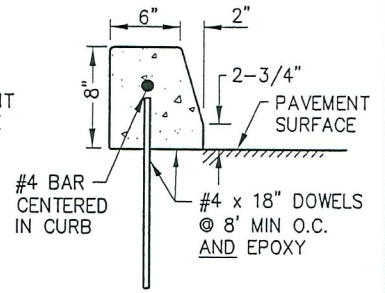
TYPE 2 REINFORCED



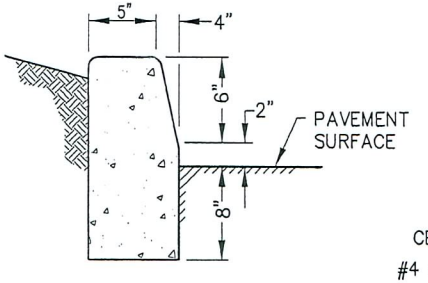
TYPE 3



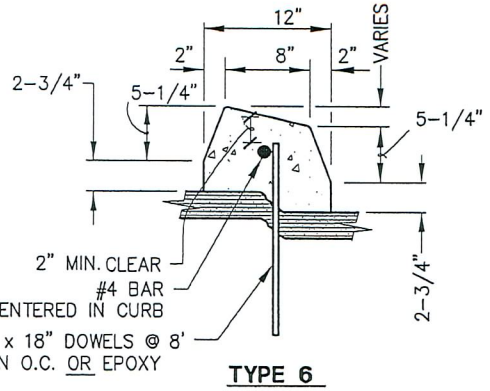
TYPE 4



TYPE 4A



TYPE 5



TYPE 6

NOTES:

1. *SEE SECTION 27-3.01 OF STANDARD CONSTRUCTION SPECIFICATIONS FOR REQUIREMENT FOR EXPANSION JOINTS, WEAKENED PLANE JOINTS AND SCORE MARKS. 1/2" RADIUS ON EXPOSED EDGES UNLESS NOTED OTHERWISE.*
2. *SEE DRAWING 4-31 FOR ADDITIONAL MEDIAN CURB DETAILS.*

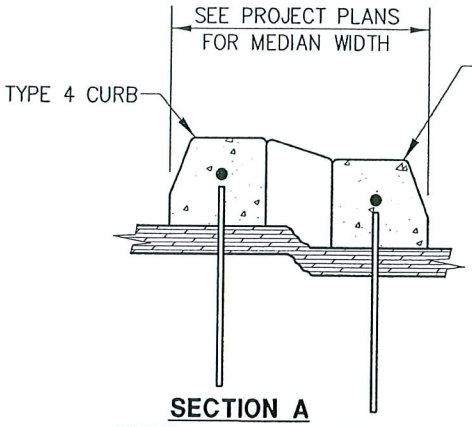
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

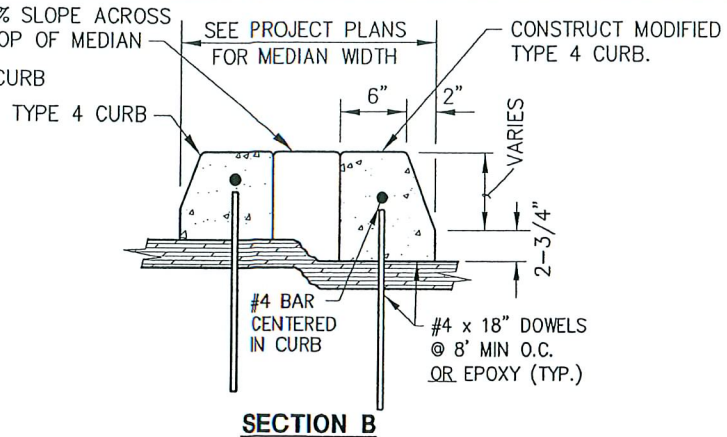
SIDEWALK CURB & GUTTER SECTIONS

SCALE: NONE
DATE: 07/20/09
DRAWN BY: B.R. & TRU P.

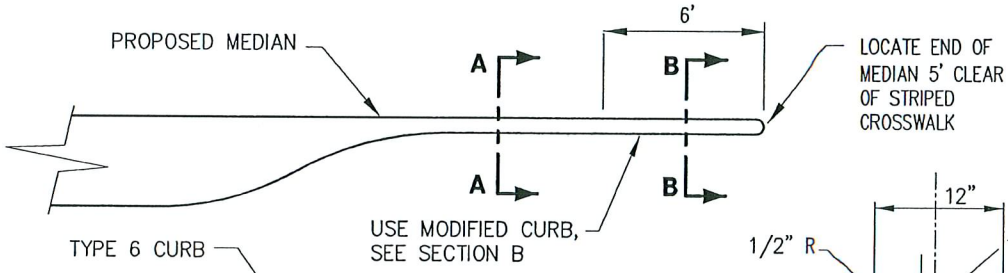
4-30

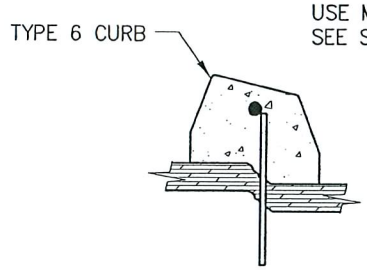


SECTION A
TYPE 4 CURB MEDIAN

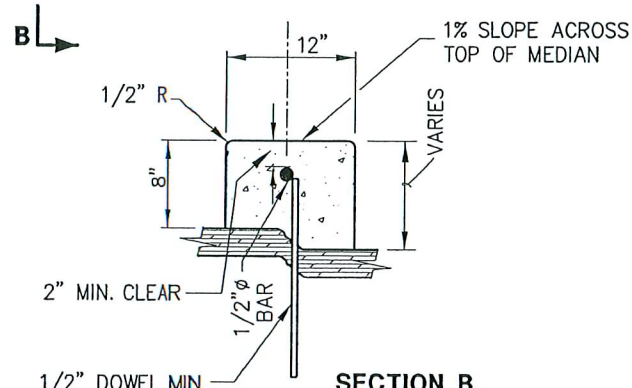


SECTION B
MODIFIED TYPE 4 CURB FOR TERMINATION OF MEDIAN

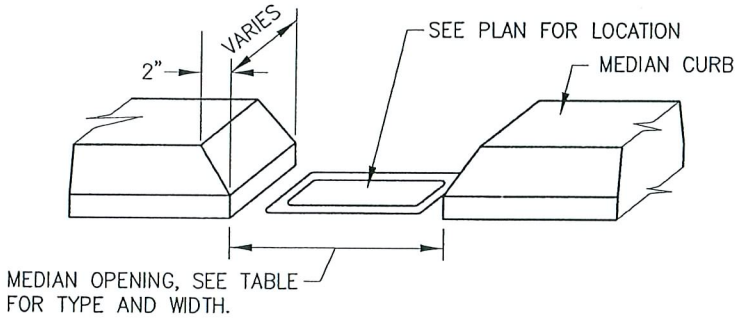




SECTION A
TYPE 6 CURB



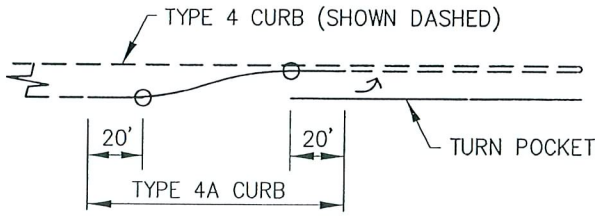
SECTION B
MODIFIED TYPE 6 CURB
FOR TERMINATION OF MEDIAN



OPENING IN MEDIAN

OPENING TYPE	OPENING WIDTH
DRAINAGE	1'-0"
PULL BOX - #5(T)	3'-0"
PULL BOX - #6(T)	3'-6"

CHIEF, DEPT. OF TRANSPORTATION



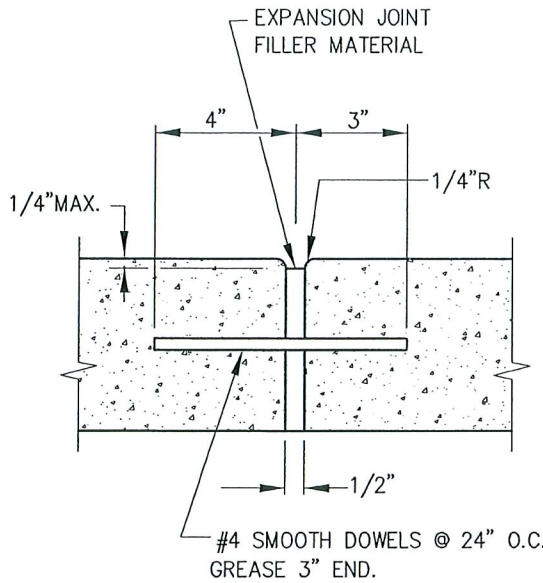
PLAN FOR TYPICAL PLACEMENT OF TYPE 4A CURB

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

MEDIAN DETAILS

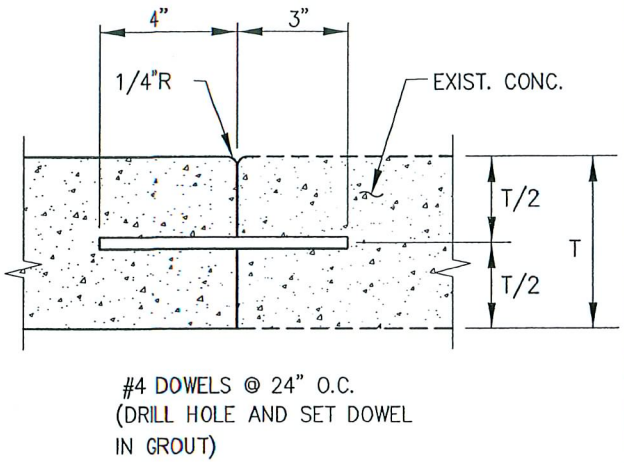
SCALE: NONE
DATE: 01/26/09
DRAWN BY: B.R & N.S..

4-31



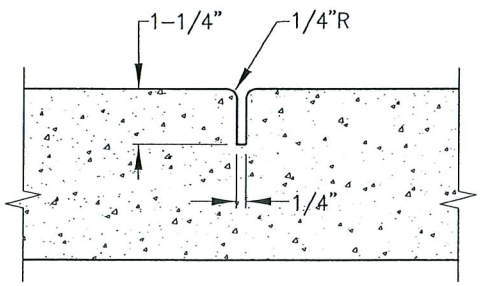
EXPANSION JOINT

USE AT 60' ON CENTER IN SIDEWALK CURB & GUTTER, MEDIAN CURBS, & MEDIAN FLATWORK. ALSO USE AT MAJOR CORNER RETURNS, SIDES OF RAMPS, DRIVEWAYS & LOCATIONS SHOWN ON PLANS & AS SPECIFIED IN SPECIFICATIONS.

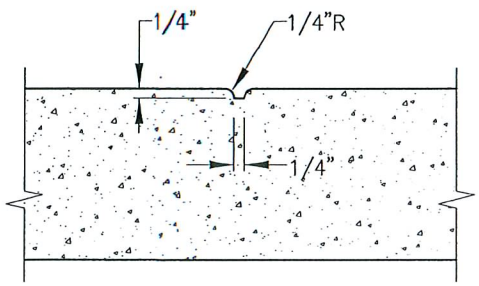


SIDEWALK CONTACT JOINT

USE WHERE NEW CONSTRUCTION OF SIDEWALK, RAMP AND/OR CURB & GUTTER ABUTTS EXISTING IMPROVEMENTS.



WEAKENED PLANE JOINT



SCORE MARK

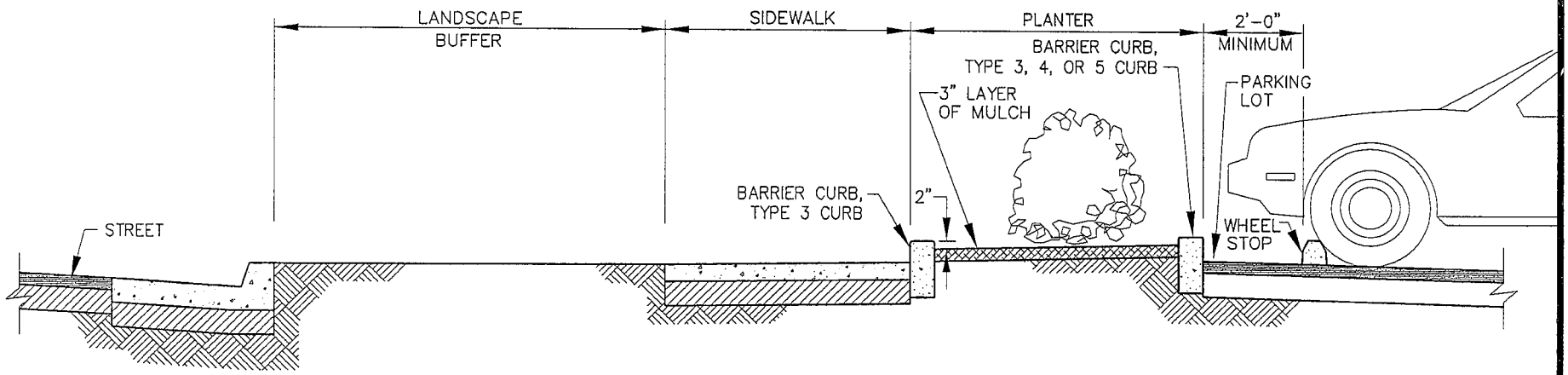
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

CONCRETE JOINT DETAILS

SCALE: NONE
DATE: 07/18/08
DRAWN BY: TRU P.

4-32



NOTES:

1. *USE BARRIER CURB ADJACENT TO SIDEWALK ON ALL ARTERIAL AND THOROUGHFARE STREETS AND ALONG ALL COMMERCIAL DEVELOPMENTS.*
2. *SEE SECTION 4-21 OF COUNTY IMPROVEMENT STANDARDS FOR REQUIREMENTS.*
3. *TYPE 3 CURB AT THE BACK OF SIDEWALK MAY BE OMITTED IF LAWN IS PLANTED TO THE BACK OF SIDEWALK.*
4. *24" ROOT BARRIERS ARE REQUIRED ON ALL SIDES OF LANDSCAPED BUFFER AREAS AND ALONG BACK OF SIDEWALK IF TREE IS WITHIN 5' (NOT SHOWN).*

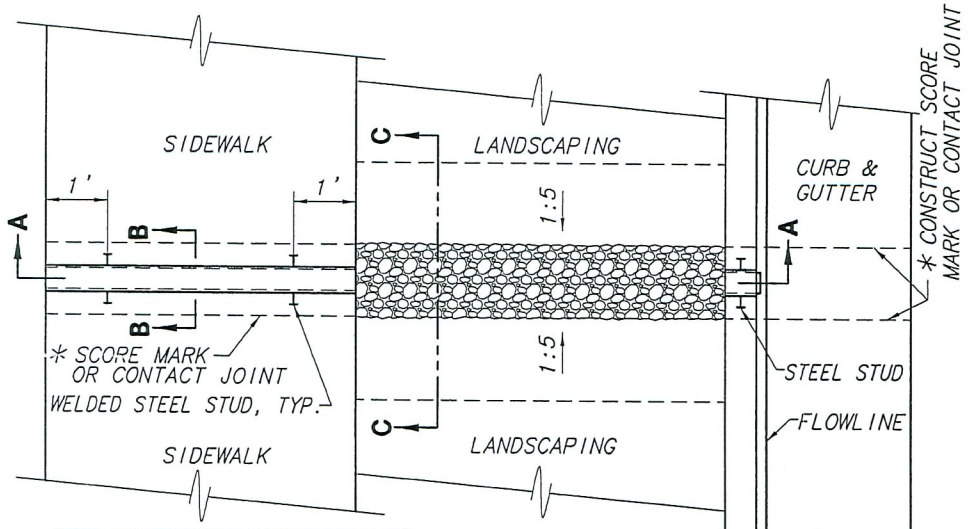
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

BARRIER CURB DETAIL

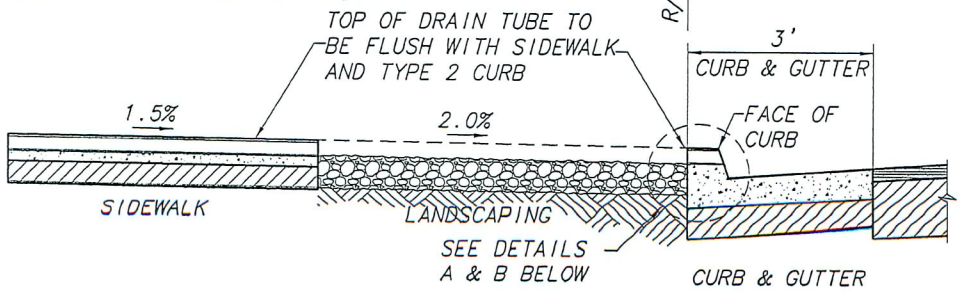
SCALE: NONE
DATE: 01/21/09
DRAWN BY: TRU P. & B.R.

4-33

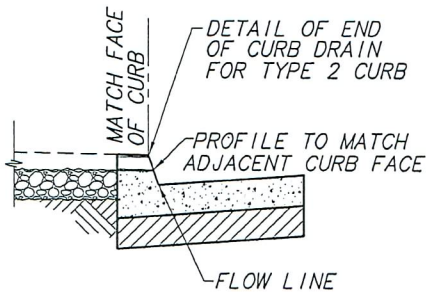


* CONSTRUCT CONTACT JOINT WHEN INSTALLED INTO EXISTING CURB & GUTTER PER STD. DWG. 4-32

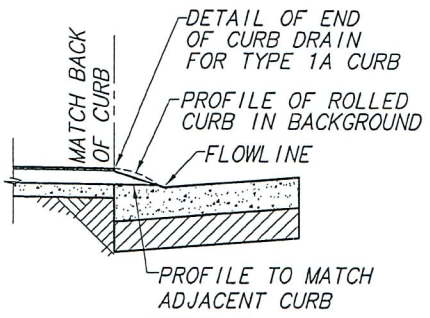
TOP VIEW



SECTION A-A



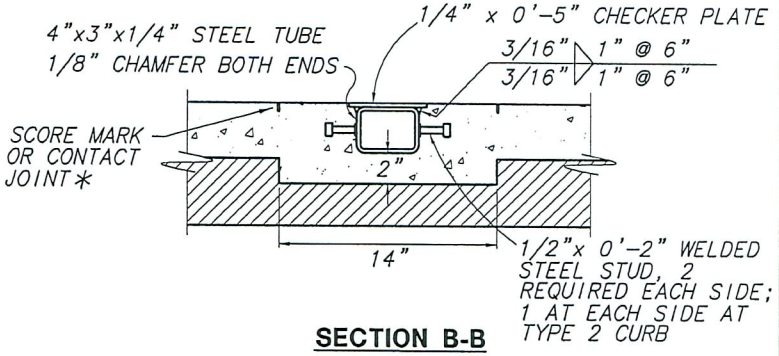
DETAIL A



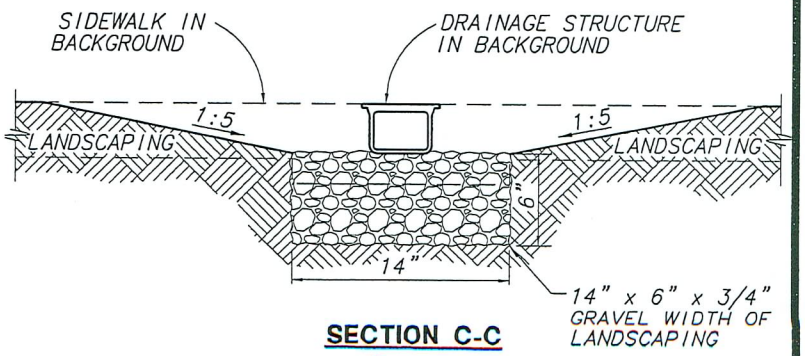
DETAIL B

NOTE:

UTILIZE MIN. G-90 GALVINIZED ELEMENTS
GALVANIZE WELDS AFTER FABRICATION



SECTION B-B



SECTION C-C

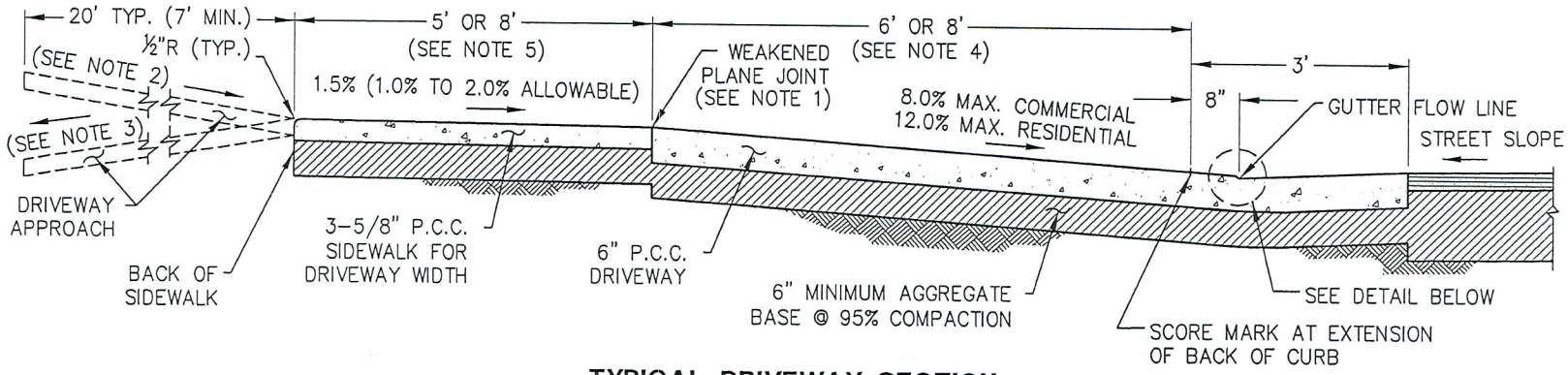
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

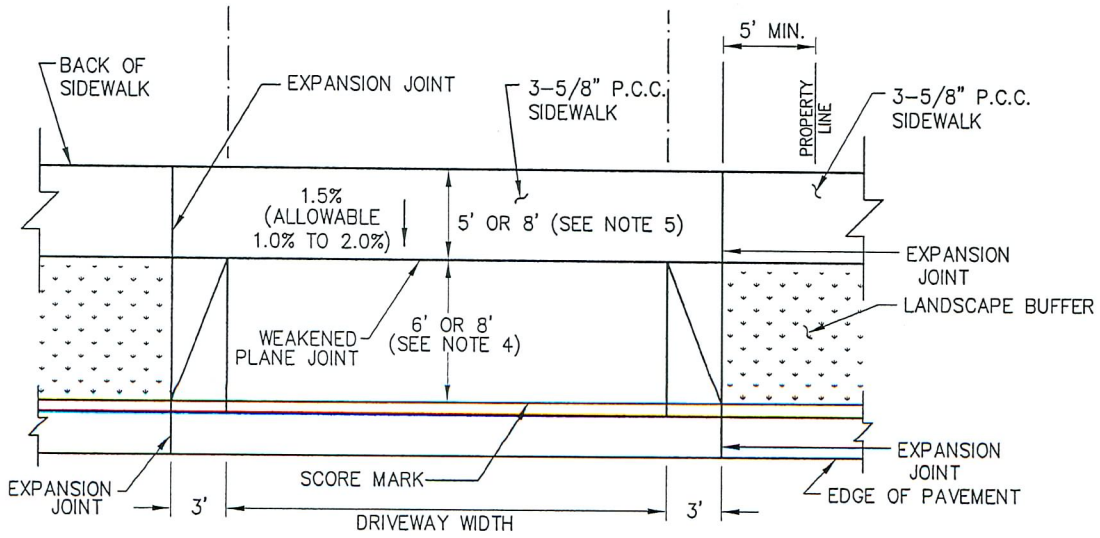
UNDER SIDEWALK DRAIN

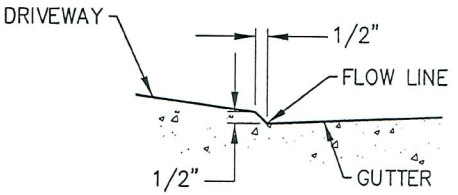
SCALE: NONE
DATE: 08/05/08
DRAWN BY: R. GOODRICH

4-34



TYPICAL DRIVEWAY SECTION





GUTTER FLOW LINE DETAIL

CHIEF, DEPT. OF TRANSPORTATION

NOTES:

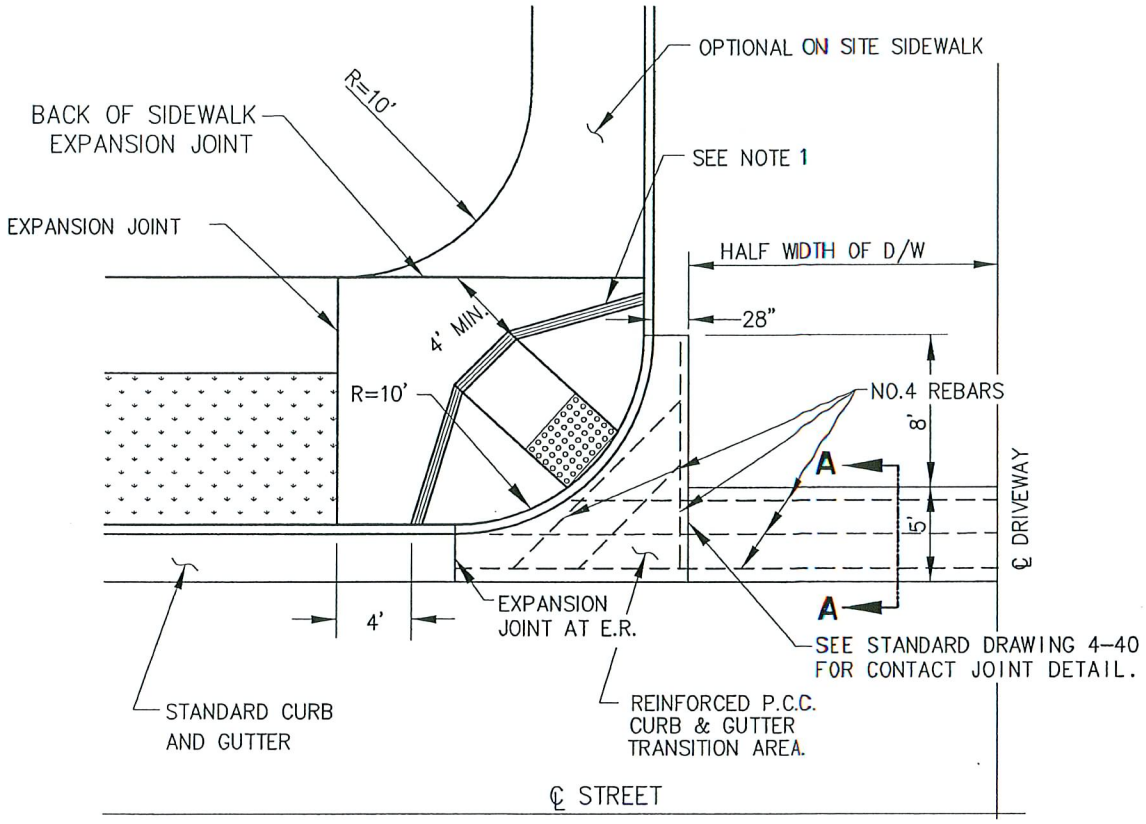
1. *FRONT OF WALK SHALL BE A MINIMUM OF SIX INCHES ABOVE GUTTER FLOW LINE.*
2. *DRIVEWAY APPROACH SLOPES: 5% MAXIMUM COMMERCIAL & LEVEE AND 12% MAXIMUM RESIDENTIAL SLOPE.*
3. *DRIVEWAY APPROACH SLOPES: −5% MAXIMUM COMMERCIAL & LEVEE AND −8% MAXIMUM RESIDENTIAL SLOPE.*
4. *SEE TYPICAL SECTION STANDARD PLANS 4−1 TO 4−3 FOR STANDARD WIDTH.*
5. *SIDEWALK STANDARD WIDTH IS 5', EXCEPT SIDEWALK WIDTH SHALL BE 8' AT SCHOOLS, HOSPITALS, AND IN PEDESTRIAN DISTRICTS.*

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

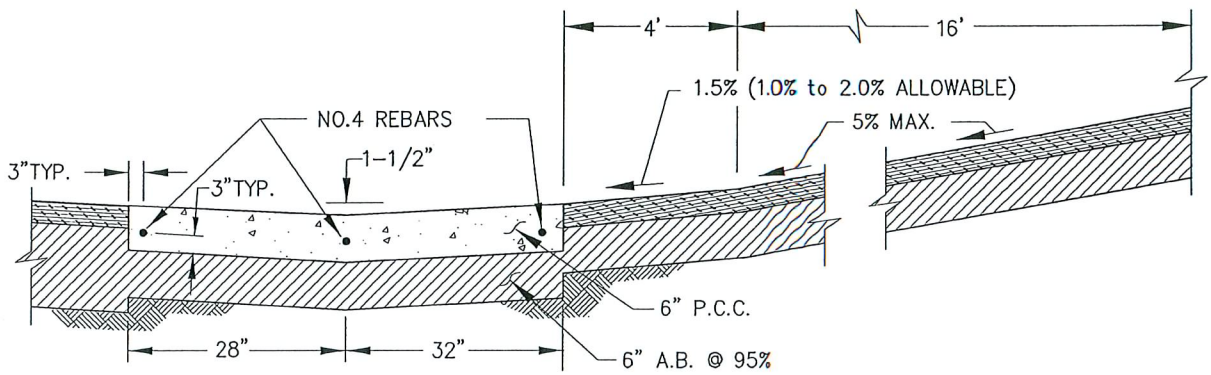
TYPE A DRIVEWAY

SCALE: NONE
DATE: 01/21/09
DRAWN BY: B.R. & TRU P.

4-35



PLAN VIEW



SECTION A-A

NOTES:

1. *FOR DETAILS OF PLAZA RAMP SEE DRAWING 4-50.*

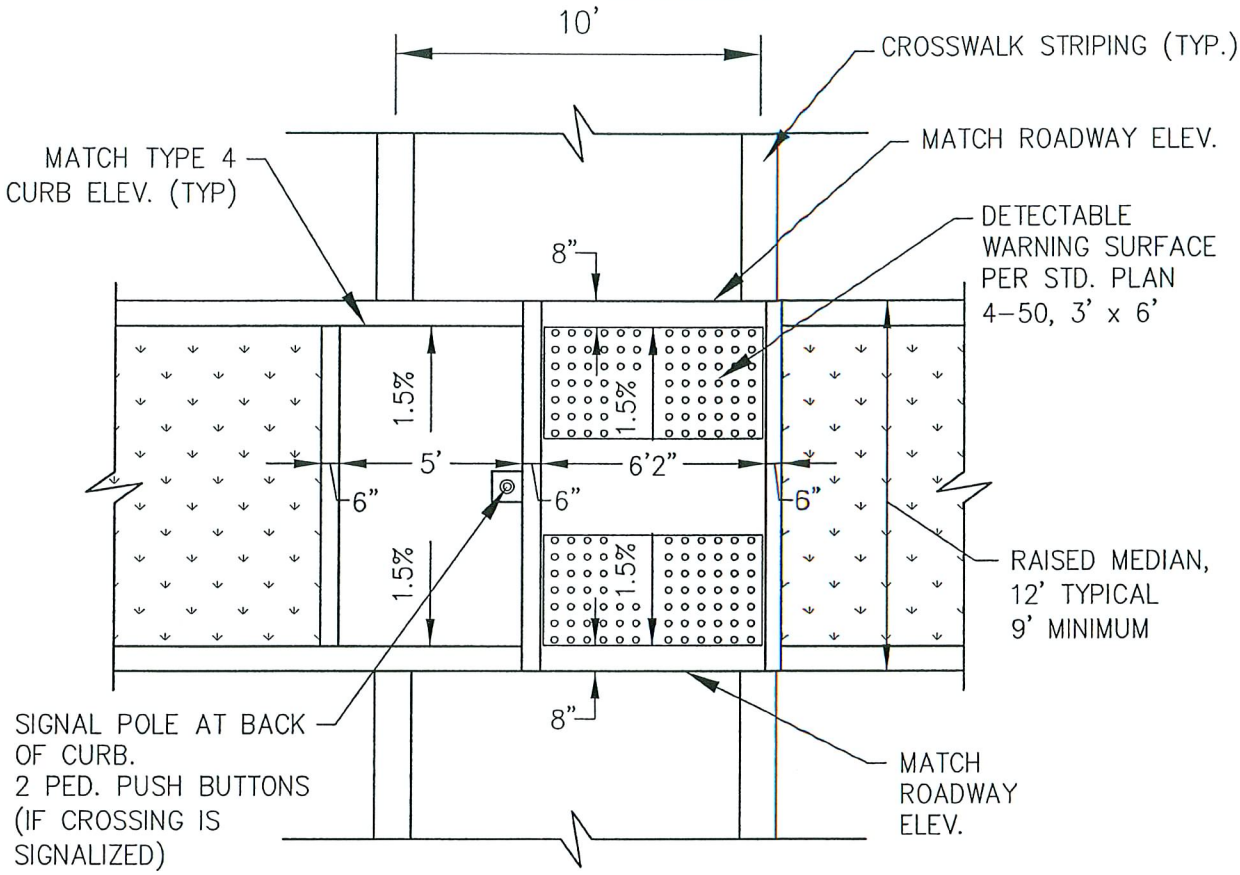
CHIEF, DEPT. OF TRANSPORTATION

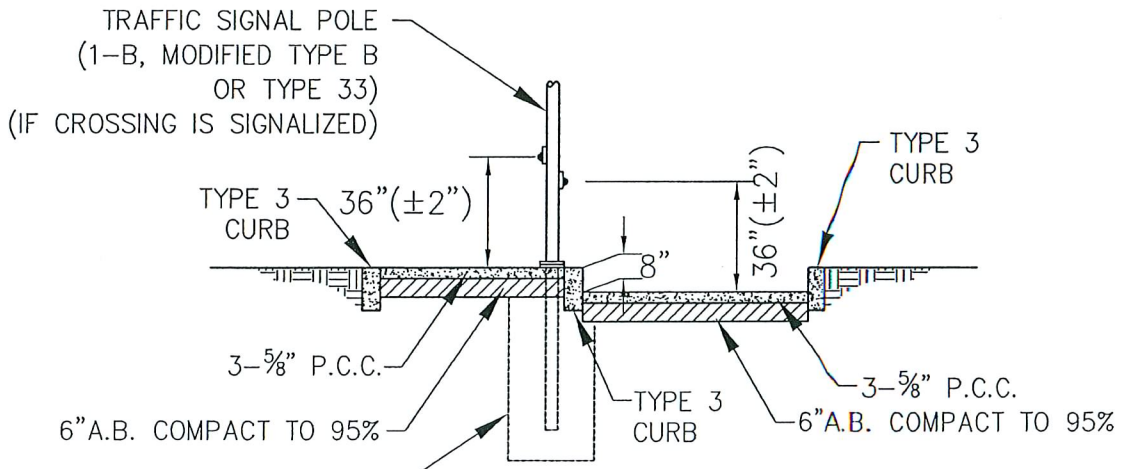
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

TYPE B DRIVEWAY

SCALE: NONE
DATE: 08/06/08
DRAWN BY: TRU P.

4-36





SECTION VIEW

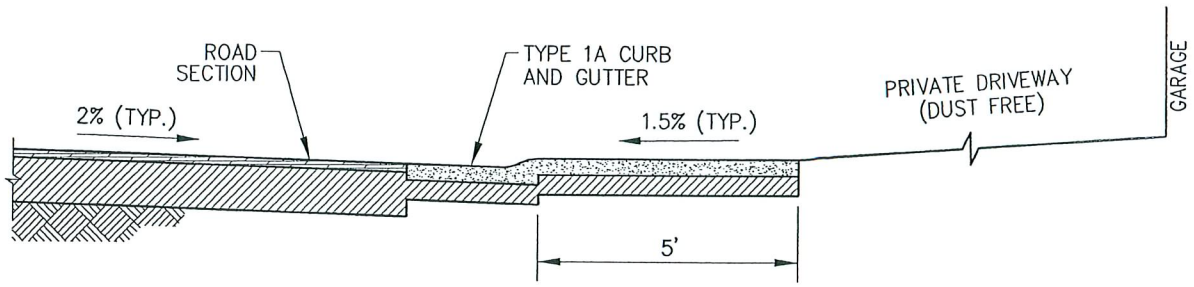
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

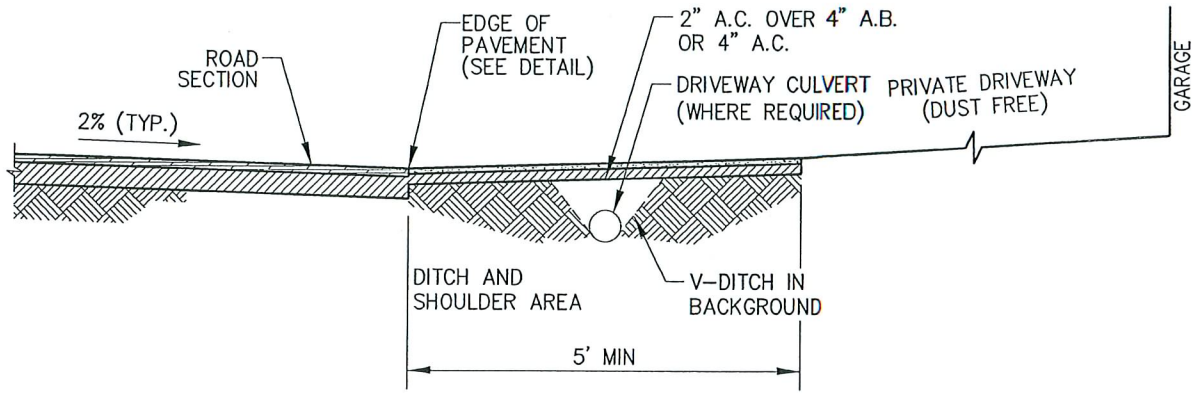
PEDESTRIAN REFUGE AREA

SCALE: NONE
DATE: 07/15/09
DRAWN BY: GODO C.

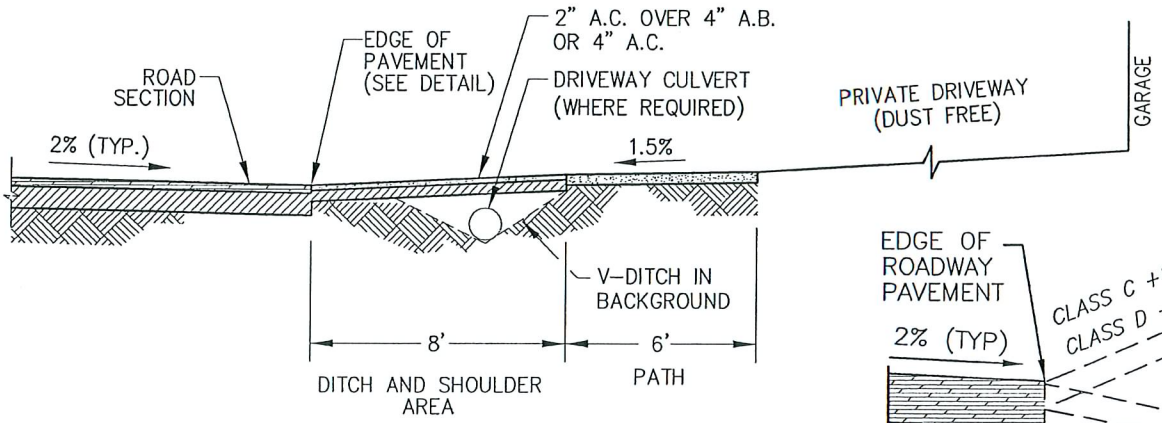
4-37



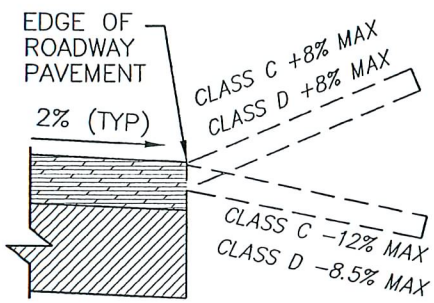
CLASS A



CLASS C



CLASS D



EDGE OF PAVEMENT DETAIL

NOTES:

1. *SEE SACRAMENTO COUNTY IMPROVEMENT STANDARDS SECTION 4-11 FOR DRIVEWAY REQUIREMENTS.*
2. *NO CONCRETE DRIVEWAYS WITHIN 15' OF EDGE OF OF PAVEMENT WITHOUT PRIOR WRITTEN APPROVAL BY THE DIRECTOR OF COUNTY ENGINEERING.*
3. *MAXIMUM ALGEBRAIC DIFFERENCE OF A GRADE CHANGE BETWEEN ANY INTERSECTING ROADWAY AND A DRIVEWAY AND OR ANY PORTION OF PUBLIC RIGHT OF WAY AND A DRIVEWAY SHALL NOT BE GREATER THAN 10% (SEE EDGE OF PAVEMENT DETAIL).*

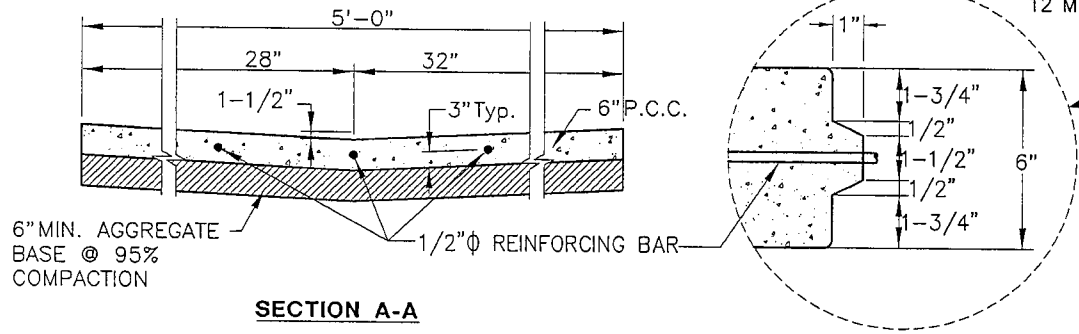
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

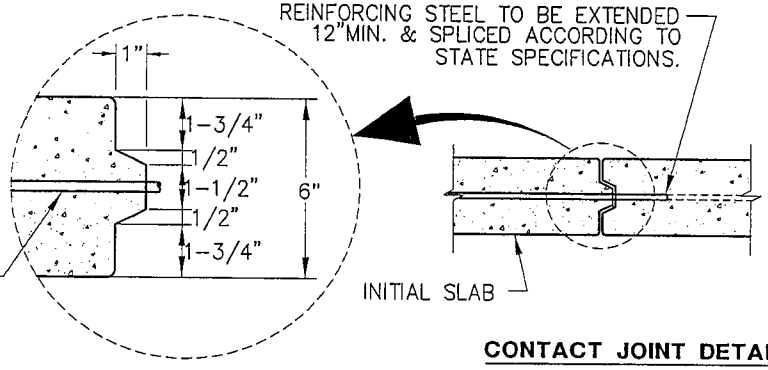
RESIDENTIAL DRIVEWAY SECTIONS: CLASS A, CLASS C AND D STREETS

SCALE: NONE
DATE: 06/11/2009
DRAWN BY: TRU P.

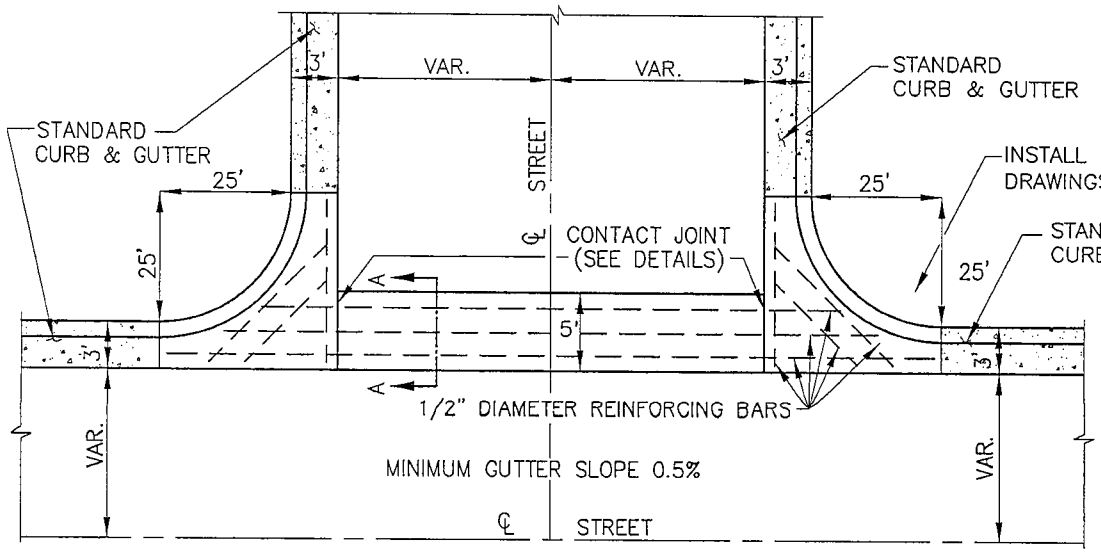
4-38



SECTION A-A



CONTACT JOINT DETAIL



PLAN

CHIEF, DEPT. OF TRANSPORTATION

NOTE:

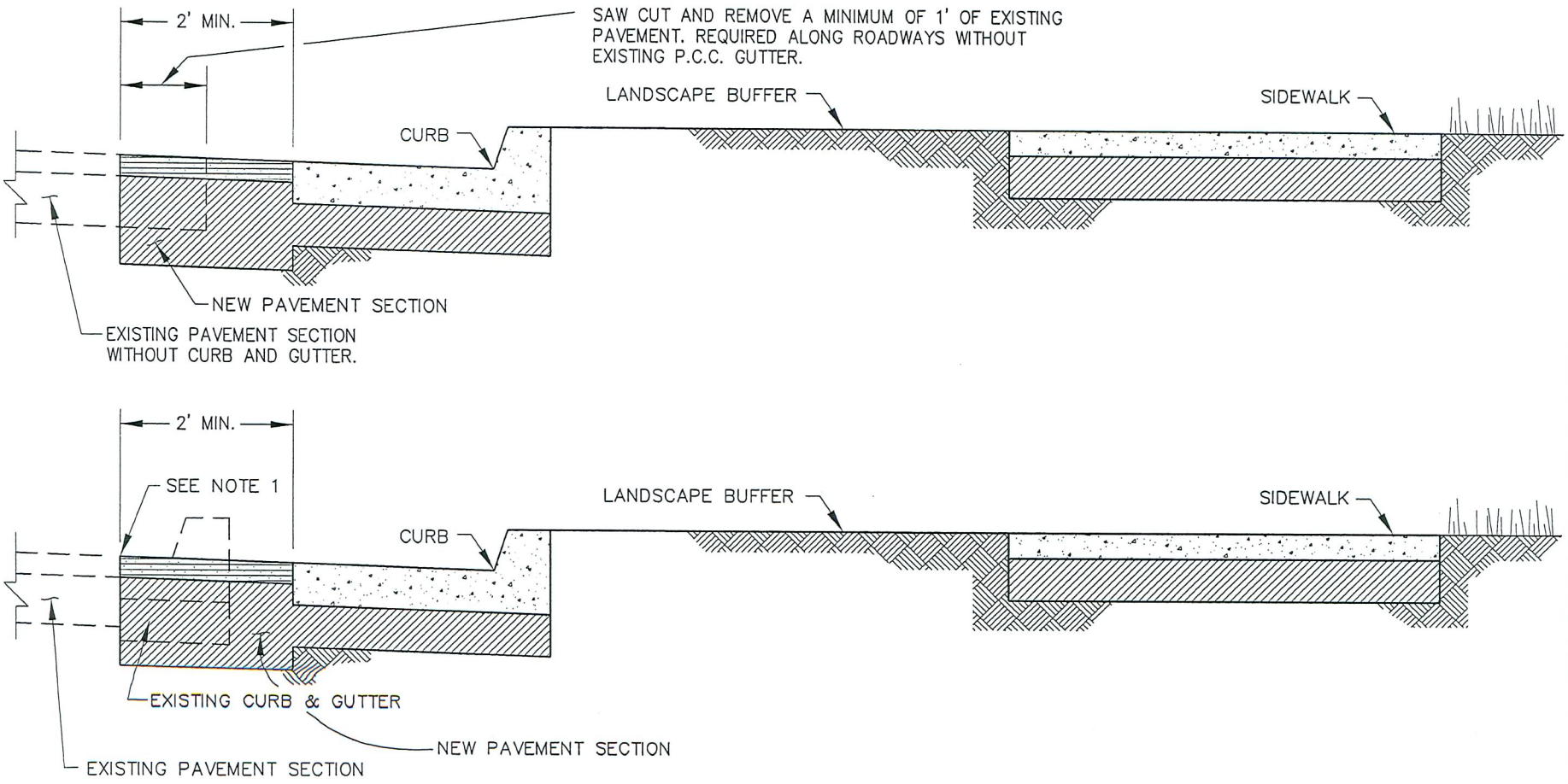
CROSS GUTTERS ARE NOT ALLOWED WITHIN A SIGNALIZED INTERSECTION.

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

CROSS GUTTER

SCALE: NONE
DATE: 09/02/2008
DRAWN BY: TRU P.

4-40



NOTE:

1. *SAW CUT AT EDGE OF PAVEMENT PRIOR TO REMOVAL OF EXISTING GUTTER. IF CONDITION OF EXISTING PAVEMENT AT EXISTING LIP OF GUTTER IS UNACCEPTABLE FOR PAVEMENT WIDENING, SAW CUT AND REMOVE ADDITIONAL PAVEMENT WIDTH AS DIRECTED BY THE ENGINEER.*

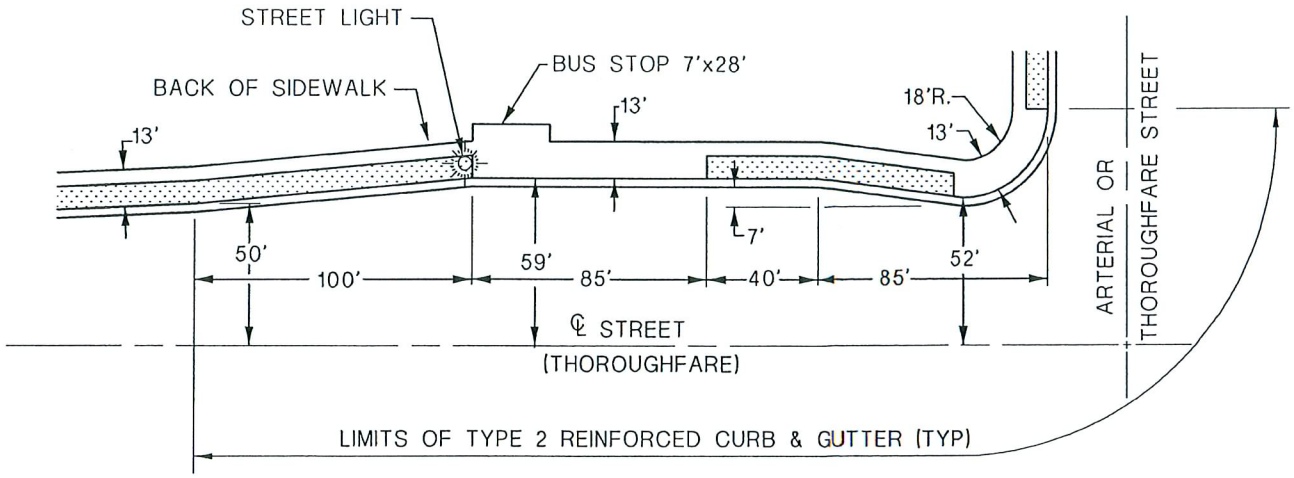
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

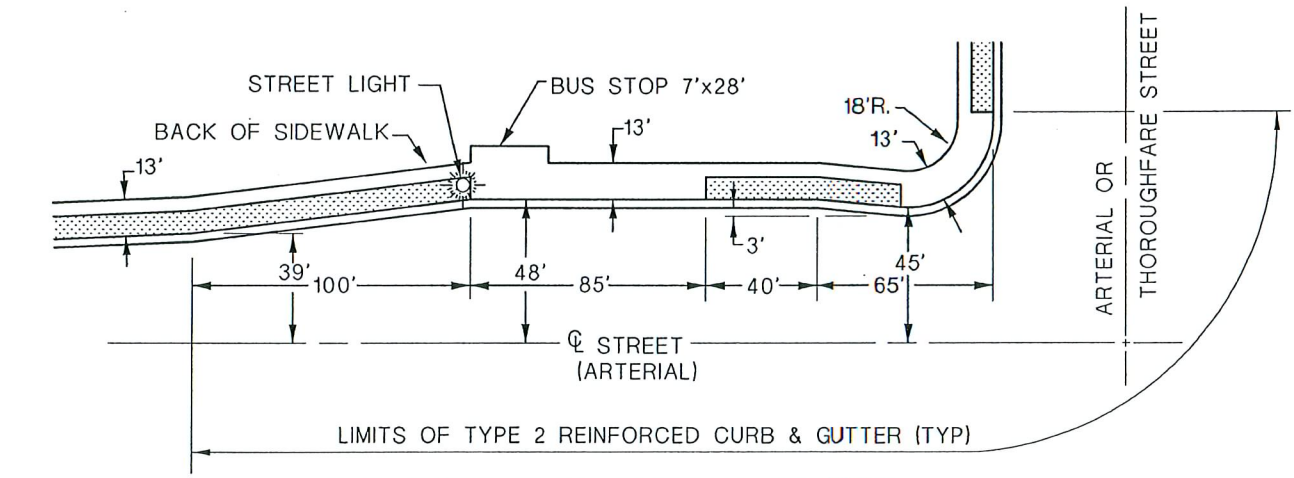
PAVEMENT WIDENING DETAIL

SCALE: NONE
DATE: 01/21/09
DRAWN BY: TRU P. & B.R.

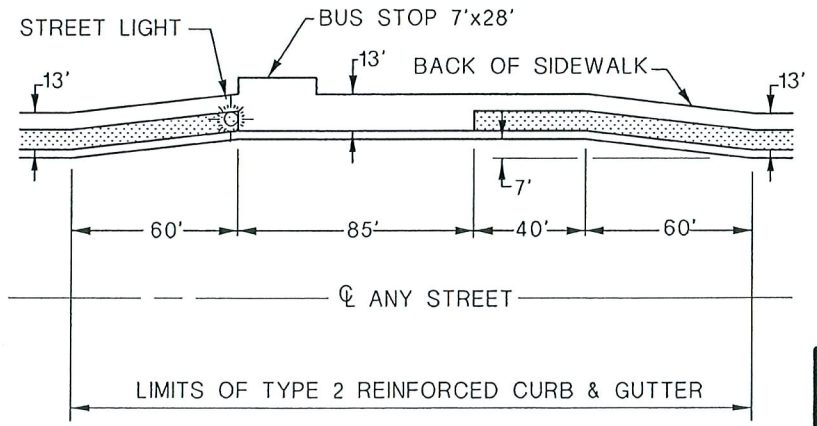
4-42



BUS TURNOUT ON THOROUGHFARE STREETS



BUS TURNOUT ON ARTERIAL STREETS



TYPICAL MID-BLOCK BUS TURNOUT

CHIEF, DEPT. OF TRANSPORTATION

NOTES:

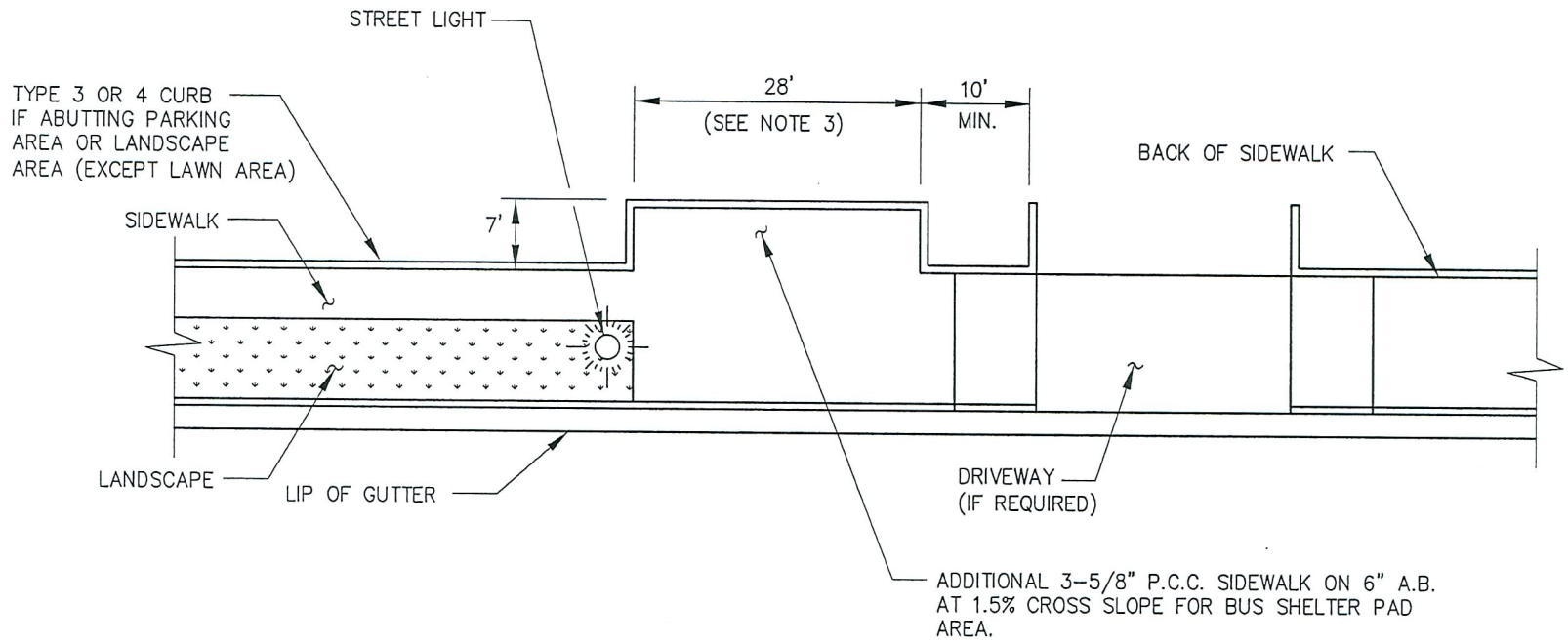
1. *SEE DRAWINGS 4-6 THRU 4-8, 4-10, 4-12 THRU 4-14 FOR ADDITIONAL BUS STOP GEOMETRY.*
2. *USE SIMILAR LIMITS FOR REINFORCED TYPE 2 CURB ALONG BUS STOPS ON ARTERIAL AND THOROUGHFARE STREETS THAT INTERSECT WITH COLLECTOR STREETS.*

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

BUS TURNOUTS

SCALE: NONE
DATE: 07/15/09
DRAWN BY: TRU P.

4-43



NOTES:

1. *FOR BUS STOPS WITHOUT TURNOUTS, TYPE 2 REINFORCED CURB & GUTTER SECTION SHALL BE USED FOR 100' EACH SIDE OF BUS STOP SIGN.*
2. *SEE STANDARD DRAWING 4-43 FOR APPLICATIONS OF TYPE 2 REINFORCED CURB & GUTTER AT BUS STOP TURNOUTS.*
3. *PAD LENGTH MAY BE 14' AT MINOR STREET INTERSECTIONS & MID BLOCK LOCATIONS.*

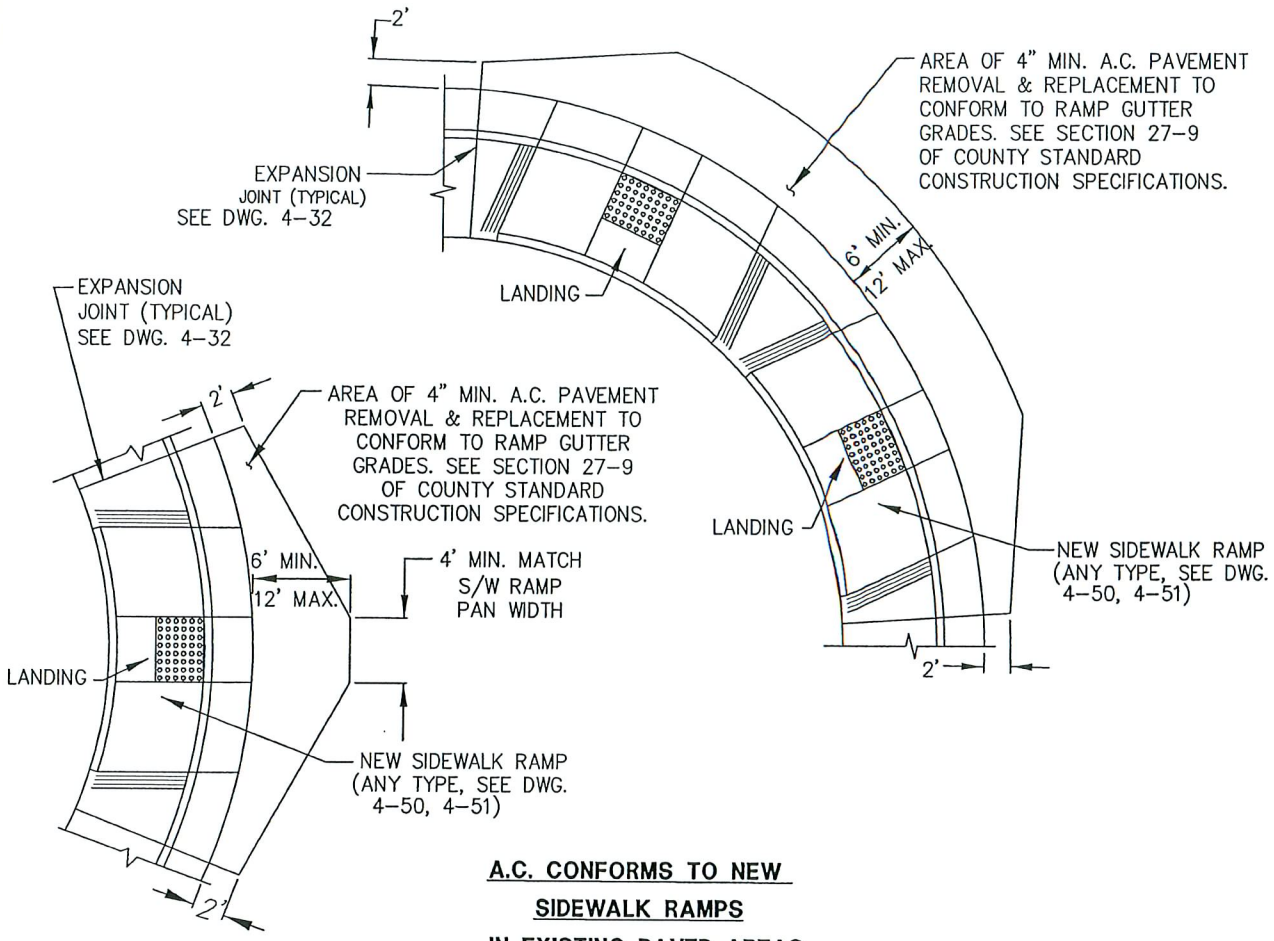
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

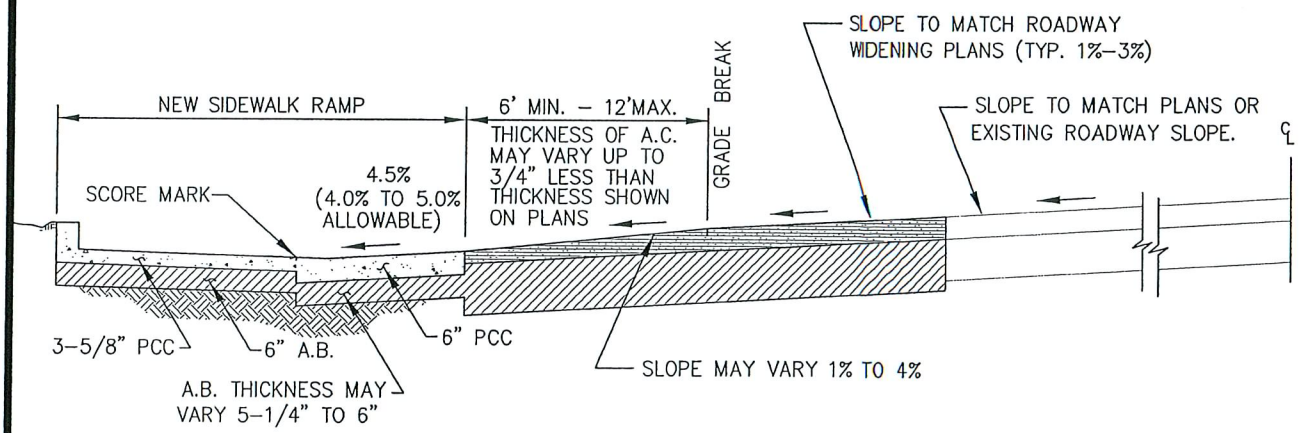
BUS STOP DETAILS

SCALE: NONE
DATE: 06/08/09
DRAWN BY: TRU P.

4-44



A.C. CONFORMS TO NEW SIDEWALK RAMPS IN EXISTING PAVED AREAS.



A.C. CONFORMS TO NEW SIDEWALK RAMPS WITH PAVEMENT WIDENING OR ROADWAY CONSTRUCTION

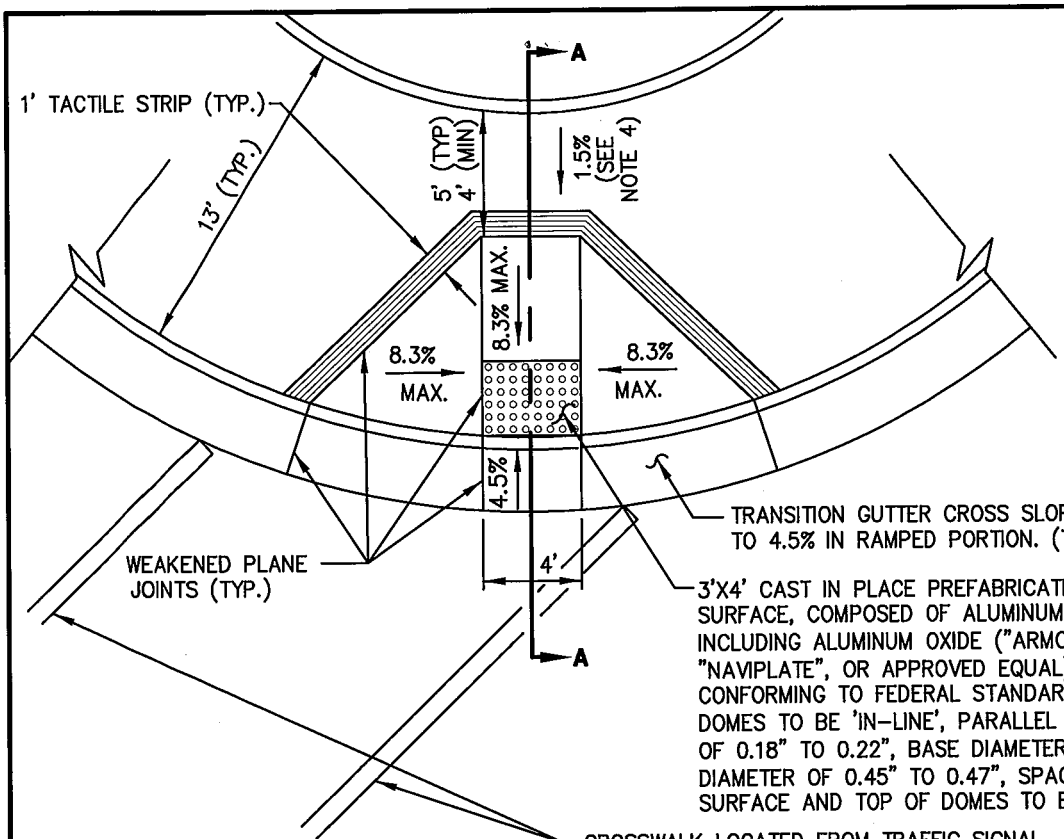
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

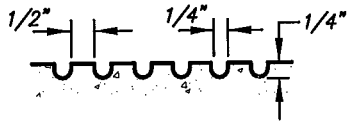
SIDEWALK RAMP INSTALLATION DETAIL - AC CONFORMS IN EXISTING PAVEMENT

SCALE: NONE
DATE: 01/09/09
DRAWN BY: TRU P. & B.R.

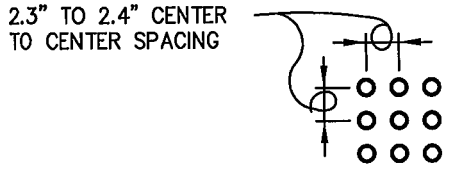
4-49



SECTION A-A
N.T.S.



TACTILE STRIP GROOVE DETAIL



RAISED TRUNCATED DOME PATTERN (IN-LINE)
N.T.S.

CHIEF, DEPT. OF TRANSPORTATION

NOTES:

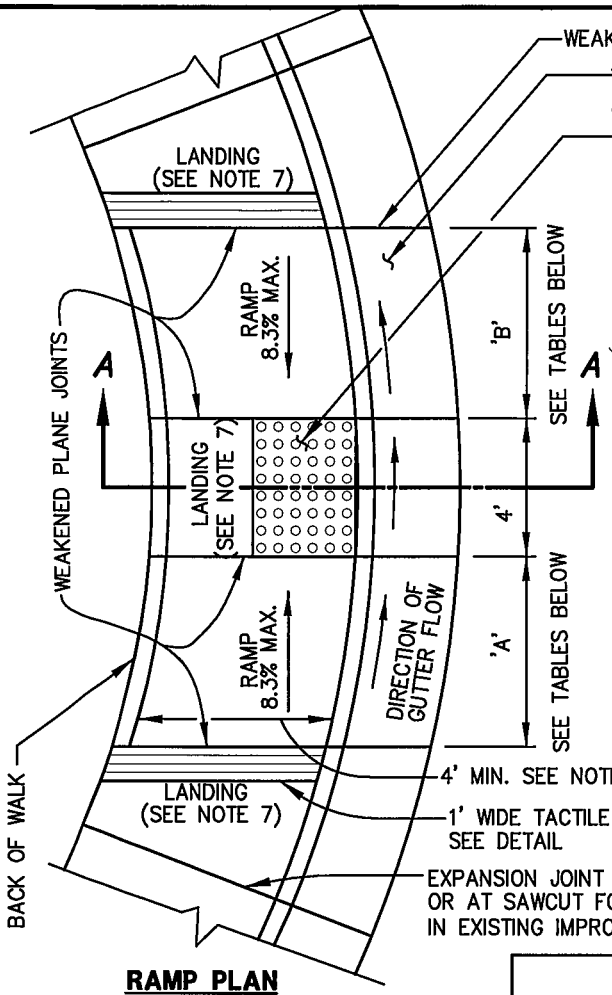
1. *SEE DWG. 4-51 TO 4-56 FOR RAMP PLACEMENT REQUIREMENTS.*
2. *NO PULL BOX, UTILITY VAULT, UTILITY POLE, MANHOLE, TRAFFIC SIGNAL POLE, OR SIMILAR APPURTENANCE SHALL BE LOCATED WITHIN SIDEWALK RAMP AREA.*
3. *IT IS DESIRABLE TO LOCATE ALL DRAIN INLETS OUT OF SIDEWALK RAMP AREA. USE OF DRAIN INLET WITHIN RAMP AREA REQUIRES SPECIAL DESIGN OF INLETS.*
4. *SLOPE OF LANDING AT TOP OF RAMP TO BE 1.5% (1.0% MIN, 2.0% MAX) TOWARDS RAMP, AND 2.0% MAX IN ALL OTHER DIRECTIONS.*

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

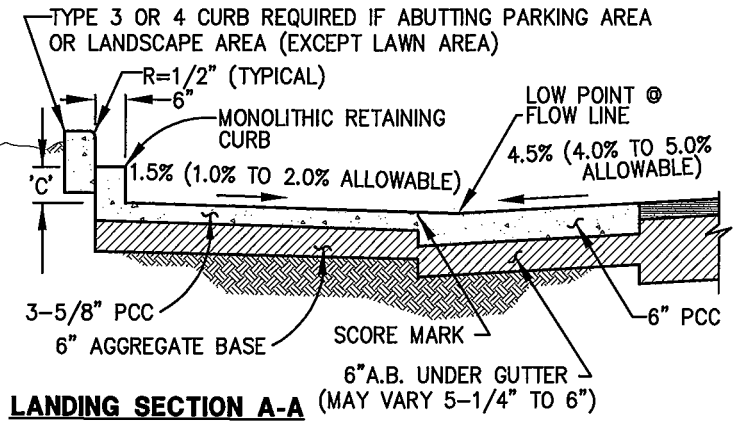
SIDEWALK RAMP DETAILS PLAZA STYLE

SCALE: NONE
DATE: 11/20/2015
DRAWN BY: DANIEL L.

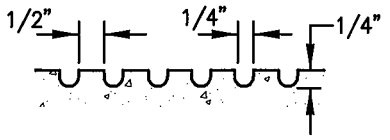
4-50



RAMP PLAN



LANDING SECTION A-A



TACTILE STRIP GROOVE DETAIL

TYPE 2 CURB			
SLOPE OF GUTTER		APPROX. RAMP LENGTH	
FROM (%)	TO (%)	A	B
0.5%	1.0%	7'-6"	6'-0"
1.0%	1.5%	8'-0"	6'-0"
1.5%	1.8%	8'-6"	5'-6"
1.8%	2.1%	9'-0"	5'-6"
2.1%	2.7%	10'-0"	5'-0"
2.7%	3.2%	11'-0"	5'-0"
3.2%	3.7%	12'-6"	4'-6"
3.7%	4.1%	14'-0"	4'-6"
4.1%	4.7%	15'-0"	4'-6"
> 4.7%		SEE NOTE #4	

TYPE 1A CURB			
SLOPE OF GUTTER		APPROX. RAMP LENGTH	
FROM (%)	TO (%)	A	B
0.5%	1.0%	4'-6"	4'-0"
1.0%	1.7%	5'-0"	3'-6"
1.7%	2.2%	5'-6"	3'-6"
2.2%	2.7%	6'-0"	3'-0"
2.7%	3.1%	6'-6"	3'-0"
3.1%	3.4%	7'-0"	3'-0"
3.4%	3.7%	7'-6"	3'-0"
3.7%	3.9%	8'-0"	3'-0"
3.9%	4.3%	9'-0"	3'-0"
4.3%	5.0%	10'-0"	2'-6"
5.0%	6.0%	15'-0"	2'-6"
> 6.0%		SEE NOTE #4	

CURB TYPE	TYPE 1A	TYPE 2
DIM 'C' *	3-5/8"	6"

* OR AS NEEDED TO MATCH EXISTING ON SITE IMPROVEMENTS, 8" MAX.

NOTES:

1. *DIMENSION 'A' IS THE LENGTH OF THE INCLINED PORTION OF THE RAMP THAT SLOPES IN THE SAME DIRECTION AS THE FLOW OF THE GUTTER.*
2. *DIMENSION 'B' IS THE LENGTH OF THE INCLINED PORTION OF THE RAMP THAT SLOPES IN THE OPPOSITE DIRECTION AS THE FLOW OF THE GUTTER.*
3. *RAMPS SHALL HAVE A HEAVY BROOM FINISH TRANSVERSE TO THEIR SLOPE.*
4. *REQUIRES SPECIAL DESIGN APPROVAL BY THE CHIEF OF THE DEPARTMENT OF TRANSPORTATION.*
5. *NO PULL BOX, UTILITY VAULT, UTILITY POLE, TRAFFIC SIGNAL POLE, MANHOLE, OR SIMILAR APPURTENANCE SHALL BE LOCATED WITHIN SIDEWALK RAMP AREA.*
6. *FOR CURB RETURNS WITH 4' SIDEWALK SEE DRAWING 4-54.*
7. *SLOPE OF LANDINGS (AREA AT BACK OF WARNING SURFACE AND 4' EITHER SIDE OF RAMP) TO BE 1.5% (1.0% MIN, 2% MAX) TOWARDS CURB, AND 2.0% MAX IN ALL OTHER DIRECTIONS*

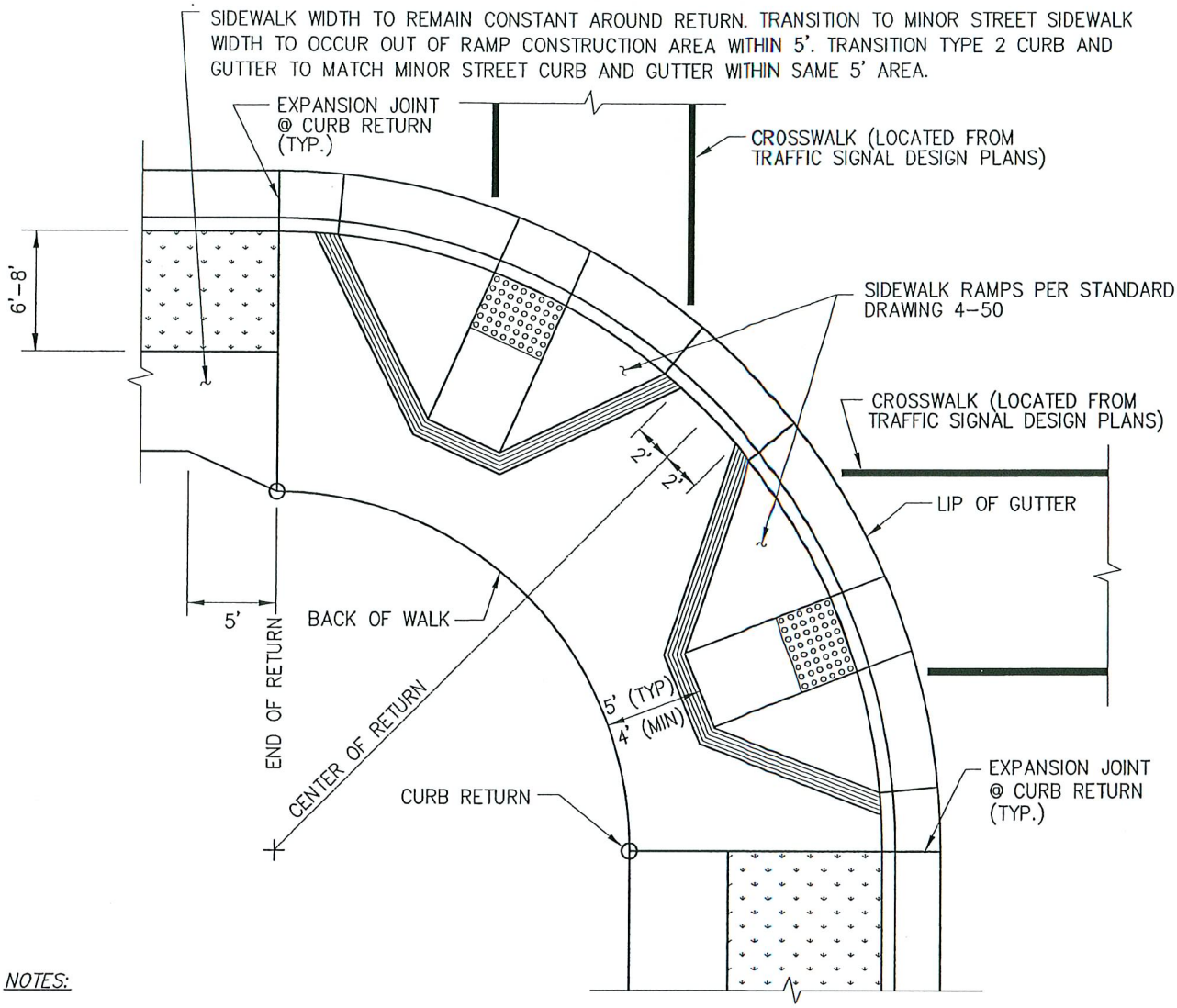
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIDEWALK RAMP DETAILS PARALLEL STYLE

SCALE: NONE
DATE: 11/2015
DRAWN BY: DANIEL L.

4-51



NOTES:

1. *AT INTERSECTIONS WITH ARTERIALS AND/OR THOROUGHFARES, THE CORNER RETURNS SHALL HAVE TWO (2) RAMPS AS SHOWN. EXCEPTIONS SEE NOTES 4 & 5.*
2. *AT INTERSECTIONS WITH NO ARTERIAL OR THOROUGHFARE STREET, SINGLE RAMPS AT THE CENTER OF THE RETURNS MAY BE USED. SEE STANDARD DRAWINGS 4-53, 4-54, 4-56, 4-57.*
3. *FULL WIDTH OF RAMP SHALL BE LOCATED WITHIN THE EXTENSION OF THE ASSOCIATED CROSSWALK STRIPES, WHERE STRIPED CROSSWALKS EXIST.*
4. *ON STREETS WITH A CONTINUOUS RAISED MEDIAN ACROSS THE INTERSECTION, A SINGLE SIDEWALK RAMP IS TO BE INSTALLED ON EACH CORNER AT THE CENTER OF RETURN.*
5. *FOR CORNERS WITH TWO STRIPED CROSSWALKS AND WITH OBSTRUCTIONS THAT PREVENT THE CONSTRUCTION OF TWO STANDARD RAMPS, A SINGLE SIDEWALK RAMP MAY BE INSTALLED CENTERED IN THE TWO CROSSWALKS. THE WIDTH OF RAMP IS TO BE 6'. THE WARNING SURFACE MATERIAL SHALL BE THREE FEET BY SIX FEET. USE OF THIS OPTION REQUIRES PRIOR WRITTEN APPROVAL BY CHIEF OF THE DEPARTMENT OF TRANSPORTATION.*

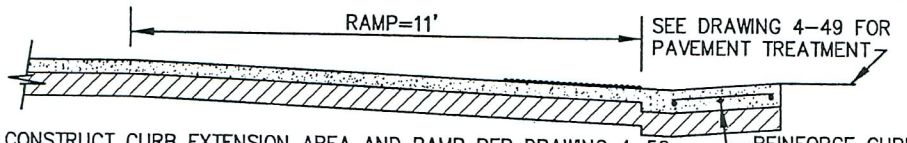
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIDEWALK RAMP PLACEMENT
MAJOR STREET INTERSECTION

SCALE: NONE
DATE: 04/02/2009
DRAWN BY: B.R. & TRU P.

4-52



CONSTRUCT CURB EXTENSION AREA AND RAMP PER DRAWING 4-50, AND INCORPORATE DIMENSIONS AND REINFORCEMENT NOTES AS INDICATED ON THIS DRAWING.

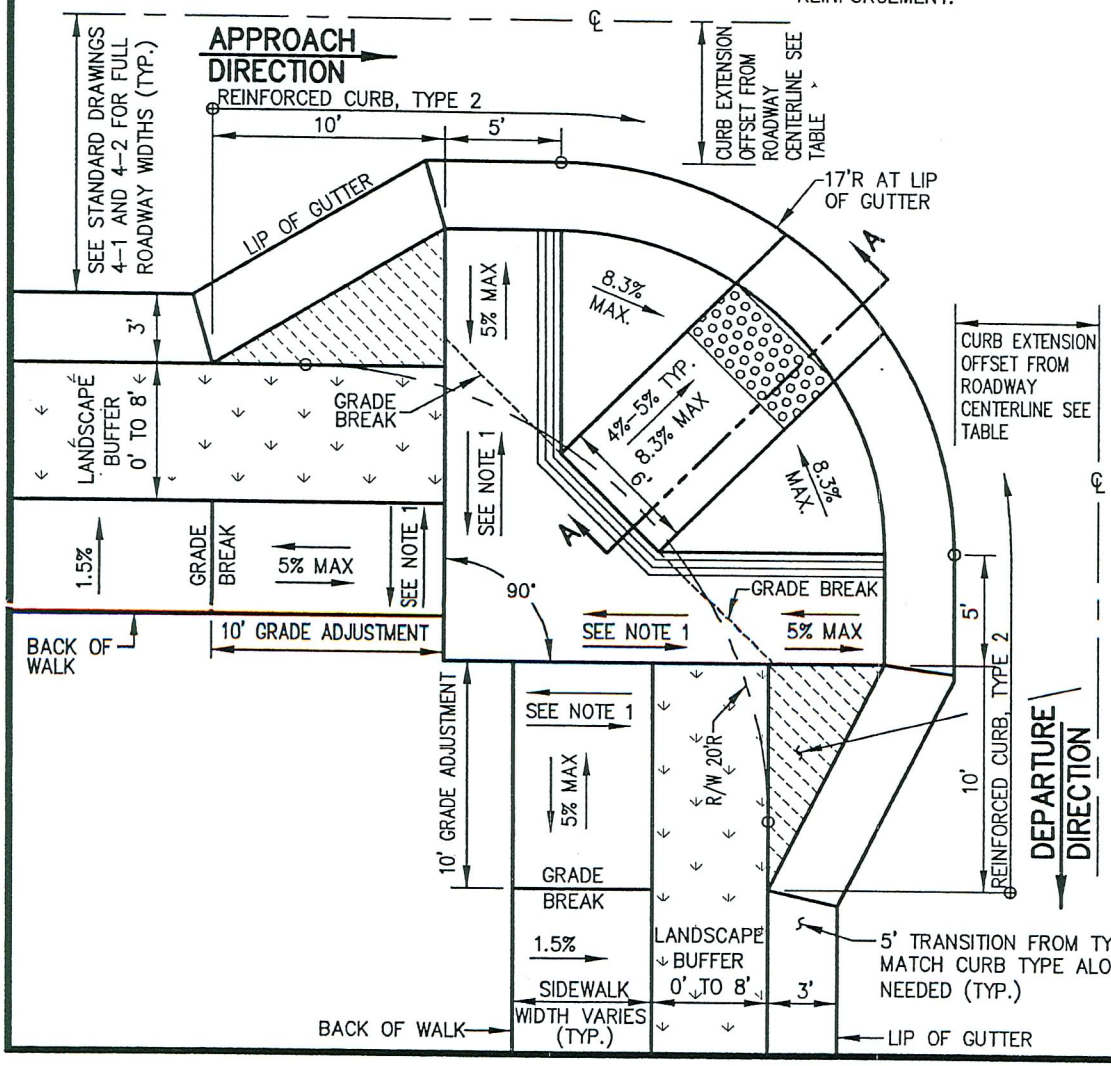
REINFORCE CURB PER TYPE 2 REINFORCED CURB NOTATIONS ON DRAWING 4-30. SEE PLAN VIEW THIS SHEET FOR AREA OF REINFORCEMENT.

SECTION 'A-A'

NO SCALE

PLAZA CONSTRUCTION NOTE

1. GRADE PLAZA AREA BEHIND RAMP AND ASSOCIATED SIDEWALK CONFORMS TO DRAIN. TYPICAL SLOPE IS 1.5% TOWARD STREET. MAXIMUM SLOPE IS 2.0% IN EITHER DIRECTION.



CURB EXTENSION OFFSETS

STREET DESIGNATION	APPROACH OFFSET	DEPARTURE OFFSET
MINOR RESIDENTIAL PRIMARY RESIDENTIAL	11'	13'
COLLECTOR	15'	15'
MAJOR COLLECTOR	22'	22'

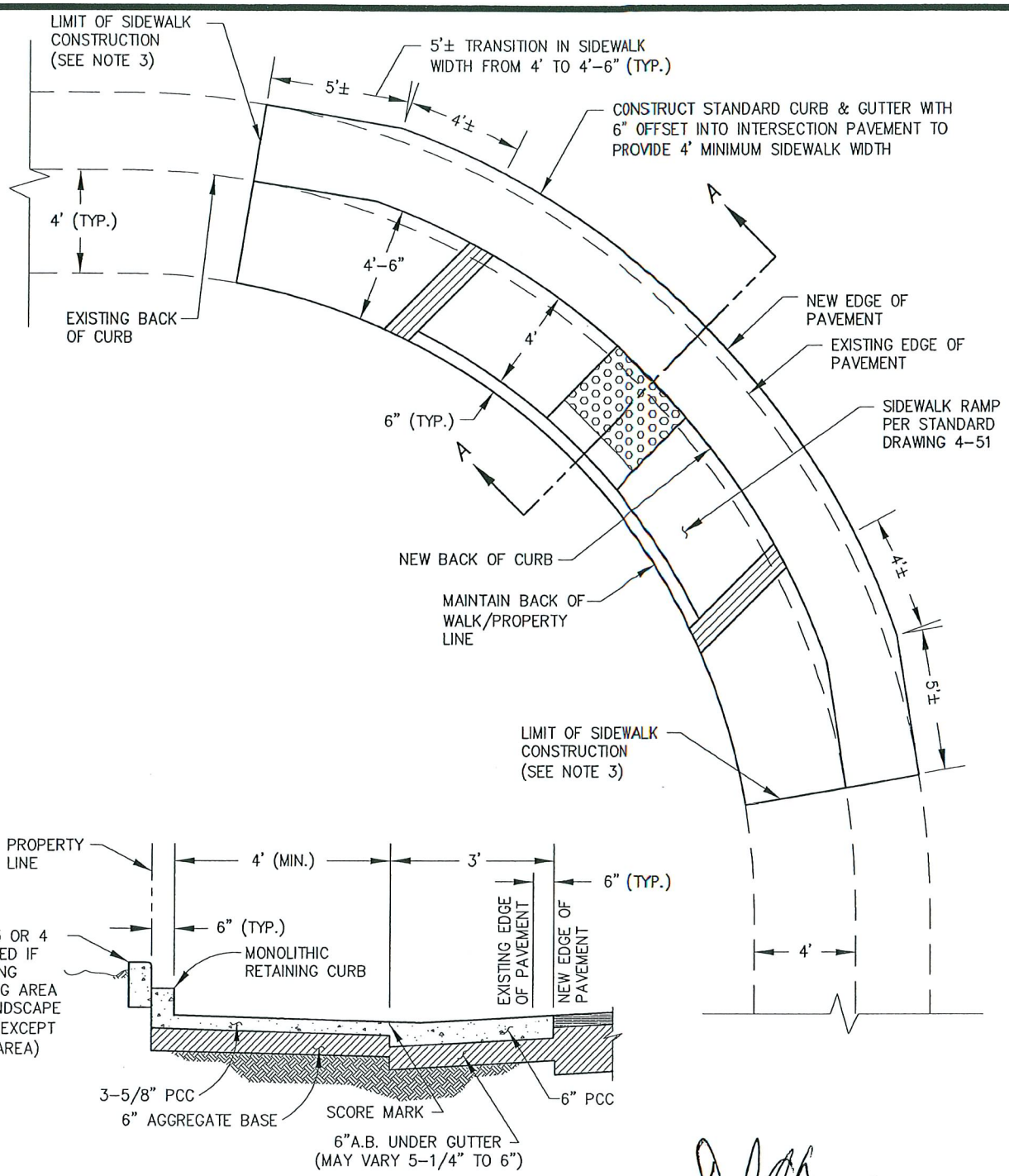
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

TYPICAL CURB EXTENSION FOR RESIDENTIAL & COLLECTOR STREETS

SCALE: NONE
DATE: 07/28/09
DRAWN BY: G. CORNEJO

4-53



LANDING SECTION A-A

NOTES:

1. *RAMPS SHALL HAVE A HEAVY BROOM FINISH TRANSVERSE TO THEIR SLOPE.*
2. *NO PULL BOX, UTILITY VAULT, UTILITY POLE, TRAFFIC SIGNAL POLE, MANHOLE, OR SIMILAR APPURTENANCE SHALL BE LOCATED WITHIN SIDEWALK RAMP AREA.*
3. *REMOVE AND REPLACE SIDEWALK TO NEAREST JOINT (CONSTRUCTION, EXPANSION, OR WEAKENED PLANE). DOWELL TO EXISTING PER DRAWING 4-32.*
4. *ASPHALT CONCRETE RECONSTRUCTION ALONG NEW RAMP SHALL CONFORM TO DRAWING 4-49.*
5. *USE THIS DETAIL WHERE CURB EXTENSION (STANDARD DRAWING 4-53) IS NOT USED WITH PERMISSION OF DIRECTOR OF COUNTY ENGINEERING.*

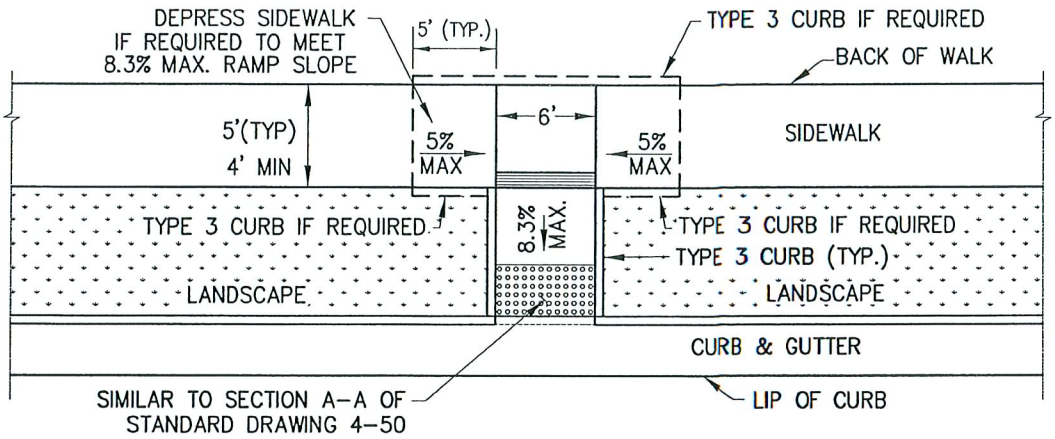
CHIEF, DEPT. OF TRANSPORTATION

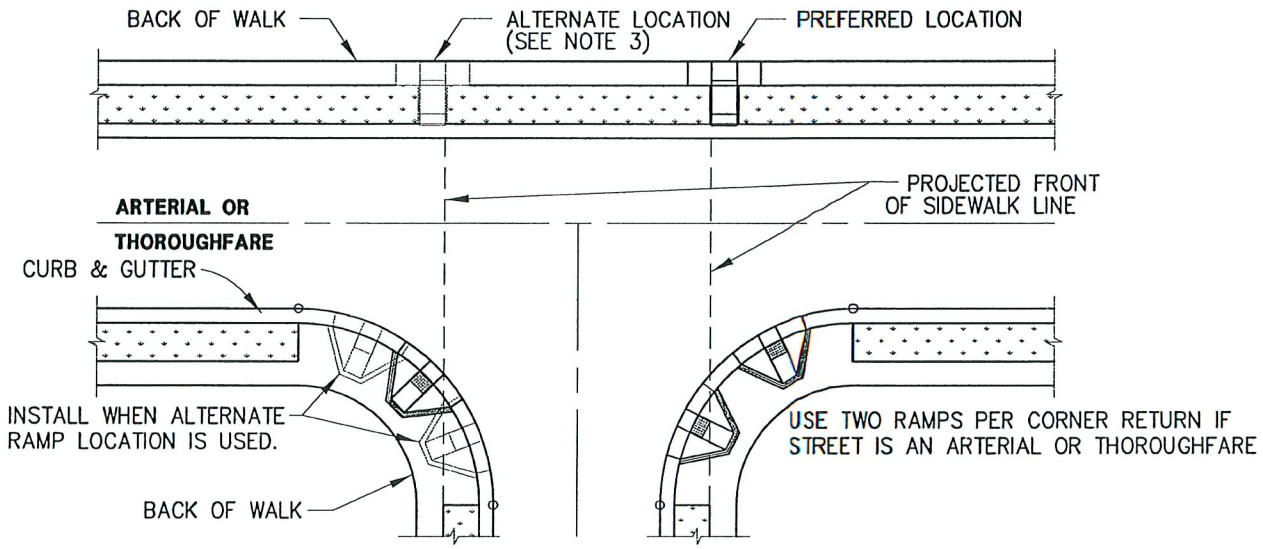
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIDEWALK RAMP DETAILS FOR RETROFIT OF EXISTING 4' WIDE SIDEWALKS

SCALE: NONE
DATE: 04/21/09
DRAWN BY: B.R.

4-54





CHIEF, DEPT. OF TRANSPORTATION

NOTES:

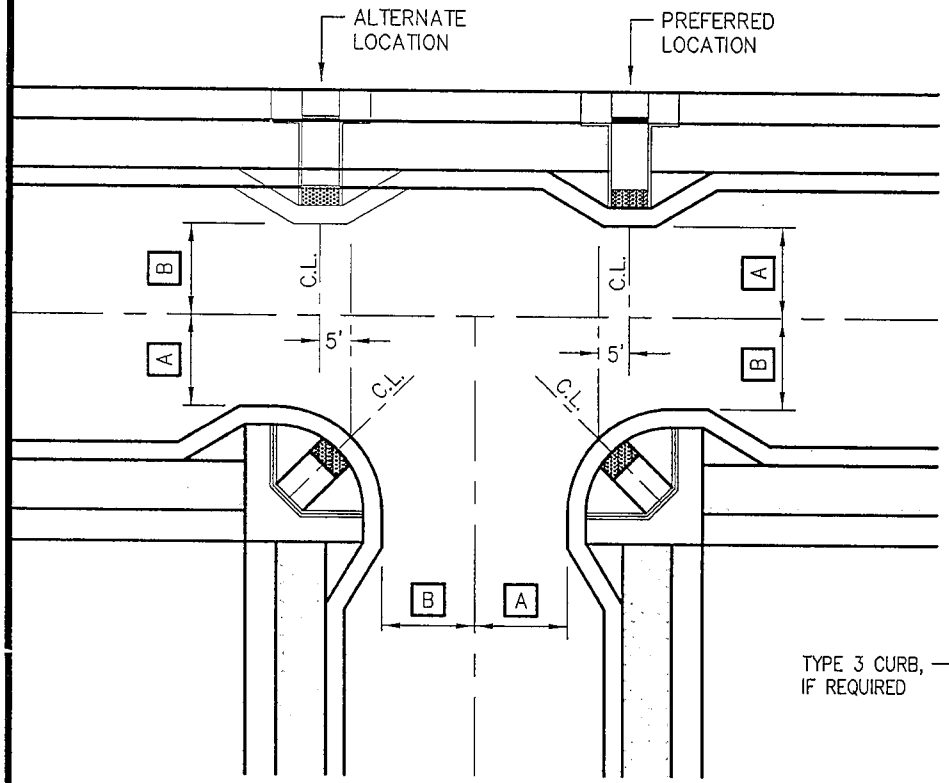
1. MARKED CROSSWALKS SHALL HAVE RAMPS AT BOTH ENDS WITH THE RAMP TERMINATING WITHIN THE MARKED CROSSWALK.
2. AT "T" INTERSECTIONS WITH UNMARKED CROSSWALKS ONLY 1 RAMP (REFERRED TO AS THE "T–RAMP") IS REQUIRED AT THE TOP OF THE "T" INTERSECTION.
3. AT "T" INTERSECTIONS ADJACENT TO SCHOOLS TWO RAMPS ARE REQUIRED AT TOP OF THE "T" WHETHER THE CROSSWALK IS MARKED OR UNMARKED
4. WHEN CROSSWALK IS UNMARKED, THE T–RAMP SHOULD BE LOCATED IN LINE WITH THE EXTENSION OF THE SIDEWALK FROM ACROSS THE STREET.
5. THIS DETAIL SHALL BE USED IN LOCATIONS WHERE NO CURB EXTENSION EXISTS.

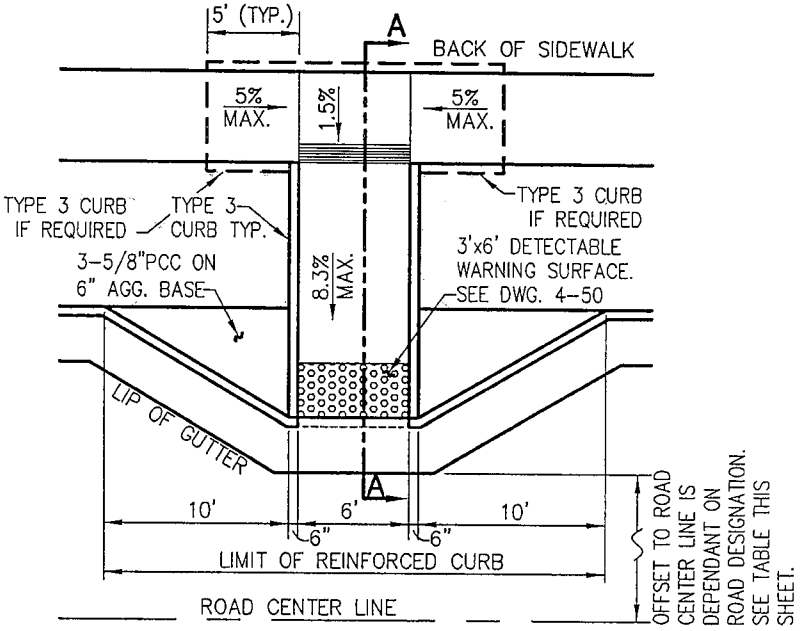
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

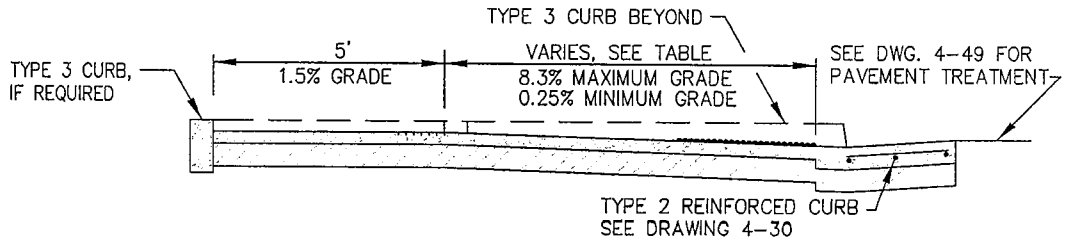
SIDEWALK RAMPS AT "T" INTERSECTIONS FOR ARTERIAL STREETS & THOROUGHFARE STREETS

SCALE: NONE
DATE: 04/01/09
DRAWN BY: TRU P. & B.R.

4-55







SECTION 'A-A'
NO SCALE

STREET DESIGNATION	A APPROACH OFFSET	B DEPARTURE OFFSET
MAJOR COLLECTOR	22'	22'
COLLECTOR	15'	15'
MINOR RESIDENTIAL AND PRIMARY RESIDENTIAL	11'	13'

SEE DWG. 4-53 FOR TYPICAL CORNER EXTENSION DESIGN.

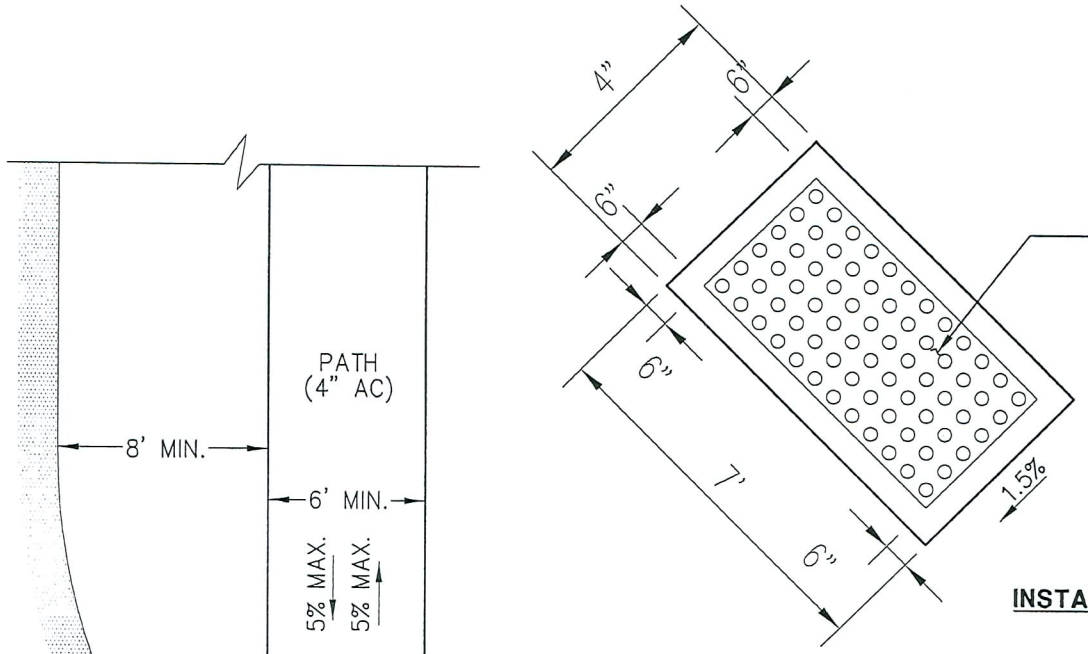
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

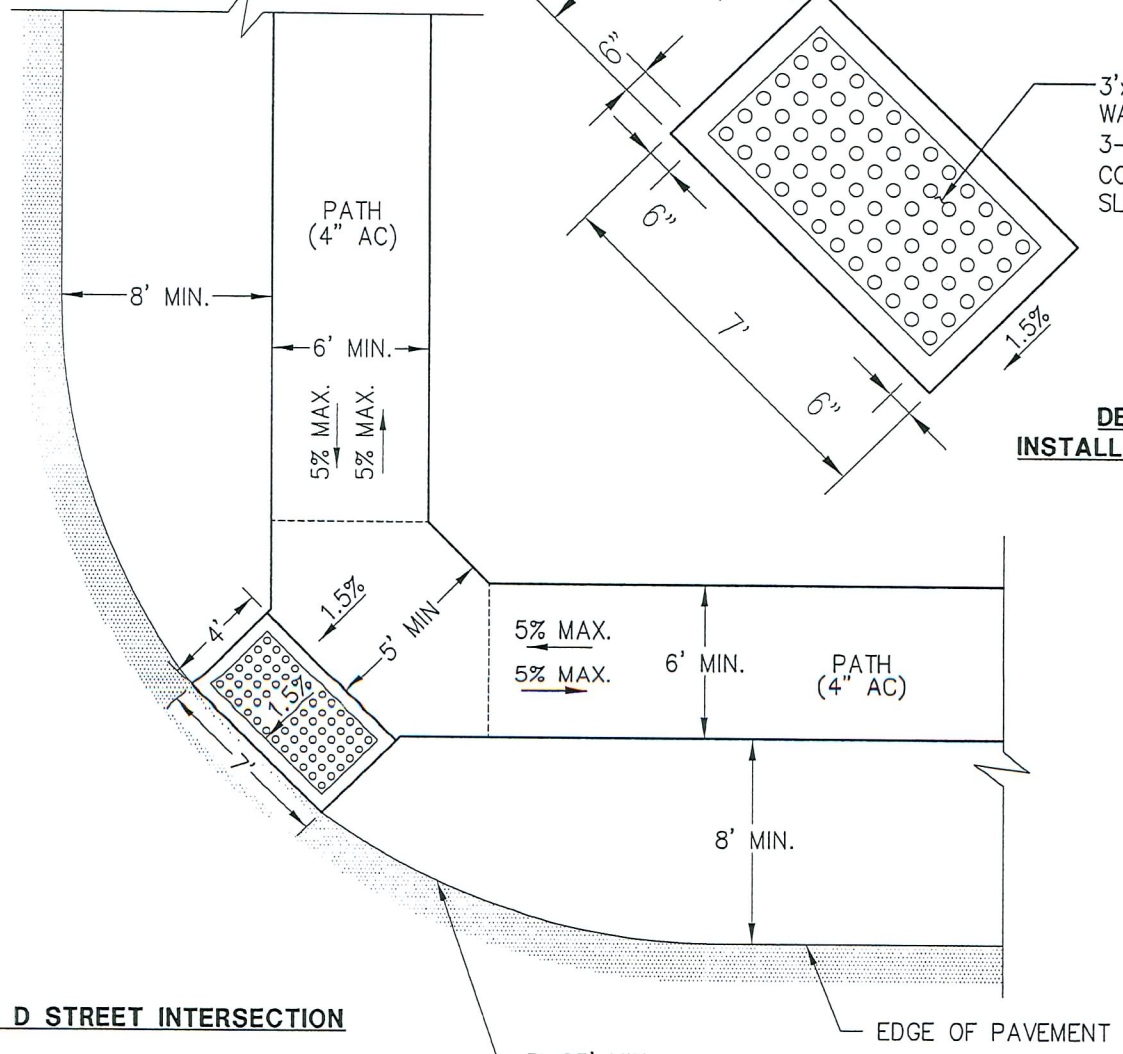
SIDEWALK RAMPS AT "T" INTERSECTIONS FOR RESIDENTIAL STREETS & COLLECTOR STREETS

SCALE: NONE
DATE: 01/22/09
DRAWN BY: G. CORNEJO

4-56



DETECTABLE WARNING SURFACE INSTALLATION DETAIL AT AC PED LANDINGS



CLASS D STREET INTERSECTION

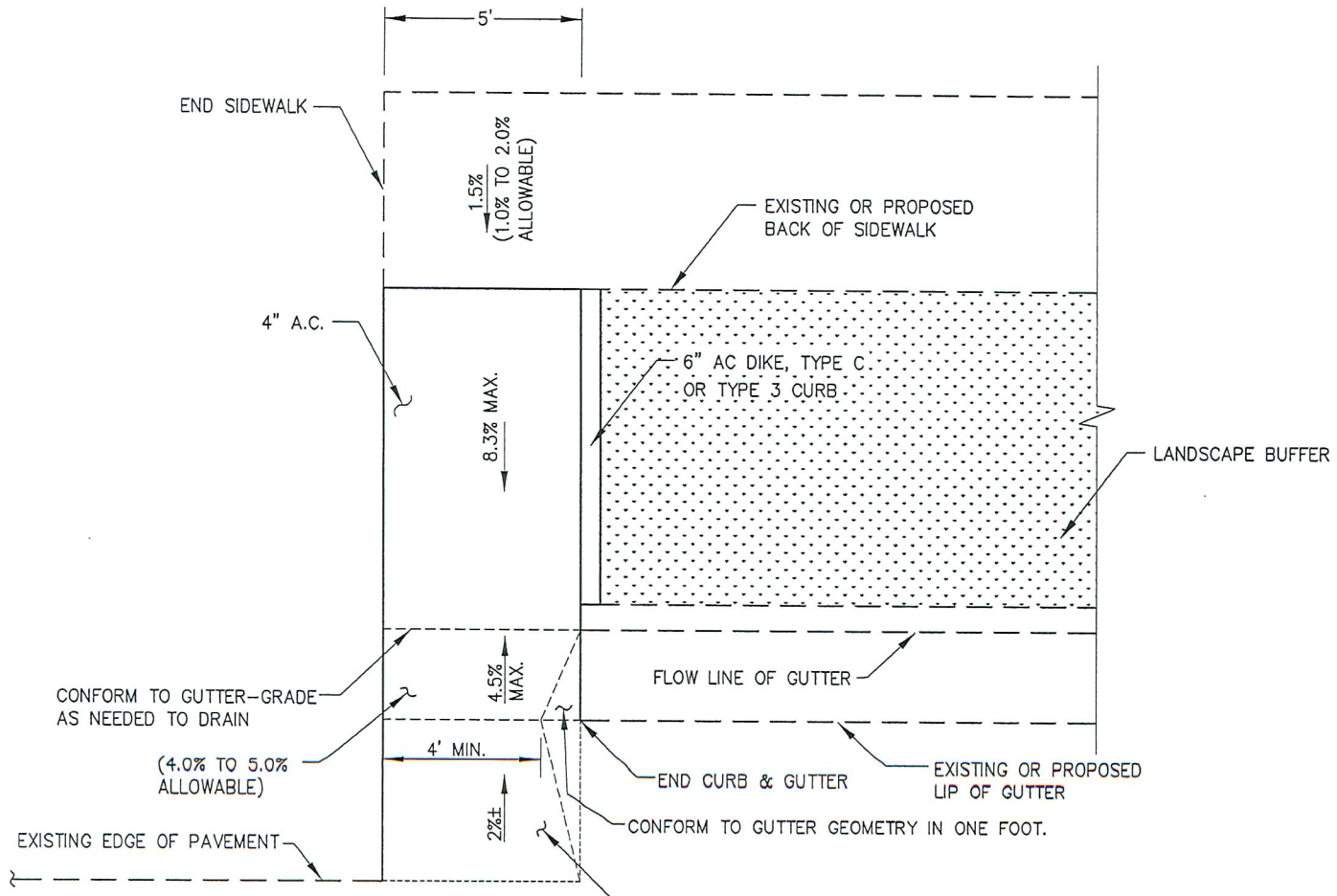
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

PEDESTRIAN LANDINGS AT CLASS D STREETS

SCALE: NONE
DATE: 04/01/2009
DRAWN BY: J.S.

4-57



NOTE: A SIDEWALK BARRICADE SHALL BE REQUIRED IF THE END OF THE A.C. SIDEWALK CONFORM ABUTS A DRAINAGE DITCH OR ANY OTHER SURFACE THAT WOULD POSE A HAZARD TO PEDESTRIANS.

SEE DWG. 4-62 FOR ROADSIDE NARROWING STANDARDS

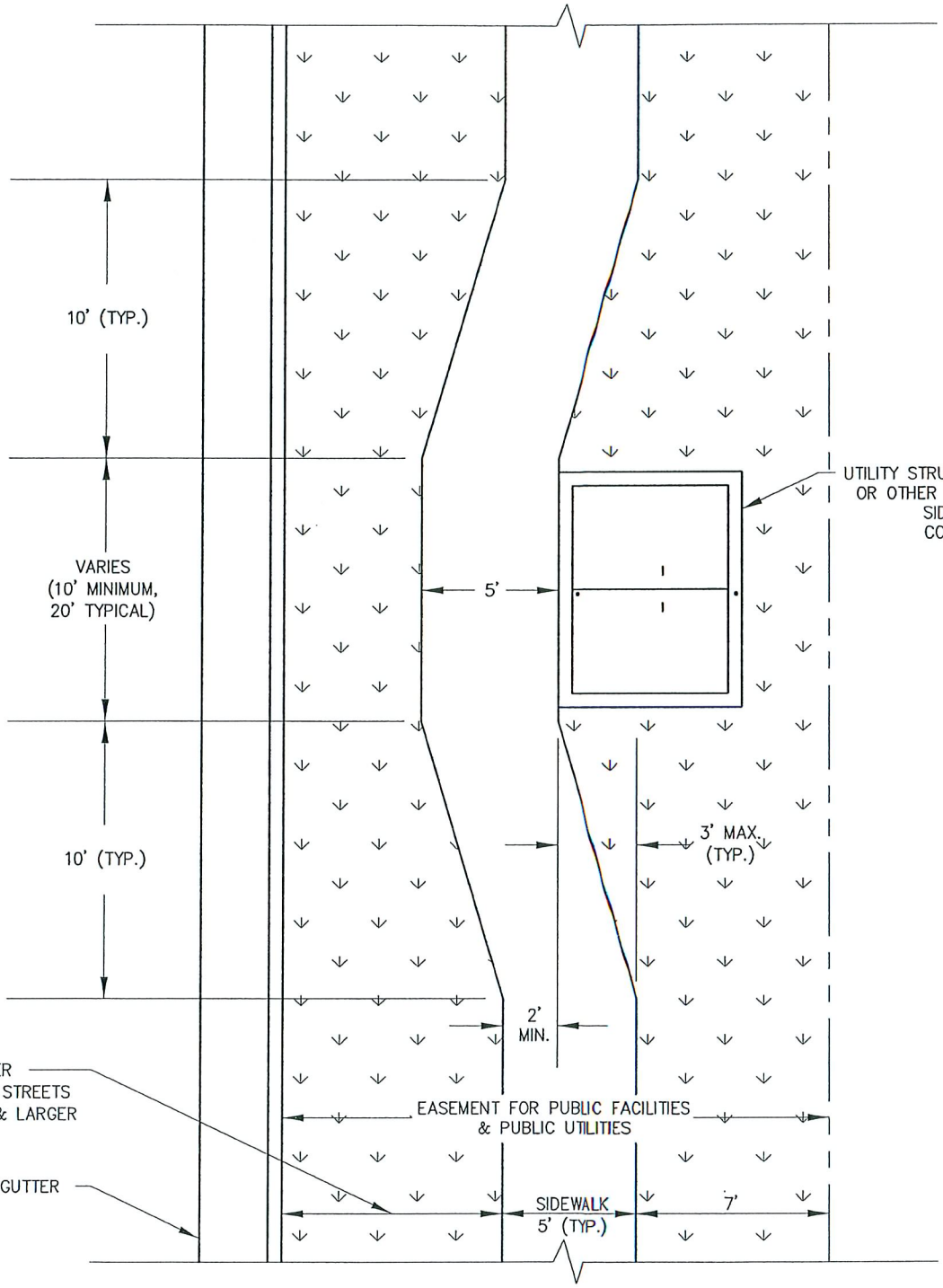
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIDEWALK CONFORM END OF SEPARATED SIDEWALK

SCALE: NONE
DATE: 04/01/09
DRAWN BY: B.R. & TRU P.

4-59



NOTES:

1. *THIS DETAIL IS TO BE USED TO RESOLVE CONFLICTS BETWEEN SEPARATED SIDEWALKS AND UTILITY STRUCTURES (OR OTHER MAJOR CONFLICTS).*
2. *WHERE REASONABLY POSSIBLE, LOCATE UTILITY FACILITIES OUTSIDE OF SIDEWALK AREA OR WITHIN SIDEWALK AT SIDEWALK GRADE TO MINIMIZE USE OF THIS DETAIL.*
3. *INSTALL EXPANSION JOINTS ACROSS FULL WIDTH OF SIDEWALK ON BOTH SIDES OF THE UTILITY STRUCTURE (OR OTHER MAJOR CONFLICTING FACILITY).*

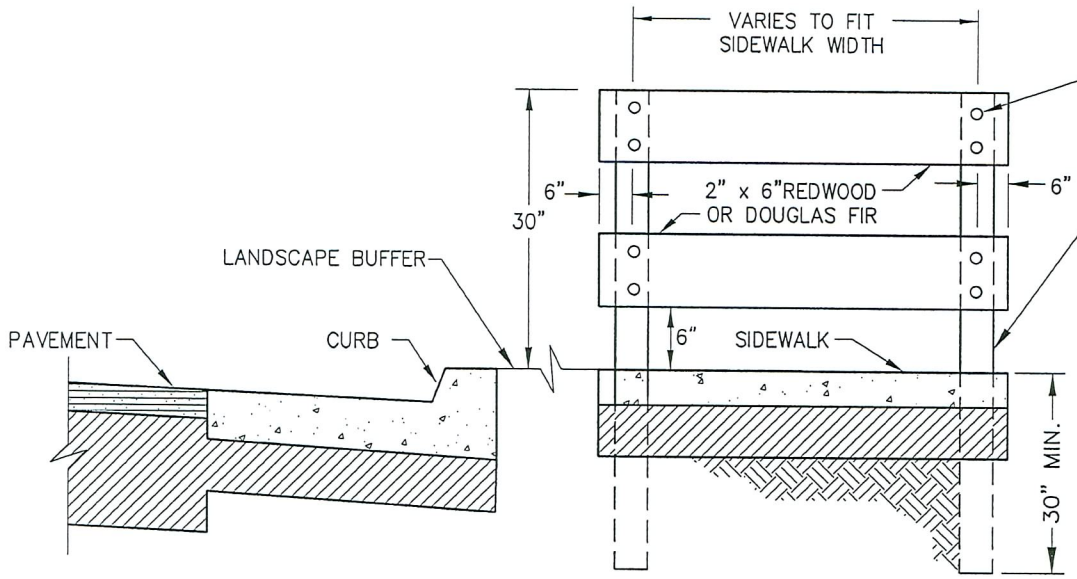
CHIEF, DEPT. OF TRANSPORTATION

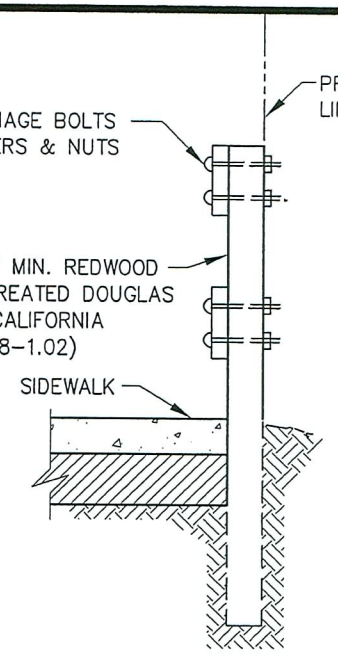
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

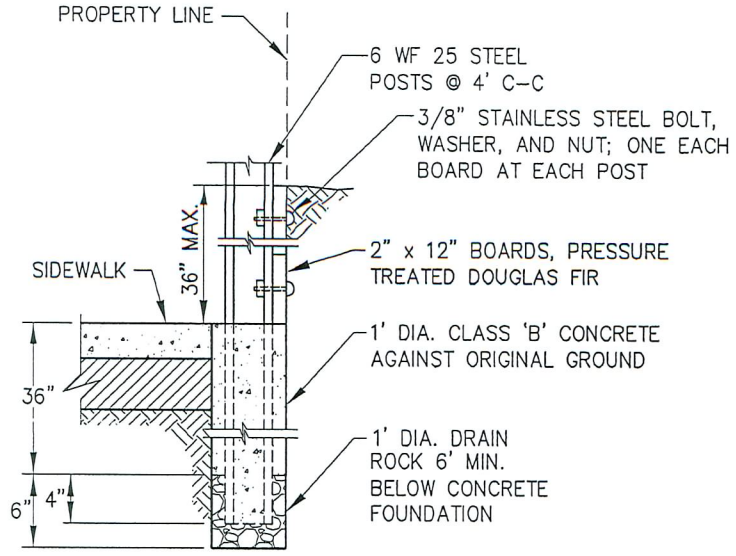
SIDEWALK FLAIR AT UTILITY STRUCTURE OR OTHER MAJOR CONFLICT

SCALE: NONE
DATE: 05/29/09
DRAWN BY: B.R.

4-60







DETAIL FOR SIDEWALK BARRICADE WITH RETAINING WALL

NOTES:

1. *SIDEWALK BARRICADES TO BE ERECTED AT EACH LOCATION WHERE SATISFACTORY PROVISION CAN NOT BE MADE FOR PEDESTRIAN TO CONTINUE BEYOND THE TERMINUS OF A SIDEWALK AND A HAZARD IS PRESENT.*

2. *ALL EXPOSED SURFACES TO BE PAINTED WITH TWO (2) COATS OF WHITE PAINT CONFORMING TO SECTION 91-3 OF STATE SPECIFICATIONS.*

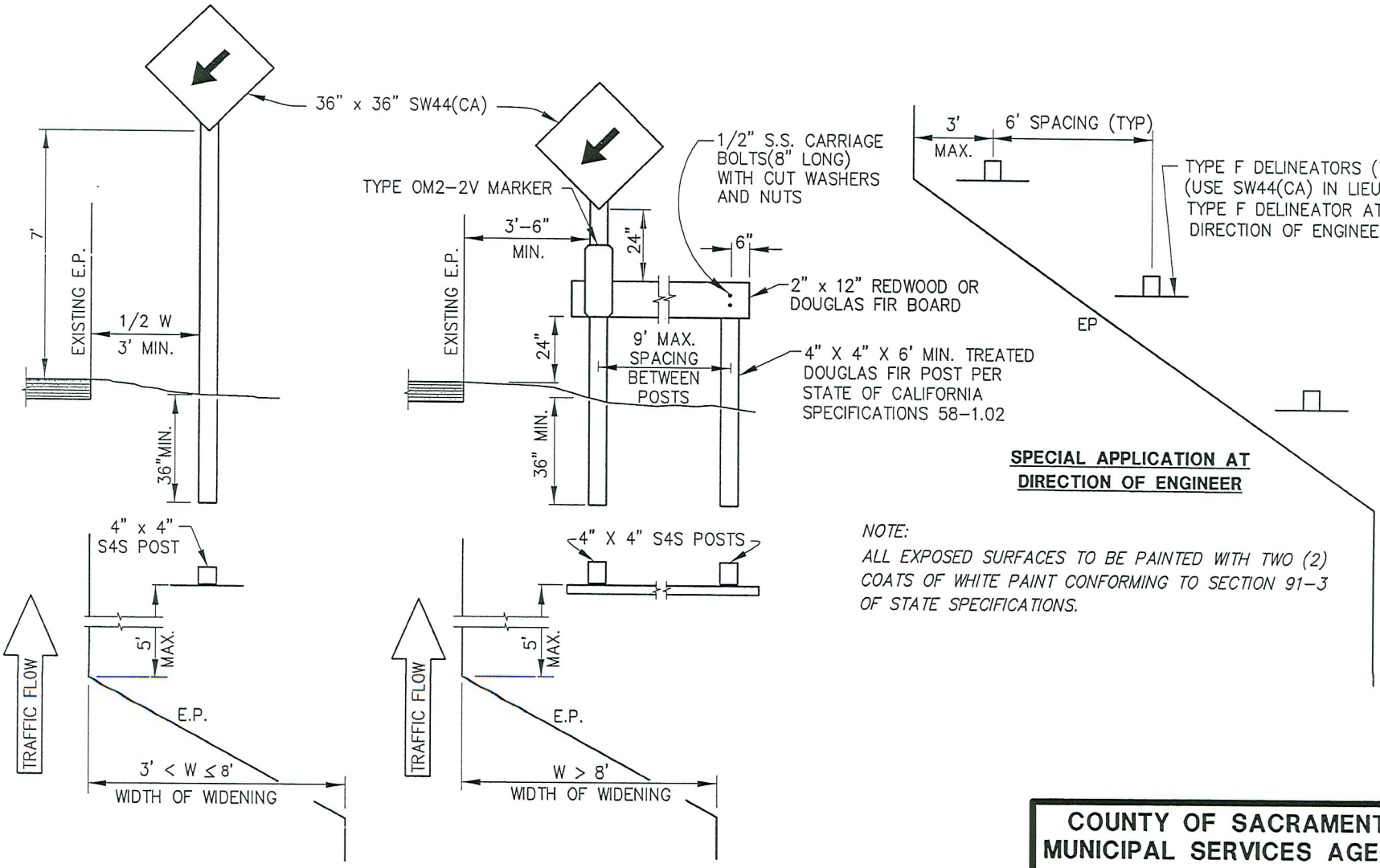
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIDEWALK BARRICADE

SCALE: NONE
DATE: 07/24/08
DRAWN BY: TRU P.

4-61



NOTE:
ALL EXPOSED SURFACES TO BE PAINTED WITH TWO (2) COATS OF WHITE PAINT CONFORMING TO SECTION 91-3 OF STATE SPECIFICATIONS.

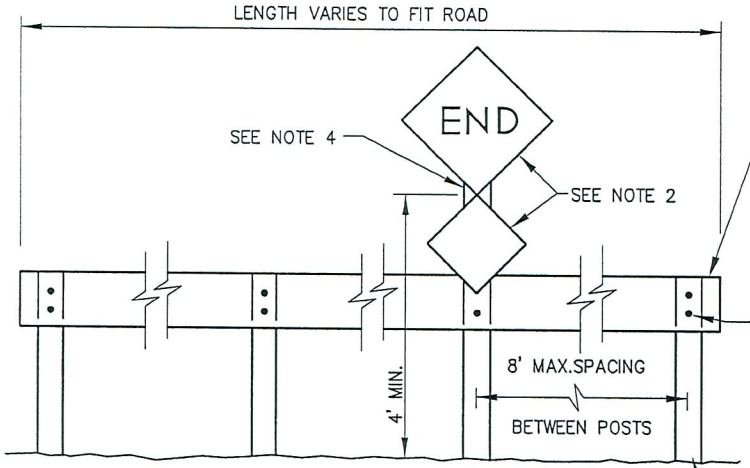
CHIEF, DEPT. OF TRANSPORTATION

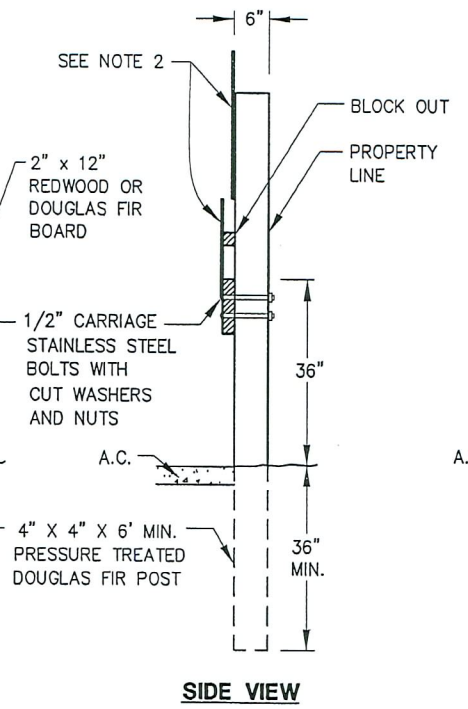
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIGNING OF LOCATIONS WITH ABRUPT CHANGE OF PAVEMENT WIDTH

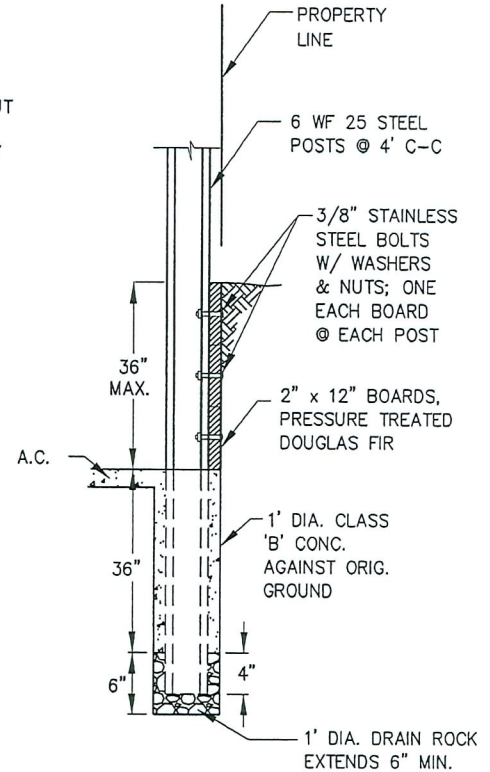
SCALE: NONE
DATE: 08/06/08
DRAWN BY: TRU P.

4-62





SIDE VIEW



STREET ENDING IN CUT WHERE SLOPE NOT OBTAINABLE

NUMBER AND SIZE OF SIGNS

PAVEMENT WIDTH	W31(CA)		OM4-3		R11-2	
	SIZE	NO.	SIZE	NO.	SIZE	NO.
26'	30"	1	18"	1	36" x 24"	1
36' – 56'	30"	1	18"	1	36" x 24"	1
66'	30"	2	18"	2	48" x 30"	1
90' – 110'	30"	3	18"	3	48" x 30"	1

NOTES:

1. *WHERE PERMISSION HAS BEEN GRANTED TO CLOSE AN EXISTING PUBLIC STREET, A R11-2 "ROAD CLOSED" SIGN MAY BE REQUIRED ON THE CENTERLINE OF THE ROAD IN ADDITION TO THE W31(CA) "END" SIGN.*
2. *30" x 30" W31(CA) SIGN AND 18" x 18" OM4-3 MARKER. BLOCK OUT AS NECESSARY FOR OM4-3 MARKER TOP MOUNTING BOLT (BOTTOM MOUNTING BOLT NORMALLY THROUGH BARRIER RAIL). OM4-3 MARKER TO HAVE SOLID RED REFLECTIVE BACKGROUND WITHOUT ADDED REFLECTORS.*
3. *ALL EXPOSED SURFACES OF BARRICADE SHALL BE PAINTED WITH WHITE PAINT CONFORMING TO STATE STANDARD SPECIFICATION 91-3.*
4. *POST AT CENTER OR NEAREST TO CENTER ON RIGHT HAND SIDE TO BE EXTENDED TO PROVIDE MOUNTING FOR SIGNS.*
5. *POSTS SHALL BE PRESSURE TREATED PER STATE SPECIFICATION 58-1.02*

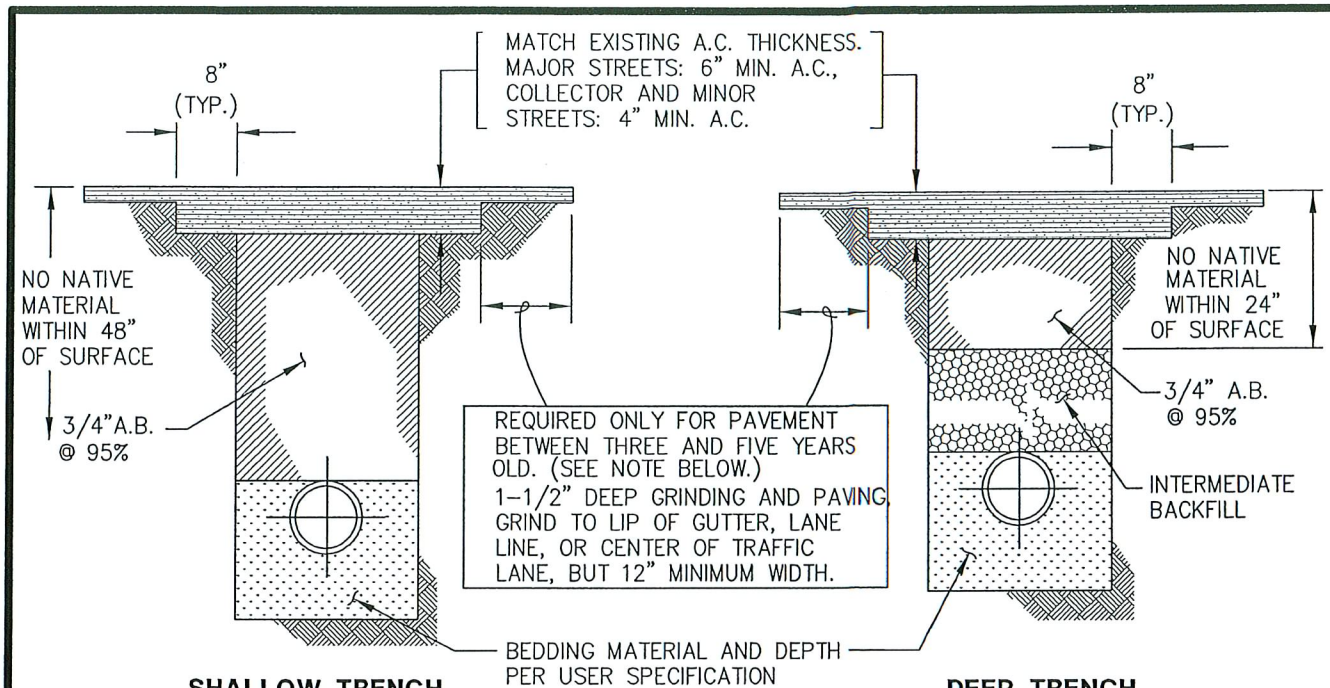
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

STREET CLOSURE BARRICADE

SCALE: NONE
DATE: 04/28/09
DRAWN BY: TRU P. & B.R.

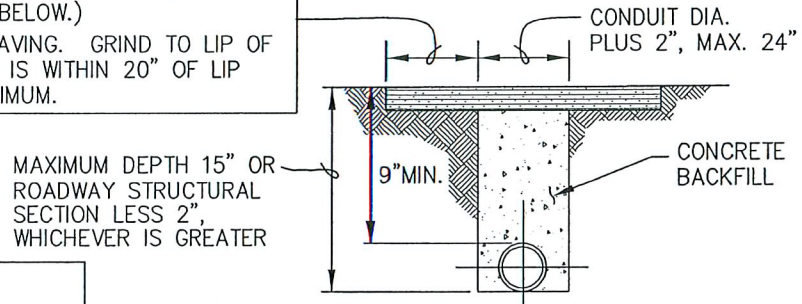
4-63



SHALLOW TRENCH
IN EXISTING PAVEMENT
(LESS THAN 4' COVER)

DEEP TRENCH
IN EXISTING PAVED AREAS
AND OTHER TRENCHING
(4' OR MORE COVER)

REQUIRED ONLY FOR PAVEMENT BETWEEN THREE AND FIVE YEARS OLD. (SEE NOTE BELOW.)
1-1/2" DEEP GRINDING AND PAVING. GRIND TO LIP OF GUTTER IF CENTER OF TRENCH IS WITHIN 20" OF LIP OF GUTTER, OTHERWISE 6" MINIMUM.

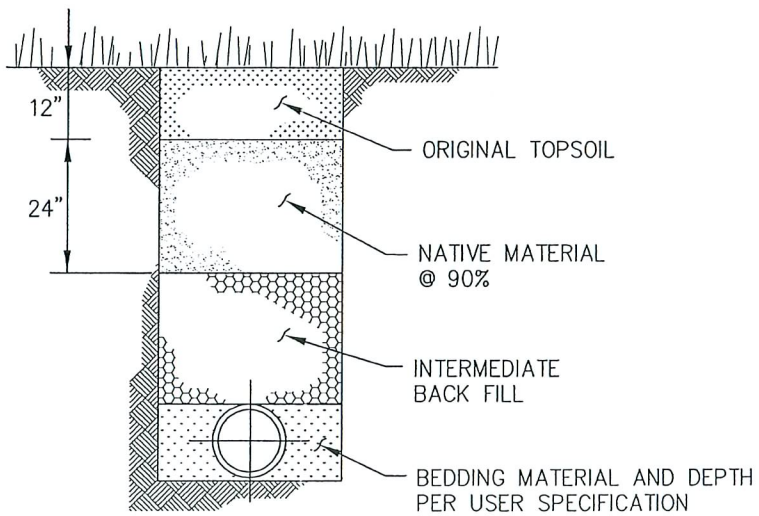


EARTH SAW
TRENCH SECTION

(SEE SECTION 49-2.02)

NOTE:

NO PAVEMENT CUTS OR TRENCHES ARE ALLOWED IN PAVEMENT LESS THAN THREE YEARS OLD.



HORTICULTURE, LAWN, OR
CULTIVATED AREAS

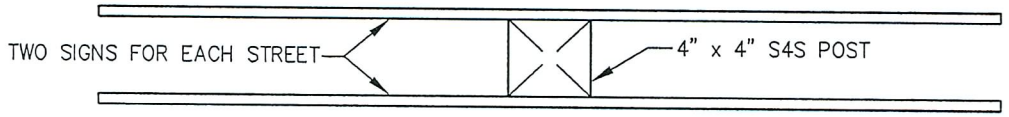
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

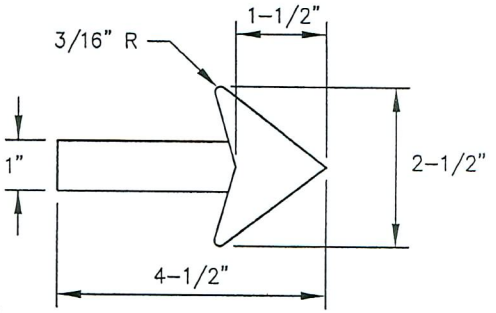
TRENCH SECTIONS

SCALE: NONE
DATE: 04/28/09
DRAWN BY: TRU P. & B.R.

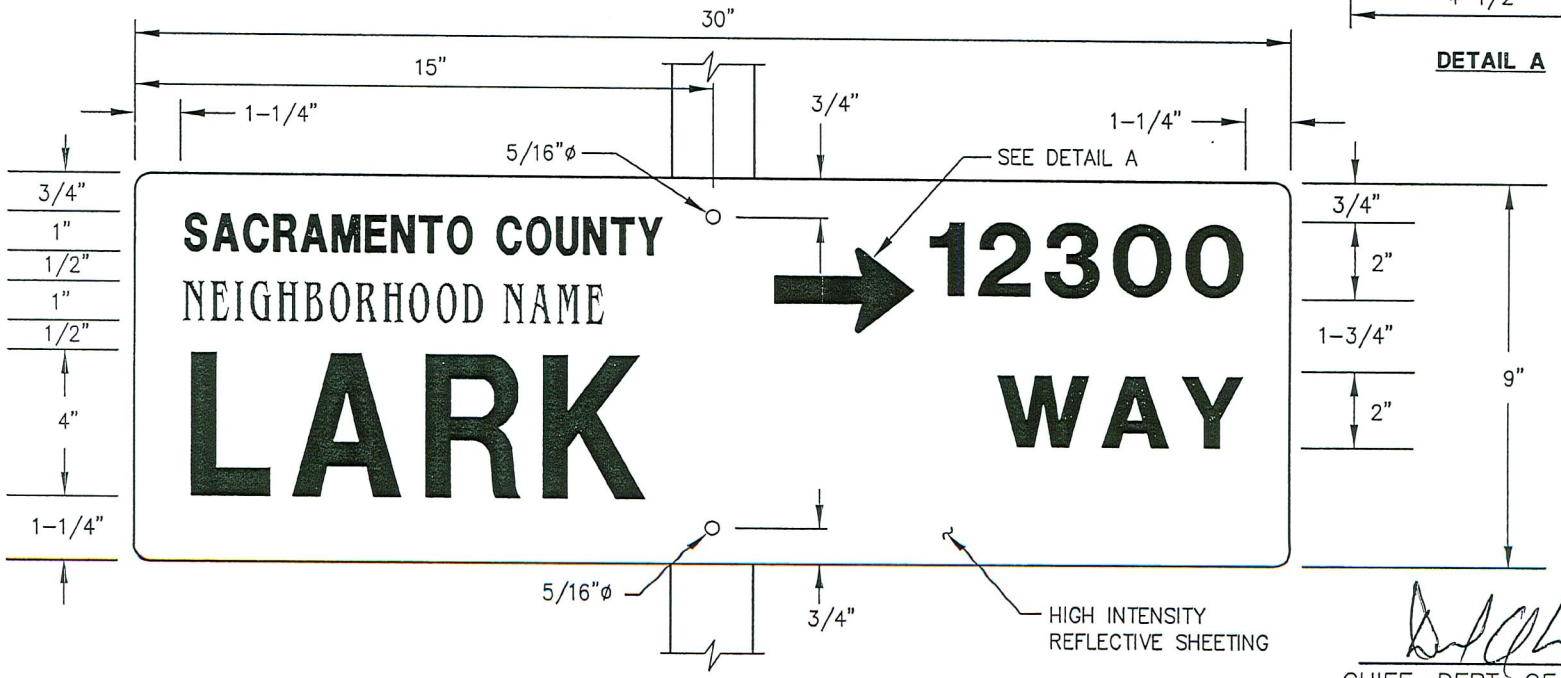
4-64



TOP VIEW



DETAIL A



CHIEF, DEPT. OF TRANSPORTATION

SIGN DETAILS FOR SINGLE STREET

NOTES:

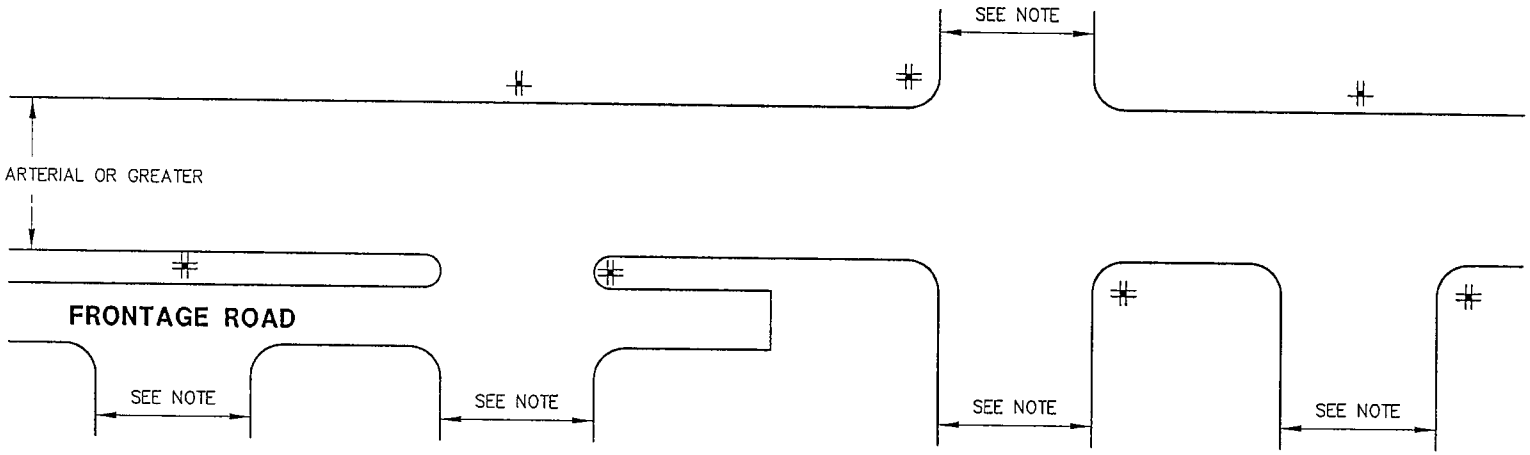
1. *ALUMINUM SHEET ALLOY 6061-T6 0.080" GAUGE ROUNDED CORNERS 1/4" RADIUS.*
2. *FOR TWO (2) STREETS, PLACE SECOND PAIR OF SIGNS AT 90° TO SIGNS AS SHOWN.*
3. *POSTS SHALL BE REDWOOD OR TREATED DOUGLAS FIR (STATE OF CALIFORNIA SPEC. NO. 56-2.02B).*
4. *FONTS FOR LETTERING AND NUMBERS SHALL BE "HIGHWAY C" EXCEPT FOR THE NEIGHBORHOOD NAME WHICH SHALL BE "BENGEL MD".*
5. *USE "NEIGHBORHOOD NAME" WHERE NEIGHBORHOOD DESIGNATION EXISTS. CONFIRM APPROPRIATE NEIGHBORHOOD NAME WITH DEPARTMENT OF TRANSPORTATION PRIOR TO SIGN FABRICATION.*

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

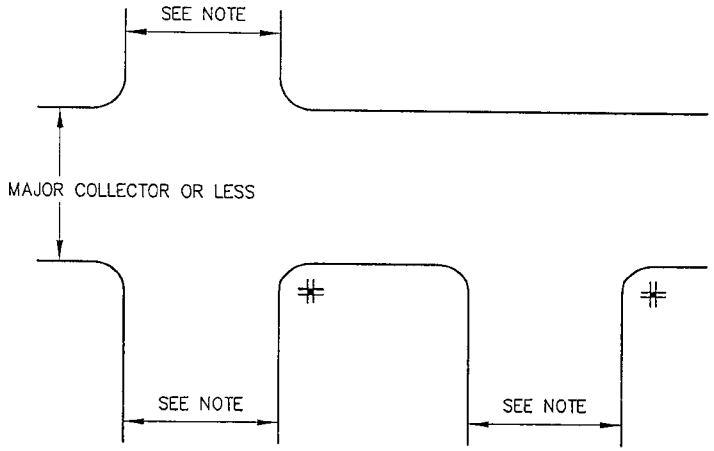
STREET NAME SIGN

SCALE: NONE
DATE: 06/08/2009
DRAWN BY: TRU P. & B.R.

4-70



STREETS CLASSIFIED AS ARTERIAL OR GREATER



STREETS CLASSIFIED AS MAJOR COLLECTOR OR LESS

NOTE:

SIDE STREETS INDICATED ARE CLASSIFIED EQUAL TO OR LESS THAN THROUGH STREET AS SHOWN ON THE PLAN.

LEGEND:

STANDARD STREET NAME SIGN INSTALLATION. FOUR (4) SIGN PLATES ON 4" x 4" POST OR ON STREET LIGHT POLE.

THREE (3) SIGN PLATES ON 4" x 4" POST OR ON STREET LIGHT POLE.

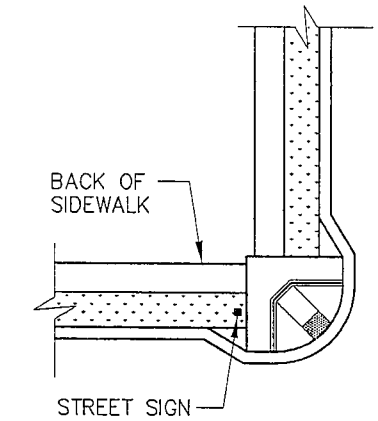
CHIEF, DEPT. OF TRANSPORTATION

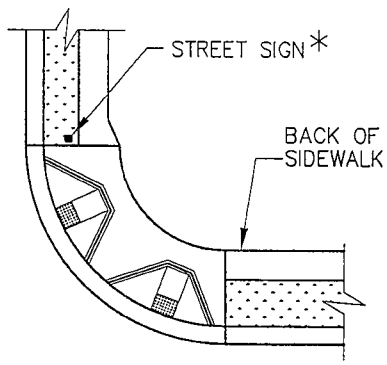
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

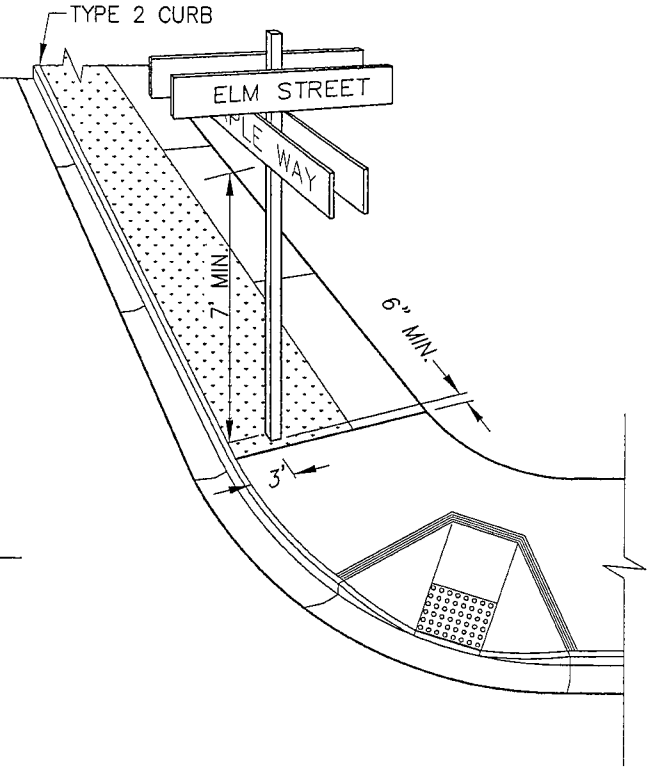
STREET NAME SIGN LOCATION REQUIREMENTS

SCALE: NONE
DATE: 07/18/2008
DRAWN BY: TRU P.

4-71

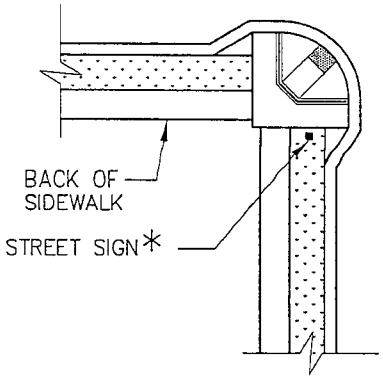


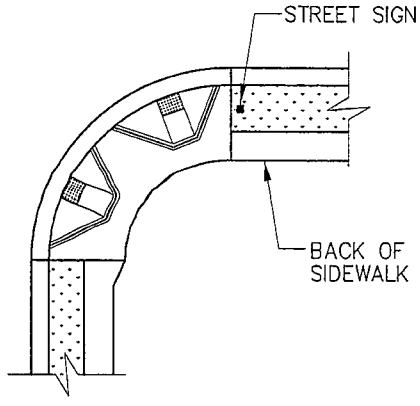




LARGER STREET (OR GREATER TRAFFIC VOLUME FOR EQUAL WIDTH STREETS)

SMALLER STREET (OR LESSER TRAFFIC VOLUME FOR EQUAL WIDTH STREETS)





* *ADDITIONAL STREET SIGN NEEDED IF LARGER STREET IS AN ARTERIAL OR THOROUGHFARE.*

NOTE: IN LIEU OF INSTALLATION OF STREET NAME SIGNS ON NEW POST, SIGNS MAY BE INSTALLED ON STREET LIGHT POLES PER DWG. 4-73.

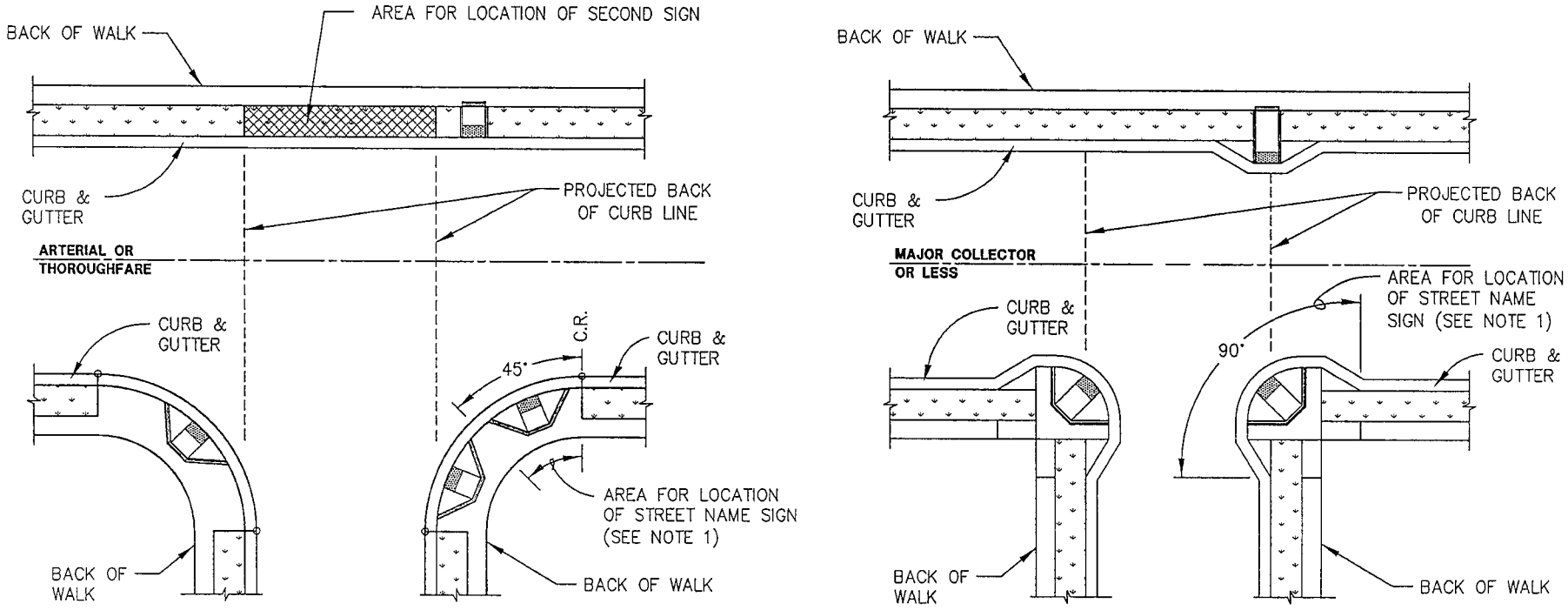
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

STREET NAME SIGN PLACEMENT DETAILS ON WOOD POLE INSTALLATIONS

SCALE: NONE
DATE: 07/20/09
DRAWN BY: B.R. & TRU P.

4-72



NOTES:

1. *STREET NAME SIGNS SHALL BE INSTALLED ON STREET LIGHT POLES WHEN THEY ARE LOCATED WITHIN THE LOCATION LIMITS DEFINED ON THIS DETAIL.*
2. *ALL OTHER STREET NAME SIGN REQUIREMENTS IN SECTIONS 4-28 & 4-29 AND IN DRAWINGS 4-70, 4-71, 4-72 & 4-74 SHALL APPLY.*

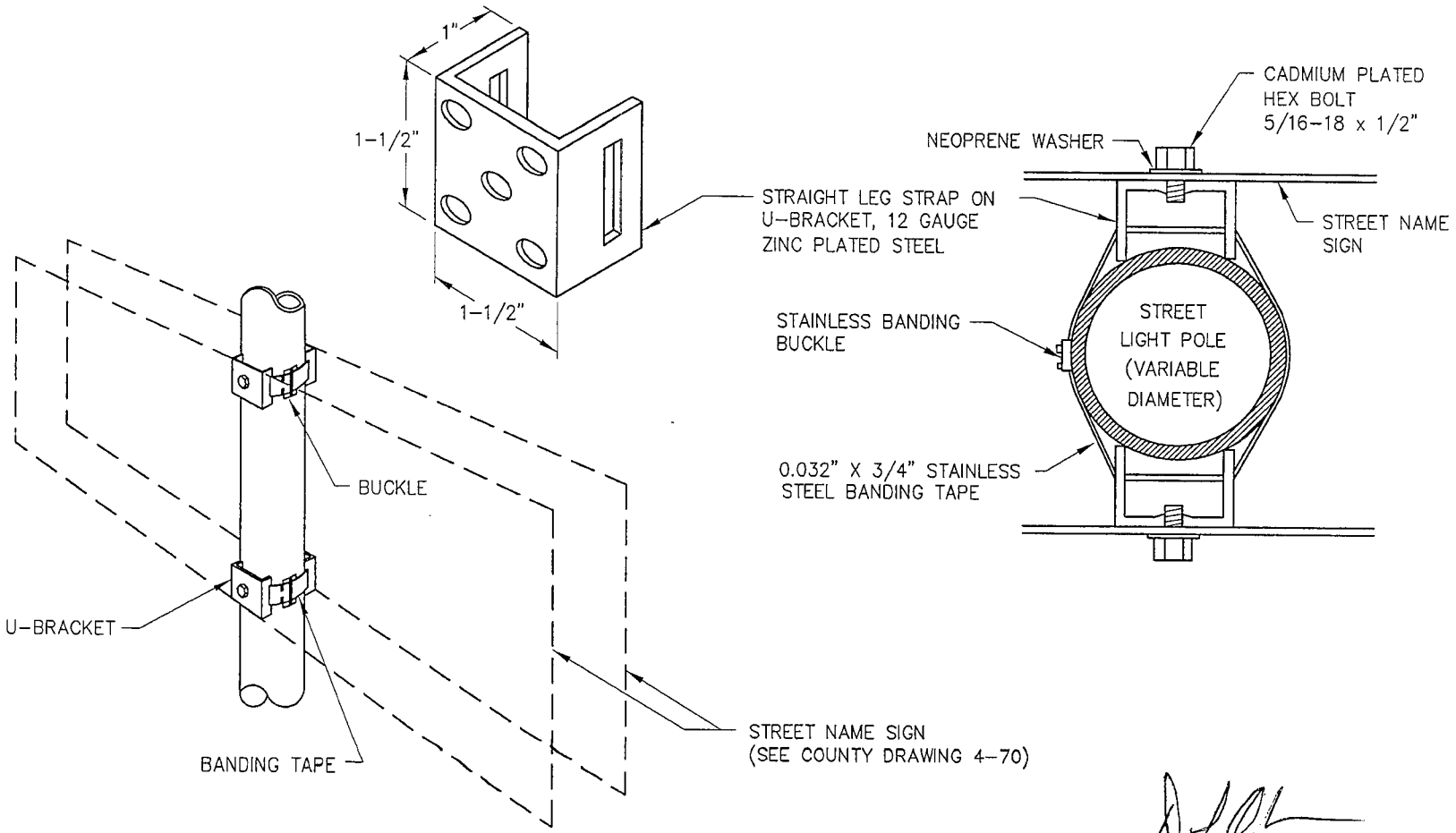
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

STREET NAME PLACEMENT DETAILS ON STREET LIGHT POLE INSTALLATIONS

SCALE: NONE
DATE: 07/20/09
DRAWN BY: B.R. & TRU P.

4-73



CHIEF, DEPT. OF TRANSPORTATION

NOTES:

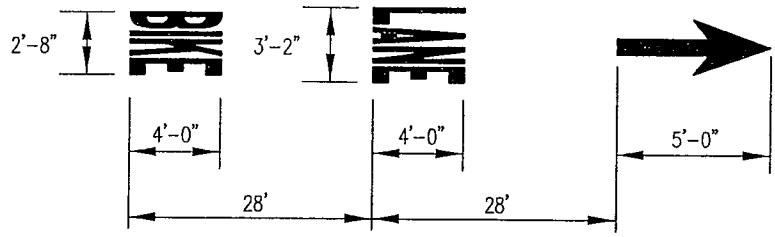
1. *DETAIL SHOWN IS FOR A TWO SIGN INSTALLATION. FOUR SIGN INSTALLATIONS MAY BE MADE, WHERE APPLICABLE, BY FASTENING A SECOND PAIR OF SIGNS IN THE SAME MANNER.*
2. *STANDARD CLEARANCE TO BOTTOM OF LOWEST SIGN IS 7 FEET MINIMUM.*

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

STREET NAME SIGN INSTALLATION ON STREET LIGHT POLE

SCALE: NONE
DATE: 07/18/2008
DRAWN BY: TRU P.

4-74



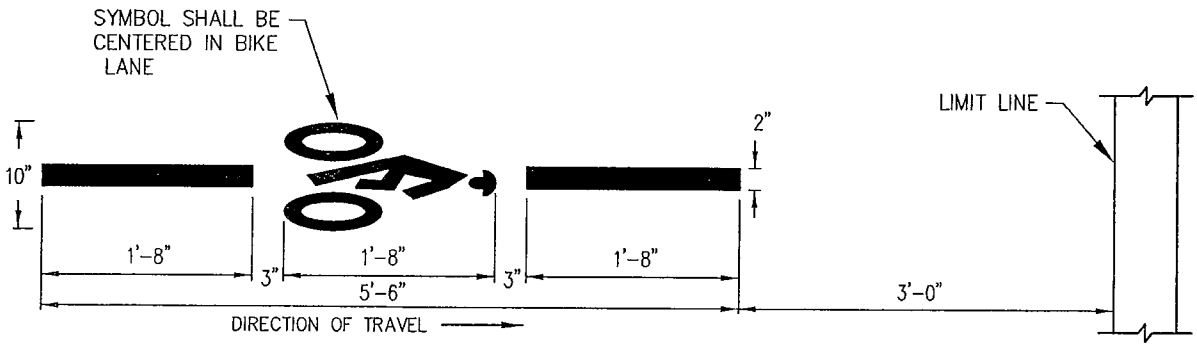
BIKE LANE LEGEND DETAIL

SEE CALTRANS STANDARD PLAN A24A AND A24D
FOR PAVEMENT MARKING WORDS AND ARROW.

BIKE LANE LEGEND

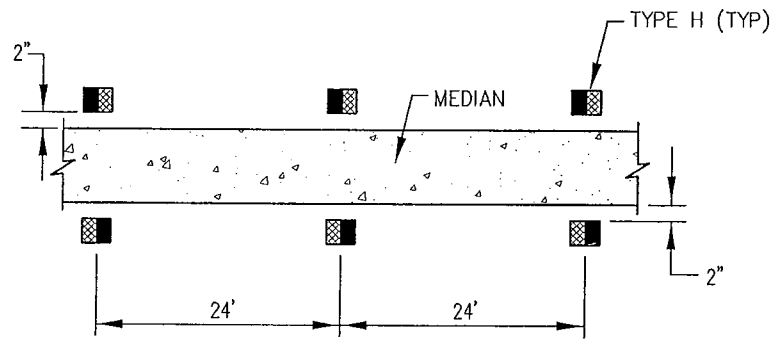
TYPICAL LOCATIONS:

- *10' AFTER START OF BIKE LANE AT INTERSECTION*
- *10' AFTER START OF BIKE LANE ALONG RIGHT TURN LANE*
- *BEFORE 39A STRIPE AT APPROACH TO A TRAFFIC SIGNAL WITHOUT RIGHT TURN LANE*



BICYCLE LOOP DETECTOR SYMBOL

SEE CALTRANS STANDARD PLAN A24C
FOR PAVEMENT MARKINGS SYMBOLS.



DETAIL MODIFIELD 26 – FOR USE ADJACENT TO MEDIANS

SEE CALTRANS STANDARD PLAN A20B
FOR PAVEMENT MARKER TYPE.

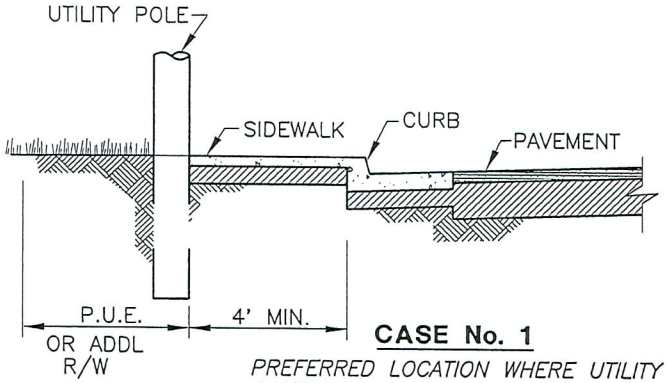
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

STRIPING AND PAVEMENT MARKING DETAILS

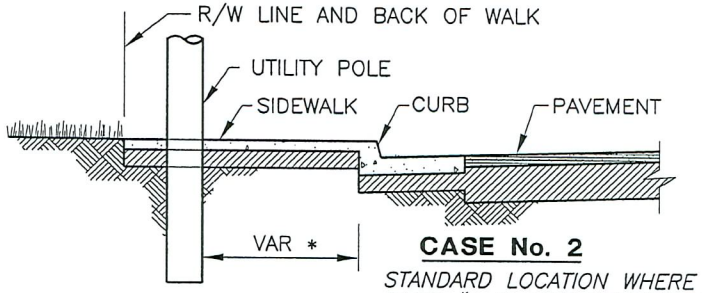
SCALE: NONE
DATE: 03/30/2009
DRAWN BY: TRU P.

4-77



CASE No. 1

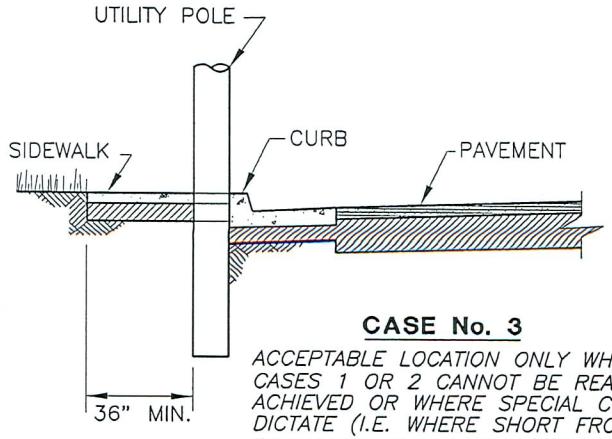
PREFERRED LOCATION WHERE UTILITY CONFLICTS AND PHYSICAL CONDITIONS ALLOW AND AN EASEMENT OR RIGHT OF WAY EXISTS BEHIND WALK.



CASE No. 2

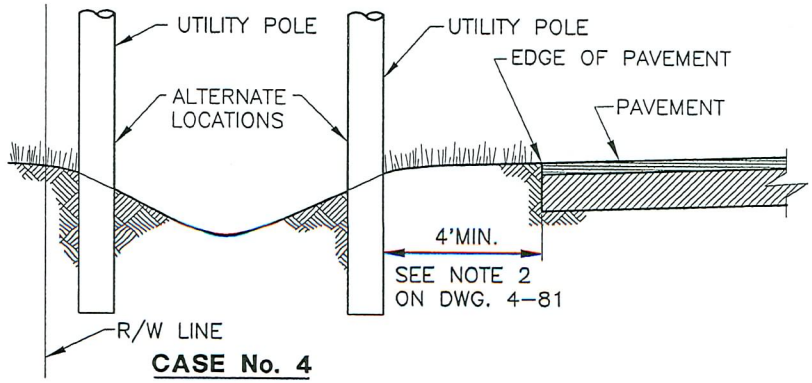
STANDARD LOCATION WHERE CASE #1 IS NOT REASONABLY ACHIEVABLE

* PEDESTRIAN CLEARANCE OF 36" MINIMUM IN FRONT OF THE POLE IS DESIRABLE. POLE CAN BE PLACED 12" MINIMUM FROM BACK OF CURB IF 36" MINIMUM PEDESTRIAN CLEARANCE IS PROVIDED BEHIND POLE. POLE TO BE PLACED WITH BACK OF POLE FLUSH WITH BACK OF WALK IF NOT IN CONFLICT WITH OTHER UTILITIES.



CASE No. 3

ACCEPTABLE LOCATION ONLY WHERE CASES 1 OR 2 CANNOT BE REASONABLY ACHIEVED OR WHERE SPECIAL CONDITIONS DICTATE (I.E. WHERE SHORT FRONTAGE IMPROVEMENT CAUSES SIGNIFICANT DEVIATION FROM POLE LINE RESULTING IN UNDESIRABLE GUYING REQUIREMENTS.



CASE No. 4

REFER TO NOTE 1 ON DWG. 4-81

SEE 4-81 FOR NOTES

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

UTILITY POLE PLACEMENT LOCATIONS DETAILS

SCALE: NONE
DATE: 01/20/09
DRAWN BY: TRU P. & B.R.

4-80

NOTES:

1. WHERE STREET IMPROVEMENTS WILL ULTIMATELY BE CLASS A OR B, THE POLE SHOULD BE LOCATED IN CONFORMANCE TO THE APPROPRIATE CASE #1 OR #2 BASED ON THE FUTURE LOCATION OF THE STREET IMPROVEMENTS. IN THE CASE WHERE NO CURBS WOULD EVER BE ANTICIPATED, THE POLE SHOULD BE LOCATED 4 FEET MINIMUM FROM THE EDGE OF PAVEMENT SO AS NOT TO ENCROACH IN AN ADJACENT DITCH AS SHOWN IN CASE #4.

2. WITH ROAD WIDENING PROJECTS, UTILITY POLES MAY BE ALLOWED TO REMAIN AT THE EDGE OF PAVEMENT, WITH 0.5 FEET MINIMUM CLEARANCE (CASE #4). HOWEVER, WHERE THE PRE-PROJECT UTILITY POLE LOCATION IS WITHIN THE PROPOSED PAVEMENT SECTION, UTILITY POLES SHOULD BE RELOCATED TO THE ULTIMATE LOCATION PER CASE #1 OR #2, IN ORDER TO AVOID RELOCATION OF THE UTILITY POLE IN THE FUTURE.

3. UTILITY POLE PLACEMENT UNDER THE FOLLOWING CONDITIONS IS SUBJECT TO APPROVAL BY THE CHIEF OF THE DEPARTMENT OF TRANSPORTATION:

   A- POLES IN VISIBILITY CONTROL AREAS (SEE STANDARD DRAWING 4-18).

   B- POLES LARGER THAN 18 INCHES IN DIAMETER WITHIN 9 FEET OF EDGE OF PAVEMENT IN CLASS A OR CLASS B STREETS.

   C- POLES LARGER THAN 18 INCHES IN DIAMETER WITHIN 9 FEET OF THE EDGE OF TRAVELED WAY ON CLASS C STREETS.

   D- POLES LOCATED ON THE OUTSIDE OF SHARP CURVES, OR IN THE TANGENT OF THE CURVES WITHIN 200 FEET OF THE BEGINNING OR END OF CURVE (FOR 45 MPH OR GREATER SPEED LIMIT) OR 100 FEET (FOR A LESSER SPEED LIMIT). IN THESE CASES, SPECIAL DELINIATION AND/OR A GUARDRAIL MAY BE REQUIRED. FOR PURPOSES OF THIS SECTION, SHARP CURVES SHALL BE CONSIDERED THOSE WITH RADII OF LESS THAN 800 FEET FOR URBAN 2 LANE STREETS, AND WITH RADII OF LESS THAN 2000 FEET FOR RURAL ROADS OR MULTI-LANE STREETS.

4. RISERS PROPOSED IN A LOCATION THAT WOULD REDUCE PEDESTRIAN CLEARANCE TO LESS THAN 36 INCHES SHALL NOT BE ALLOWED.

5. FOR LOCATIONS WITH SEPERATED SIDEWALK, UTILITY FACILITIES SHALL BE PLACED OUTSIDE OF THE SIDEWALK AREA. SIDEWALK LOCATION MAY BE ADJUSTED TO RESOLVE CONFLICT WITH EXISTING UTILITIES WITH WRITTEN APPROVAL OF DIRECTOR OF COUNTY OF ENGINEERING.

CHIEF, DEPT. OF TRANSPORTATION

SEE 4-80 FOR DETAILS

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

UTILITY POLE PLACEMENT LOCATIONS NOTES

SCALE: NONE
DATE: 01/20/09
DRAWN BY: TRU P. & B.R.

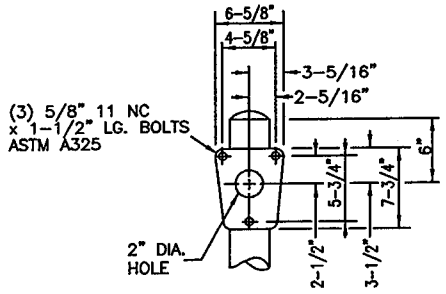
DRAWING NUMBER	TITLE
5-3	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS TYPE 'A' STREET LIGHT STANDARD
5-8	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS BASE LOCATION FOR STREET LIGHTS
5-12	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS DIRECT SERVICE INSTALLATION TO STREET LIGHTING STANDARD
5-13	STREET LIGHT PULL BOX
5-16	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS TYPE 'B' STREET LIGHT STANDARD
5-20B	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS TRAFFIC RATED PULL BOX WITH STEEL TRAFFIC COVER
5-24	INDUCTION DETECTORS
5-25	TYPE "B" DETECTOR HANDHOLE DETAIL
5-30	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS - UNMETERED SERVICE ENCLOSURE (CAN) (120/208V, 120/240V, 277/480V)
5-31	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS - UNMETERED SERVICE ENCLOSURE (CAN) WITH STEP-DOWN TRANSFORMER (277/480V to 120/240V)
5-32	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS METERED SERVICE ENCLOSURE (CAN) (120/208V, 120/240V)
5-33	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS METERED SERVICE ENCLOSURE (CAN) WITH STEP-DOWN TRANSFORMER (277/480V to 120/240V)
5-34	SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS PULL BOX
5-40	TRAFFIC SIGNAL CONTROLLER CABINET & SERVICE CAN WITH BATTERY BACKUP FOUNDATIONS
5-41	METERED SERVICE ENCLOSURE WITH BATTERY BACKUP
5-44	DETECTOR LOOP LOCATION DETAILS

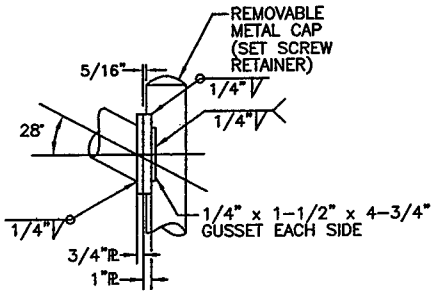
NOTES:

1. 'A' SERIES NUMBERING PROCEDURE

   POLE SIZE 'A'
   A-286-8
   SERIES — LUMINAIRE ARM SIZE 'F'
   (STANDARD UNLESS OTHERWISE SPECIFIED)

2. POLES SHALL NOT HAVE HANDHOLDS

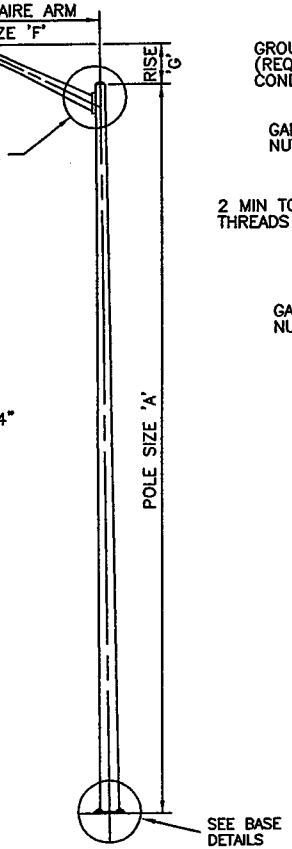




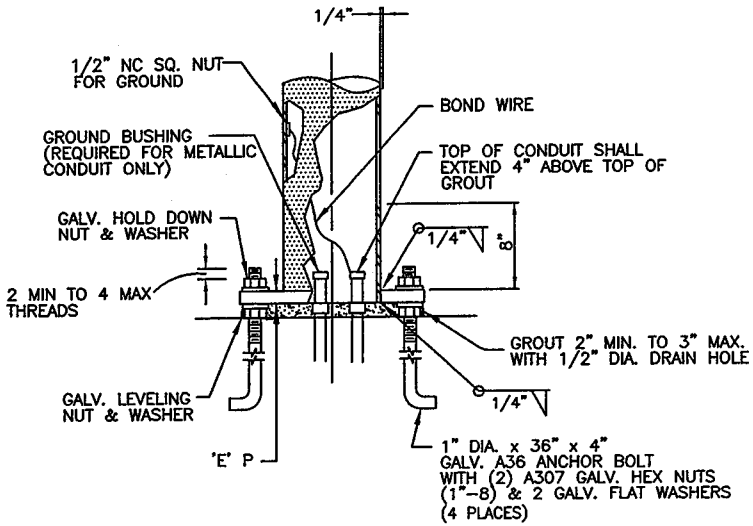
LUMINAIRE ARM DETAILS

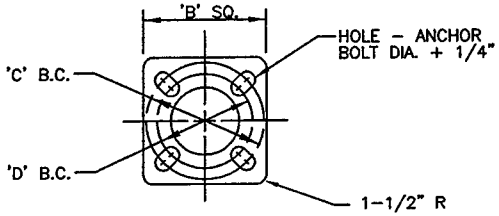
LUMINAIRE ARM DATA					
'F'	END OD	BASE OD	GA	'G'	'H'
6'-0"	2-3/8"	3-3/8"	10	1'-6"	7'-5"
8'-0"	2-3/8"	3-11/16"	10	2'-3"	7'-5"
* 10'-0"	2-3/8"	3-7/8"	10	2'-6"	13'-3"
12'-0"	2-3/8"	4-5/16"	10	3'-9"	13'-3"
15'-0"	2-3/8"	4-3/4"	10	4'-3"	13'-3"
18'-0"	2-3/8"	4-3/4"	10	5'-3"	13'-3"

FOUNDATION DIMENSIONS		
	SQUARE	ROUND
'A' SERIES	2'6" x 2'6" x 5'	30" x 6'6"



'A' SERIES





BASE DETAILS

'A' SERIES									
IDENTIFICATION NUMBER 1	POLE DATA				BASE PLATE DATA				ANCHOR BOLTS
	'A'	TOP OD	BASE OD	GA	'B'	'C'	'D'	'E'	
A-250-'F'	25'-0"	3-7/8"	7-5/16"	11	12"	11-1/2"	11"	1"	1" x 36" x 4"
A-266-'F'	26'-6"	3-7/8"	7-1/2"	11	12"	11-1/2"	11"	1"	1" x 36" x 4"
A-286-'F'	28'-6"	3-7/8"	7-3/4"	11	12"	11-1/2"	11"	1"	1" x 36" x 4"
A-300-'F'	30'-0"	3-7/8"	8"	11	12"	11-1/2"	11"	1"	1" x 36" x 4"

* UTILIZE STANDARD POLES SHOWN ON 5-1 UNLESS UTLITY CONFLICTS

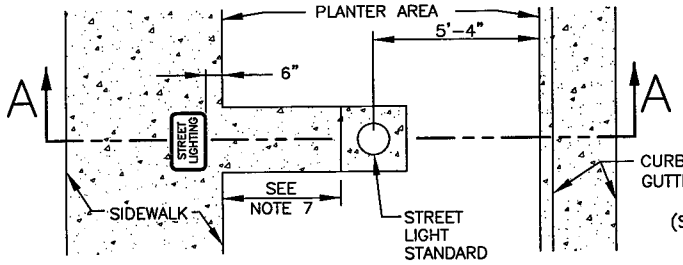
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

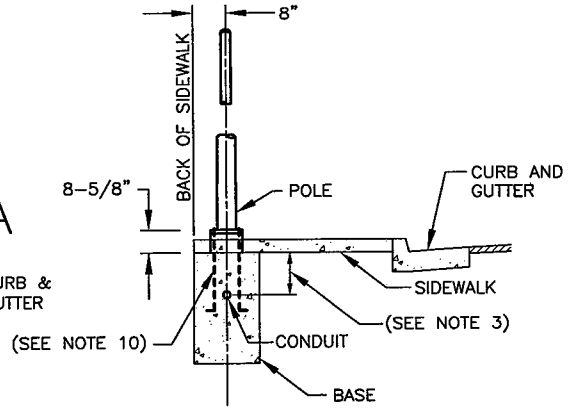
SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
TYPE 'A' STREET LIGHT STANDARD

SCALE: NONE
DATE: 05/08/14
DRAWN BY: KK

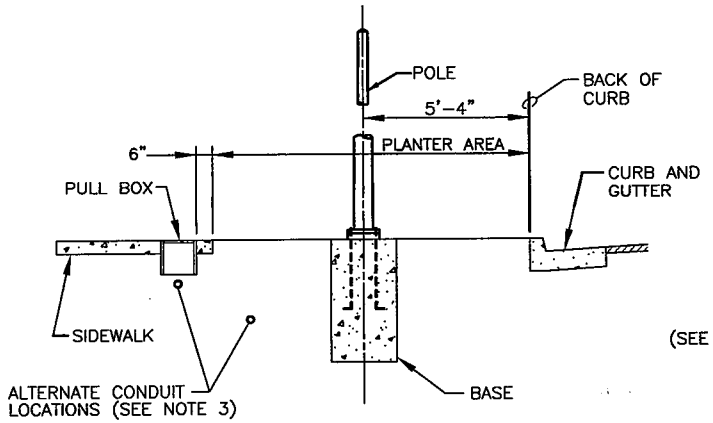
5-3



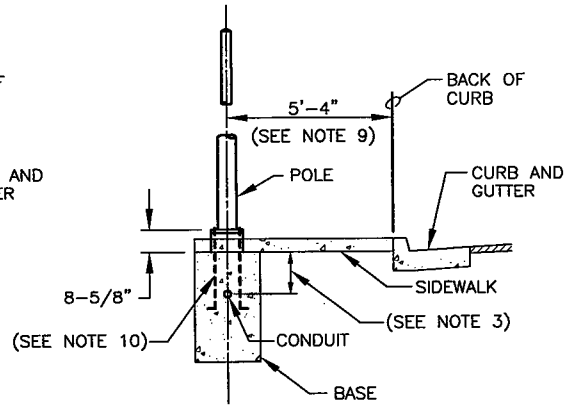
SIDEWALK WITH PLANTER AREA



OVER 6' SIDEWALK



SECTION A-A



5' to 6' SIDEWALK

NOTES:

1. CONDUIT TRENCH BACKFILL SHALL BE COMPACTED TO 90% RELATIVE COMPACTION.
2. LANDSCAPING IN THE AREA OF THE STREET LIGHT STANDARD WILL MATCH BASE ELEVATION AND HAVE A MINIMUM OF 12" OF CLEARANCE FROM THE BASE.
3. CONDUITS LOCATED BENEATH THE SIDEWALK MAY BE PLACED AT 9" DEPTH. CONDUITS IN LANDSCAPE STRIP SHALL BE PLACED AT 18" DEPTH AND 6" FROM THE FACE OF THE SIDEWALK.
4. IF THE PLANTER AREA IS LESS THAN SIX FEET WIDE, THEN PLACE STREET LIGHT STANDARD SO THAT THE BASE PLATE ALIGNS WITH THE EDGE OF SIDEWALK. TOP OF FOUNDATION TO MATCH SIDEWALK GRADE.
5. NO PULL BOXES ARE TO BE PLACED IN THE PLANTER AREA.
6. PULL BOXES LOCATED IN A DRIVEWAY OR WITHIN 5-FEET OF A DRIVEWAY SHALL BE TRAFFIC RATED (SEE STATE STANDARD PLANS FOR TRAFFIC RATED PULL BOXES).
7. IF DIMENSION IS LESS THAN 2-FEET, PLACE 3-1/2" THICK, 2-FOOT WIDE CONCRETE PAD BETWEEN SIDEWALK AND STREET LIGHT FOUNDATION.
8. PULL BOXES SHALL BE INSTALLED AT EACH STREET LIGHT AND SERVICE CAN.
9. FOR DECORATIVE STREET LIGHTS, LOCATE BASE CLEAR OF BACK OF SIDEWALK.
10. EXTEND ANCHOR BOLTS BY 10" MINIMUM EITHER BY USE OF LONGER ANCHOR BOLTS OR BY LAP SPLICED 3/4" RE-BAR EXTENDED 10" BELOW "J" HOOK WITH LAP LENGTH OF 2".

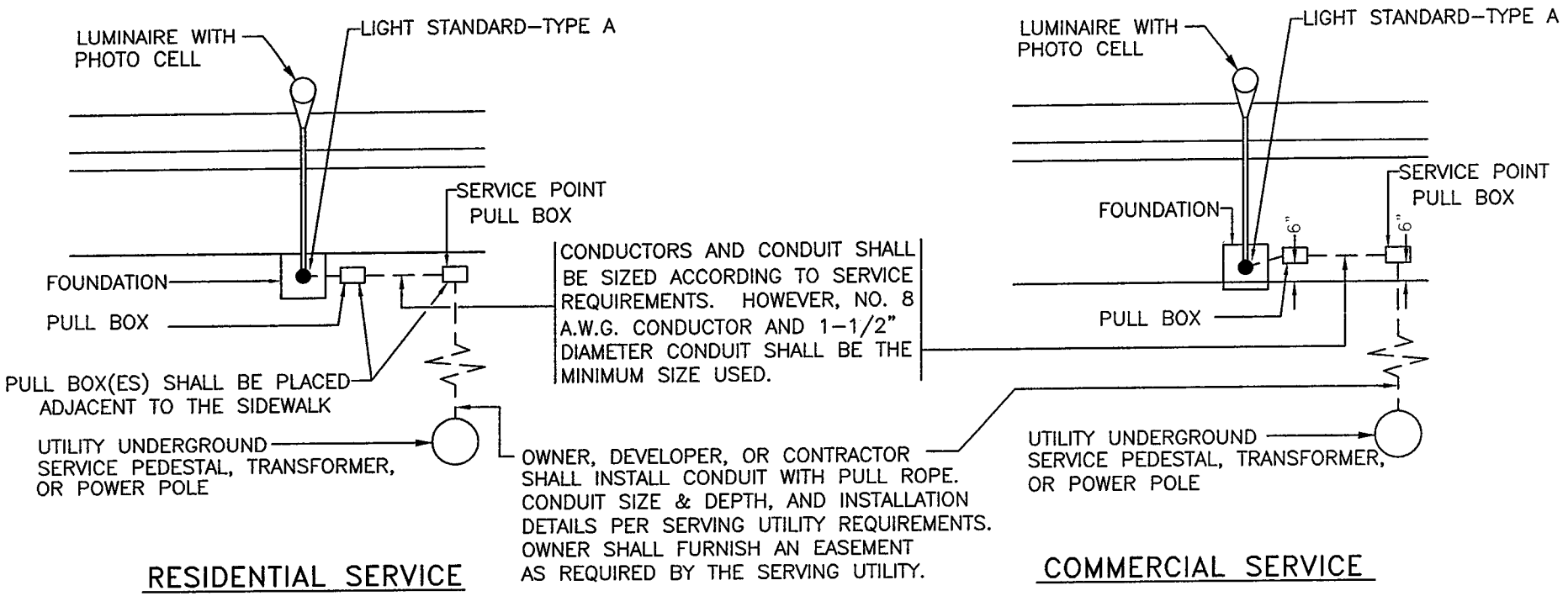
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
BASE LOCATION FOR STREET LIGHTS

SCALE: NONE
DATE: 10/15/14 - BR
DRAWN BY: KK

5-8



RESIDENTIAL SERVICE

COMMERCIAL SERVICE

NOTES:

1. ALL COUNTY OWNED FACILITIES SHALL BE WITHIN RIGHT–OF–WAY OR EASEMENT FOR PUBLIC UTILITIES AND PUBLIC FACILITIES.
2. SEE STANDARD DRAWING 5–13 FOR SERVICE POINT PULL BOX DETAILS AND WIRING DIAGRAM.
3. SEE STANDARD DRAWING 5–34 FOR PULL BOX DETAILS.
4. SEE STANDARD DRAWINGS 5–3 FOR STREET LIGHT DETAILS.
5. THE SERVING UTILITY WILL INSTALL AND MAINTAIN CONDUCTORS FROM THEIR UNDERGROUND SERVICE PEDESTAL, TRANSFORMER, OR POWER POLE TO THE SERVICE POINT PULL BOX.

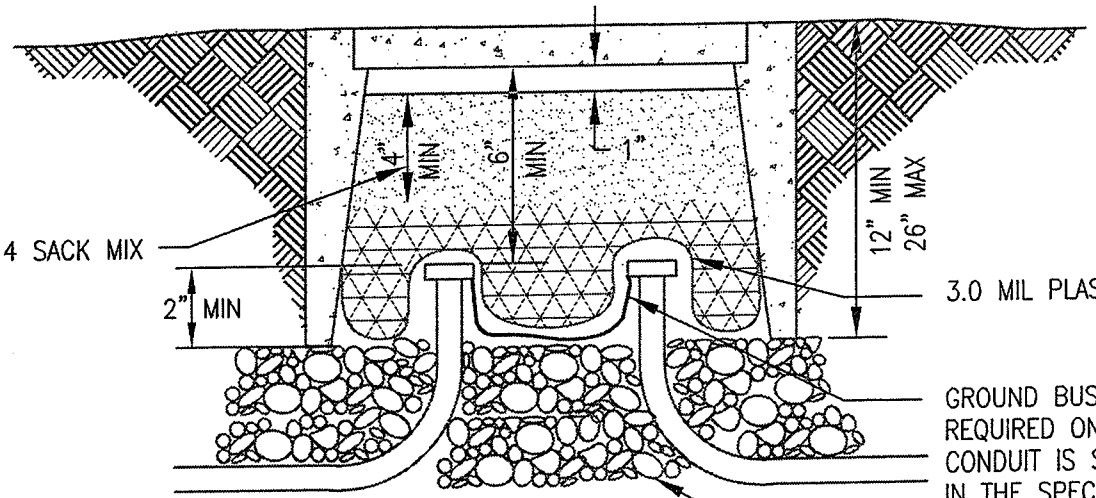
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
DIRECT SERVICE INSTALLATION TO STREET LIGHTING STANDARD

SCALE: NONE
DATE: 05/08/14
DRAWN BY: KK

5-12



SECTION B–B

NOTES:

1. THIS DETAIL IS NOT TO BE USED FOR TRAFFIC SIGNAL PULL BOXES.
2. INSTALL GROUND ROD IN PULL BOX OR POLE BASE CLOSEST TO SERVICE CAN.
3. ORGANIZE AND COMPRESS THE WIRES AT THE BOTTOM OF THE PULL BOX.
4. COVER WIRES AND CONDUIT OPENINGS WITH 3.0 MIL PLASTIC TO PROTECT CONDUIT OPENINGS FROM SAND INTRUSION.
5. FILL WITH SAND AS SHOWN.
6. POUR CONCRETE IN THE PULL BOX OVER SAND TO LEVEL 1" BELOW PULL BOX LID.
7. ALL PULL BOXES SHALL HAVE PROVISIONS FOR LOCKING.
8. PULL BOXES LOCATED IN A DRIVEWAY OR WITHIN 5–FEET OF A DRIVEWAY OR ON THE ROADWAY SHALL BE TRAFFIC RATED.

LEGEND:

ELECTRICAL WIRING – FILL WITH SAND AFTER PLASTIC AND WIRES ARE IN PLACE.

CONCRETED AREA – 4 SACK CONCRETE MINIMUM 4" THICK.

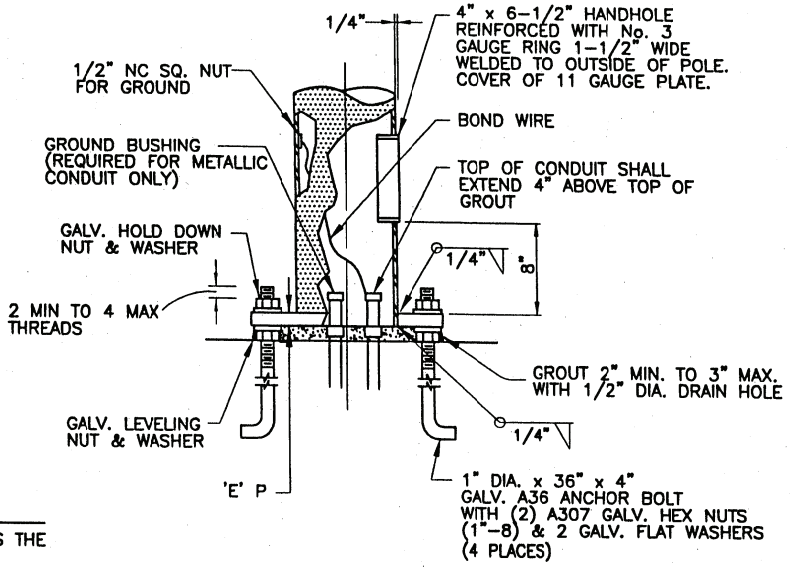
CHIEF, DEPT. OF TRANSPORTATION

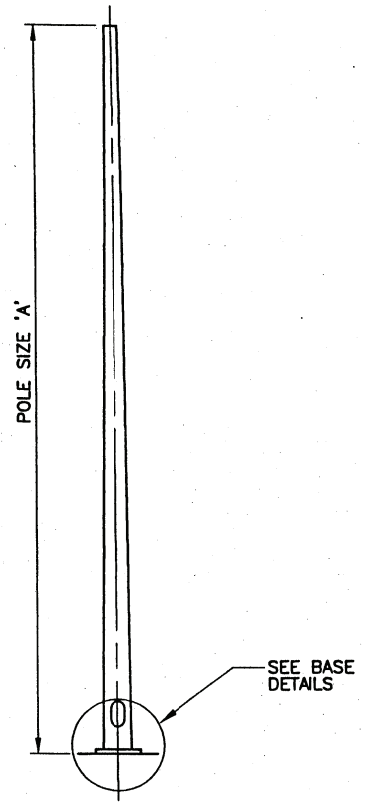
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

STREET LIGHT PULL BOX

SCALE: NONE
DATE: 05/08/14
DRAWN BY: KK

5-13

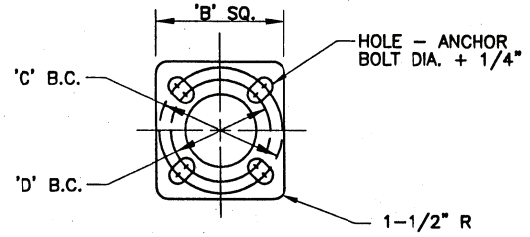




'B' SERIES

NOTES:

1. STANDARD SHALL BE INSTALLED SO HANDHOLE FACES THE STREET.



BASE DETAILS

FOUNDATION DIMENSIONS		
	SQUARE	ROUND
'B' SERIES	2' x 2' x 4'	30" x 3'-6"

'B' SERIES									
POLE DATA					BASE PLATE DATA				ANCHOR BOLTS
'A'	TOP OD	BASE OD		GAUGE	'B'	'C'	'D'	'E'	
		MIN	MAX						
20'-0"	2-7/8"	5.61"	5.85"	10	10"	9-1/2"	9"	1"	1" x 36" x 4"

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS
TYPE 'B' STREET LIGHT STANDARD

SCALE: NONE
DATE: 10/03
DRAWN BY:

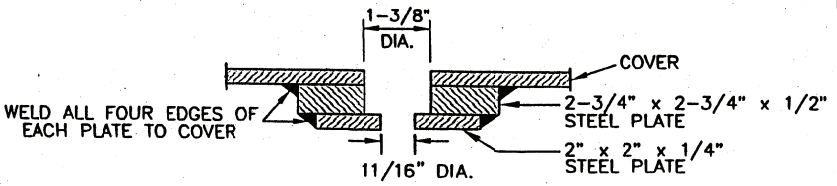
5-16

NOTES:

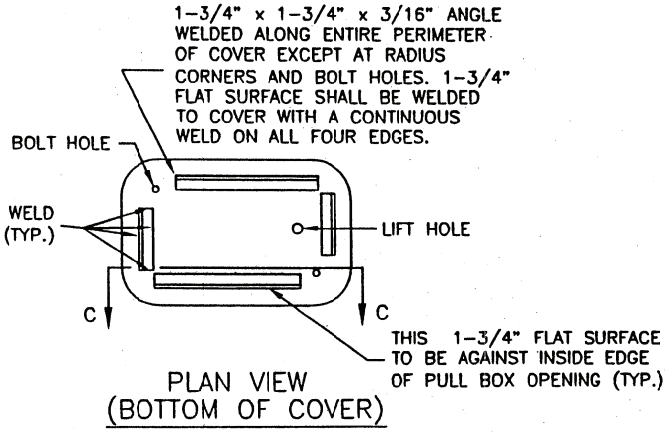
1. STEEL COVER SHALL HAVE EMBOSSED NON-SKID PATTERN.
2. STEEL REINFORCING SHALL BE AS REGULARLY USED IN THE STANDARD PRODUCTS OF THE RESPECTIVE MANUFACTURER.
3. PULL BOX COVERS SHALL BE MARKED AS DESCRIBED IN NOTE 6 ON STANDARD DRAWING 5-20A. MARKING SHALL BE APPLIED TO EACH COVER PRIOR TO GALVANIZING BY BEAD WELDING THE LETTERS ON THE COVERS. THE LETTERS SHALL BE RAISED AT LEAST 3/32 INCH.
4. BONDING JUMPER FOR COVER SHALL BE A MIN. OF 36" LONG. WHEN NON-METALLIC CONDUIT IS USED, THE BONDING JUMPER FOR THE COVER SHALL BE SPLICED TO THE BOND WIRE IN THE CONDUITS. WHEN THE USE OF METALLIC CONDUIT IS SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, THE BONDING JUMPER FOR THE COVER SHALL BE CONNECTED TO THE CONDUIT GROUND BUSHING, AND THE CONDUITS SHALL BE BONDED TOGETHER WITH GROUND BUSHINGS AND A BONDING JUMPER.
5. CONDUITS SHALL ENTER AT BOTTOM OF PULL BOX AS SHOWN IN THE DRAWING.

	REINFORCED CONCRETE BOX					
PULL BOX No.	MIN.** THICKNESS	MIN. DEPTH BOX AND EXTENSION	LO	WO	L	W
3-1/2	1"	NO EXTENSION	20"	14"	15-1/2" ±	10" ±
5	1"	22"	28"	18"	23" ±	13-1/2" ±
5A	1"	22"	25-1/4"	15-3/4"	21" ±	10-1/2" ±

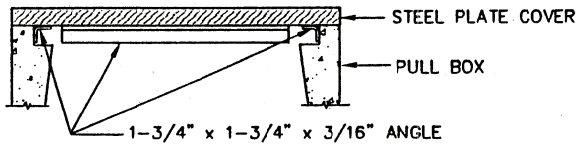
** EXCLUDING CONDUIT WEB



BOLT HOLE DETAIL

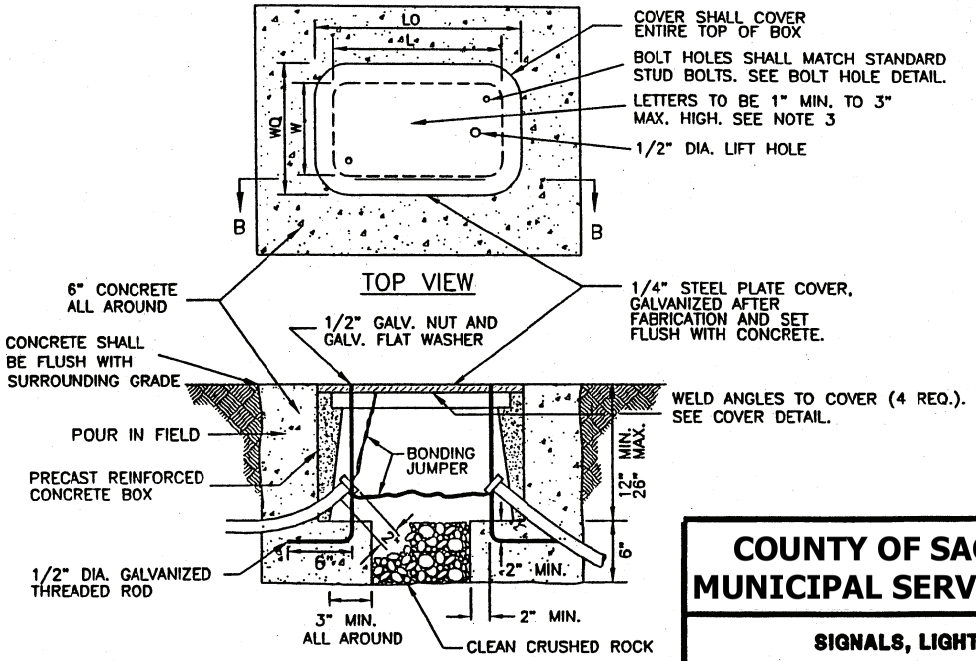


PLAN VIEW
(BOTTOM OF COVER)



SECTION C-C

COVER DETAIL



SECTION B-B

DIRECTOR

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

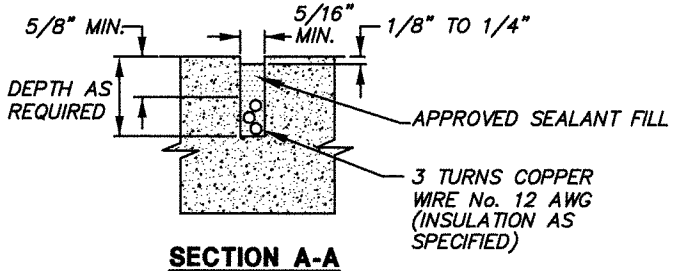
SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS
TRAFFIC RATED PULL BOX WITH STEEL TRAFFIC COVER

SCALE: NONE
DATE: 1/01
DRAWN BY:

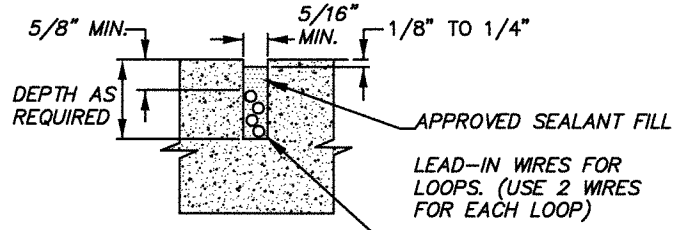
5-20B

LOOP INSTALLATION PROCEDURE

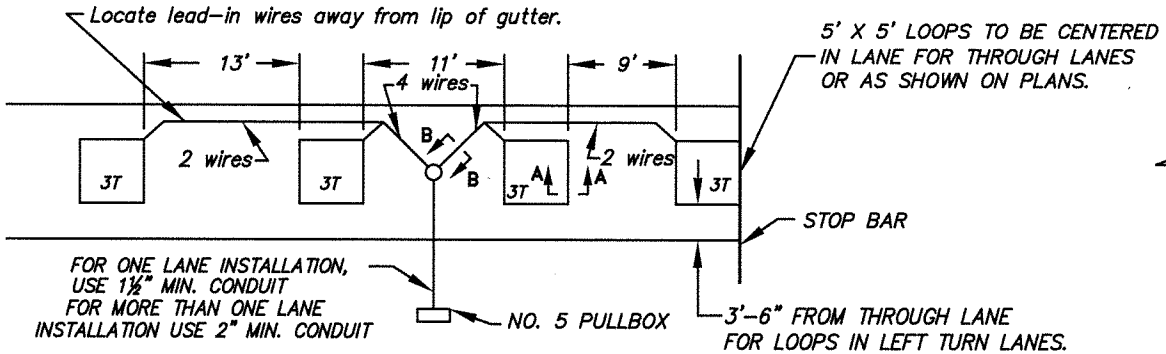
1. Test each loop circuit at controller cabinet (or, if these are not installed, test at termination pull box) before filling slots. Perform a resistance test between each circuit and ground. Insulation resistance shall not be less than 100 mega ohms. Test each loop circuit for continuity. Loop circuit resistance shall not exceed 0.5 ohms plus 0.35 ohms per 100 feet of lead–in cable.
2. Distance between side of loop and lead–in saw cut shall be 1'–0" minimum.
3. Width of saw cuts shall be 1/8" to 3/16" wider than thickness of the conductor.
4. Depth of saw cuts shall be such that the minimum sealant cover shall be 1/2" with an additional 1/8" to 1/4" gap between top of sealant and surface of pavement.
5. Loops and lead–in cuts shall be located a minimum of 2 feet from the nearest edge of manhole cover and valve boxes.
6. Loop installation 250' or more from stop bar shall have 4 turns.
7. See State Standard drawing ES – 5A for additional details.
8. See Drawing 5–44 for direction as to number of turns for loops 1 and 2, and location relative to stop bar.



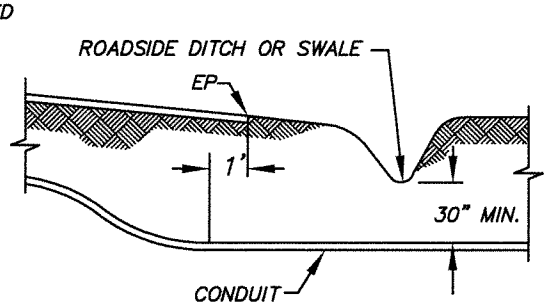
SECTION A-A



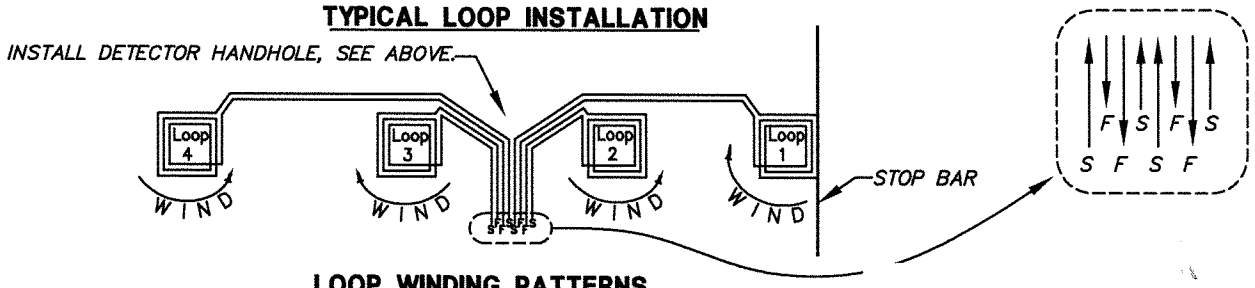
SECTION B-B



TYPICAL LOOP INSTALLATION



CONDUIT DETAIL FOR CLASS "C" STREET



LOOP WINDING PATTERNS
(SEE NOTE 8)

Conductor identification shall include the following:
1. Sensor number and phase 2. Loop number 3. Start (S) or finish (F)

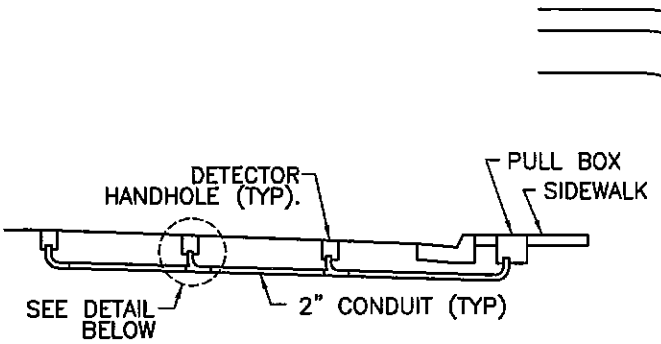
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

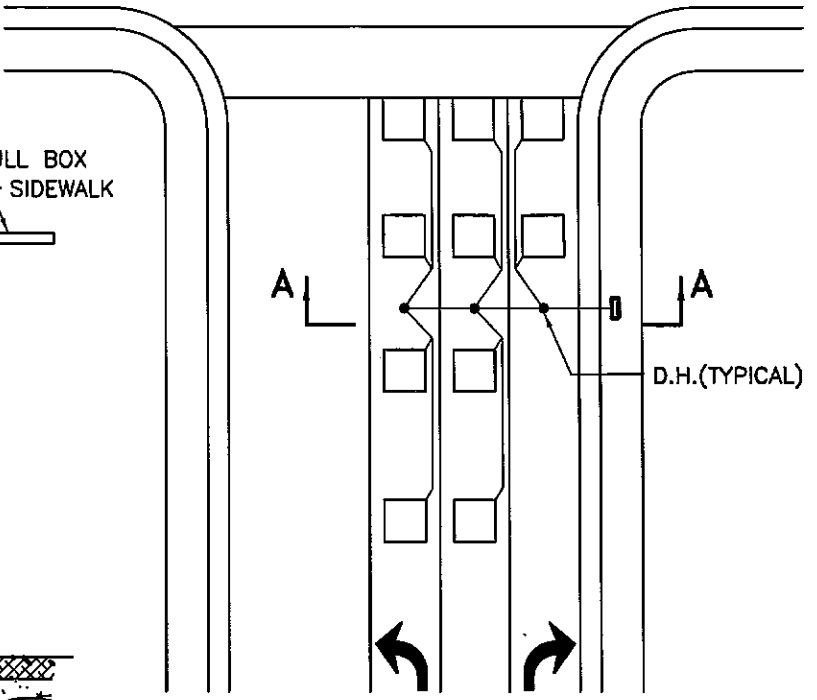
INDUCTION DETECTORS

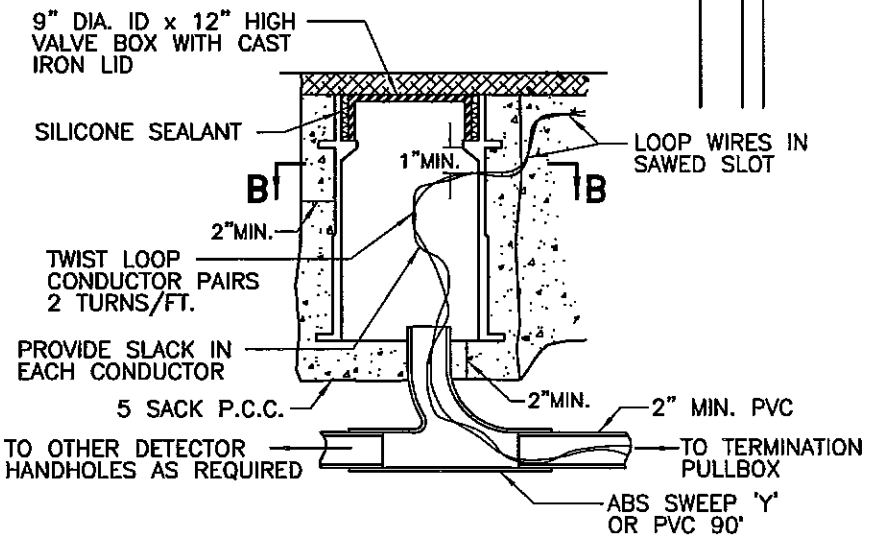
SCALE: NONE
DATE: 12/2015
DRAWN BY: KRG

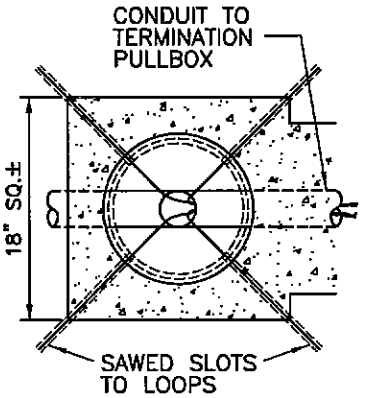
5-24



SECTION A–A







SECTION B–B

INSTALLATION REQUIREMENTS:

1. 18" SQ.± P.C.C. ENCASEMENT OUTLINE SHALL BE SAW CUT TO A MINIMUM DEPTH OF 3", EXCEPT WHERE AC OVERLAY IS TO BE PLACED.
2. THE PRECAST VALVE BOX WITH CAST IRON LID SHALL BE FABRICATED OF CALCIUM CARBONATE AND POLYESTER RESINS WITH FIBERGLASS REINFORCING AND DESIGNED FOR HEAVY TRAFFIC LOADS.
3. CAST IRON LID SHALL BE MARKED "DETECTOR" AND SHALL BE SECURED IN PLACE BY APPLYING WATERPROOF SILICONE SEALANT. VALVE BOX LOCATION SHALL BE AS SHOWN ON THE PLANS.
4. THE EXCAVATION AROUND THE HANDHOLE SHALL BE BACKFILLED WITH 5 SACK P.C.C.
5. THE HANDHOLE SHALL BE PROTECTED WITH COLD PATCH OR OTHER SUITABLE PROTECTION UNTIL PERMANENT AC BACKFILL IS PLACED.
6. THE CEMENT USED TO JOIN THE ABS SWEEP "Y" TO THE PVC CONDUIT SHALL BE CAPABLE OF PROVIDING A SOLVENT TYPE WELD BETWEEN THE TWO MATERIALS.

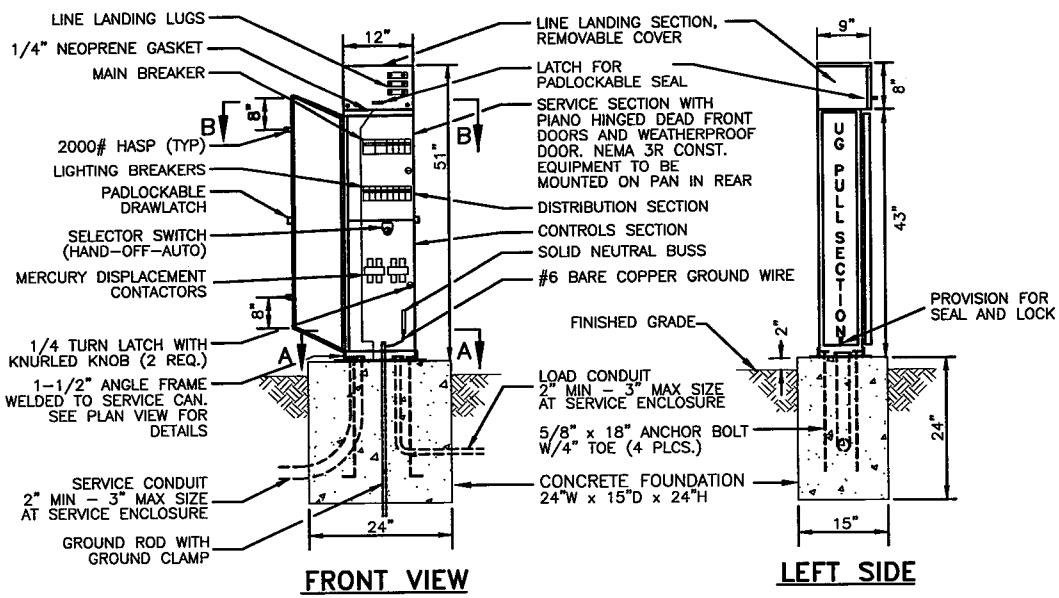
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

TYPE "B" DETECTOR HANDHOLE DETAIL

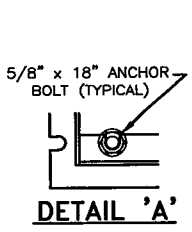
SCALE: NONE
DATE: 12/2007
DRAWN BY: COUNTY D.O.T.

5-25

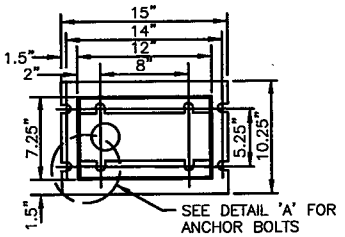


FRONT VIEW

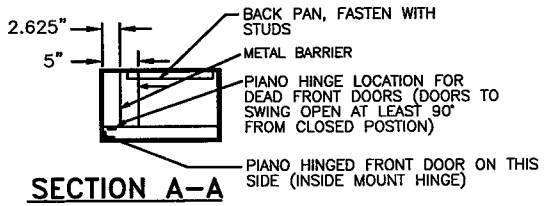
LEFT SIDE



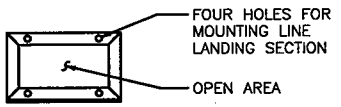
DETAIL 'A'



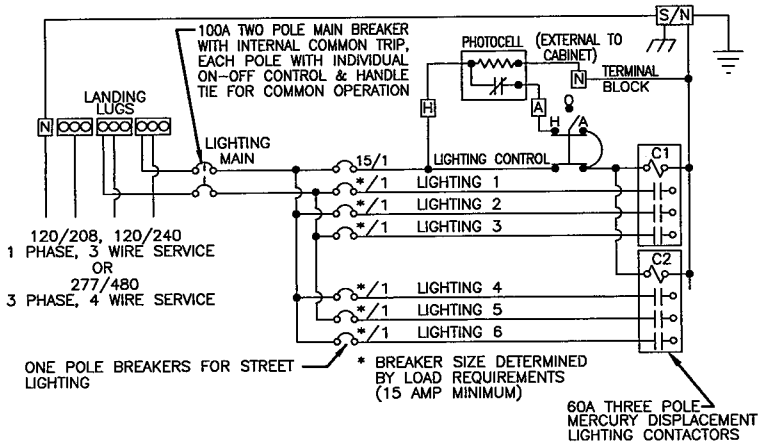
FRONT
BASE PLATE DETAIL



SECTION A-A



SECTION B-B



UNMETERED SERVICE
WIRING SCHEMATIC DIAGRAM

1. EXTERIOR SHALL BE 14 GAUGE #304D STAINLESS STEEL. INTERIOR DEAD FRONT PANEL AND BACK PAN SHALL BE 14 GAUGE STEEL, PAINTED WHITE. ENCLOSURE SHALL BE ELECTRICALLY WELDED AND REINFORCED WHERE REQUIRED.
2. CONSTRUCTION SHALL BE NEMA 3R AND 12, RAINTIGHT AND DUSTTIGHT.
3. ALL NUTS, BOLTS, SCREWS AND HINGES SHALL BE STAINLESS STEEL.
4. NUTS, BOLTS AND SCREWS SHALL NOT BE USED ON THE OUTSIDE OF THE SERVICE ENCLOSURE.
5. PHENOLIC NAMEPLATES SHALL BE USED TO IDENTIFY ALL OPERATOR CONTROLS.
6. CONTROL WIRING SHALL BE MARKED AT BOTH ENDS BY PERMANENT WIRE MARKERS.
7. A PLASTIC COVERED WIRING DIAGRAM SHALL BE ATTACHED TO THE INSIDE OF THE FRONT DOOR.
8. SERVICE ENCLOSURE SHALL BE FACTORY WIRED AND CONFORM TO REQUIRED NEMA STANDARDS.
9. SERVICE ENCLOSURE SHALL BE U.L. LISTED AS INDUSTRIAL CONTROL PANELS U.L. 508 FILE NO. E62062
10. WIRING BETWEEN CIRCUIT BREAKER AND CONTACTOR SHALL BE #6 THWN OR THHN MINIMUM.
11. SERVICE ENCLOSURE SHALL BE OF TWO-PIECE CONSTRUCTION.
12. THE WIRING SCHEMATIC DIAGRAM AS SHOWN IS FOR A 2-WIRE STREET LIGHTING SYSTEM. IF THE SERVICE ENCLOSURE WILL BE USED FOR A 3-WIRE STREET LIGHTING SYSTEM, THEN THE LIGHTING BREAKERS SHALL CONSIST OF 2-POLE BREAKERS WITH INTERNAL COMMON TRIP, EACH POLE WITH INDIVIDUAL ON-OFF CONTROL AND HANDLE TIE FOR COMMON OPERATION. FOR EACH 2-POLE BREAKER, THE CIRCUIT LOAD SHALL BE EQUALLY DIVIDED ACROSS THE LIGHTING MAIN.
13. SEE STANDARD SPECIFICATIONS FOR ADDITIONAL DETAILS.

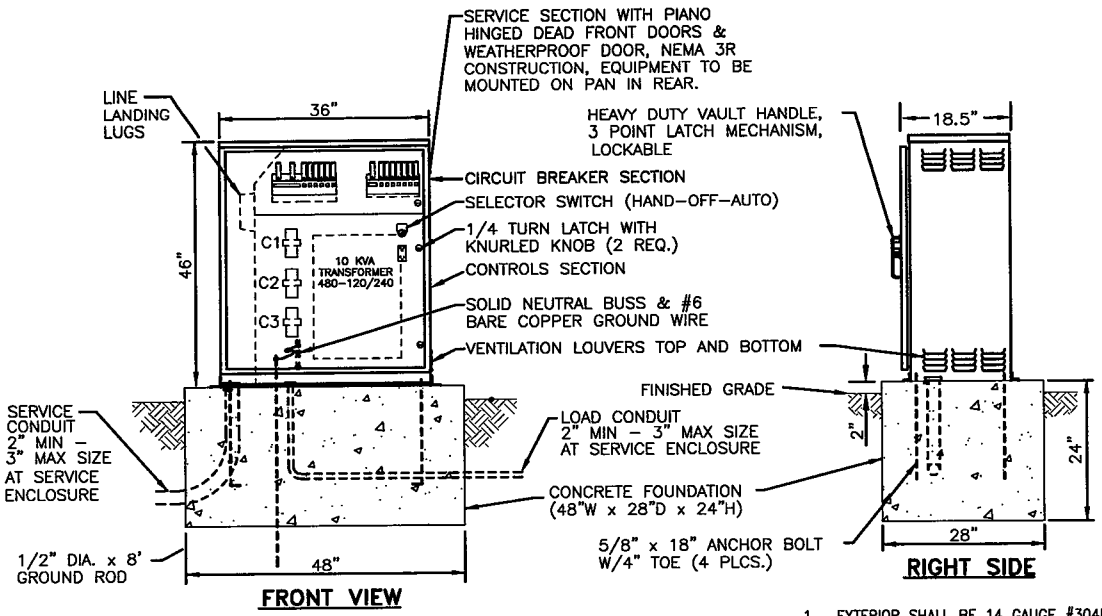
CHIEF, DEPT. OF TRANSPORTATION

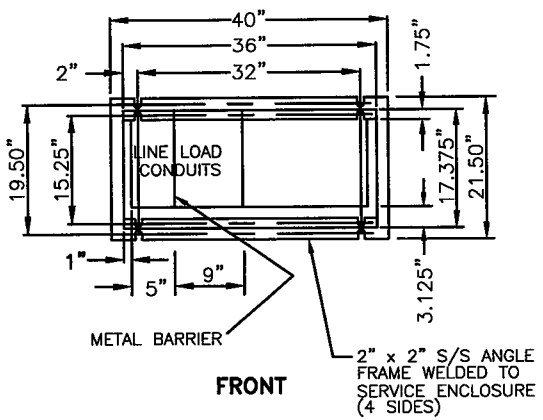
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
UNMETERED SERVICE ENCLOSURE CAN
(120/280V, 120/240V, 277/480V)

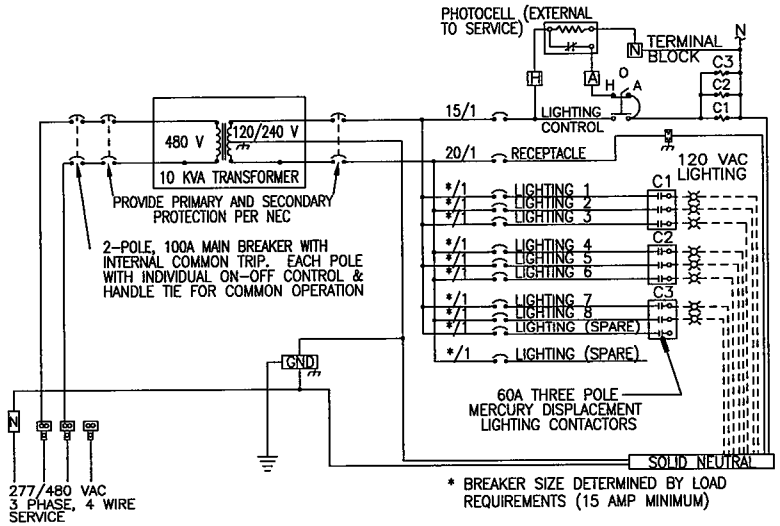
SCALE: NONE
DATE: 10/07/14 - BR
DRAWN BY: JAS

5-30





BASE PLATE DETAIL



UNMETERED SERVICE WIRING SCHEMATIC DIAGRAM

1. EXTERIOR SHALL BE 14 GAUGE #304D STAINLESS STEEL. INTERIOR DEAD FRONT PANEL AND BACK PAN SHALL BE 14 GAUGE STEEL, PAINTED WHITE. ENCLOSURE SHALL BE ELECTRICALLY WELDED AND REINFORCED WHERE REQUIRED.
2. CONSTRUCTION SHALL BE NEMA 3R AND 12, RAINTIGHT AND DUSTTIGHT.
3. ALL NUTS, BOLTS, SCREWS AND HINGES SHALL BE STAINLESS STEEL.
4. NUTS, BOLTS AND SCREWS SHALL NOT BE USED ON THE OUTSIDE OF THE SERVICE ENCLOSURE.
5. PHENOLIC NAMEPLATES SHALL BE USED TO IDENTIFY ALL OPERATOR CONTROLS.
6. CONTROL WIRING SHALL BE MARKED AT BOTH ENDS BY PERMANENT WIRE MARKERS.
7. A PLASTIC COVERED WIRING DIAGRAM SHALL BE ATTACHED TO THE INSIDE OF THE FRONT DOOR.
8. SERVICE ENCLOSURE SHALL BE FACTORY WIRED AND CONFORM TO REQUIRED NEMA STANDARDS.
9. SERVICE ENCLOSURE SHALL BE U.L. LISTED AS INDUSTRIAL CONTROL PANELS U.L. 508 FILE NO. E62062
10. WIRING BETWEEN CIRCUIT BREAKER AND CONTACTOR SHALL BE #6 THWN OR THHN MINIMUM.
11. SIZE OF TRANSFORMER SHALL BE 10 KVA. PROVIDE PRIMARY AND SECONDARY PROTECTION PER NEC.
12. WHEN CHANGING VOLTAGE ON A RETROFIT PROJECT WHERE A NEW SERVICE ENCLOSURE WITH A STEP-DOWN TRANSFORMER IS REQUIRED, THE NEW SERVICE ENCLOSURE SHALL BE PLACED BETWEEN THE SERVICE POINT AND THE OLD SERVICE ENCLOSURE LOCATED WITHIN THE COUNTY R/W. VOLTAGE OUTPUT FROM THE NEW SERVICE ENCLOSURE MAY BE CONNECTED INTO THE EXISTING CONDUIT SYSTEM.
13. THE WIRING SCHEMATIC DIAGRAM AS SHOWN IS FOR A 2-WIRE STREET LIGHTING SYSTEM. IF THE SERVICE ENCLOSURE WILL BE USED FOR A 3-WIRE STREET LIGHTING SYSTEM, THEN THE LIGHTING BREAKERS SHALL CONSIST OF 2-POLE BREAKERS WITH INTERNAL COMMON TRIP, EACH POLE WITH INDIVIDUAL ON-OFF CONTROL AND HANDLE TIE FOR COMMON OPERATION. FOR EACH 2-POLE BREAKER, THE ACROSS THE LIGHTING MAIN.
14. SEE STANDARD SPECIFICATIONS FOR ADDITIONAL DETAILS.

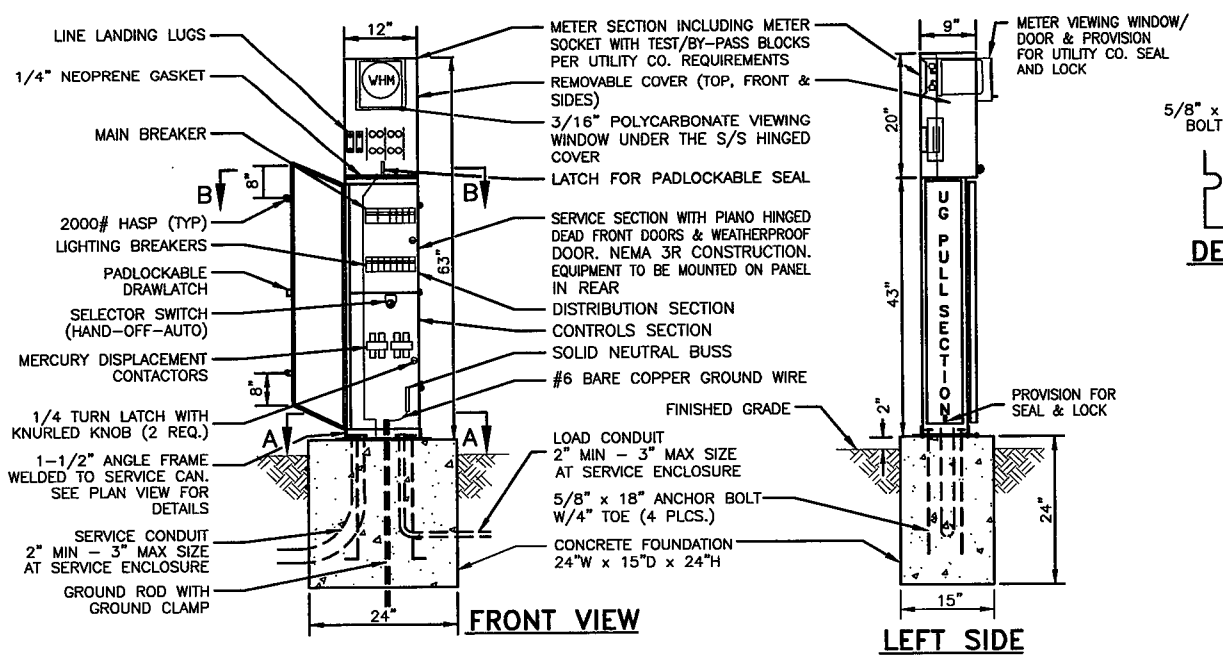
CHIEF, DEPT. OF TRANSPORTATION

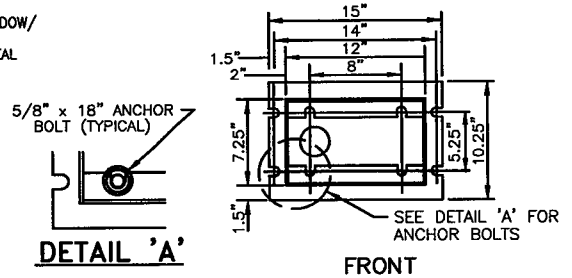
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

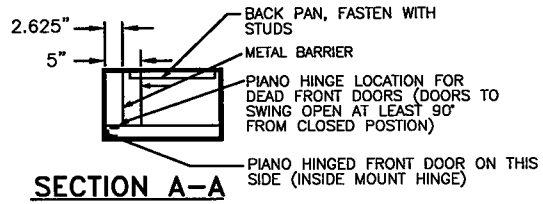
SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
UNMETERED SERVICE ENCLOSURE CAN WITH STEP-DOWN TRANSFORMER (277/480V TO 120/240V)

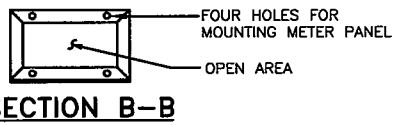
SCALE: NONE
DATE: 10/08/14 – BR
DRAWN BY: JAS

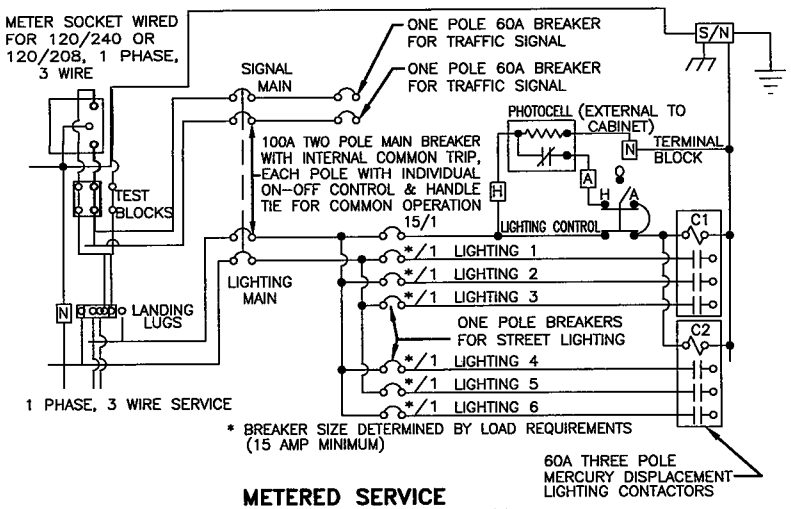
5-31











METERED SERVICE
WIRING SCHEMATIC DIAGRAM

1. EXTERIOR SHALL BE 14 GAUGE #304D STAINLESS STEEL. INTERIOR DEAD FRONT PANEL AND BACK PAN SHALL BE 14 GAUGE STEEL, PAINTED WHITE. ENCLOSURE SHALL BE ELECTRICALLY WELDED AND REINFORCED WHERE REQUIRED.
2. CONSTRUCTION SHALL BE NEMA 3R AND 12, RAINTIGHT AND DUSTTIGHT.
3. ALL NUTS, BOLTS, SCREWS AND HINGES SHALL BE STAINLESS STEEL.
4. NUTS, BOLTS AND SCREWS SHALL NOT BE USED ON THE OUTSIDE OF THE SERVICE ENCLOSURE.
5. PHENOLIC NAMEPLATES SHALL BE USED TO IDENTIFY ALL OPERATOR CONTROLS.
6. CONTROL WIRING SHALL BE MARKED AT BOTH ENDS BY PERMANENT WIRE MARKERS.
7. A PLASTIC COVERED WIRING DIAGRAM SHALL BE ATTACHED TO THE INSIDE OF THE FRONT DOOR.
8. SERVICE ENCLOSURE SHALL BE FACTORY WIRED AND CONFORM TO REQUIRED NEMA STANDARDS.
9. SERVICE ENCLOSURE SHALL BE U.L. LISTED AS INDUSTRIAL CONTROL PANELS U.L. 508 FILE NO. E62062
10. WIRING BETWEEN CIRCUIT BREAKER AND CONTACTOR SHALL BE #6 THWN OR THHN MINIMUM.
11. SIZE OF TRANSFORMER SHALL BE 10 KVA. PROVIDE PRIMARY AND SECONDARY PROTECTION PER NEC.
12. THE WIRING SCHEMATIC DIAGRAM AS SHOWN IS FOR A 2-WIRE STREET LIGHTING SYSTEM. IF THE SERVICE ENCLOSURE WILL BE USED FOR A 3-WIRE STREET LIGHTING SYSTEM, THEN THE LIGHTING BREAKERS SHALL CONSIST OF 2-POLE BREAKERS WITH INTERNAL COMMON TRIP, EACH POLE WITH INDIVIDUAL ON-OFF CONTROL AND HANDLE TIE FOR COMMON OPERATION. FOR EACH 2-POLE BREAKER, THE ACROSS THE LIGHTING MAIN.
13. SEE STANDARD SPECIFICATIONS FOR ADDITIONAL DETAILS.

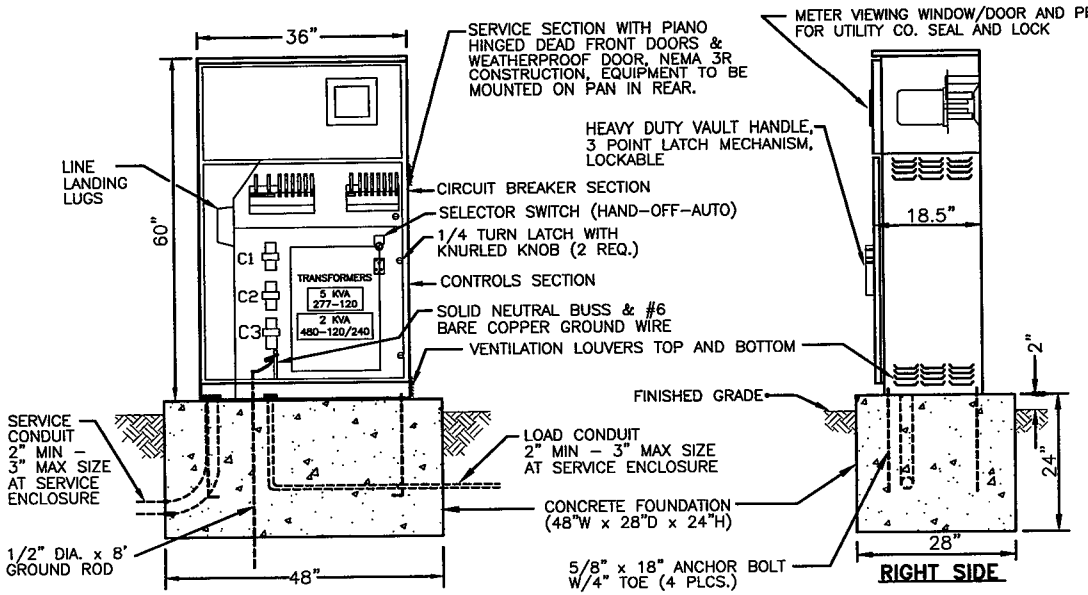
CHIEF, DEPT. OF TRANSPORTATION

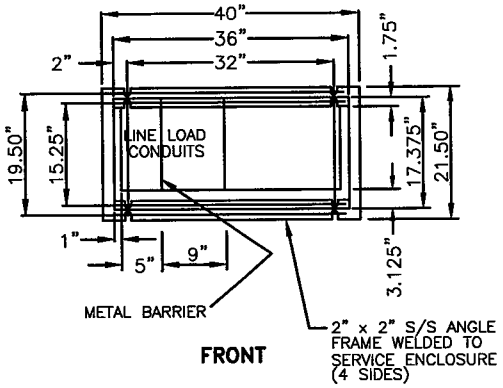
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
METERED SERVICE, ENCLOSURE CAN (120/280V, 120/240V)

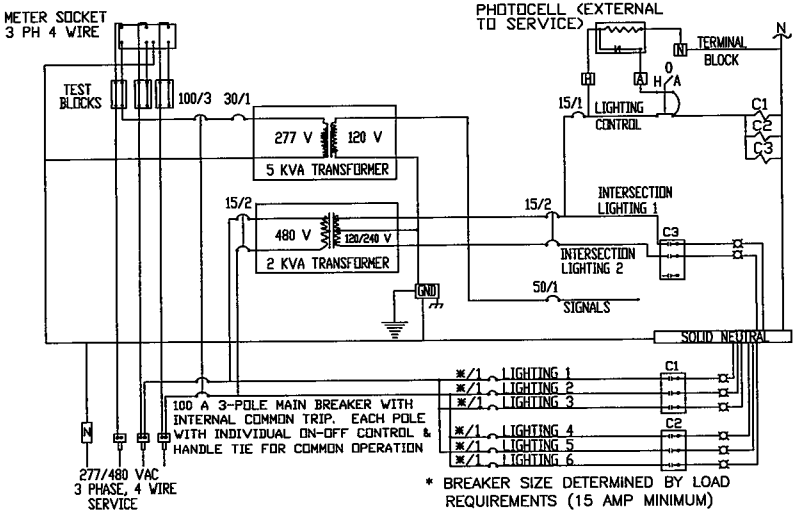
SCALE: NONE
DATE: 10/08/14 - BR
DRAWN BY: JAS

5-32





BASE PLATE DETAIL



METERED SERVICE WIRING SCHEMATIC DIAGRAM

1. EXTERIOR SHALL BE 14 GAUGE #304D STAINLESS STEEL. INTERIOR DEAD FRONT PANEL AND BACK PAN SHALL BE 14 GAUGE STEEL, PAINTED WHITE. ENCLOSURE SHALL BE ELECTRICALLY WELDED AND REINFORCED WHERE REQUIRED.
2. CONSTRUCTION SHALL BE NEMA 3R AND 12, RAINTIGHT AND DUSTTIGHT.
3. ALL NUTS, BOLTS, SCREWS AND HINGES SHALL BE STAINLESS STEEL.
4. NUTS, BOLTS AND SCREWS SHALL NOT BE USED ON THE OUTSIDE OF THE SERVICE ENCLOSURE.
5. PHENOLIC NAMEPLATES SHALL BE USED TO IDENTIFY ALL OPERATOR CONTROLS.
6. CONTROL WIRING SHALL BE MARKED AT BOTH ENDS BY PERMANENT WIRE MARKERS.
7. A PLASTIC COVERED WIRING DIAGRAM SHALL BE ATTACHED TO THE INSIDE OF THE FRONT DOOR.
8. SERVICE ENCLOSURE SHALL BE FACTORY WIRED AND CONFORM TO REQUIRED NEMA STANDARDS.
9. SERVICE ENCLOSURE SHALL BE U.L. LISTED AS INDUSTRIAL CONTROL PANELS U.L. 508 FILE NO. E62062
10. WIRING BETWEEN CIRCUIT BREAKER AND CONTACTOR SHALL BE #6 THWN OR THHN MINIMUM.
11. SIZE OF TRANSFORMER SHALL BE 5 KVA. SIZE OF TRANSFORMER FOR 120 V INTERSECTION LIGHTING SHALL BE 2 KVA.
12. WHEN CHANGING VOLTAGE ON A RETROFIT PROJECT WHERE A NEW SERVICE ENCLOSURE WITH A STEP-DOWN TRANSFORMER IS REQUIRED, THE NEW SERVICE ENCLOSURE SHALL BE PLACED BETWEEN THE SERVICE POINT AND THE OLD SERVICE ENCLOSURE LOCATED WITHIN THE COUNTY R/W. VOLTAGE OUTPUT FROM THE NEW SERVICE ENCLOSURE MAY BE CONNECTED INTO THE EXISTING CONDUIT SYSTEM.
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14. SEE STANDARD SPECIFICATIONS FOR ADDITIONAL DETAILS.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
METERED SERVICE ENCLOSURE CAN WITH STEP-DOWN TRANSFORMER (277/480V TO 120/240V)

SCALE: NONE
DATE: 10/09/14 - BR
DRAWN BY: JAS/DJTM

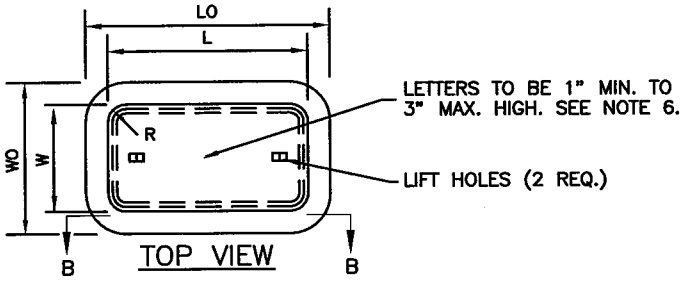
5-33

	REINFORCED CONCRETE BOX				COMPOSITE BOX		REINFORCED CONC. OR COMPOSITE COVER				
PULL BOX No.	MIN.** THICKNESS	MIN. DEPTH BOX AND EXTENSION	LO	WO	MIN.** THICKNESS	MIN. DEPTH BOX AND EXTENSION	L***	W***	R	EDGE THICKNESS	EDGE TAPER
3-1/2	1"	NO EXTENSION	20"	14"	5/16"	NO EXTENSION	15-3/8"	10-1/8"	1-1/8"	1-3/4"	1/8"
5	1"	22"	28"	18"	5/16"	20"	23-1/4"	13-3/4"	1-1/4"	2"	1/8"
5A	1"	22"	25-1/4"	15-3/4"	5/16"	20"	20-5/8"	10-1/2"	1-1/4"	2"	1/8"
6	1-1/2"	24"	36"	23"	3/8"	20"	30-5/8"	17-5/8"	1-1/4"	2"	1/8"

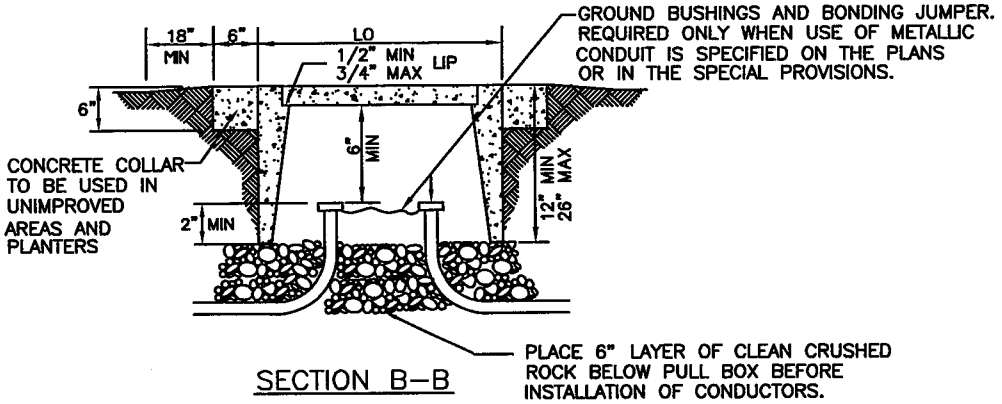
** EXCLUDING CONDUIT WEB *** TOP DIMENSION

NOTES:

1. IN UNIMPROVED AREAS AND PLANTERS, THE TOP OF PULL BOXES SHALL BE PLACED 0.10 FOOT ABOVE THE SURROUNDING GRADE OR, WHEN ADJACENT TO A CURB, FLUSH WITH THE TOP OF THE CURB. THE SURROUNDING GRADE SHALL BE RAMPED UP TO MATCH THE TOP OF THE CONCRETE COLLAR. UNLESS ORTHERWISE NOTED, AND WHERE PRACTICAL, PULL BOXES SHOWN IN THE VICINITY OF CURBS SHALL BE PLACED ADJACENT TO THE BACK OF CURB, AND PULL BOXES SHOWN ADJACENT TO STANDARDS SHALL BE PLACED ON THE SIDE OF THE FOUNDATION FACING AWAY FROM TRAFFIC.
2. IN SIDEWALK AREAS, THE TOP OF PULL BOXES SHALL BE PLACED FLUSH WITH THE SIDEWALK GRADE.
3. PLACEMENT OF PULL BOXES IN AREAS SUBJECT TO VEHICULAR TRAFFIC LOADS (INCLUDES TRAFFIC LANES, BIKE LANES, SHOULDERS, AND DRIVEWAYS) SHALL BE AVOIDED WHENEVER POSSIBLE. IF UNAVOIDABLE, THEN A TRAFFIC RATED PULL BOX WITH STEEL TRAFFIC COVER SHALL BE USED. SEE STATE STANDARD PLANS.
4. PULL BOXES SHALL NOT BE PLACED WITHIN THE BOUNDARIES OF SIDEWALK RAMPS.
5. PULL BOXES SHOULD NOT BE PLACED WITHIN PLANTER AREAS WHENEVER POSSIBLE.
6. PULL BOX COVERS SHALL BE MARKED AS FOLLOWS:
   1) "TRAFFIC SIGNAL" TRAFFIC SIGNAL CIRCUITS WITH OR WITHOUT STREET LIGHTING CIRCUITS.
   2) "STREET LIGHTING" STREET LIGHTING CIRCUITS WHERE NO VOLTAGE IS ABOVE 600V.
   3) "STREET LIGHTING-HIGH VOLTAGE" STREET LIGHTING CIRCUITS WHERE VOLTAGE IS ABOVE 600V.
   4) "SERVICE" SERVICE CIRCUITS BETWEEN SERVICE POINT AND SERVICE DISCONNECT.
   5) "SPRINKLER CONTROL" SPRINKLER CONTROL CIRCUITS, 50 VOLTS OR LESS.
   6) "IRRGATION" CIRCUITS TO IRRIGATION CONTROLER, 120 VOLTS OR MORE.
   7) "RAMP METER" RAMP METER CIRCUITS.
   8) "COUNT STATION" COUNT AND/OR SPEED MONITOR CIRCUITS.
   9) "COMMUNICATION" COMMUNICATION CIRCUITS.
   10) "TELEPHONE" TELEPHONE SERVICE.
   11) "TOS COMMUNICATIONS" TOS COMMUNICATIONS TRUNK LINE.
   12) "TOS POWER" TOS POWER.
   13) "TDC POWER" TELEPHONE DEMARCATION CABINET POWER.
7. COVERS SHALL FIT FLUSH WITH THE TOP OF PULL BOXES. THERE SHALL BE 1/8" MAXIMUM CLEARANCE ALL AROUND BETWEEN COVERS AND PULL BOX OPENINGS.
8. ALL COVERS AND BOXES SHALL BE INTERCHANGEABLE WITH CALIFORNIA STANDARD MALE AND FEMALE GAUGES. WHEN INTERCHANGED WITH A STANDARD MALE OR FEMALE GAUGE, THE TOP SURFACES SHALL BE FLUSH WITHIN 1/8 INCH.
9. THE TOP EDGES OF ALL CONCRETE COVERS AND PULL BOXES SHALL HAVE A 1/4" MIN. RADIUS.
10. STACKING OF PULL BOXES IS PERMITTED (TWO PULL BOXES MAXIMUM).
11. STEEL REINFORCING SHALL BE AS REGULARLY USED IN THE STANDARD PRODUCTS OF THE RESPECTIVE MANUFACTURER.
12. REFER TO STATE STANDARD PLANS AND SPECIFICATIONS FOR USE OF ELECTRICAL VAULTS AND TRAFFIC RATED PULL BOXES.
13. REFER TO STANDARD DRAWING 5-13 FOR STREET LIGHT PULL BOXES.
14. WHEN INSTALLING INTERCONNECT CONDUCTORS, THE CONDUCTORS SHALL BE SEALED USING THE PROCEDURE SPECIFIED ON STANDARD DRAWING 5-13.
15. IF ELECTRICAL VAULT IS REQUIRED FOR INSTALLATION, IT SHALL BE A CHRISTY CONCRETE P48 BOX OR EQUIVALENT.



TOP VIEW



SECTION B-B

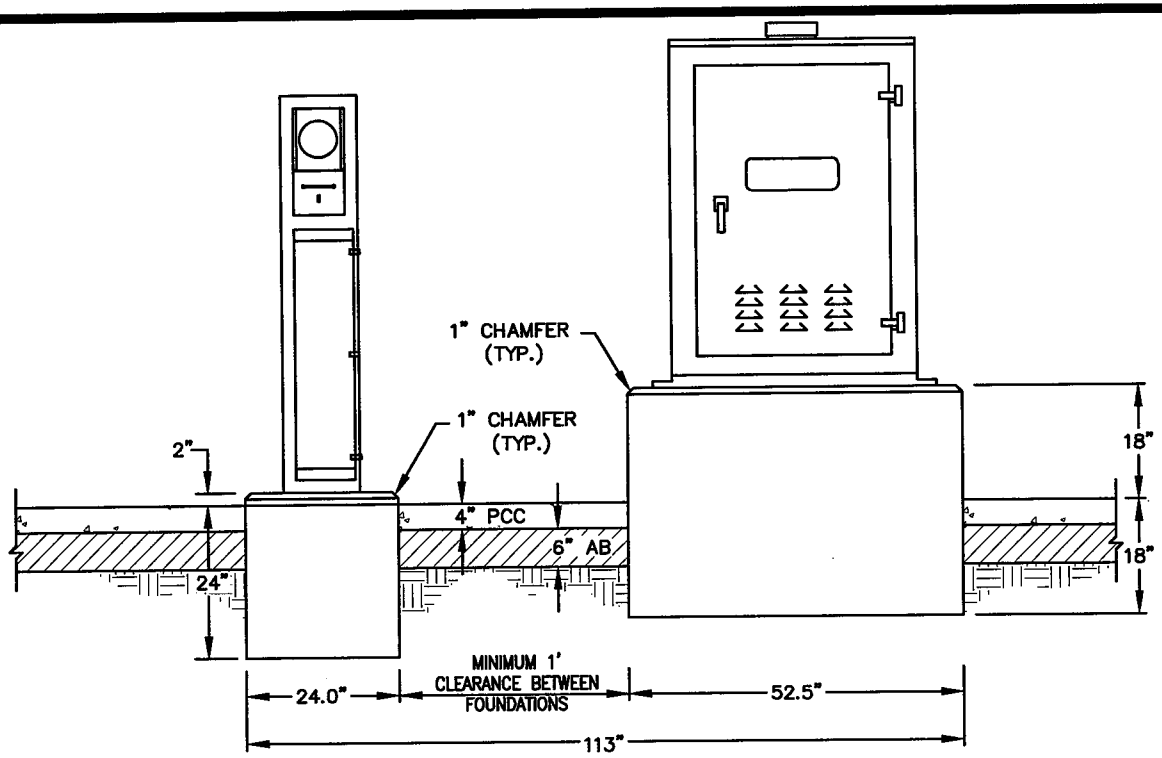
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

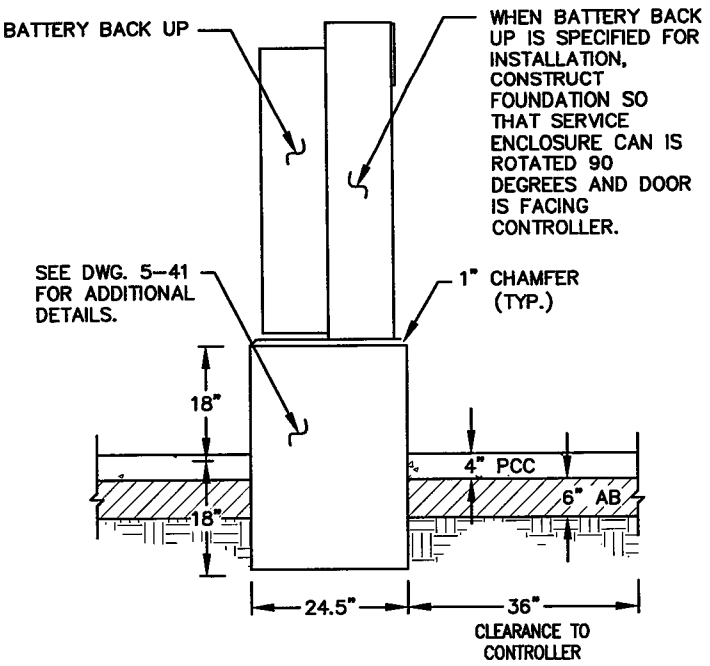
SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
PULL BOX

SCALE: NONE
DATE: 10/29/14 - BR
DRAWN BY: KK

5-34

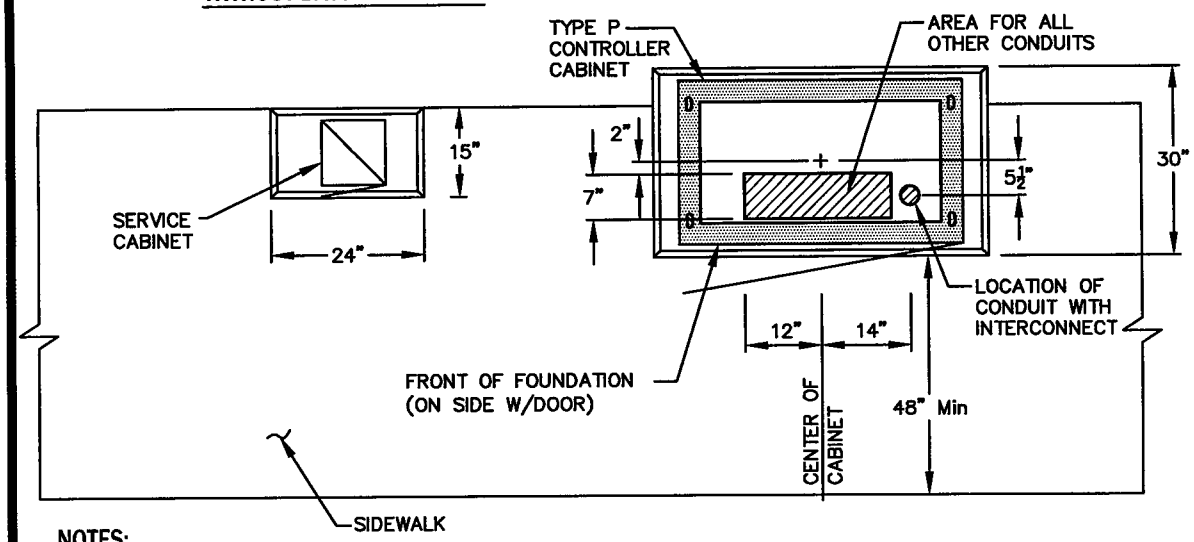


WITHOUT BATTERY BACK UP



WITH BATTERY BACK UP

SEE NOTE 2



CHIEF, DEPT. OF TRANSPORTATION

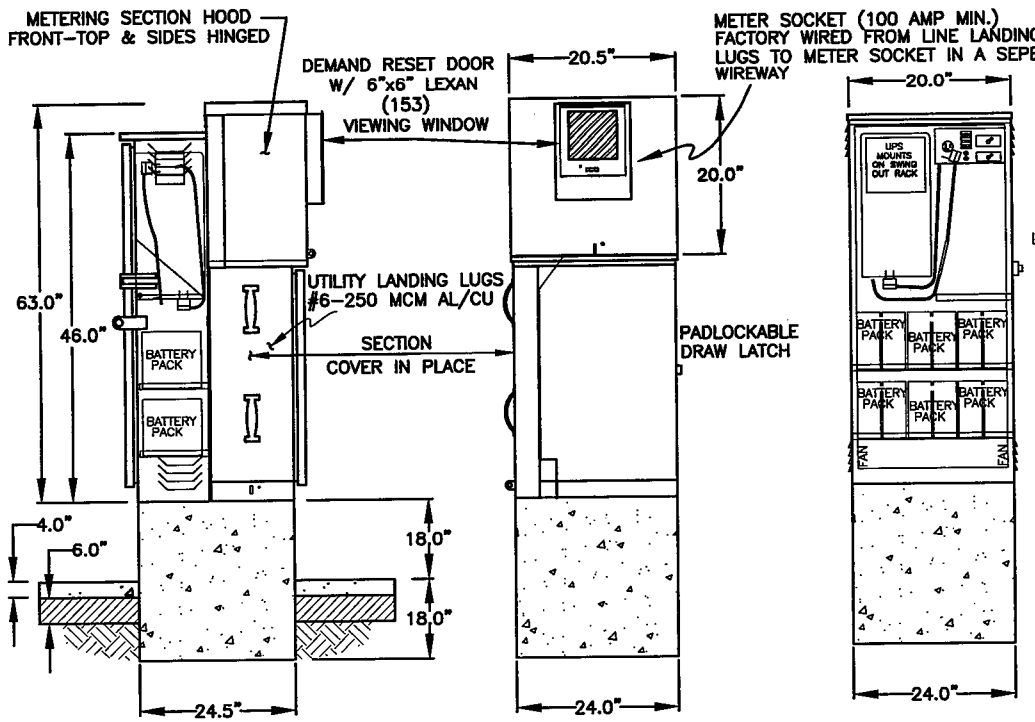
NOTES:

1. INSTALLATION OF CABINET FOUNDATION PARTIALLY BEHIND BACK OF WALK MAY REQUIRE ADDITIONAL RIGHT-OF-WAY OR EASEMENT.
2. USE OF BATTERY BACK UP SHALL ONLY BE USED WHEN SPECIFIED ON PROJECT PLANS.

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

TRAFFIC SIGNAL CONTROLLER CABINET AND SERVICE CAN WITH BATTERY BACKUP FOUNDATIONS

SCALE:	NONE	5 - 40
DATE:	10/15/14 -BR	
DRAWN BY:	JAS	

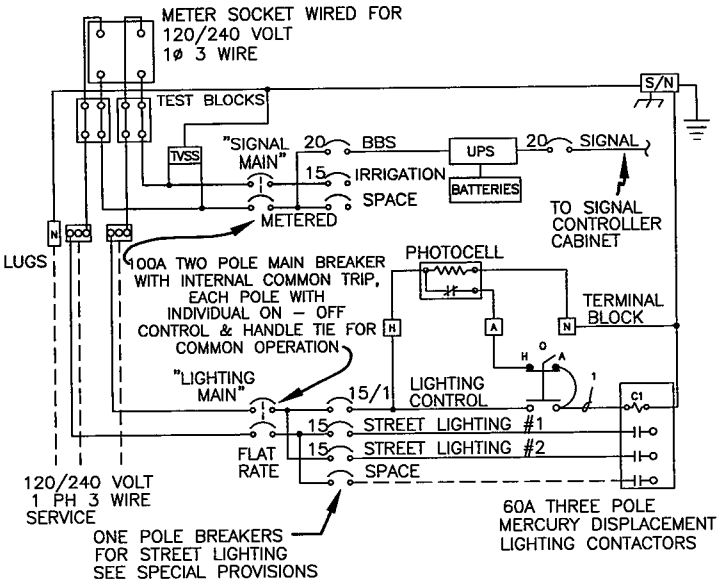


LEFT SIDE

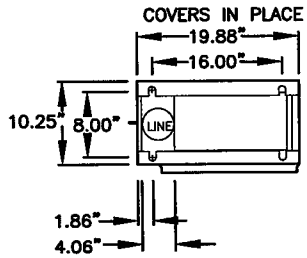
COVERS IN PLACE MOUNTED ON PAD

FRONT VIEW

REAR VIEW



WIRING SCHEMATIC DIAGRAM



BASE PLAN

ENCLOSURE CONSTRUCTION NOTES

1. EXTERIOR, 1/8" ALUMINUM, AND INTERIOR 14 GA COLD ROLLED STEEL ELECTRICALLY WELDED AND REINFORCED WHERE REQUIRED.
2. CONSTRUCTION WILL BE NEMA 3R, RAINTIGHT.
3. ALL NUTS, BOLTS AND SCREWS WILL BE STAINLESS STEEL.
4. NUTS, BOLTS & SCREWS WILL NOT BE VISIBLE FROM OUTSIDE OF ENCLOSURE.
5. NAMEPLATES WILL BE PROVIDED AS REQUIRED.
6. CONTROL WIRING WILL BE MARKED AT BOTH ENDS BY PERMANENT WIRE MARKERS.
7. A PLASTIC COVERED WIRING DIAGRAM WILL BE ATTACHED TO THE INSIDE OF THE FRONT DOOR.
8. ENCLOSURE WILL BE FACTORY WIRED AND CONFORM TO REQUIRED NEMA STANDARDS.
9. ANODIZE AFTER FABRICATION.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

METERED SERVICE ENCLOSURE WITH BATTERY BACKUP (120/240V)

SCALE: NONE
DATE: 10/09/2014 – BR
DRAWN BY: JAS

5-41

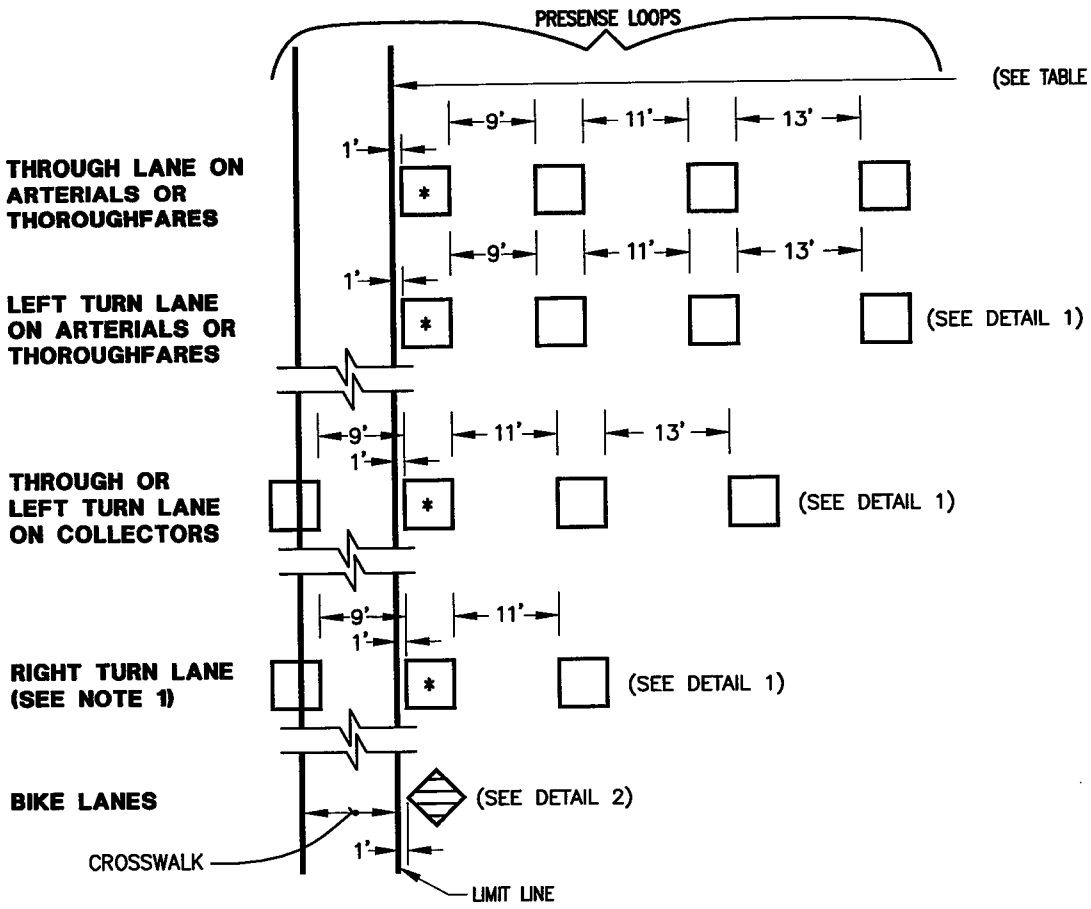
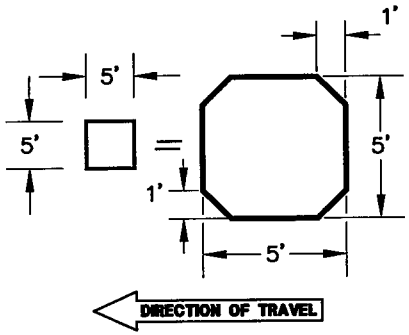


TABLE 1: LOCATION OF ADVANCE LOOP	
Design Speed (mph)	**Distance from limit line (feet)**
40	250
45	300
50	350
55	400
60	450

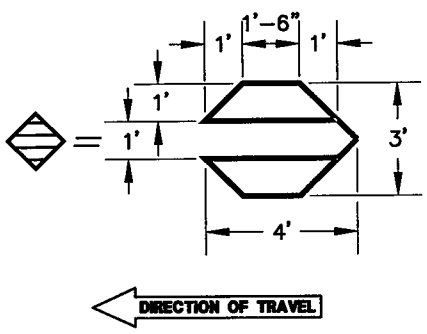
NOTES:

1. LOOP DETECTORS ON RIGHT TURN LANES ARE NOT NECESSARY FOR ARTERIAL OR THOROUGHFARE STREETS WHERE THE CROSS STREET IS A COLLECTOR.
2. SEE DWG. 5-43 FOR LOOP WINDING REQUIREMENTS.



MODIFIED TYPE A DETECTOR LOOP PER COUNTY STD DWG 5-43 & CALTRANS STD PLAN ES-5A

DETAIL 1



MODIFIED TYPE D DETECTOR LOOP PER COUNTY STD DWG 5-43 & CALTRANS STD PLAN ES-5B

DETAIL 2

* — LOOP DETECTOR AT STOP BAR TO HAVE 4 TURNS AND SHALL BE CONNECTED TO ITS OWN DETECTOR LEAD-IN CABLE (DLC). ALL OTHER PRESENSE LOOPS IN THE SAME LANE SHALL BE CONNECTED TO ANOTHER DETECTOR LEAD-IN CABLE (DLC).

CHIEF, DEPT. OF TRANSPORTATION

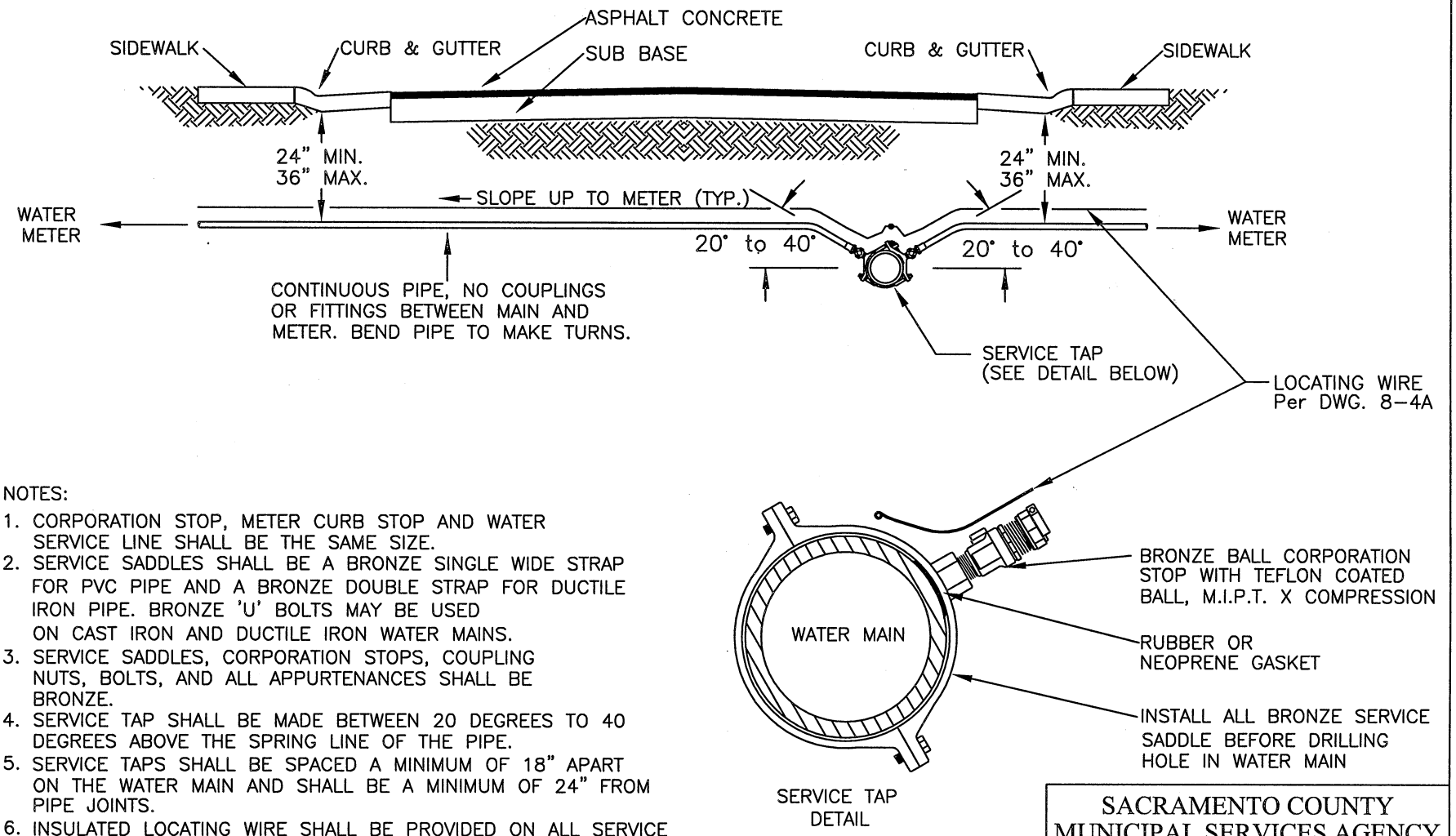
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

DETECTOR LOOP LOCATION DETAILS

SCALE: NONE
DATE: 5/2014
DRAWN BY: TRS/SCS

5 - 44

DRAWING NUMBER	TITLE
8-1	1”-2” WATER SERVICE INSTALLATION (8/13)
8-2A	FIRE HYDRANT INSTALLATION WATER MAIN IN STREET (8/13)
8-2B	FIRE HYDRANT INSTALLATION WATER MAIN NOT IN ROADWAY (8/13)
8-3A	THRUST BLOCK BEARING AREA (8/13)
8-3B	PIPE RESTRAINED LENGTH (11/15)
8-4A	LOCATING WIRE FOR WATER MAINS AND SERVICES (8/13)
8-4B	LOCATING WIRE STATION (8/13)
8-5	VALVE BOX INSTALLATION AND OPERATING NUT EXTENSION (8/13)
8-6A-1	1.5” RESIDENTIAL WATER SERVICE WITH 1” WATER METER (10/13)
8-6B	1-1/2” OR 2” COMMERCIAL METERED WATER SERVICE (11/15)
8-6C	3” TO 6” WATER SERVICE & METER INSTALLATION (11/15)
8-7	FIRE PROTECTION DETAIL (11/15)
8-8A	REDUCED PRESSURE BACKFLOW PREVENTER 1” TO 2” (11/15)
8-8B	REDUCED PRESSURE BACKFLOW PREVENTER 3” AND LARGER (11/15)
8-8C	DOUBLE CHECK DETECTOR OR RP PRINCIPLE DETECTOR 6” AND LARGER (11/15)
8-9A	MAXIMUM DEFLECTION FOR DUCTILE IRON PIPE (8/13)
8-9B	MAXIMUM DEFLECTION FOR PVC PIPE (8/13)
8-10	UTILITY CROSSING (11/15)
8-11	UTILITY CROSSING UNDER EXISTING WATER MAIN (11/15)
8-12	TEMPORARY BLOW OFF ASSEMBLY (8/13)
8-13A	4” BLOW OFF ASSEMBLY AT END OF MAIN (8/13)
8-13B	4” BLOW OFF ASSEMBLY AT END OF CUL-DE-SAC (8/13)
8-13C	4” IN-LINE BLOW-OFF ASSEMBLY (8/13)
8-14A	1” COMBINATION AIR/VACUUM VALVE (8/13)
8-14B	2” COMBINATION AIR/VACUUM VALVE (8/13)
8-15	WATER MAIN CUT-IN (11/15)
8-16	RECYCLED WATER SIGN (8/13)
8-17	TRENCH DETAIL (8/13)
8-18	TRANSITION SLEEVE (11/15)
8-19	TYPICAL WELL SITE (11/15)



SERVICE TAP DETAIL

NOTES:

1. CORPORATION STOP, METER CURB STOP AND WATER SERVICE LINE SHALL BE THE SAME SIZE.
2. SERVICE SADDLES SHALL BE A BRONZE SINGLE WIDE STRAP FOR PVC PIPE AND A BRONZE DOUBLE STRAP FOR DUCTILE IRON PIPE. BRONZE 'U' BOLTS MAY BE USED ON CAST IRON AND DUCTILE IRON WATER MAINS.
3. SERVICE SADDLES, CORPORATION STOPS, COUPLING NUTS, BOLTS, AND ALL APPURTENANCES SHALL BE BRONZE.
4. SERVICE TAP SHALL BE MADE BETWEEN 20 DEGREES TO 40 DEGREES ABOVE THE SPRING LINE OF THE PIPE.
5. SERVICE TAPS SHALL BE SPACED A MINIMUM OF 18" APART ON THE WATER MAIN AND SHALL BE A MINIMUM OF 24" FROM PIPE JOINTS.
6. INSULATED LOCATING WIRE SHALL BE PROVIDED ON ALL SERVICE LINES, PER DRAWING 8-4A. WIRE SHALL BE CONNECTED TO LOCATING WIRE ALONG WATER MAIN FOR CONTINUITY.
7. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

Michael L. Peterson

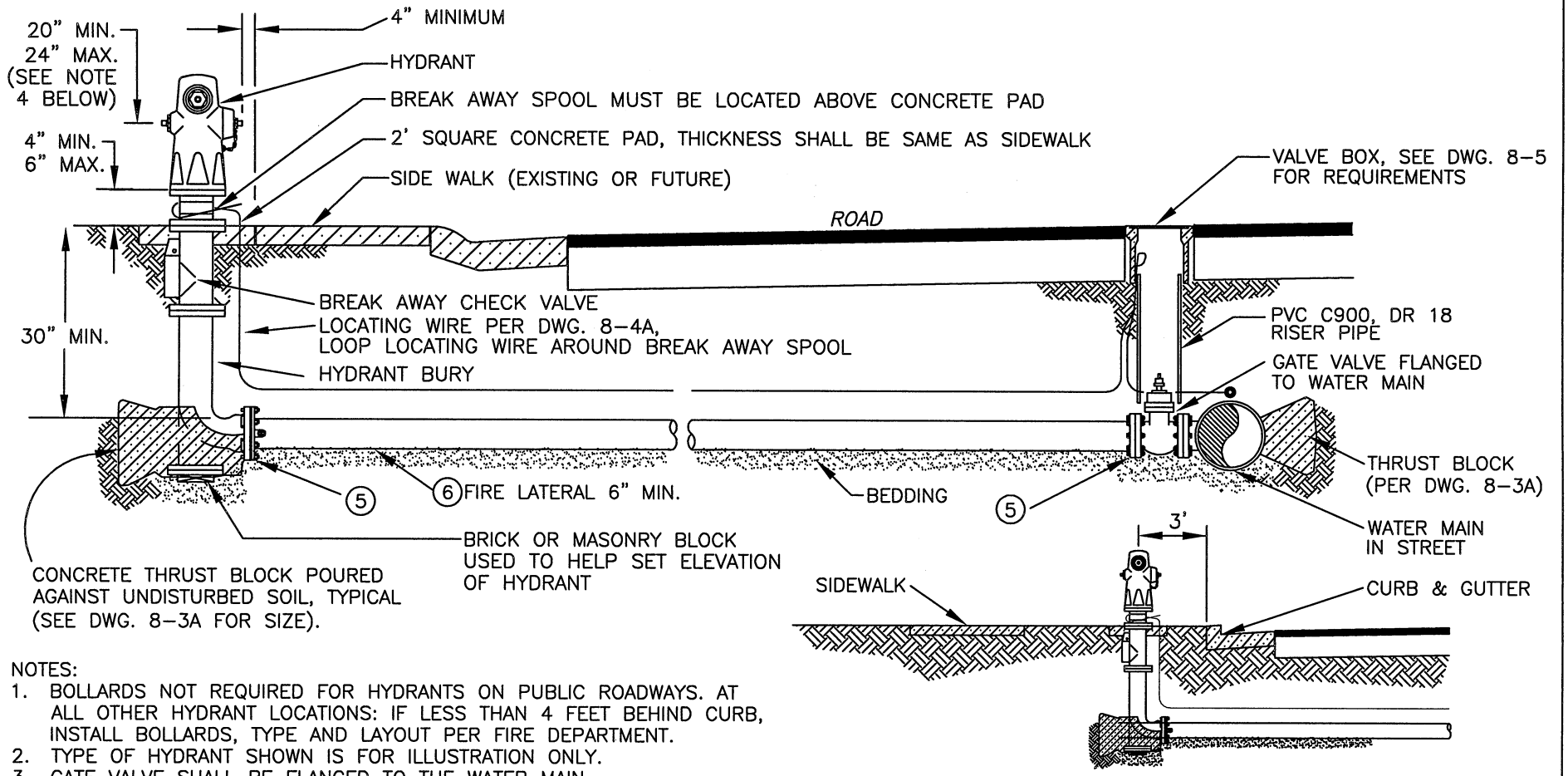
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

1"-2" WATER SERVICE INSTALLATION

SCALE: NONE
DATE: 8/13

8-1



HYDRANT LOCATION AT SEPARATED SIDEWALK

NOTES:

1. BOLLARDS NOT REQUIRED FOR HYDRANTS ON PUBLIC ROADWAYS. AT ALL OTHER HYDRANT LOCATIONS: IF LESS THAN 4 FEET BEHIND CURB, INSTALL BOLLARDS, TYPE AND LAYOUT PER FIRE DEPARTMENT.
2. TYPE OF HYDRANT SHOWN IS FOR ILLUSTRATION ONLY.
3. GATE VALVE SHALL BE FLANGED TO THE WATER MAIN.
4. LOWEST CAP NUT ON HYDRANT SHALL BE 20" MIN. TO 24" MAX. ABOVE TOP OF CONCRETE PAD.
5. THESE JOINTS MAY BE FLANGED OR RESTRAINED MECHANICAL JOINT WITH AN APPROVED RESTRAINED DEVICE.
6. FIRE LATERAL: RESTRAIN ALL JOINTS. DUCTILE IRON PIPE, C900 PVC PIPE ALLOWED IF RUN IS LESS THAN ONE PIPE LENGTH AND INSTALLED WITHOUT PVC-TO-PVC JOINTS.
7. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

Michael L. Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES

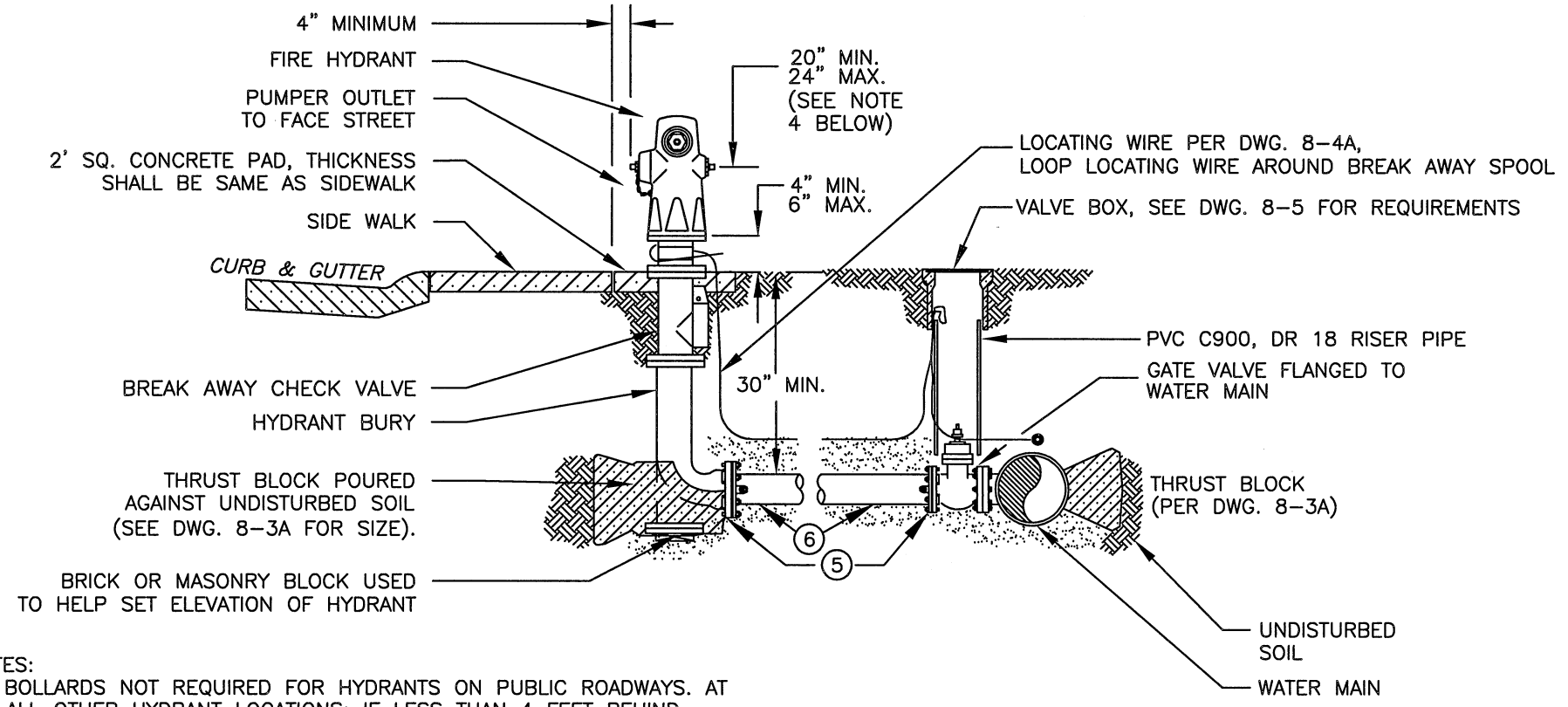
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

FIRE HYDRANT INSTALLATION

WATER MAIN IN STREET

SCALE: NONE
DATE: 8/13

8-2A



NOTES:

1. BOLLARDS NOT REQUIRED FOR HYDRANTS ON PUBLIC ROADWAYS. AT ALL OTHER HYDRANT LOCATIONS: IF LESS THAN 4 FEET BEHIND CURB, INSTALL BOLLARDS, TYPE AND LAYOUT PER FIRE DEPARTMENT.
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7. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

Michael L Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

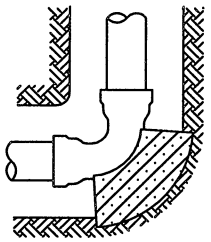
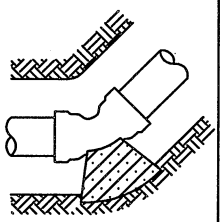
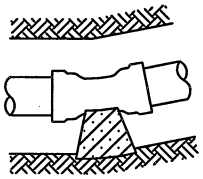
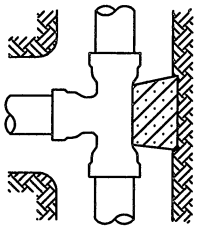
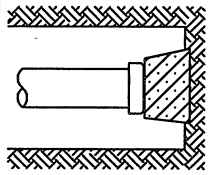
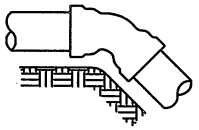
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

FIRE HYDRANT INSTALLATION
WATER MAIN NOT IN ROADWAY

SCALE: NONE
DATE: 8/13

8-2B

REQUIRED BEARING AREA IN TOTAL SQUARE FEET

TYPE OF FITTING		90° BEND	45° BEND	11-1/4° BEND 22-1/2° BEND	TEE	DEAD END	VERTICAL DOWN BEND
TYPICAL INSTALLATION						 SEE NOTE 5	
SIZE OF PIPE	4"	2	1	1	2	2	THRUST BLOCKS NOT ALLOWED. USE RESTRAINED JOINTS WITH RESTRAINED LENGTH PER PLANS AND WATER NOTES.
	6"	4	2	1	3	3	
	8"	7	4	2	5	5	
	10"	12	6	3	8	8	
	12"	16	10	5	12	12	

NOTES

1. THRUST BLOCKS SHALL BE CONSTRUCTED OF CLASS "B" CONCRETE.
2. BEARING AREAS GIVEN ARE FOR TEST PRESSURES OF 150 PSI IN SOIL WITH MINIMUM 2,000 PSF BEARING CAPACITY. IF TEST PRESSURE IS HIGHER OR SOIL BEARING CAPACITY IS LOWER, THRUST BLOCK SIZE SHALL BE RE-DESIGNED & APPROVED BY THE WATER UTILITY.
3. THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED SOIL. IF THIS CANNOT BE DONE, USE RESTRAINED JOINTS TO RESIST THRUST OVER RESTRAINED LENGTHS APPROVED BY THE WATER UTILITY.
4. PIPE JOINTS SHALL BE KEPT CLEAR OF CONCRETE.
5. FOR DEAD ENDS: INSTALL TEMPORARY BLOW OFF PER DWG. 8-12.

Michael L Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

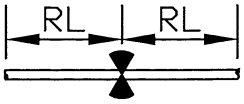
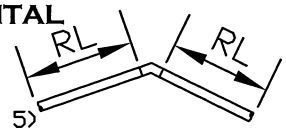
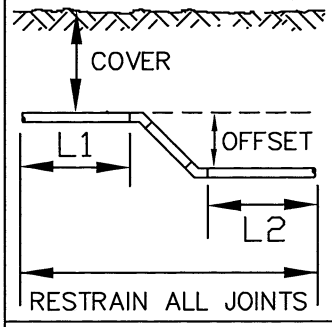
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

THRUST BLOCK BEARING AREA

SCALE: NONE
DATE: 8/13

8-3A

RESTRAINED LENGTH IN FEET

PIPE CONFIGURATION		30" COVER AND GREATER								60" COVER AND GREATER							
		DIP				PVC				DIP				PVC			
RL = RESTRAINED LENGTH		6"	8"	10"	12"	6"	8"	10"	12"	6"	8"	10"	12"	6"	8"	10"	12"
NA = PVC PIPE NOT ALLOWED IN RESTRAINED LENGTH, USE ONLY DUCTILE IRON.																	
IN LINE VALVE 		46	59	71	83	NA				24	31	38	45	NA			
DEAD END W/O THRUST BLOCK (SEE NOTE 5)		69	88	107	125	NA				36	47	57	67	NA			
HORIZONTAL BEND (SEE NOTE 5) 	11.25°	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	22.5°	6	6	7	8	6	6	7	8	6	6	6	6	6	6	6	6
	45°	9	12	14	16	9	12	14	16	6	6	7	9	6	6	7	9
VERTICAL DROP OR RISE  OFFSET ≤1.5–3.4 FT.	11.25°	L1	10	14	17	21	10	14	17	NA	6	6	7	9	6	6	7	9
		L2	6	6	6	6	6	6	6		6	6	6	6	6	6	6	6
	22.5°	L1	25	33	41	48	NA				12	17	21	25	12	17	NA	
		L2	7	9	11	13					6	6	6	6	6	6		
OFFSET ≥ 3.5 FT.	11.25°	L1	7	9	11	12	NA				6	6	6	7	NA			
		L2	6	6	6	6					6	6	6	6				
	22.5°	L1	23	31	38	45	NA				10	14	18	22	10	14	18	NA
		L2	6	7	9	11					6	6	6	6	6	6	6	
TEE, CROSS & ASSOCIATED VALVES		PIPE RESTRAINT REQUIRED. SEE RESTRAINED LENGTHS SHOWN ON PLANS. (SEE NOTE 2)															

***** RESTRAINED LENGTHS SHOWN ON THE PLANS SUPERSEDE THIS TABLE *****

NOTES:

1. ALL JOINTS WITHIN THE RESTRAINED LENGTH SHALL BE RESTRAINED. NO JOINTS WITHIN 6 FEET OF FITTINGS, UNLESS OTHERWISE SPECIFIED.
2. RESTRAINED LENGTHS ARE REQUIRED AT TEES AND CROSSES. IF NOT SPECIFIED ON THE PLANS, RESTRAINED LENGTHS SHALL BE DESIGNED BY THE CIVIL ENGINEER OF RECORD AND APPROVED BY THE WATER UTILITY.
3. RESTRAINING DEVICES FOR MJ'S: FOR DUCTILE IRON USE EBAA MEGALUG 1100, STAR PIPE PRODUCTS STARGRIP 3000, OR SIGMA ONE–LOK SLDE; FOR PVC PIPE USE EBAA 2000PV, STAR PIPE PRODUCTS STARGRIP 4000, OR SIGMA ONE–LOC SLCE.
4. RESTRAINING DEVICES FOR PUSH–ON JOINTS: FOR DUCTILE IRON USE U.S. PIPE FIELD LOK GASKETS, U.S. PIPE TR FLEX PIPE, OR APPROVED EQUAL; RESTRAINED PVC PUSH–ON JOINTS NOT ALLOWED, USE DUCTILE IRON PIPE ONLY FOR RESTRAINED PUSH–ON JOINTS.
5. FOR DEAD ENDS AND HORIZONTAL BENDS ONLY: IF A THRUST BLOCK IS INSTALLED BEHIND THE FITTING IN ACCORDANCE WITH DWG. 8–3A, RESTRAINED JOINTS NOT REQUIRED UNLESS OTHERWISE SPECIFIED.
6. RESTRAINED LENGTHS ARE BASED ON 150 PSI TEST PRESSURE. IF HIGHER PRESSURES OR HIGHER SURGES ARE ANTICIPATED, THIS TABLE SHALL NOT APPLY AND RESTRAINED LENGTHS SHALL BE DESIGNED BY THE CIVIL ENGINEER OF RECORD AND APPROVED BY THE WATER UTILITY.

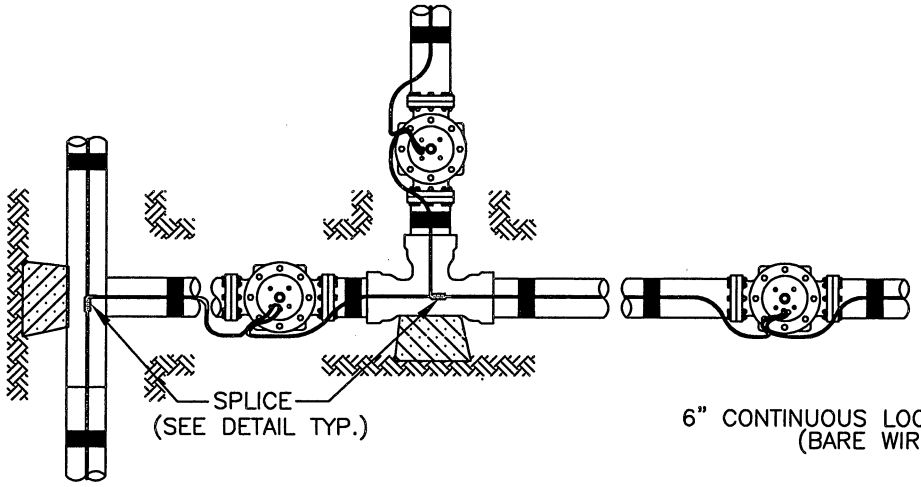
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

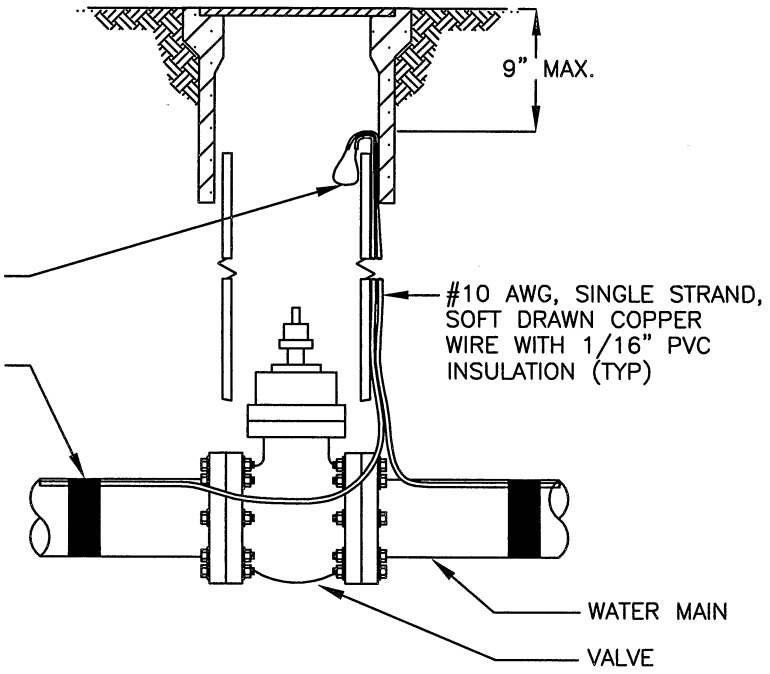
PIPE RESTRAINED LENGTH

SCALE: NONE
DATE: 11/15

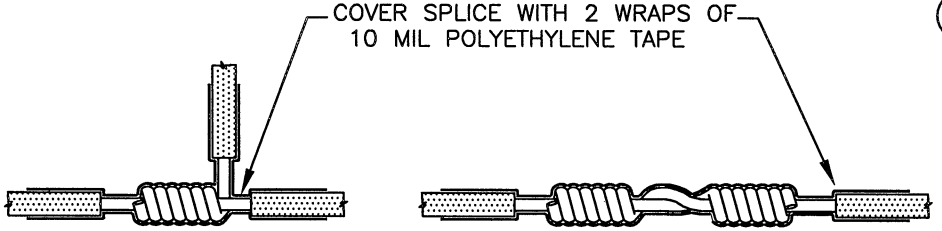
8-3B



TYPICAL LAYOUT



VALVE DETAIL



SPLICE DETAIL
(TEE SPLICE)

SPLICE DETAIL
(BUTT SPLICE)

NOTES:

1. WIRE SHALL BE CONTINUOUS, EXCEPT WHERE SPLICES ARE REQUIRED AT TEES, CROSSES, AND CONNECTIONS TO EXISTING LOCATING WIRES.
2. LOCATING WIRE SHALL BE LAID ON TOP OF THE WATER MAIN, AND SHALL BE TAPED TO IT OR THE POLYETHYLENE ENCASEMENT AT 10' INTERVALS AND TAPED AT ALL FITTINGS. TAPE SHALL BE 10 MIL POLYETHYLENE.
3. CONTINUITY TESTS SHALL BE PERFORMED ON EACH SPLICE PRIOR TO BACKFILL, AND ON THE FULL WIRE SYSTEM AFTER IT IS FINISHED.
4. **ALL SPLICES SHALL BE SOLDERED AND TAPED.**

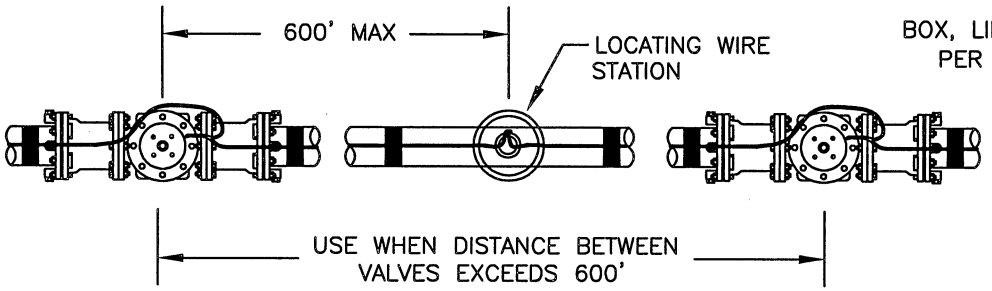
Michael L. Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

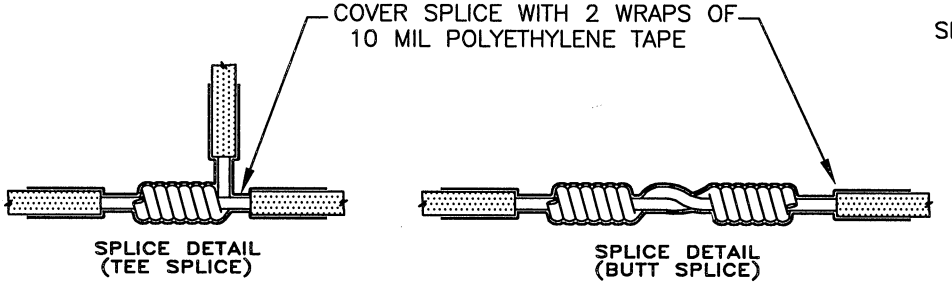
LOCATING WIRE FOR WATER MAINS AND SERVICES

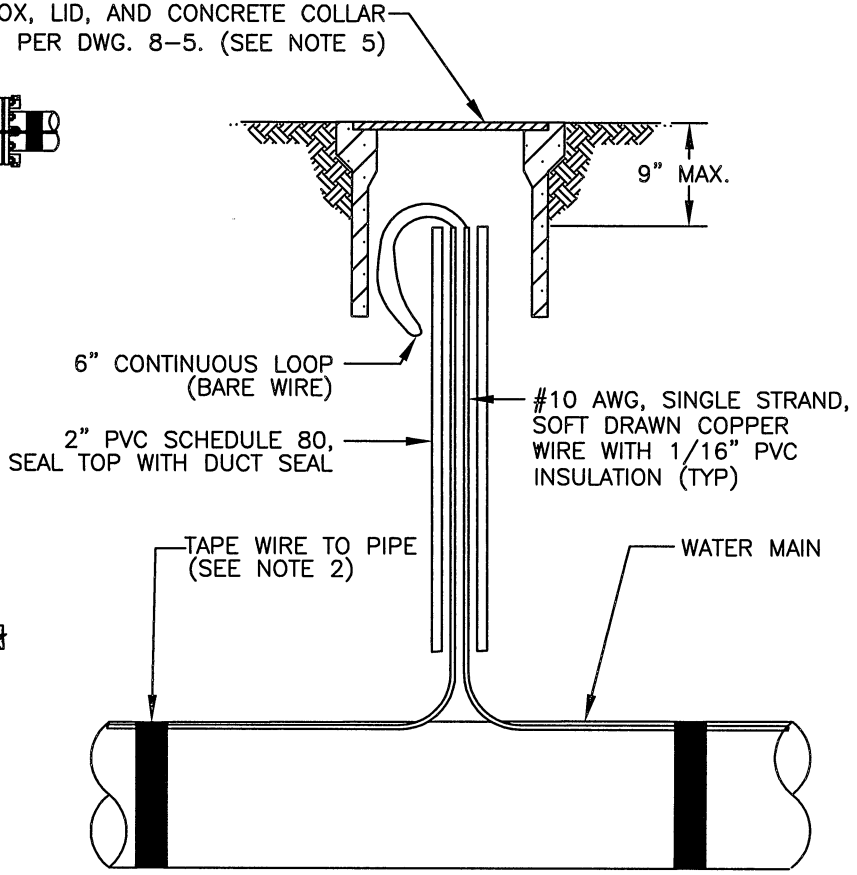
SCALE: NONE
DATE: 8/13

8-4A



TYPICAL LAYOUT





LOCATING WIRE STATION

NOTES:

1. WIRE SHALL BE CONTINUOUS, EXCEPT WHERE SPLICES ARE REQUIRED AT TEES AND CROSSES.
2. LOCATING WIRE SHALL BE LAID ON TOP OF THE WATER MAIN, AND SHALL BE TAPED TO IT OR THE POLYETHYLENE ENCASEMENT AT 10' INTERVALS AND TAPED AT ALL FITTINGS. TAPE SHALL BE 10 MIL POLYETHYLENE.
3. CONTINUITY TESTS SHALL BE PERFORMED ON EACH SPLICE PRIOR TO BACKFILL, AND ON THE FULL WIRE SYSTEM AFTER IT IS FINISHED.
4. **ALL SPLICES SHALL BE SOLDERED AND TAPED.**
5. LABELING AND COATING OF BOX AND LID SHALL COMPLY WITH THE REQUIREMENTS OF DWG. 8–5.

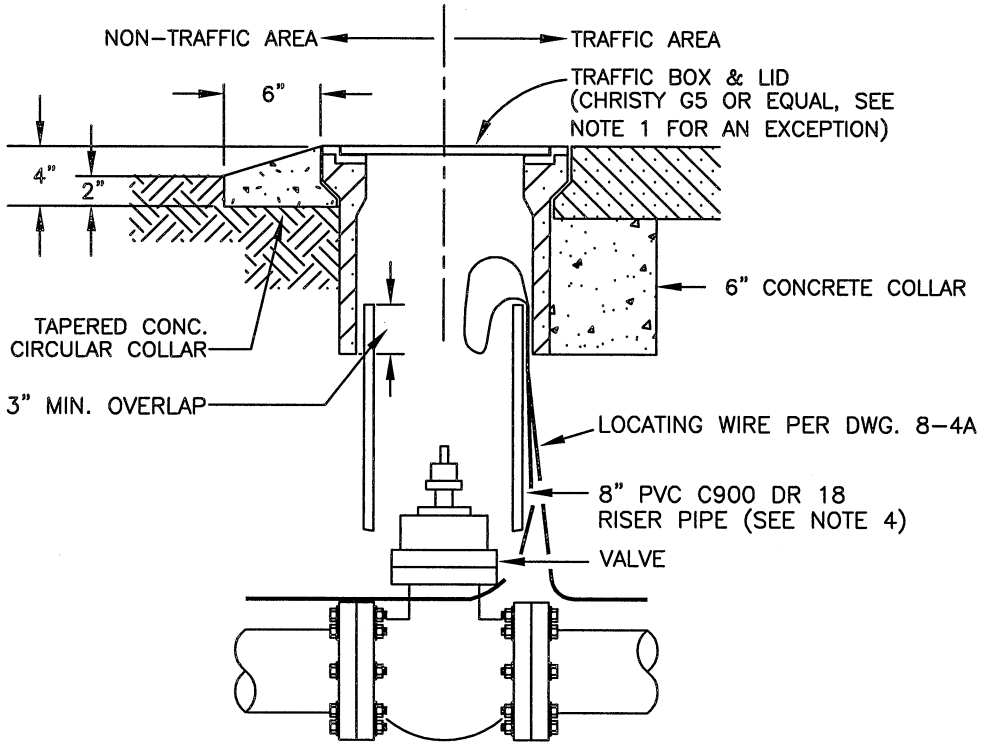
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

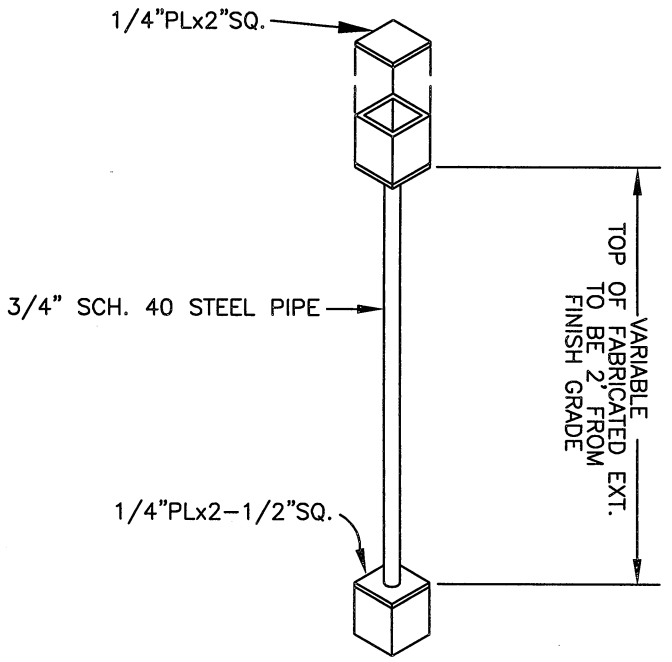
LOCATING WIRE STATION

SCALE: NONE
DATE: 8/13

8-4B



TRAFFIC VALVE BOX



VALVE OPERATING NUT EXTENSION

REQUIRED WHERE VALVE NUT IS IN EXCESS OF 10 FEET BELOW FINISH GRADE.

NOTES:

1. BOXES IN MAJOR ROADS (ULTIMATE PLANNED WIDTH ≥ 70 FT BOC TO BOC) SHALL BE CHRISTY G5VP BOLT–DOWN LID AND BOX, OR EQUAL.
2. VALVE BOX AND RISER SHALL BE SET PLUMB AND CENTERED OVER WATER VALVE NUT.
3. SET VALVE BOX TO FINAL FINISH GRADE. IN AREAS WHERE FINISH GRADE HAS NOT BEEN DEFINED, PLACE 4"X4" LOCATING POST WITHIN 1 FOOT OF VALVE BOX. POST SHALL BE 6 FEET IN LENGTH AND BURIED 3 FEET. PAINT POST BLUE FOR POTABLE WATER, PURPLE FOR RECYCLED AND NONPOTABLE WATER,GREEN FOR RAW WATER.
4. RISER PIPE SHALL BE BLUE OR WHITE FOR POTABLE WATER, WHITE FOR RAW WATER, OR PURPLE FOR RECYCLED AND NONPOTABLE WATER. FOR RAW WATER ONLY: PAINT BOX INTERIOR & TOP 1 FT. OF RISER GREEN.
5. LIDS SHALL BE LABELED WITH CAST OR BEAD WELDED LETTERS: "WATER" FOR POTABLE, "RECYCLED WATER" FOR RECYCLED AND NONPOTABLE WATER, "RAW WATER" FOR RAW WATER.
6. RECYCLED AND NONPOTABLE WATER: TOP OF FRAME AND COVER SHALL BE COATED PURPLE PRIOR TO INSTALLATION PER STANDARD SPECIFICATIONS.
7. LIDS SHALL NOT BE INTERCHANGED INTO DIFFERENT MAKE OR MODEL BOXES.

Michael L. Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

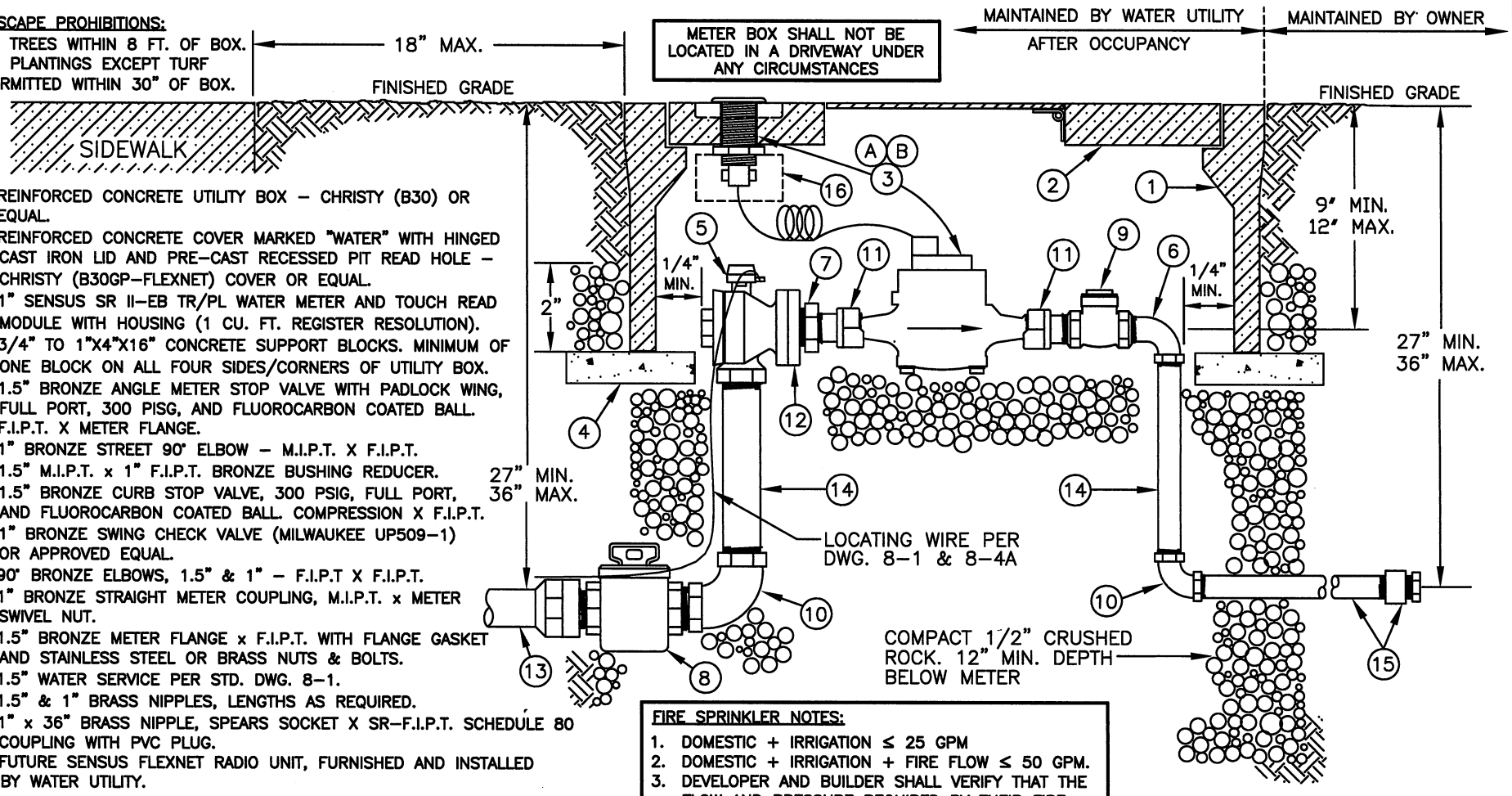
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

VALVE BOX INSTALLATION AND OPERATING NUT EXTENSION

SCALE: NONE
DATE: 8/13

8-5

LANDSCAPE PROHIBITIONS:
1. NO TREES WITHIN 8 FT. OF BOX.
2. NO PLANTINGS EXCEPT TURF PERMITTED WITHIN 30" OF BOX.



1. REINFORCED CONCRETE UTILITY BOX – CHRISTY (B30) OR EQUAL.
2. REINFORCED CONCRETE COVER MARKED "WATER" WITH HINGED CAST IRON LID AND PRE-CAST RECESSED PIT READ HOLE – CHRISTY (B30GP-FLEXNET) COVER OR EQUAL.
3. 1" SENSUS SR II-EB TR/PL WATER METER AND TOUCH READ MODULE WITH HOUSING (1 CU. FT. REGISTER RESOLUTION).
4. 3/4" TO 1"X4"X16" CONCRETE SUPPORT BLOCKS. MINIMUM OF ONE BLOCK ON ALL FOUR SIDES/CORNERS OF UTILITY BOX.
5. 1.5" BRONZE ANGLE METER STOP VALVE WITH PADLOCK WING, FULL PORT, 300 PISG, AND FLUOROCARBON COATED BALL. F.I.P.T. X METER FLANGE.
6. 1" BRONZE STREET 90° ELBOW – M.I.P.T. X F.I.P.T.
7. 1.5" M.I.P.T. x 1" F.I.P.T. BRONZE BUSHING REDUCER.
8. 1.5" BRONZE CURB STOP VALVE, 300 PSIG, FULL PORT, AND FLUOROCARBON COATED BALL. COMPRESSION X F.I.P.T.
9. 1" BRONZE SWING CHECK VALVE (MILWAUKEE UP509-1) OR APPROVED EQUAL.
10. 90° BRONZE ELBOWS, 1.5" & 1" – F.I.P.T X F.I.P.T.
11. 1" BRONZE STRAIGHT METER COUPLING, M.I.P.T. x METER SWIVEL NUT.
12. 1.5" BRONZE METER FLANGE x F.I.P.T. WITH FLANGE GASKET AND STAINLESS STEEL OR BRASS NUTS & BOLTS.
13. 1.5" WATER SERVICE PER STD. DWG. 8-1.
14. 1.5" & 1" BRASS NIPPLES, LENGTHS AS REQUIRED.
15. 1" x 36" BRASS NIPPLE, SPEARS SOCKET X SR-F.I.P.T. SCHEDULE 80 COUPLING WITH PVC PLUG.
16. FUTURE SENSUS FLEXNET RADIO UNIT, FURNISHED AND INSTALLED BY WATER UTILITY.

NOTES:
A. THE CONTRACTOR INSTALLING FACILITIES SHOWN ON THE IMPROVEMENT PLANS SHALL INSTALL ALL ITEMS ON THIS DRAWING EXCEPT THAT A METER IDLER PIPE SHALL BE INSTALLED IN PLACE OF THE METER. IDLER PIPE MATERIAL SHALL BE BRASS, GALV. STEEL, OR SCHED. 80 PVC AND SUPPLIED BY A WATER MATERIAL SUPPLIER. (SEE NOTE B)
B. THE HOME BUILDER SHALL INSTALL THE METER AND TOUCH READ MODULE. AS AN OPTION, THE IMPROVEMENT PLAN CONTRACTOR MAY INSTALL THE METER AND TOUCH READ MODULE.
C. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

FIRE SPRINKLER NOTES:
1. DOMESTIC + IRRIGATION ≤ 25 GPM
2. DOMESTIC + IRRIGATION + FIRE FLOW ≤ 50 GPM.
3. DEVELOPER AND BUILDER SHALL VERIFY THAT THE FLOW AND PRESSURE REQUIRED BY THEIR FIRE SPRINKLER DESIGN CAN BE DELIVERED BY THE WATER SYSTEM AND WATER SERVICE BASED ON THE WATER UTILITY'S LATEST MODELED PEAK-HOUR SCENARIO.
4. PASSIVE-PURGE SPRINKLER DESIGN MANDATORY.

DIRECTOR, DEPARTMENT OF WATER RESOURCES

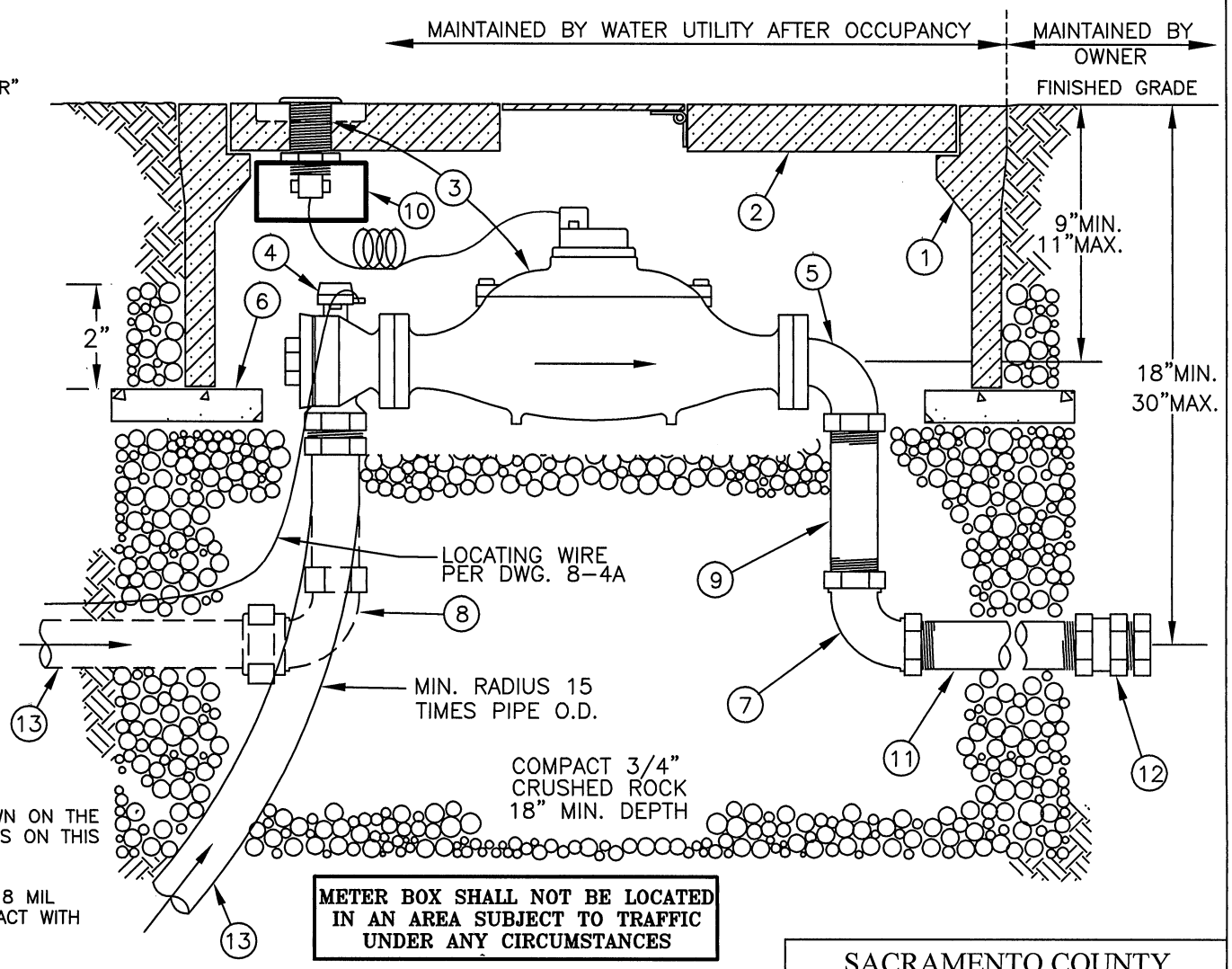
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

1.5" RESIDENTIAL WATER SERVICE WITH 1" WATER METER

SCALE: NONE
DATE: 12/15

8-6A-1

1. REINFORCED CONCRETE UTILITY BOX (CHRISTY B36) OR EQUAL.
2. REINFORCED CONCRETE COVER MARKED "WATER" WITH A HINGED CAST IRON LID AND A PRE-CAST RECESSED PIT READ HOLE - (CHRISTY B36G-FLEXNET) OR EQUAL.
3. SENSUS OMNI C^2 TR/PL WATER METER AND TOUCH READ MODULE WITH HOUSING (1 CU. FT. REGISTER RESOLUTION).
4. FLANGED WINGED ANGLE METER STOP VALVE WITH TEFLON COATED BALL.
5. OVAL FLANGED 90° BRONZE ELBOW FITTING.
6. 3/4" TO 1"X4"X16" CONCRETE BLOCK TO HELP SUPPORT VALVE BOX, USE ONE BLOCK ON ALL FOUR SIDES OF METER BOX. COVER ANY OPENINGS OR HOLES IN THE SIDE OF THE UTILITY BOX WITH CONCRETE BLOCK.
7. BRONZE 90° ELBOW, THREADED.
8. BRONZE 90° ELBOW, THREADED OR COMPRESSION.
9. BRASS NIPPLE, LENGTH AS REQURED
10. FUTURE SENSUS FLEXNET RADIO UNIT, FURNISHED AND INSTALLED BY WATER UTILITY.
11. 36" BRASS NIPPLE.
12. BRASS COUPLING WITH BRASS M.I.P.T. PLUG.
13. WATER SERVICE LINE PER STD. DWG. 8-1, WITH TWO CONFIGURATION OPTIONS.



NOTES:

A. THE CONTRACTOR INSTALLING FACILITIES SHOWN ON THE IMPROVEMENT PLANS SHALL INSTALL ALL ITEMS ON THIS DRAWING.

B. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

C. RECYCLED AND NONPOTABLE SERVICES: BOX SHALL HAVE A PURPLE POLYETHYENE FACE RING, READING LID SHALL BE LABELED "RECYCLED WATER" WITH BEAD WELDED OR ENGRAVED LETTERS, AND TOP OF THE COVER SHALL BE COATED PURPLE PER STANDARD SPECIFICATIONS.

D. SIZE OF SERVICE LINE, PIPING, AND FITTINGS SHALL BE THE SAME SIZE AS METER.

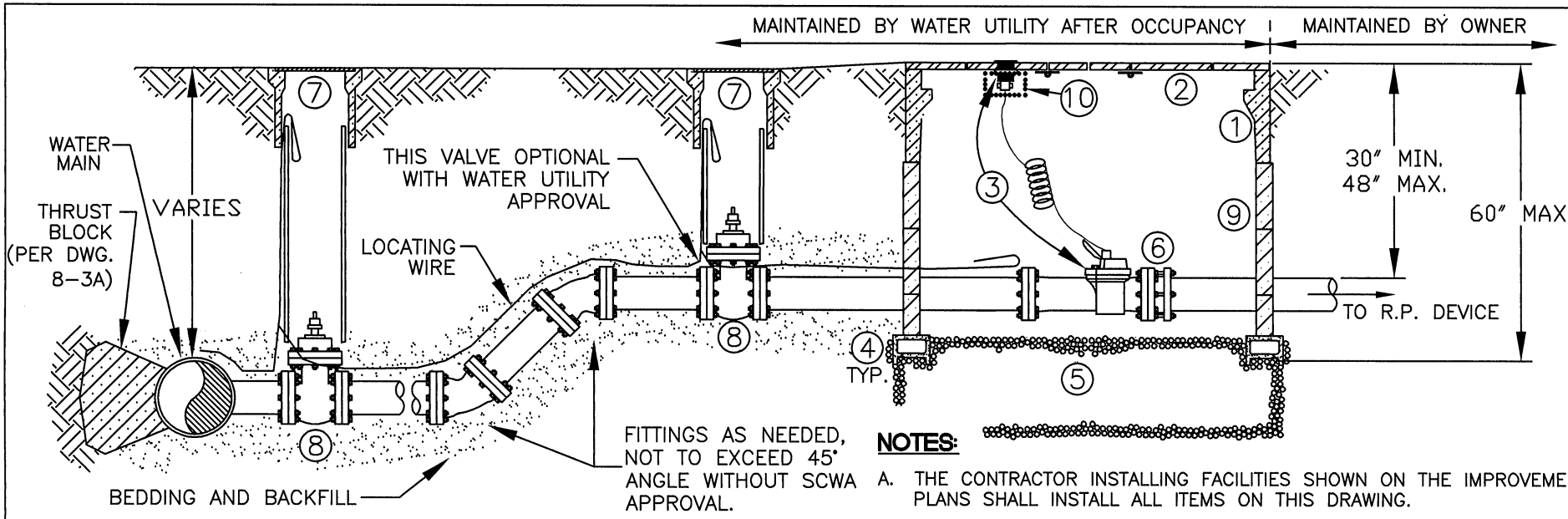
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

1-1/2" OR 2" COMMERCIAL METERED WATER SERVICE

SCALE: NONE
DATE: 11/15

8-6B



(1) REINFORCED CONCRETE UTILITY BOX WITH EXTENSIONS (CHRISTY B48).

(2) 2 PIECE GALVANIZED STEEL CHECKER PLATE W/ TWO 10" ROUND SELF-CLOSING READING LIDS AND 1-3/4" HOLE FOR TOUCH READ MODULE IN ONE READING LID (CHRISTY B48-62G PIT READ COVER).

(3) SENSUS OMNI C^2 TR/PL METER AND TOUCH READ MODULE WITH HOUSING (1 CU. FT. REGISTER RESOLUTION).

(4) CONCRETE BLOCKS SHALL BE PLACED ALONG THE ENTIRE PERIMETER TO SUPPORT BOX.

(5) 3/4" CRUSHED ROCK, 12" TO 18" DEEP, COMPACTED.

(6) FLANGED COUPLING ADAPTER, EPOXY COATED WITH STAINLESS STEEL HARDWARE.

(7) VALVE BOX, SEE DWG. 8-5 FOR REQUIREMENTS.

(8) GATE VALVE, BOTH ENDS FLANGED.

(9) METER BOX EXTENSION (TYPICAL).

(10) FUTURE SENSUS FLEXNET RADIO UNIT, FURNISHED AND INSTALLED BY WATER UTILITY.

METER BOX SHALL NOT BE LOCATED IN AN AREA SUBJECT TO TRAFFIC UNDER ANY CIRCUMSTANCES

NOTES:

A. THE CONTRACTOR INSTALLING FACILITIES SHOWN ON THE IMPROVEMENT PLANS SHALL INSTALL ALL ITEMS ON THIS DRAWING.

B. 4" TO 6" DIA. PIPE BETWEEN WATER MAIN AND METER SHALL BE DUCTILE IRON. 3" PIPE SHALL BE TYPE K COPPER OR DUCTILE IRON. JOINTS BETWEEN MAIN AND METER SHALL BE RESTRAINED. RESTRAINING DEVICES SHALL BE APPROVED BY WATER UTILITY.

C. INSTALL LOCATING WIRE PER DWG. 8-4A.

D. CONCRETE BLOCKS SHALL BE USED TO BLOCK ANY OPENING OR CUT-OUT PORTIONS OF THE METER BOX NOT UTILIZED (MINIMUM 1" THICK BLOCK).

E. SIZE OF SERVICE LINE, PIPING, AND FITTINGS SHALL BE THE SAME SIZE AS METER.

F. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

G. RECYCLED AND NONPOTABLE SERVICES: COVER SHALL BE LABELED "RECYCLED WATER" WITH BEAD WELDED LETTERS AND TOP OF COVER SHALL BE COATED PURPLE PER STANDARD SPECIFICATIONS.

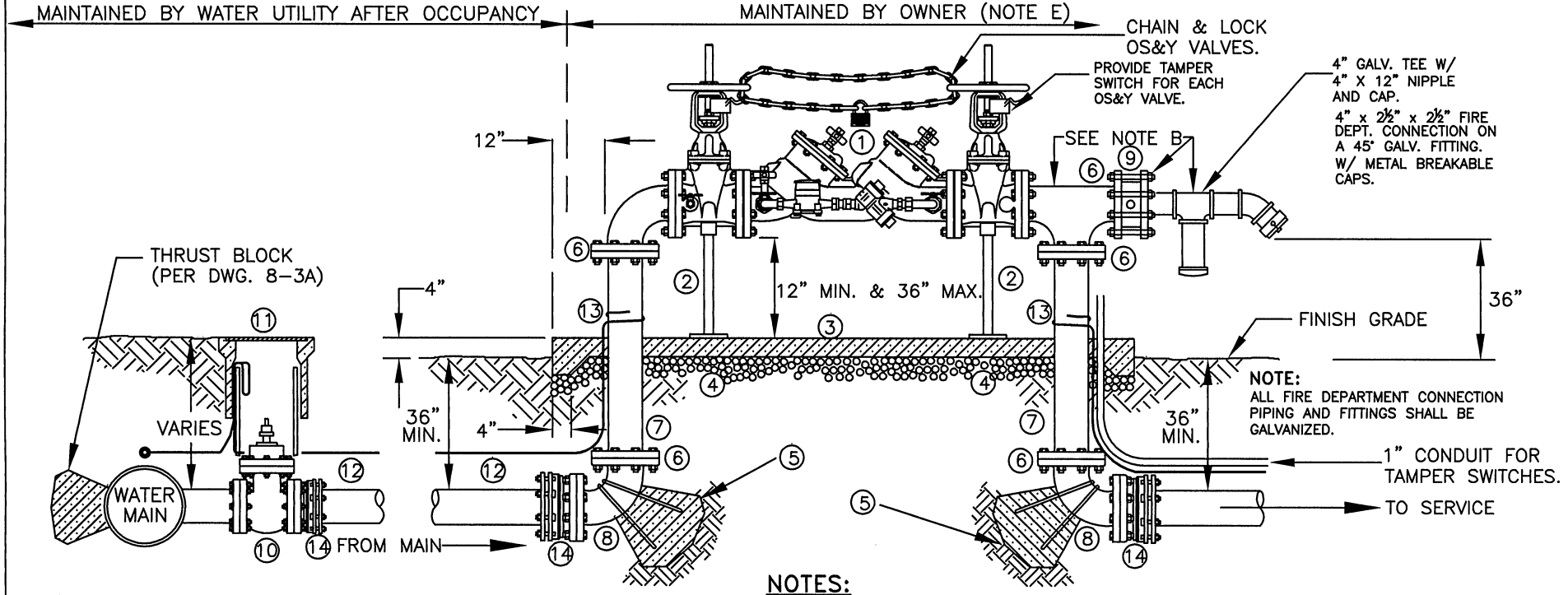
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

3" TO 6" WATER SERVICE & METER INSTALLATION

SCALE: NONE
DATE: 11/15

8-6C



① DOUBLE CHECK DETECTOR ASSEMBLY W/ FLANGED OS&Y VALVES.
② PIPE SUPPORT, 2" GALVANIZED SCH 40 AT MINIMUM.
③ 4" CONCRETE SLAB – 24" WIDE WITH VARYING LENGTH.
④ 6" OF CRUSHED AGGREGATE COMPACTED TO 95% COMPACTION.
⑤ THRUST BLOCK (PER DWG. 8–3A) WITH #5 REBARS. WRAP THE PORTION OF THE REBAR THAT IS NOT EMBEDDED IN THE CONCRETE WITH 20 MIL POLYETHYLENE TAPE.
⑥ FLANGED CONNECTION ONLY.
⑦ FLANGE X FLANGE SPOOL, DUCTILE IRON. WRAP WITH TWO LAYERS OF 20 MIL TAPE AT SLAB PENETRATION.
⑧ FLANGE X FLANGE 90° ELBOW, DUCTILE IRON.
⑨ WAFER CHECK VALVE.
⑩ GATE VALVE, FLANGE X FLANGE.
⑪ VALVE BOX, SEE DWG. 8–5 FOR REQUIREMENTS.
⑫ DUCTILE IRON PIPE, PUSH ON JOINTS. RESTRAIN WITH U.S. PIPE FIELD LOK GASKETS OR APPROVED EQUAL.
⑬ LOCATING WIRE PER DWG. 8–4A. LOOP WIRE AROUND PIPE AT TOP OF SLAB.
⑭ FLANGE X MJ ADAPTER. RESTRAIN MJ WITH EBAA MEGALUG 1100 OR APPROVED EQUAL.

NOTES:

A. DOUBLE CHECK DETECTOR ASSEMBLY SHALL BE APPROVED BY THE STATE OF CALIFORNIA DIVISION OF DRINKING WATER AND BE ON THE MOST RECENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
(www.emd.saccounty.net/EC/Pages/CrossConnection.aspx)
(www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Publications.shtml)
(www.usc.edu/dept/fccchr/list.html)
B. IF SPECIFICALLY CALLED OUT ON THE PLANS, DO NOT PROVIDE FIRE DEPARTMENT CONNECTION. IN THAT CASE, INSTALL FL X FL 90° ELBOW INSTEAD OF FL X FL TEE.
C. PIPE SHALL BE DUCTILE IRON. FLANGES SHALL BE CLASS D.
D. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
E. BYPASS DETECTOR ASSEMBLY SHALL BE MAINTAINED IN OPERABLE CONDITION AT ALL TIMES BY OWNER.

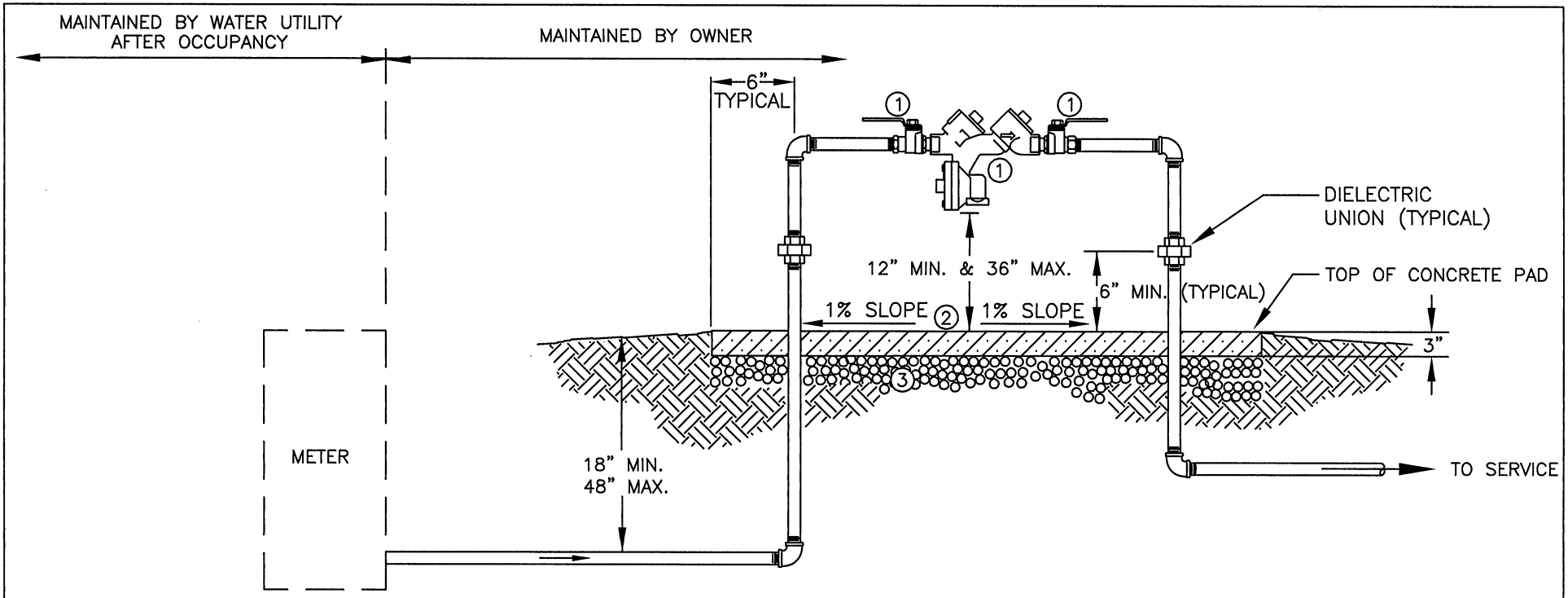
Michael L. Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

FIRE PROTECTION DETAIL

SCALE: NONE
DATE: 11/15

8-7



NOTES:

A. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL BE APPROVED BY THE STATE OF CALIFORNIA DIVISION OF DRINKING WATER AND BE ON THE MOST RECENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
(www.emd.saccounty.net/EC/Pages/CrossConnection.aspx)
(www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Publications.shtml)
(www.usc.edu/dept/fccchr/list.html)

B. ALL PIPE SHALL BE GALVANIZED SCHEDULE 40 STEEL, TYPE K COPPER, OR BRASS. BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE WRAP OR 10 MIL POLYETHYLENE TAPE SO THAT NO SOIL IS IN CONTACT WITH METAL.

C. GALVANIZED PIPE SHALL HAVE ANODE BAG PER COUNTY CODE SECTION 16.24.100. INSTALL DIELECTRIC COUPLING OR FITTING BETWEEN DISSIMILAR METALS.

① REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY, WITH 2 BRONZE RESILIENT SEATED BALL VALVES MINIMUM WORKING PRESSURE 175 PSI.

② 3" SLAB – 18" WIDE WITH VARYING LENGTH

③ 1/2" OR 3/4" CRUSHED ROCK, 4" MINIMUM THICKNESS, MECHANICALLY COMPACTED TO 95% COMPACTION.

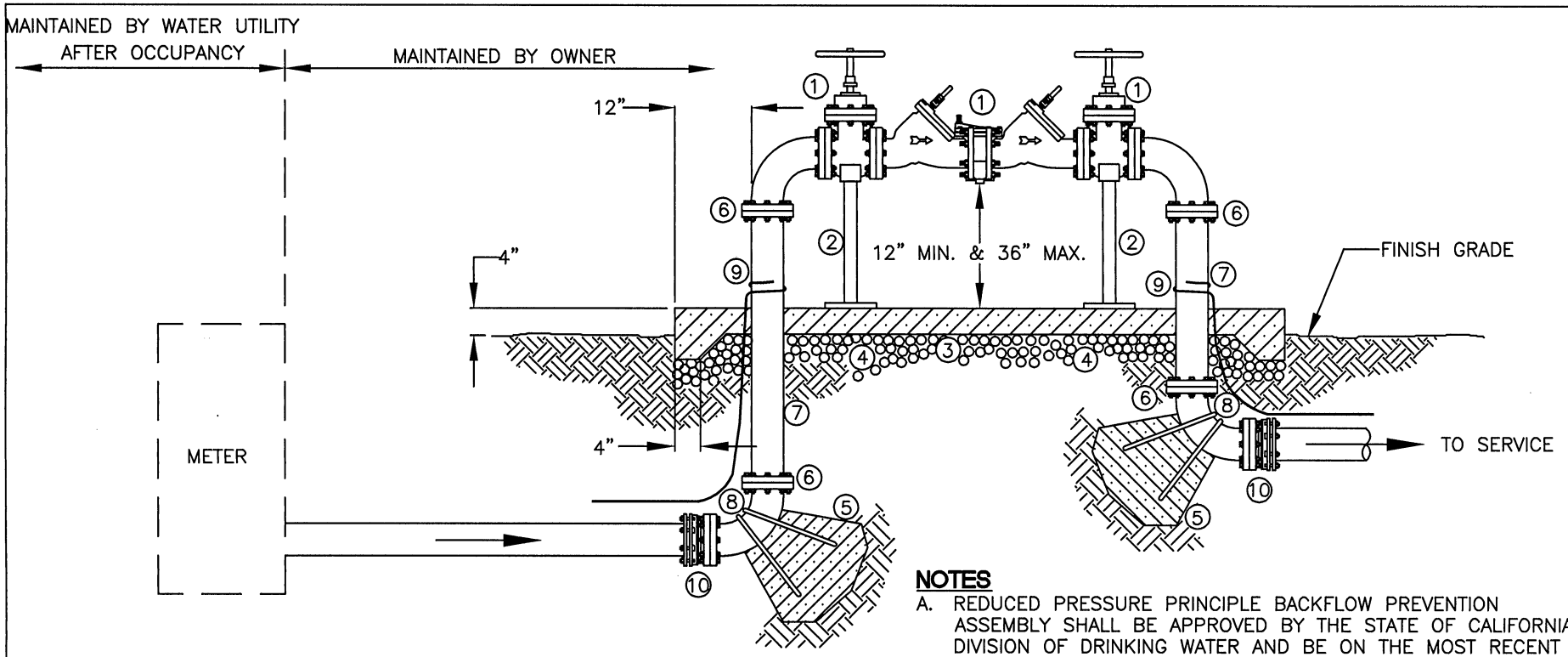
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

REDUCED PRESSURE BACKFLOW PREVENTER 1" TO 2"

SCALE: NONE
DATE: 11/15

8-8A



1. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY, WITH 2 RESILIENT WEDGE GATE VALVES, FLANGED, WITH HANDWHEEL OPERATORS.
2. PIPE SUPPORT, MIN. 2" GALVANIZED SCH 40.
3. 4" CONCRETE SLAB – 24" WIDE WITH VARYING LENGTH.
4. 6" CRUSHED AGGREGATE COMPACTED TO 95% COMPACTION
5. THRUST BLOCK (PER DWG. 8–3A) WITH #5 REBARS. WRAP THE PORTION OF THE REBAR NOT EMBEDDED IN CONCRETE WITH 20 MIL POLYETHYLENE TAPE .
6. FLANGE CONNECTION ONLY.
7. FLANGE X FLANGE SPOOL, DUCTILE IRON. WRAP WITH 2 LAYERS 20 MIL TAPE AT SLAB PENETRATION
8. FLANGE X FLANGE 90° ELBOW, DUCTILE IRON.
9. LOCATING WIRE PER DWG. 8–4A. LOOP WIRE AROUND PIPE AT TOP OF SLAB.
10. FLANGE X MJ ADAPTER, RESTRAINED.

NOTES

A. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL BE APPROVED BY THE STATE OF CALIFORNIA DIVISION OF DRINKING WATER AND BE ON THE MOST RECENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
(www.emd.saccounty.net/EC/Pages/CrossConnection.aspx)
(www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Publications.shtml)
(www.usc.edu/dept/fccchr/list.html)

B. PIPE SHALL BE DUCTILE IRON. FLANGES SHALL BE CLASS D.

C. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL. POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

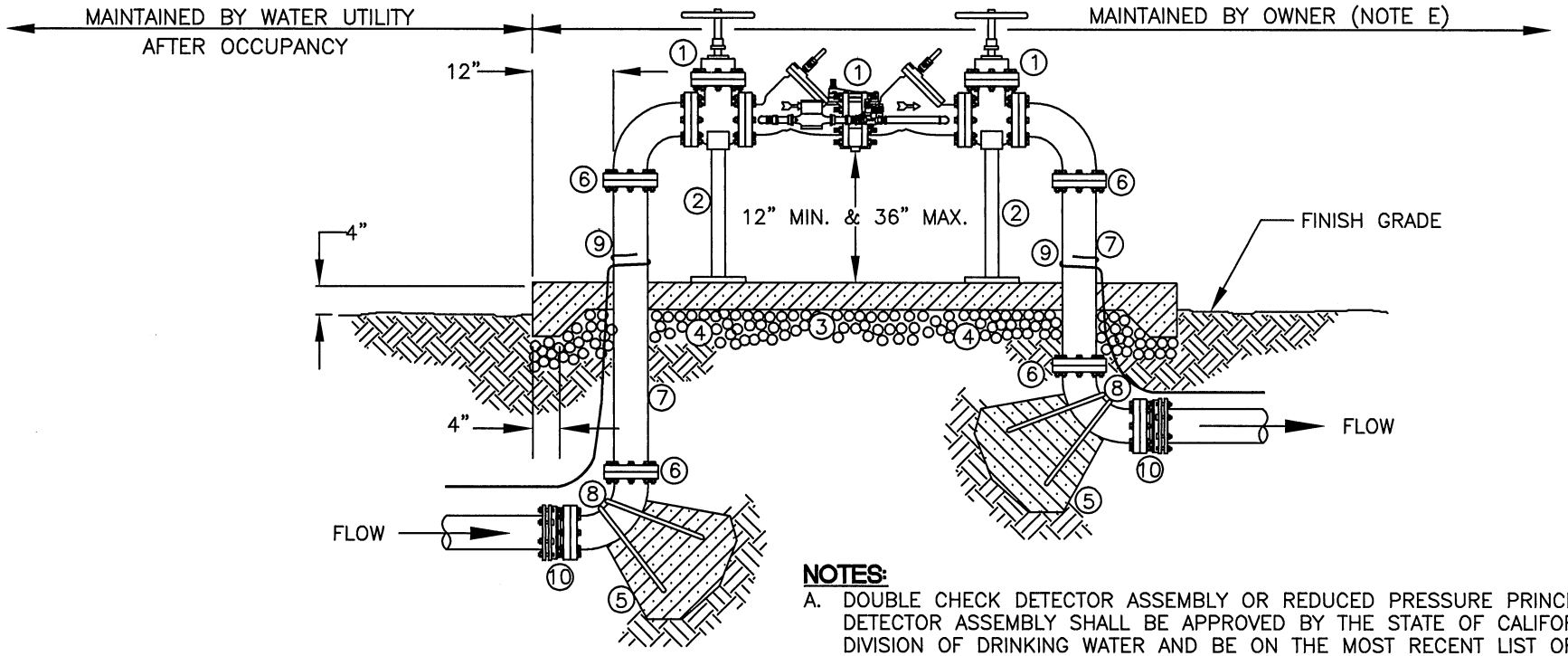
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

REDUCED PRESSURE BACKFLOW PREVENTER 3" AND LARGER

SCALE: NONE
DATE: 11/15

8-8B



① DOUBLE CHECK DETECTOR ASSEMBLY OR RP PRINCIPLE DETECTOR ASSEMBLY. TYPE AS CALLED OUT ON PLANS, WITH 2 RESILIENT WEDGE GATE VALVES, FLANGED, WITH HANDWHEEL OPERATORS.
② PIPE SUPPORT, MIN. 2" GALVANIZED SCH 40.
③ 4" CONCRETE SLAB – 24" WIDE WITH VARYING LENGTH.
④ 6" CRUSHED AGGREGATE COMPACTED TO 95% COMPACTION
⑤ THRUST BLOCK (PER DWG. 8–3A) WITH #5 REBARS. WRAP THE PORTION OF THE REBAR NOT EMBEDDED IN CONCRETE WITH 20 MIL POLYETHYLENE TAPE.
⑥ FLANGE CONNECTION ONLY.
⑦ FLANGE X FLANGE SPOOL, DUCTILE IRON. WRAP WITH 2 LAYERS 20 MIL TAPE AT SLAB PENETRATION.
⑧ FLANGE X FLANGE 90° ELBOW, DUCTILE IRON.
⑨ LOCATING WIRE PER DWG. 8–4A. LOOP WIRE AROUND PIPE AT TOP OF SLAB.
⑩ FLANGE X MJ ADAPTER, RESTRAINED.

NOTES:

A. DOUBLE CHECK DETECTOR ASSEMBLY OR REDUCED PRESSURE PRINCIPLE DETECTOR ASSEMBLY SHALL BE APPROVED BY THE STATE OF CALIFORNIA DIVISION OF DRINKING WATER AND BE ON THE MOST RECENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
(www.emd.saccounty.net/EC/Pages/CrossConnection.aspx)
(www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Publications.shtml)
(www.usc.edu/dept/fccchr/list.html)
B. PIPE SHALL BE DUCTILE IRON. FLANGES SHALL BE CLASS D.
C. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL. POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
D. PROVIDE TAMPER SWITCHES AND CHAIN LOCK IF REQUIRED BY FIRE DEPARTMENT.
E. BYPASS DETECTOR ASSEMBLY SHALL BE MAINTAINED IN OPERABLE CONDITION AT ALL TIMES BY OWNER.

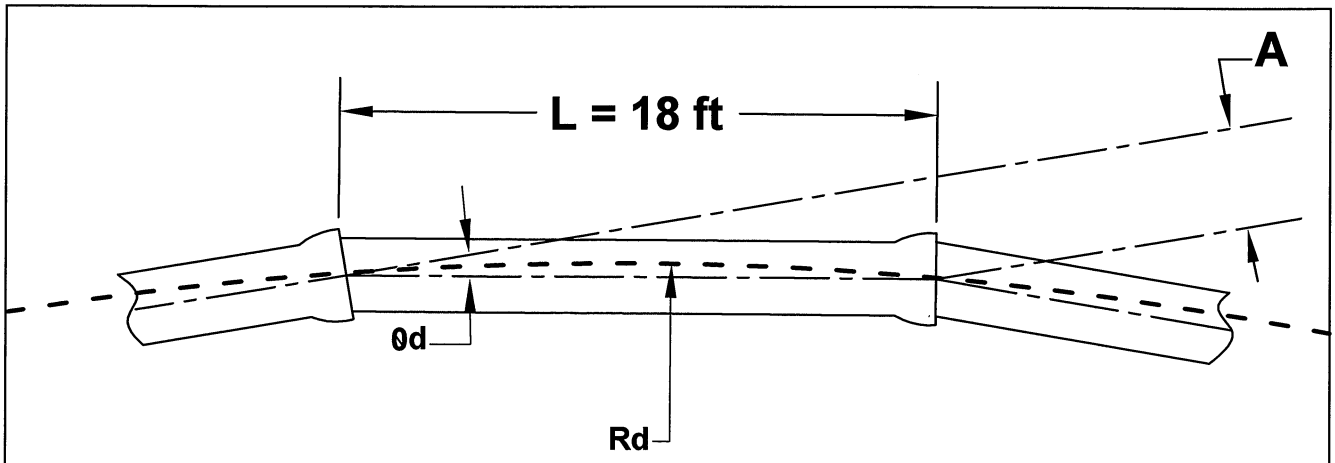
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

DOUBLE CHECK DETECTOR OR RP PRINCIPLE DETECTOR 6" AND LARGER

SCALE: NONE
DATE: 11/15

8-8C



0d = Maximum joint deflection angle (degrees)

A = Offset at the end of the pipe (inches)

Rd = Minimum radius of curve produced by succession of joints (feet)

MAXIMUM JOINT DEFLECTION FOR DUCTILE IRON PIPE

Size Of Pipe (inches)	UNRESTRAINED JOINTS			RESTRAINED JOINTS		
	Maximum Deflection Angle, "0d" (degrees)	Minimum Radius, "Rd" (feet)	Offset At Free End, "A" (inches)	Maximum Deflection Angle, "0d" (degrees)	Minimum Radius, "Rd" (feet)	Offset At Free End, "A" (Inches)
4	2.5	400	10	2.5	400	10
6	2.5	400	10	2.5	400	10
8	2.5	400	10	2.5	400	10
10	2.5	400	10	2.5	400	10
12	2.5	400	10	2.5	400	10
14	2.5	400	10	2.0	500	8
16	2.5	400	10	2.0	500	8
18	2.5	400	10	2.0	500	8
20	2.5	400	10	1.25	800	5
24	2.5	400	10	1.25	800	5
30	2.5	400	10	1.00	1100	4
36	2.5	400	10	0.75	1400	3
42	2.0	500	8	0.25	4000	1

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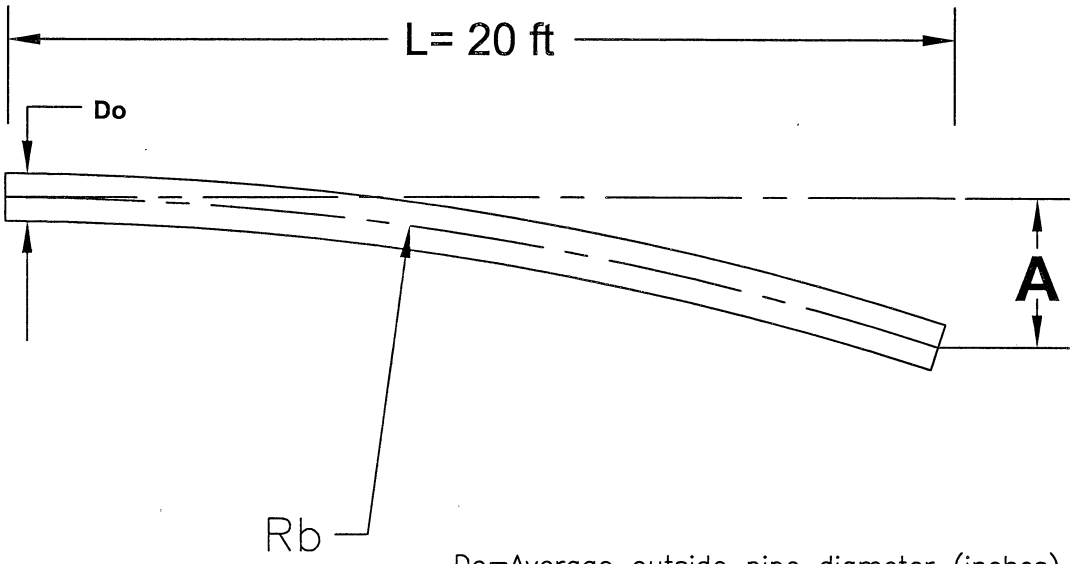
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

MAXIMUM DEFLECTION FOR DUCTILE IRON PIPE

SCALE: NONE
DATE: 8/13

8-9A



Do=Average outside pipe diameter (inches)
A=Offset at the end of the pipe (inches)
Rb=Minimum bending radius (feet)

MAXIMUM BENDING DEFLECTION FOR PVC PIPE				
Nominal Pipe Diameter	Average Outside Pipe Diameter "Do"	Minimum Wall Thickness	Minimum Bending Radius "Rb"	Offset at Free End, "A"
(inches)	(inches)	(inches)	(feet)	(inches)
AWWA C900 CLASS 150 DR 18				
4	4.800	0.267	120	20
6	6.900	0.383	185	13
8	9.050	0.503	240	10
10	11.100	0.617	400	6
12	13.200	0.733	800	3
AWWA C905 CLASS 235 DR 18				
14	15.300	0.850	1500	2
16	17.400	0.967	1500	2
18	19.500	1.083	1500	2

JOINT DEFLECTION OF AWWA C900 & C905 PVC PIPE IS PROHIBITED.

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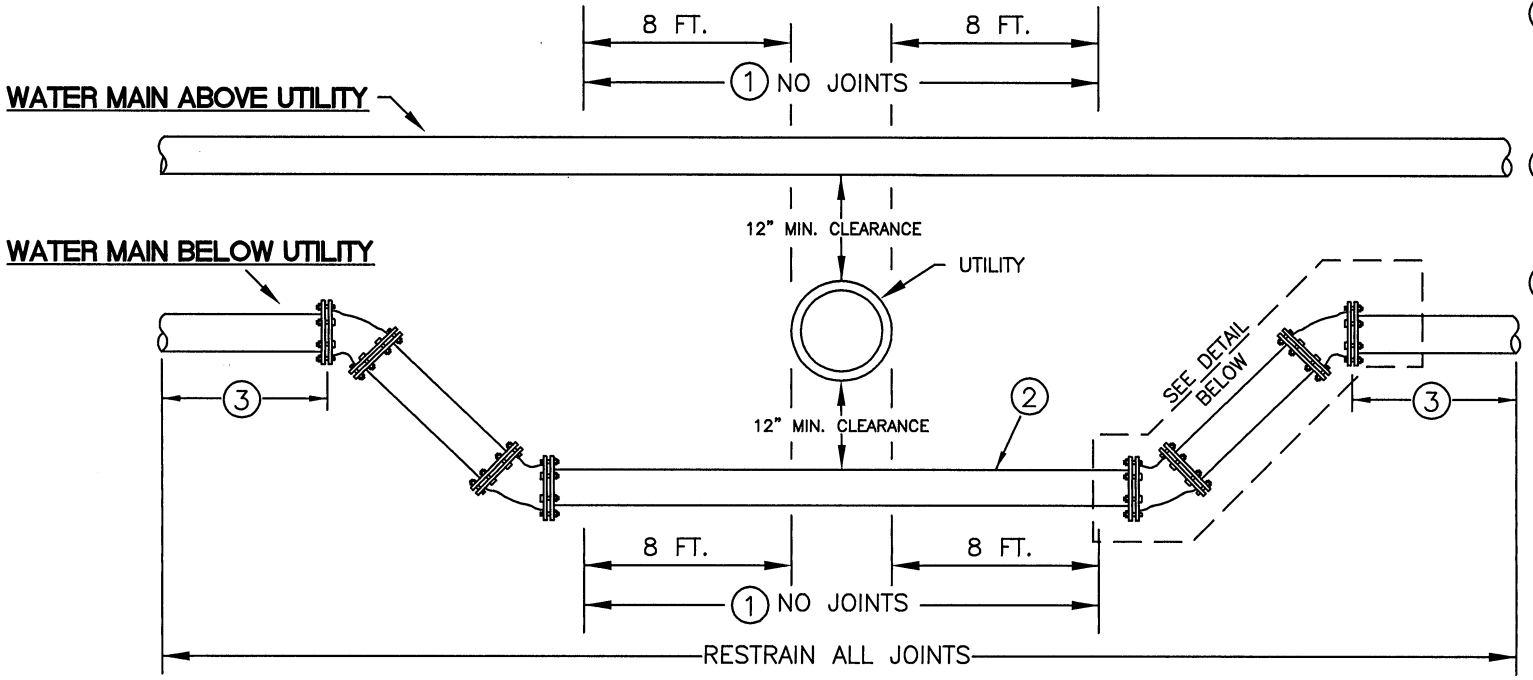
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

MAXIMUM DEFLECTION FOR PVC PIPE

SCALE: NONE
DATE: 8/13

8-9B



1. THE "NO JOINTS" RESTRICTION APPLIES ONLY TO NEW WATER PIPE INSTALLED ABOVE OR BELOW STORM DRAINAGE, SEWER, RECYCLED WATER, OR HAZARDOUS FLUIDS (SEE NOTE A).

2. IF SUBJECT TO THE "NO JOINTS" RESTRICTION, MINIMUM LENGTH SHALL BE 16 FT. + OUTER DIAMETER OF UTILITY.

3. MINIMUM PER 8-3B, UNLESS OTHERWISE CALLED OUT ON PLANS SIGNED BY WATER UTILITY. IF PIPE IS EXISTING, REMOVE AND REPLACE WITH CLASS 350 DIP.

LEGEND:

DIP = DUCTILE IRON PIPE
MJ = MECHANICAL JOINT
PVC = POLYVINYL CHLORIDE PIPE
POJ = PUSH ON JOINTS

NOTES:

A. APPLICABILITY: (1) DETAIL APPLIES TO 12" & SMALLER WATER MAINS; (2) PER 2008 CALIFORNIA WATER REGULATIONS, NEW POTABLE WATER MAINS SHALL NOT BE INSTALLED BELOW STORM DRAINAGE, SEWER, RECYLCED WATER, OR HAZARDOUS FLUIDS. WRITTEN APPROVAL FROM CALIFORNIA DIVISION OF DRINKING WATER SHALL BE RECEIVED BY WATER UTILITY PRIOR TO INSTALLATION OF NON-COMPLIANT WATER MAINS. ADDITIONAL DESIGN REQUIREMENTS WILL APPLY.

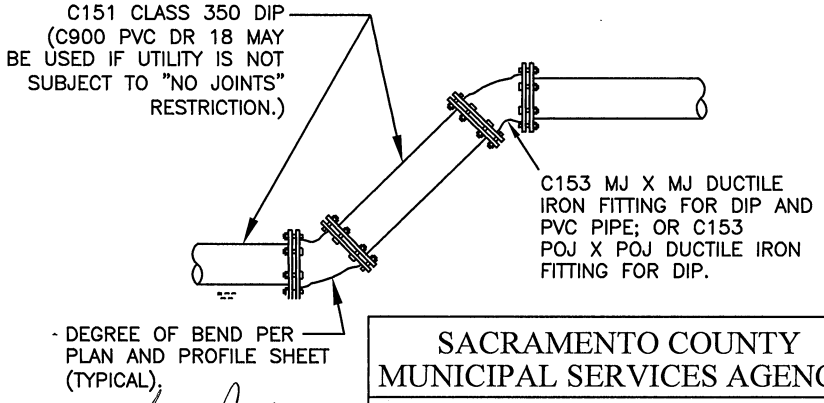
B. BENDS SHALL NOT EXCEED 22.5° OF BEND UNLESS OTHERWISE SPECIFIED ON PLANS SIGNED BY THE WATER UTILITY.

C. RESTRAINING DEVICES FOR MJ'S: FOR DUCTILE IRON USE EBAA MEGALUG 1100, STAR PIPE PRODUCTS STARGRIP 3000, OR SIGMA ONE-LOK SLDE; FOR PVC PIPE USE EBAA 2000PV, STAR PIPE PRODUCTS STARGRIP 4000, OR SIGMA ONE-LOK SLCE.

D. RESTRAINING DEVICES FOR PUSH-ON JOINTS: FOR DUCTILE IRON USE U.S. PIPE FIELD LOK GASKETS, U.S. PIPE TR FLEX PIPE, OR APPROVED EQUAL; RESTRAINED PVC PUSH-ON JOINTS NOT ALLOWED, USE DUCTILE IRON PIPE ONLY FOR RESTRAINED PUSH-ON JOINTS.

E. INSTALL LOCATING WIRE PER 8-4A.

F. ALL BURIED METAL SHALL BE ENCASED WITH AWWA C105 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.



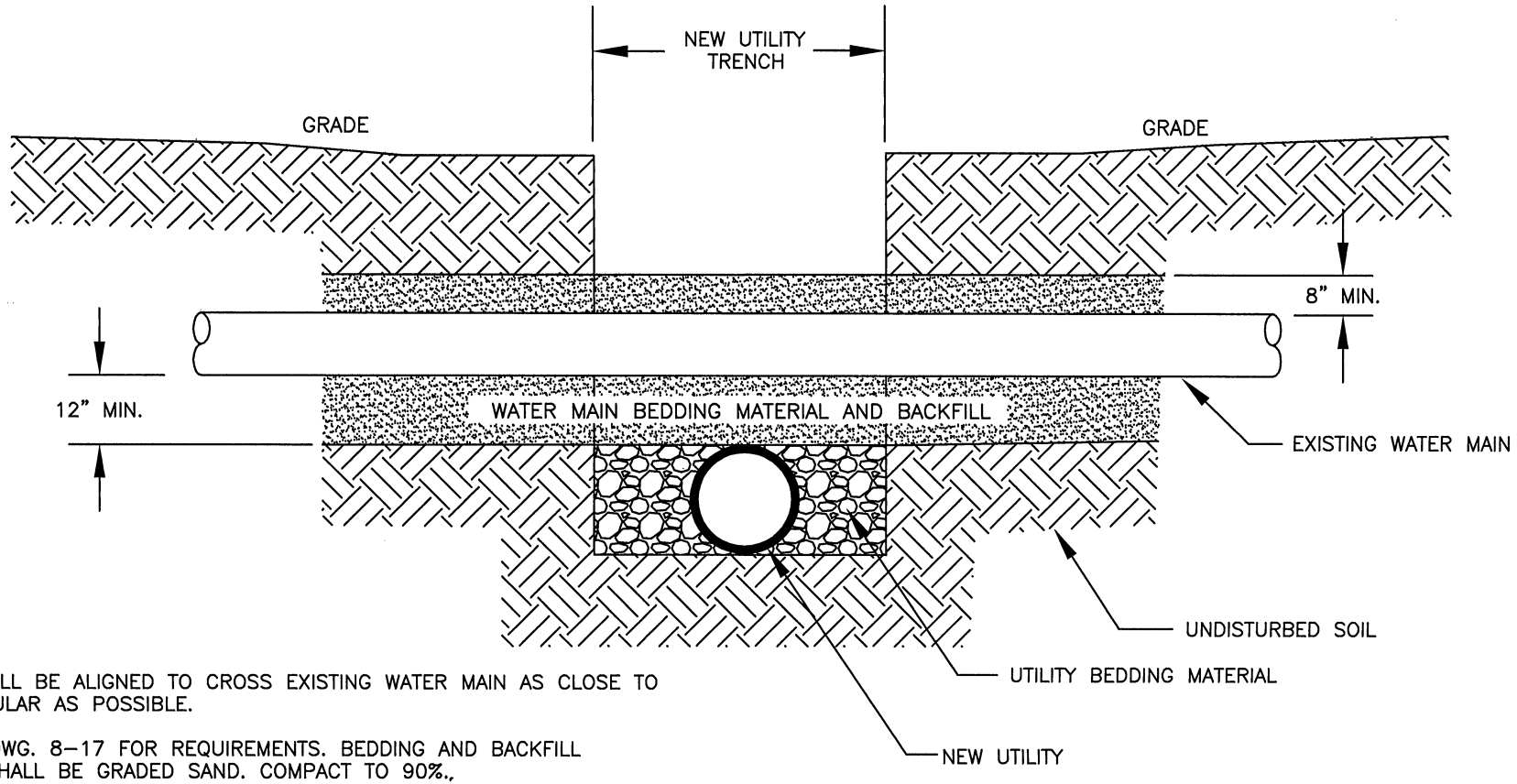
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

UTILITY CROSSING

SCALE: NONE
DATE: 11/15

8-10



NOTES:

1. UTILITY SHALL BE ALIGNED TO CROSS EXISTING WATER MAIN AS CLOSE TO PERPENDICULAR AS POSSIBLE.

2. SEE STD. DWG. 8–17 FOR REQUIREMENTS. BEDDING AND BACKFILL MATERIAL SHALL BE GRADED SAND. COMPACT TO 90%.,

3. REPAIR OR REPLACE EXISTING LOCATING WIRE, POLYETHYLENE ENCASEMENT, AND UNDERGROUND MARKING TAPE.

4. FOR EXISTING ASBESTOS CEMENT (ACP) WATER MAINS:
PRIOR TO EXCAVATION OF NEW UTILITY TRENCH, EXCAVATE AND REMOVE EXISTING ACP 5 TO 10 FEET BEYOND THE PLANNED TRENCH LIMITS OF NEW UTILITY TO AN EXISTING ACP JOINT AND REPLACE WITH CLASS 350 DUCTILE IRON PIPE (DIP) USING TRANSITION COUPLINGS (SMITH–BLAIR OMNI 442 WITH 12–INCH SLEEVE AND S.S. HARDWARE). WRAP DIP AND COUPLINGS WITH 8 MIL POLYETHYLENE AND BACKFILL WITH CLSM 6 INCHES UNDER DIP TO SPRINGLINE WITHIN 5 FEET OF ACP. BACKFILL REST OF PIPE ZONE WITH SAND. COMPLY WITH WRITTEN REQUIREMENTS OBTAINED FROM THE WATER UTILITY FOR THE REPLACEMENT.

DIRECTOR, DEPARTMENT OF WATER RESOURCES

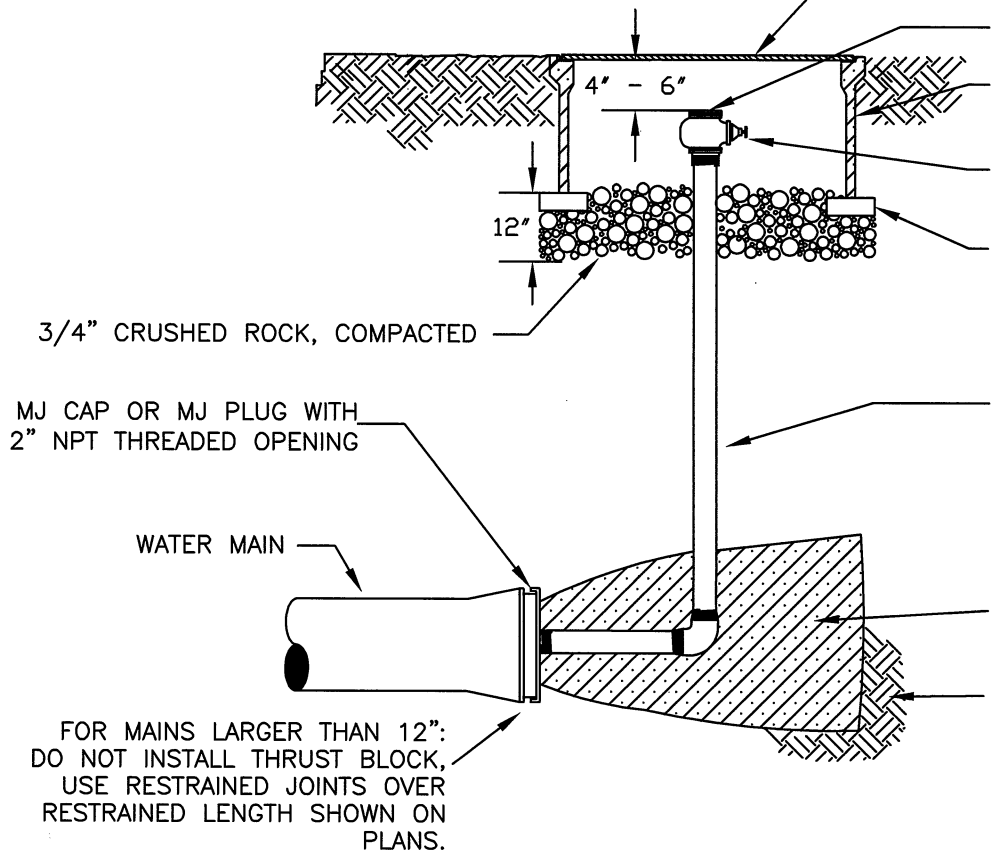
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

UTILITY CROSSING UNDER EXISTING WATER MAIN

SCALE: NONE
DATE: 11/15

8-11

A 2" TEMPORARY BLOW OFF IS SHOWN. FOR 3" TEMPORARY BLOW OFF, USE 3" BRONZE BALL VALVE OR 3" AWWA GATE VALVE, WITH 3" BRONZE PLUG, 3" GALVANIZED PIPE & FITTING, 3" THREADED TAP AT MJ CAP/PLUG, AND CHRISTY B1324 TRAFFIC BOX, OR EQUAL.



BOLT DOWN H20 TRAFFIC RATED GALVANIZED STEEL COVER. COVER SHALL BE LABELED WITH BEAD WELDED LETTERS: "WATER" FOR POTABLE, "RECYCLED WATER" FOR RECYCLED AND NON-POTABLE WATER, "RAW WATER" FOR RAW WATER. (SEE NOTE 1)

BRONZE PLUG W/ 1/2" SQUARE INDENTED NUT

10"X17" BOX WITH H/20 TRAFFIC LOADING: CHRISTY B1017BOX, BROOKS 3 1/2-T PB, OR APPROVED EQUAL.

2" BRONZE BALL CURB STOP WITH TEFLON COATED BALL, F.I.P.T. x F.I.P.T. WITH LOCKWING.

3/4" TO 1"X4"X16" CONCRETE BLOCKS TO HELP LEVEL AND SUPPORT BOX. USE MINIMUM OF ONE BLOCK ON ALL FOUR SIDES OF BOX. COVER ANY OPENINGS OR HOLES IN UTILITY BOX WITH CONCRETE BLOCKS.

2" GALVANIZED SCH 40 STEEL PIPE & 90° ELBOW. WRAP WITH 10 MIL POLYETHYLENE TAPE, DOUBLE WRAP PIPE THREADS (TYPICAL). A STREET 90° ELBOW MAY BE USED IF THE END OF THE MJ CAP/PLUG IS FLAT.

THRUST BLOCK (12" AND SMALLER MAINS), SIZE FOR "DEAD END" PER DWG. 8-3A.

UNDISTURBED EARTH

NOTES:

1. RECYCLED AND NONPOTABLE WATER: TOP OF FRAME AND COVER SHALL BE COATED PURPLE PRIOR TO INSTALLATION PER STANDARD SPECIFICATIONS.

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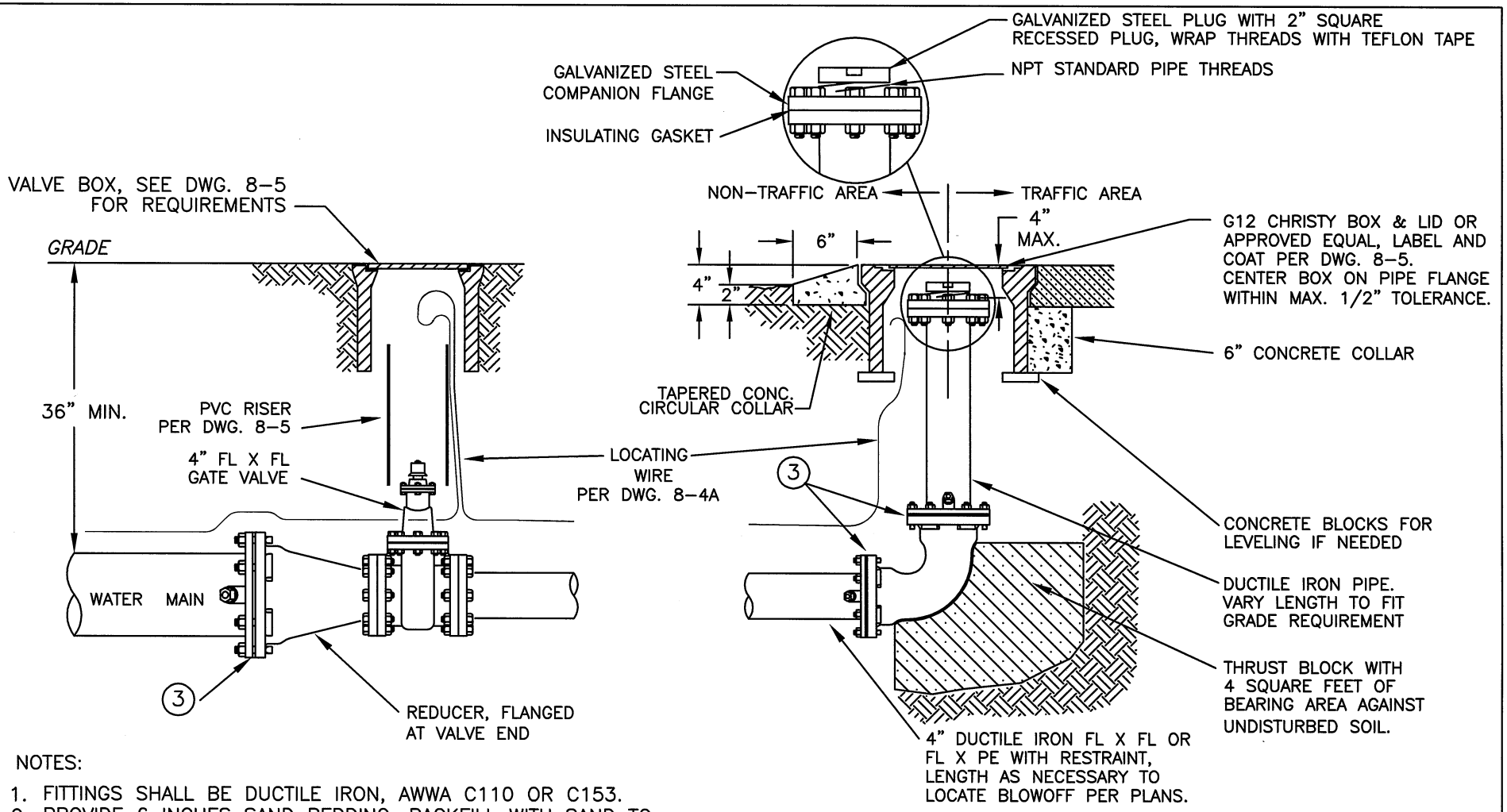
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

TEMPORARY BLOW OFF ASSEMBLY

SCALE: NONE
DATE: 8/13

8-12



NOTES:

1. FITTINGS SHALL BE DUCTILE IRON, AWWA C110 OR C153.
2. PROVIDE 6 INCHES SAND BEDDING. BACKFILL WITH SAND TO 8 INCHES ABOVE THE TOP OF PIPE. COMPACT TO 90% RELATIVE COMPACTION.
3. THESE JOINTS MAY BE FLANGED, RESTRAINED MECHANICAL JOINT WITH APPROVED RESTRAINING DEVICES, OR PUSH-ON WITH U.S. PIPE FIELD-LOK GASKETS OR APPROVED EQUAL.
4. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

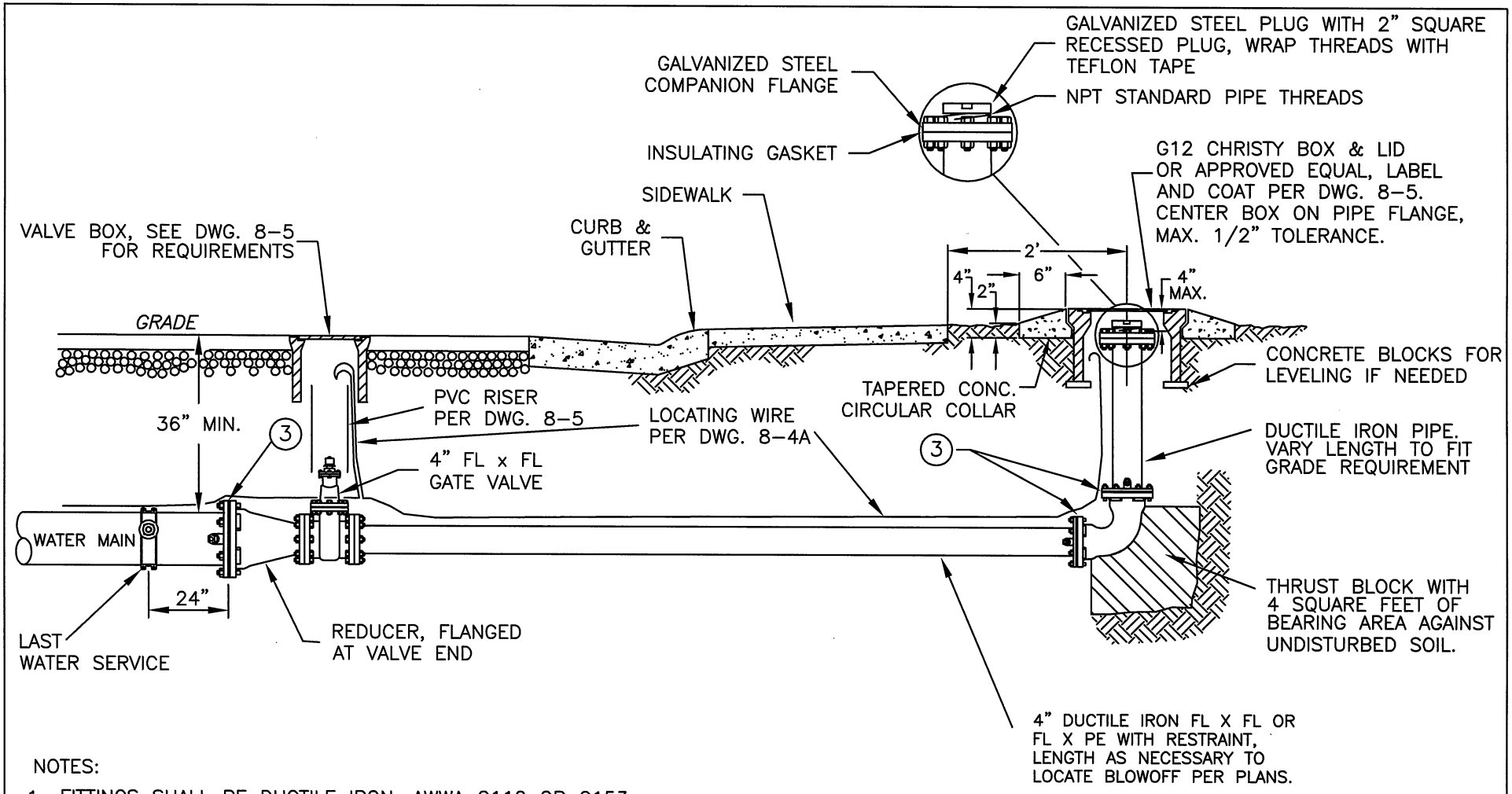
Michael L. Peterson
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

4" BLOW OFF ASSEMBLY AT END OF MAIN

SCALE: NONE
DATE: 8/13

8-13A



NOTES:

1. FITTINGS SHALL BE DUCTILE IRON, AWWA C110 OR C153.
2. PROVIDE 6 INCHES SAND BEDDING. BACKFILL WITH SAND TO 8 INCHES ABOVE THE TOP OF PIPE. COMPACT TO 90% RELATIVE COMPACTION.
3. THESE JOINTS MAY BE FLANGED, RESTRAINED MECHANICAL JOINT WITH APPROVED RESTRAINING DEVICES, OR PUSH-ON WITH U.S. PIPE FIELD-LOK GASKETS OR APPROVED EQUAL.
4. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

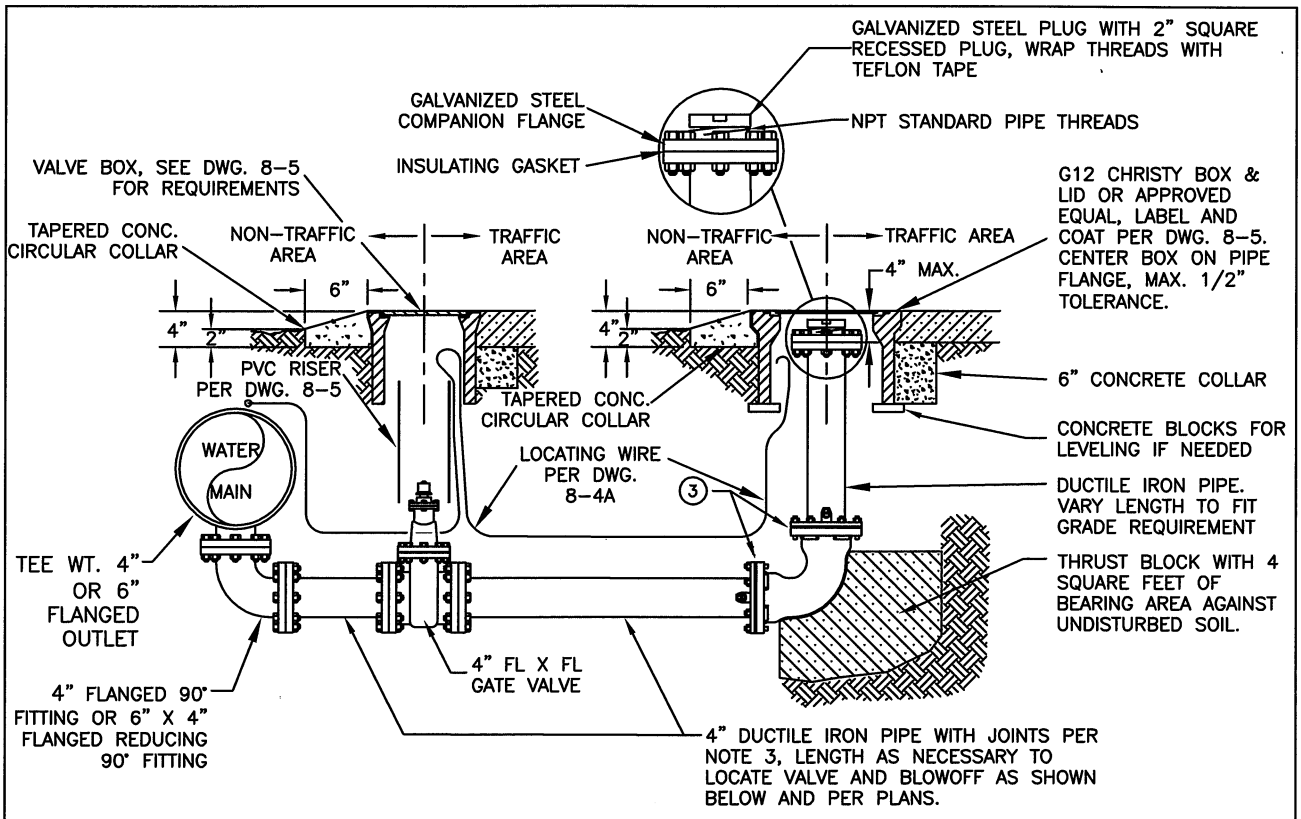
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

4" BLOW OFF ASSEMBLY AT END OF CUL-DE-SAC

SCALE: NONE
DATE: 8/13

8-13 B



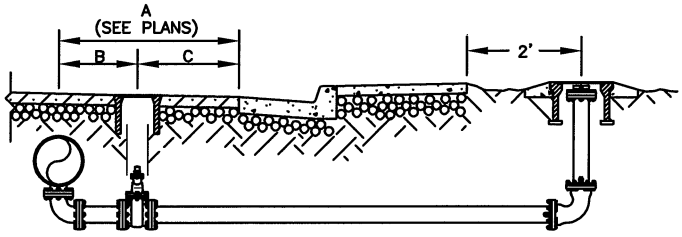
NOTES:

1. FITTINGS SHALL BE DUCTILE IRON, AWWA C110 OR C153.
2. PROVIDE 6 INCHES SAND BEDDING. BACKFILL WITH SAND TO 8 INCHES ABOVE THE TOP OF PIPE. COMPACT TO 90% RELATIVE COMPACTION.
3. JOINTS MAY BE FLANGED, RESTRAINED MECHANICAL JOINT WITH APPROVED RESTRAINING DEVICES, OR PUSH-ON WITH U.S. PIPE FIELD-LOK GASKETS OR APPROVED EQUAL.
4. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
5. RECYCLED AND NONPOTABLE WATER: THE TOP SURFACES OF BOXES AND LIDS SHALL BE COATED PURPLE PRIOR TO INSTALLATION PER STANDARD SPECIFICATIONS.

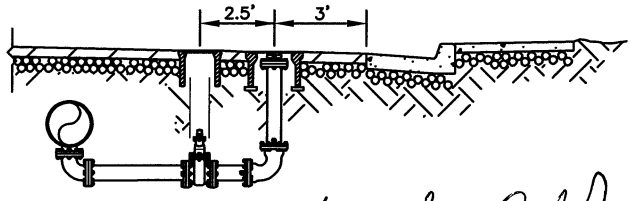
UNLESS OTHERWISE SPECIFIED ON THE PLANS, LOCATION OF VALVE AND BLOW-OFF BOX SHALL CONFORM TO THE FOLLOWING:

A (SEE PLANS)	B	C
3'	1.5'	1.5'
4'	2.5'	1.5'
≥5'	AS REQ'D	3'

STANDARD BLOW-OFF



BLOW-OFF IN ROADWAY
(ALLOWED IF CALLED OUT ON PLANS)



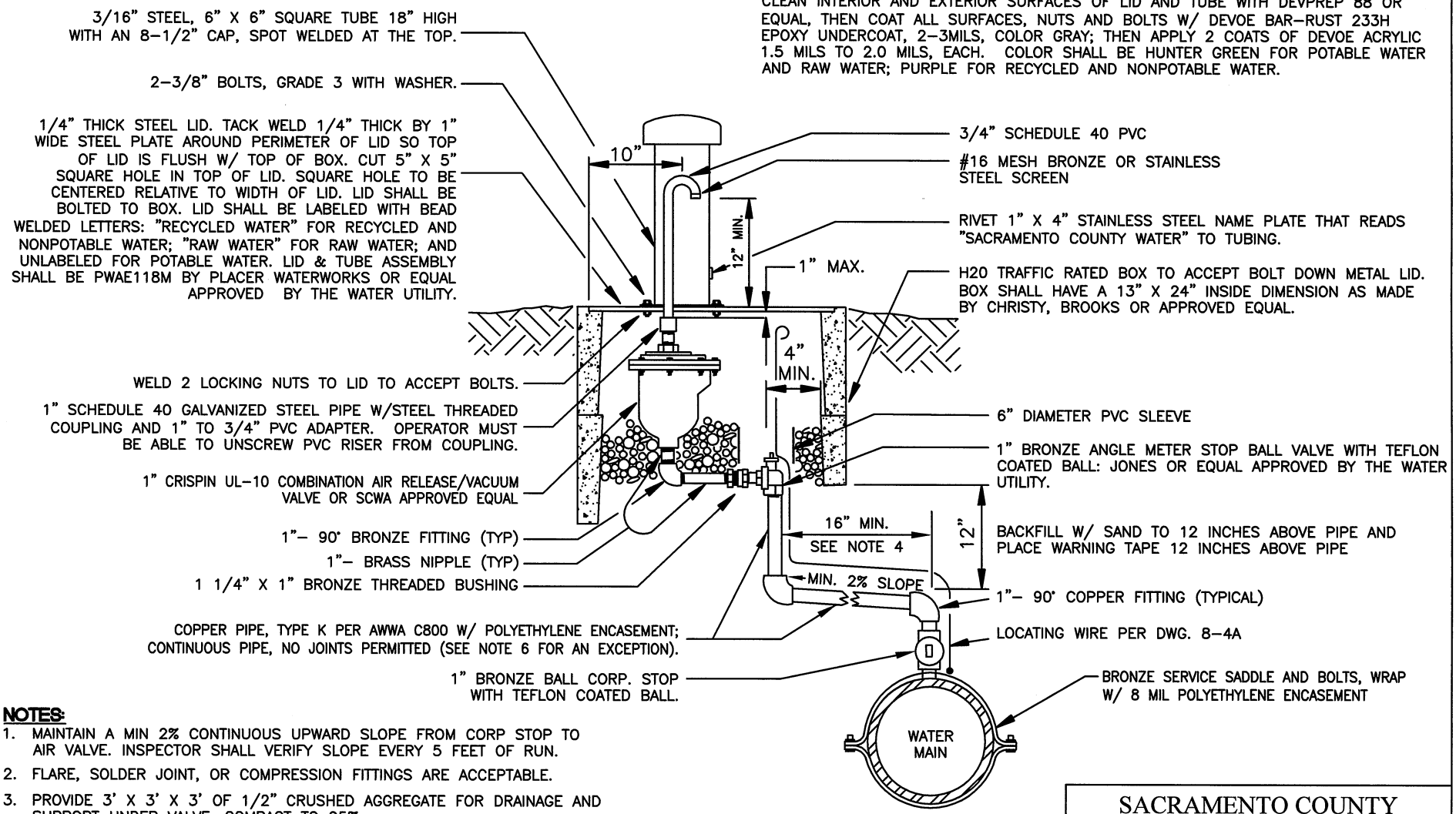
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

4" IN-LINE BLOW-OFF ASSEMBLY

SCALE: NONE
DATE: 8/13

8-13C



NOTES:

1. MAINTAIN A MIN 2% CONTINUOUS UPWARD SLOPE FROM CORP STOP TO AIR VALVE. INSPECTOR SHALL VERIFY SLOPE EVERY 5 FEET OF RUN.
2. FLARE, SOLDER JOINT, OR COMPRESSION FITTINGS ARE ACCEPTABLE.
3. PROVIDE 3' X 3' X 3' OF 1/2" CRUSHED AGGREGATE FOR DRAINAGE AND SUPPORT UNDER VALVE, COMPACT TO 95%.
4. SEE PLANS FOR LOCATION INFORMATION. UNLESS OTHERWISE SPECIFIED, LOCATE BOX 2' BEHIND SIDEWALK.
5. BOX SHALL NOT BE INSTALLED IN LOCATIONS SUBJECT TO TRAFFIC.
6. IF IT IS NECESSARY TO RELOCATE AN EXISTING INSTALLATION THAT IS UNDER EXISTING PAVEMENT: NEW COPPER PIPE MAY BE JOINED TO EXISTING COPPER PIPE WITH A MUELLER 110 H-15403 CONNECTOR.

Michael L. Peterson

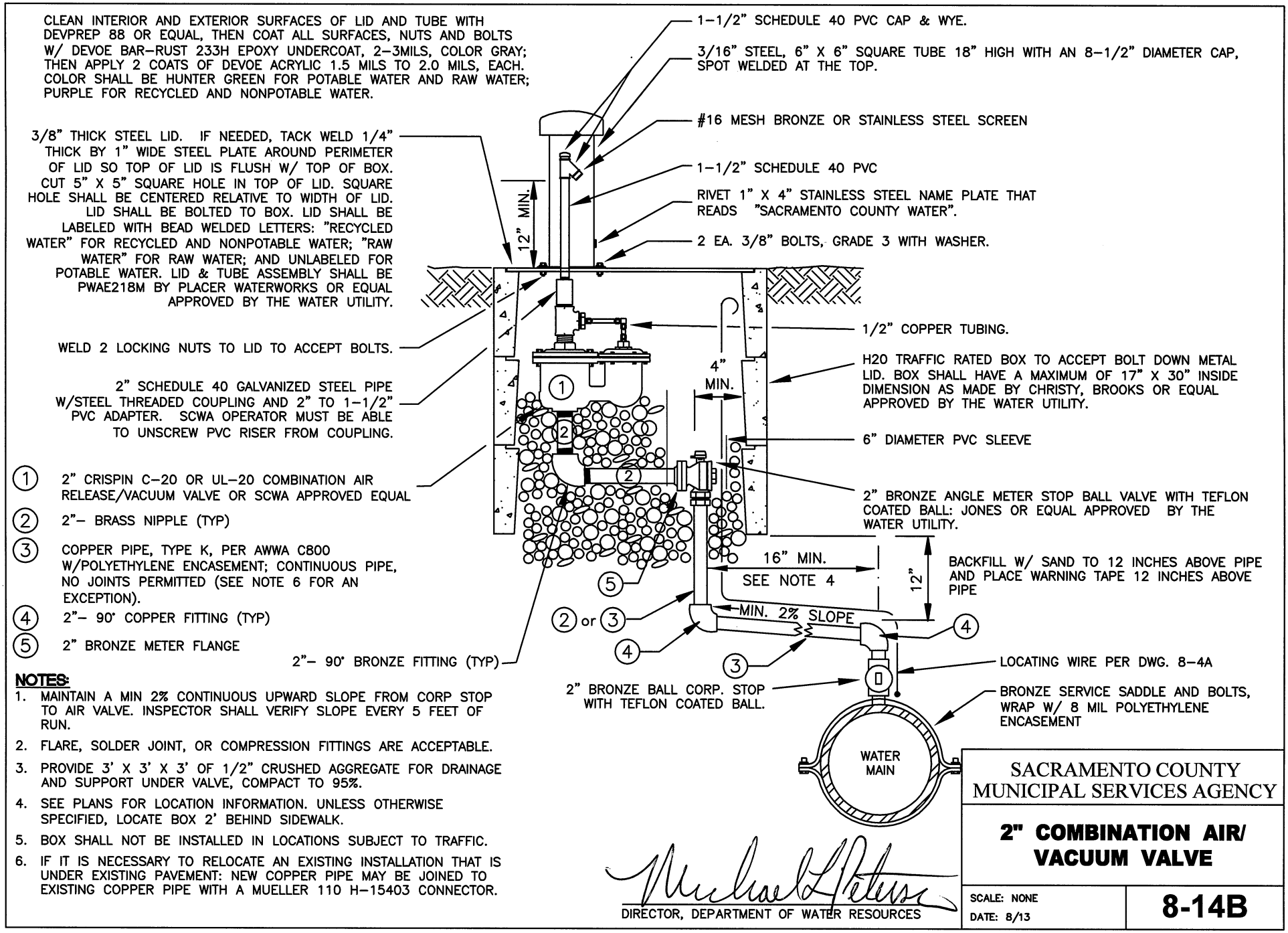
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

1" COMBINATION AIR/ VACUUM VALVE

SCALE: NONE
DATE: 8/13

8-14A



NOTES:

1. MAINTAIN A MIN 2% CONTINUOUS UPWARD SLOPE FROM CORP STOP TO AIR VALVE. INSPECTOR SHALL VERIFY SLOPE EVERY 5 FEET OF RUN.
2. FLARE, SOLDER JOINT, OR COMPRESSION FITTINGS ARE ACCEPTABLE.
3. PROVIDE 3' X 3' X 3' OF 1/2" CRUSHED AGGREGATE FOR DRAINAGE AND SUPPORT UNDER VALVE, COMPACT TO 95%.
4. SEE PLANS FOR LOCATION INFORMATION. UNLESS OTHERWISE SPECIFIED, LOCATE BOX 2' BEHIND SIDEWALK.
5. BOX SHALL NOT BE INSTALLED IN LOCATIONS SUBJECT TO TRAFFIC.
6. IF IT IS NECESSARY TO RELOCATE AN EXISTING INSTALLATION THAT IS UNDER EXISTING PAVEMENT: NEW COPPER PIPE MAY BE JOINED TO EXISTING COPPER PIPE WITH A MUELLER 110 H-15403 CONNECTOR.

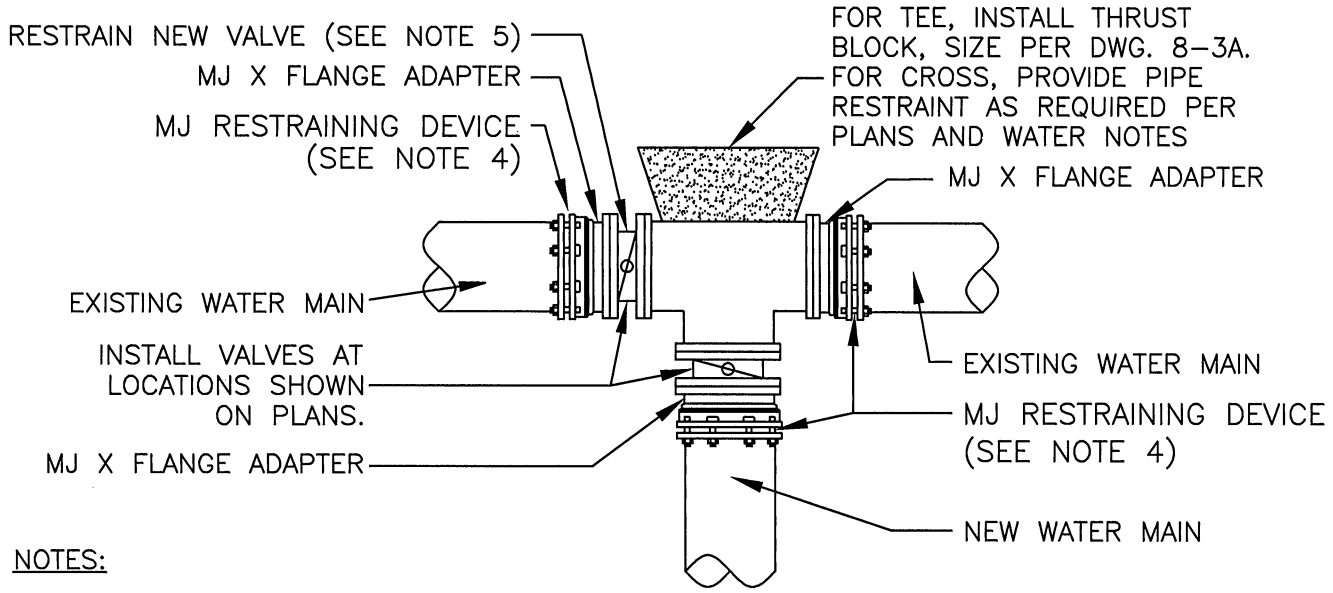
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

2" COMBINATION AIR/ VACUUM VALVE

SCALE: NONE
DATE: 8/13

8-14B



NOTES:

1. APPLICABILITY: THIS DETAIL SHALL BE USED WHEN (A) THE PLANS REQUIRE BOTH A NEW CONNECTION AND NEW IN-LINE VALVE IN AN EXISTING MAIN, OR WHEN (B) CALLED OUT ON THE PLANS.
2. DIG SUMP UNDER THE CUT AND PUMP ALL WATER FROM EXISTING MAIN AWAY FROM CUT-IN LOCATION. DO NOT ALLOW ANY WATER TO ENTER EXISTING PIPE. SPRAY EXISTING PIPE, ALL FITTINGS AND VALVES WITH A SOLUTION OF SUPER CHLORINATED WATER JUST PRIOR TO INSTALLATION.
3. RESTRAIN ALL JOINTS.
4. RESTRAINING DEVICES FOR MJ'S: FOR DUCTILE IRON USE EBAA MEGALUG 1100, STAR PIPE PRODUCTS STARGRIP 3000, OR SIGMA ONE-LOK SLDE; FOR PVC PIPE USE EBAA 2000PV, STAR PIPE PRODUCTS STARGRIP 4000, OR SIGMA ONE-LOK SLCE.
5. RESTRAIN NEW IN-LINE VALVE WITH A CONCRETE ANCHOR BLOCK PER A DESIGN APPROVED BY THE WATER UTILITY. SUBMIT DESIGN TO WATER UTILITY FOR REVIEW AND APPROVAL.
6. CONNECT NEW LOCATING WIRE TO EXISTING LOCATING WIRE PER DWG. 8-4A.
7. FOR EXISTING ASBESTOS CEMENT (ACP) WATER MAINS: REMOVE EXISTING ACP 5 TO 10 FEET BEYOND EACH SIDE OF CUT-IN TO AN EXISTING ACP JOINT AND REPLACE WITH CLASS 350 DIP USING TRANSITION COUPLINGS (SMITH-BLAIR OMNI 442 WITH 12-INCH SLEEVE AND S.S. HARDWARE). PLACE CLSM 6-INCHES UNDER DIP TO SPRINGLINE WITHIN 5 FEET OF ACP.
8. BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.

FIT UP PROCEDURE:

1. CAREFULLY MEASURE AND CUT A SECTION FROM THE EXISTING WATER MAIN 1/4" LARGER THAN THE COMBINED MAKE UP OF THE FITTINGS AND GASKETS.
2. BOLT UP THE ASSEMBLY WITH THE EXCEPTION OF THE MJ X FL ADAPTERS.
3. LOOSELY BOLT THE MJ ADAPTERS TO THE ENDS OF THE PIPE. TWO-HOLE THE FLANGES AND LEAVE THE MJ BOLTS SNUG.
4. DROP IN THE FLANGED TEE AND VALVE ASSEMBLY AND SUPPORT THE VALVE WITH BLOCKS.
5. INSTALL THE BOTTOM TWO FLANGE BOLTS (THIS WILL SECURE THE GASKET IN PLACE WHILE ADJUSTMENTS ARE MADE TO THE MJ ADAPTERS).
6. ADJUST EVERYTHING LEVEL AND TO GRADE AND INSTALL ALL OF THE BOLTS AND NUTS ON THE FLANGES AND TIGHTEN.
7. TIGHTEN THE BOLTS FOR THE MJ GLANDS.
8. LASTLY, TIGHTEN THE MJ RESTRAINING BOLTS.

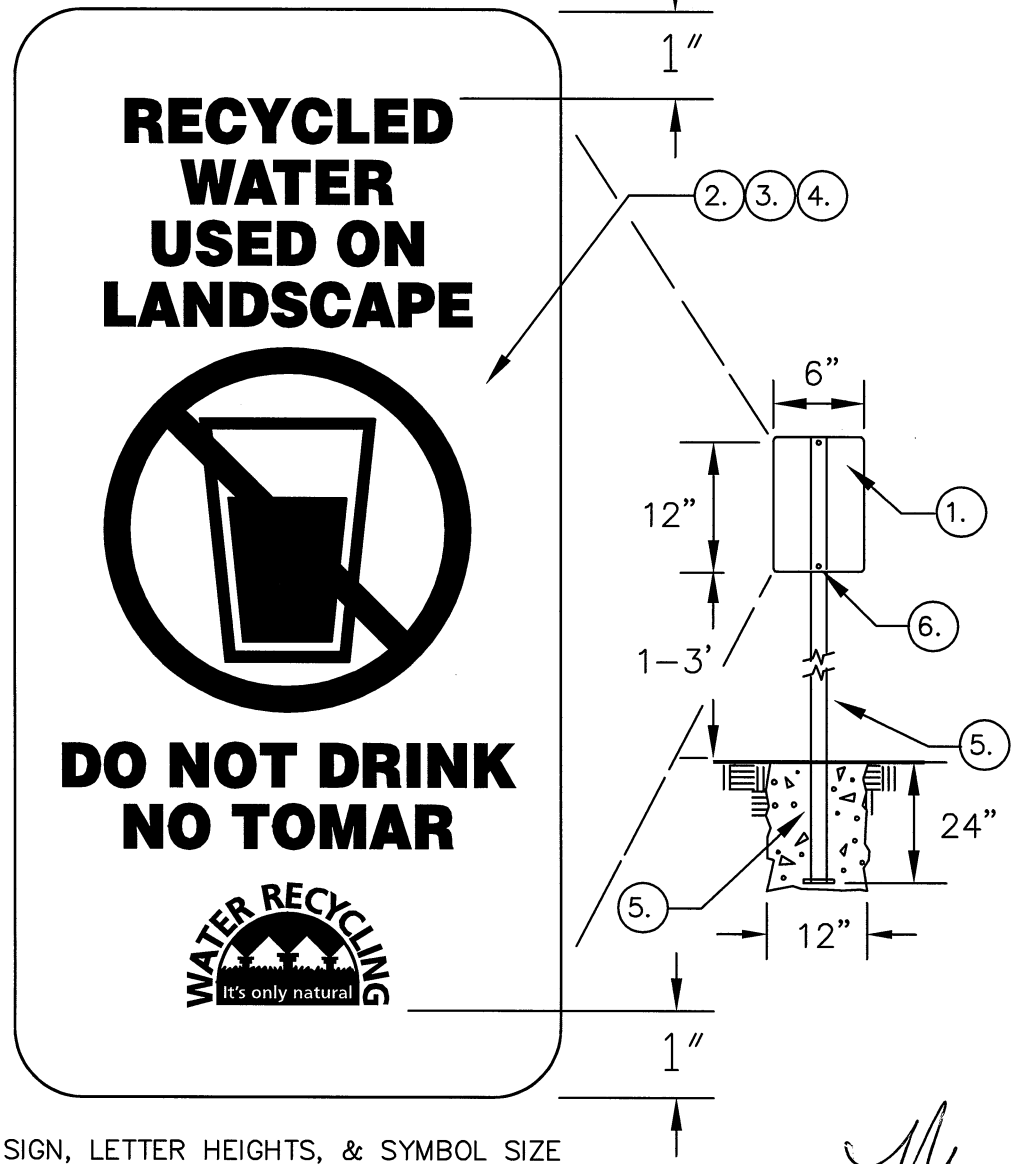
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

WATER MAIN CUT - IN

SCALE: NONE
DATE: 11/15

8-15



SIGN, LETTER HEIGHTS, & SYMBOL SIZE SHOWN ARE IN REQUIRED PROPORTIONS

NOTES:

1. 6"x 12" ALUMINUM SHEET ALLOY 6061–T6 0.080" GAUGE, ROUNDED CORNERS (1" RADIUS).
2. LETTER HEIGHT & SYMBOL SIZE SHALL BE PROPORTIONAL TO SIGN SIZE.
3. THE BACKGROUND SHALL BE WHITE. THE LETTERING SHALL BE PURPLE, THE GRASS GREEN, AND THE WATER BLUE.
4. LETTERING AND SYMBOL SHALL BE PRESSURE SENSITIVE VINYL. CLEAR COAT ENTIRE SIGN ONCE LETTERING AND SYMBOLS ARE ATTACHED.
5. 1"x1" SQUARE STEEL POST PAINTED WHITE TO MATCH SIGN BACKGROUND. CAP OFF POST AND FINISH CLEAN. PROVIDE REBAR AT END FOR CONCRETE INSTALLATION AT 24 INCH DEPTH.
6. 5/16"ø x 4–1/2" ZINC PLATED CARRIAGE BOLT WITH VANDAL PROOF NUTS. PAINT WHITE TO MATCH SIGN.

WHEN MOUNTING ON WALLS OR CHAIN LINK FENCE, PROVIDE 1/4 INCH HOLES IN ALL FOUR CORNERS.

3" x 4–1/2" PRESSURE SENSITIVE DECALS ARE REQUIRED FOR IRRIGATION CONTROLLERS AND OTHER ABOVE GROUND FACILITIES REQUIRING A WARNING SIGN. WHEN CONDITIONS AND/OR FACILITY CHARACTERISTICS RENDER THESE SPECIFICATIONS INAPPROPRIATE, ALTERNATIVE SIGNING SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY THE WATER UTILITY.

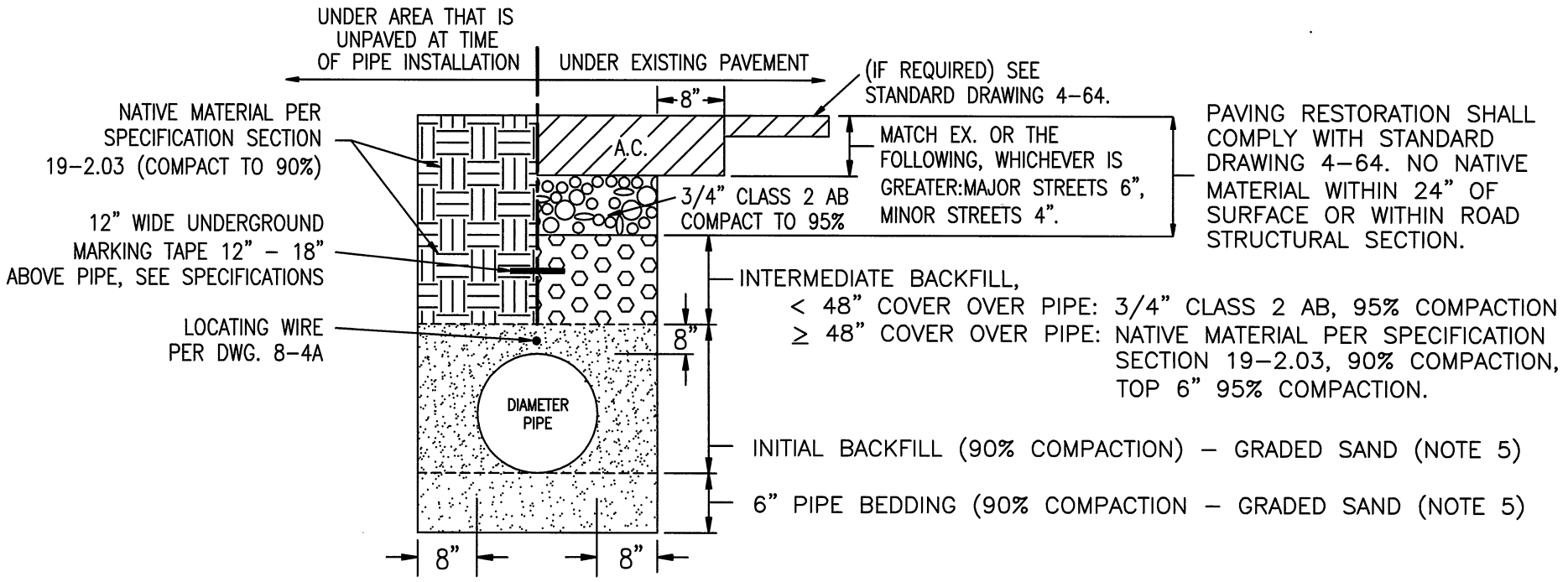
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

RECYCLED WATER SIGN

SCALE: NONE
DATE: 8/13

8-16



NOTES:

1. SEE THE COUNTY OF SACRAMENTO STANDARD CONSTRUCTION SPECIFICATIONS, IMPROVEMENT STANDARDS, AND THE PROJECT WATER NOTES FOR REQUIREMENTS.
2. 6" & 8" DIMENSIONS SHALL INCLUDE DISTANCE BETWEEN PIPE BELL AND TRENCH WALL.
3. EXCAVATION, BEDDING, AND BACKFILL SHALL COMPLY WITH STANDARD SPECIFICATION SECTION 19.
4. COORDINATE COMPACTION TESTS WITH RESIDENT ENGINEER.
5. PIPE BEDDING AND INITIAL BACKFILL REQUIREMENTS ARE THE SAME FOR BOTH TYPES OF TRENCHES.
6. IF USED, BATCH-PLANT BASED TRENCH BACKFILL MATERIAL USED IN PLACE OF NATIVE MATERIAL SHALL BE DESIGNED WITH A 28-DAY COMPRESSIVE STRENGTH OF 100 PSI. STRONGER MIXES ARE NOT PERMITTED.

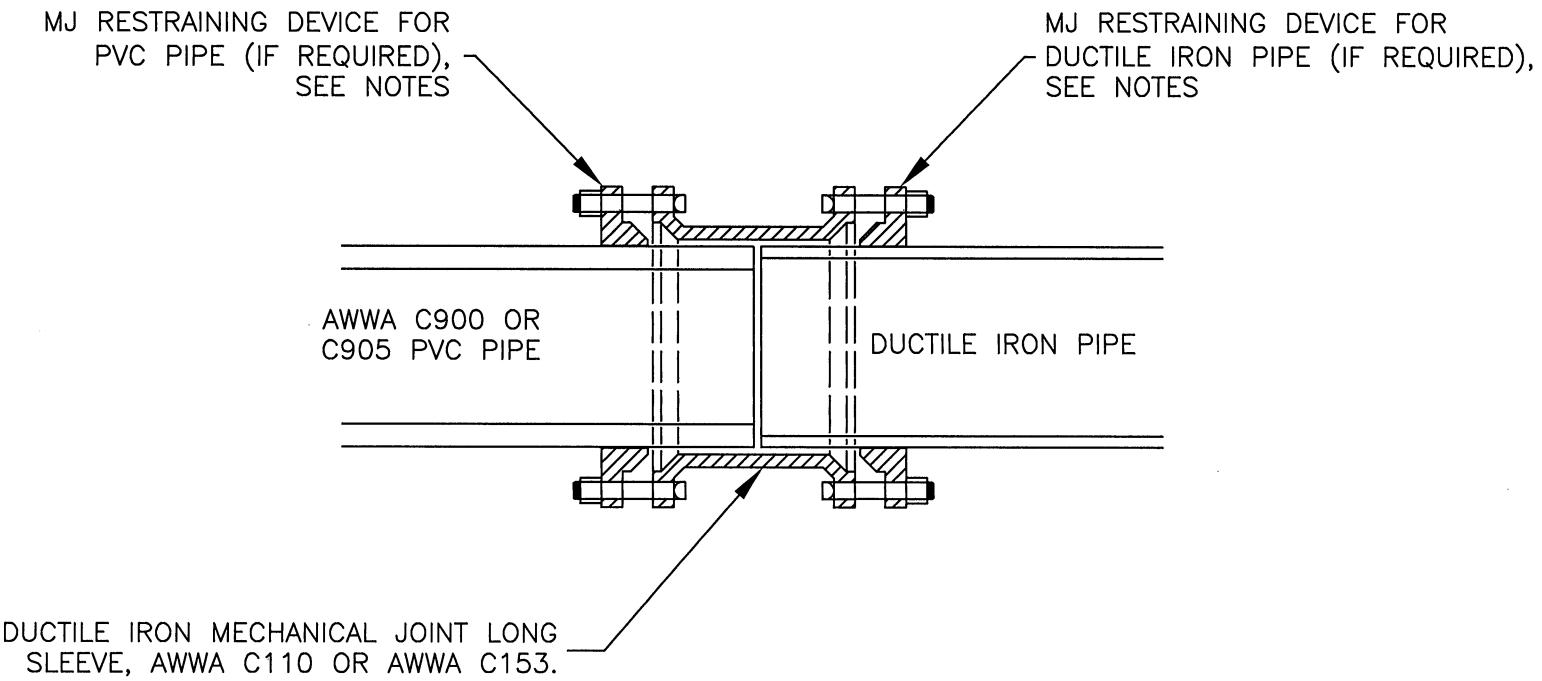
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

TRENCH DETAIL

SCALE: NONE
DATE: 8/13

8-17



NOTES:

1. THIS DETAIL SHALL BE USED AT ALL IN-LINE TRANSITIONS BETWEEN PVC PIPE AND DUCTILE IRON PIPE.
2. TRANSITIONS SHALL BE LOCATED OUTSIDE OF RESTRAINED AREAS, UNLESS APPROVED BY THE WATER UTILITY.
3. TRANSITIONS LOCATED WITHIN RESTRAINED AREAS SHALL BE RESTRAINED. RESTRAINING DEVICE FOR THE PVC PIPE SIDE SHALL BE EBAA 2000PV, STAR PIPE PRODUCTS STARGRIP 4000, OR SIGMA ONE-LOK SLCE. RESTRAINING DEVICE FOR THE DUCTILE IRON PIPE SIDE SHALL BE EBAA MEGALUG 1100, STAR PIPE PRODUCTS STARGRIP 3000, OR SIGMA ONE-LOK SLDE.
4. RESTRAINING DEVICES NOT REQUIRED IF TRANSITION IS NOT IN A RESTRAINED AREA.
5. ALL BURIED METAL SHALL BE ENCASED WITH 8 MIL POLYETHYLENE SO THAT NO SOIL IS IN CONTACT WITH METAL.
6. FOR EXISTING ASBESTOS CEMENT (ACP) WATER MAINS:
   CONNECT NEW WATER MAINS TO EXISTING ACP WITH SMITH-BLAIR OMNI 442 TRANSITION COUPLINGS, WITH 12-INCH SLEEVE AND S.S. HARDWARE.

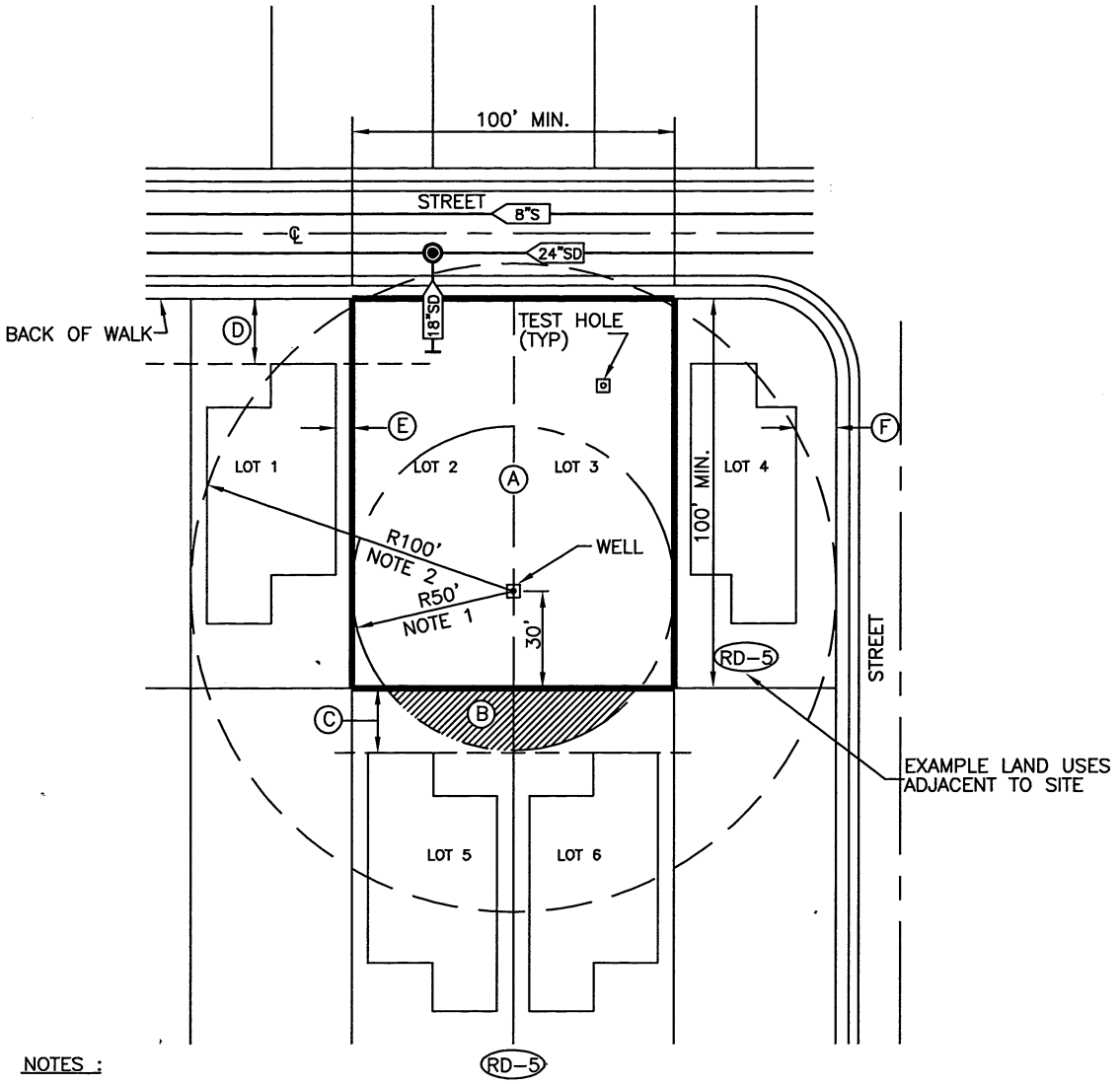
DIRECTOR, DEPARTMENT OF WATER RESOURCES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

TRANSITION SLEEVE

SCALE: NONE
DATE: 11/15

8-18



NOTES :

1. 50' RADIUS PRIMARY DRINKING WATER SOURCE PROTECTION ZONE: NO SEWER, STORMWATER, OR INDUSTRIAL LINES; NO LATERAL LINES; NO HOUSE FOUNDATIONS.
2. 100' RADIUS SECONDARY DRINKING WATER SOURCE PROTECTION ZONE: NO SEWER OR STORMWATER MAINS; NO DRAINAGE CHANNELS.
3. 200' SETBACK REQUIRED FROM FORCE MAINS (SEWER, STORMWATER, INDUSTRIAL), UNDERGROUND FUEL TANKS, SEPTIC TANKS, LEACH LINES, AND STABLES.
4. 500' SETBACK REQUIRED FROM PETROLEUM PIPELINES.
5. MINIMUM WELL LOT SIZE IS 100' X 100'. EXAMPLE RD-5 LOT SIZE TAKEN AS 50' X 120'.
6. ANY STRUCTURE(S) PROPOSED WITHIN THE SPECIAL PROVISION AREA ARE SUBJECT TO REVIEW AND APPROVAL BY THE WATER UTILITY FOR COMPLIANCE WITH THE DRINKING WATER SOURCE PROTECTION SETBACKS.
7. CONTACT THE WATER UTILITY FOR SPECIFIC INFORMATION ON A CASE-BY-CASE BASIS.
8. WELL SITES SHALL BE PROVIDED WITH A WATER SERVICE, A STORM DRAIN STUB SIZED FOR WELL CAPACITY (TYP. 1500 GPM), A 480V 3-PHASE 250-300 AMP ELECTRIC SERVICE, AND A 20-FOOT COMMERCIAL DRIVEWAY.

DIRECTOR, DEPARTMENT OF WATER RESOURCES

LEGEND :

- (A) WELL SITE IS TWO LOTS (TYPICAL)
- (B) SPECIAL PROVISION AREA
- (C) 20' MINIMUM SETBACK, REAR YARD.
- (D) 20' MINIMUM SETBACK, FRONT YARD.
- (E) 5' MINIMUM SETBACK, SIDE YARD.
- (F) 12.5' MINIMUM SETBACK, SIDE STREET YARD.

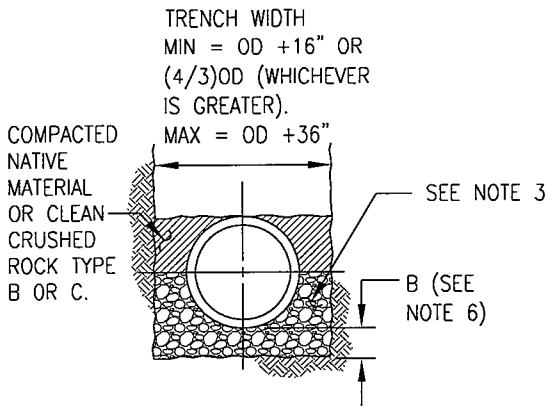
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

TYPICAL WELL SITE

SCALE: NONE
DATE: 11/15

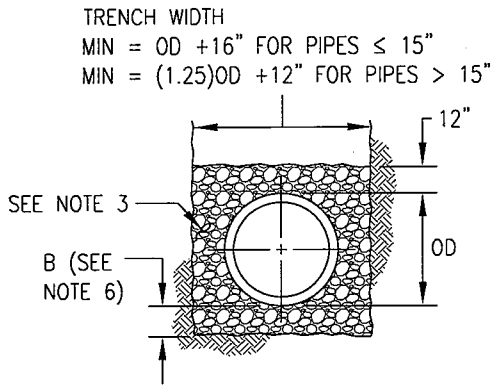
8-19

DRAWING NUMBER	TITLE
9-1	STORM DRAIN PIPE BEDDING AND INITIAL BACKFILL (10/09)
9-7A	STANDARD PRECAST CONCRETE DRAINAGE MANHOLE (8/10)
9-8A	TYPE A SADDLE MANHOLE (11/98)
9-9	GREY CAST IRON STANDARD 24" MANHOLE FRAME & COVER (10/09)
9-10	GREY CAST IRON STANDARD 36" MANHOLE FRAME & COVER (08/10)
9-11	GRATE TYPE MANHOLE COVER (08/10)
9-13B	DROP INLET TYPE B (10/09)
9-13C	DROP INLET TYPE C (01/09)
9-14	WELDED STEEL GRATE FRAME (04/07)
9-15	WELDED STEEL GRATE (04/07)
9-16	CENTER SUPPORT ASSEMBLY FOR MULTIPLE GRATES(04/07)
9-17	CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR (04/07)
9-18	DROP INLET TYPE F (10/09)
9-19	DROP INLET TYPE G (10/09)
9-20	CORRUGATED METAL PIPE DRAINAGE INLET TYPE I (10/09)
9-21	PRECAST DROP INLET TYPE J (10/15)
9-22	CORRUGATED PIPE FITTINGS (11/98)
9-23	PIPE CONNECTIONS (01/03)
9-24	LINED CHANNEL SECTION (10/09)
9-26G	TRASH RACK 24"-36" PIPE (10/09)
9-26H	PIPE HEADWALL, ENDWALL WINGWALL STRUCTURE (10/09)
9-27	EROSION CONTROL DITCH DISCHARGE (10/09)
9-28	BARBED WIRE AND WIRE MESH FENCES (11/98)
9-29	CHAIN LINK FENCE (12/99)
9-30	UTILITY STREAM CROSSING(10/09)
9-31	FLEXIBLE CONNECTOR PIPE TO MANHOLE (10/09)
9-32	CONSTRUCTION SITE SIGN (02/07)
9-33	UTILITY CROSSING (04/97)
9-34	CAST IRON 24" MANHOLE FRAME & COVER FOR TYPE G AND 300-1 INLET (4/07)
9-35	WATER STOP (10/09)
9-36	24" MANHOLE FRAME & COVER FOR TYPE J INLET (10/15)
300-1	CURB OPENING CATCH BASIN (12/02)
301-1	CURB OPENING CATCH BASIN (12/02)
308-0	MONOLITHIC CATCH BASIN CONNECTION (3/07)
309-0	CATCH BASIN REINFORCEMENT (01/06)



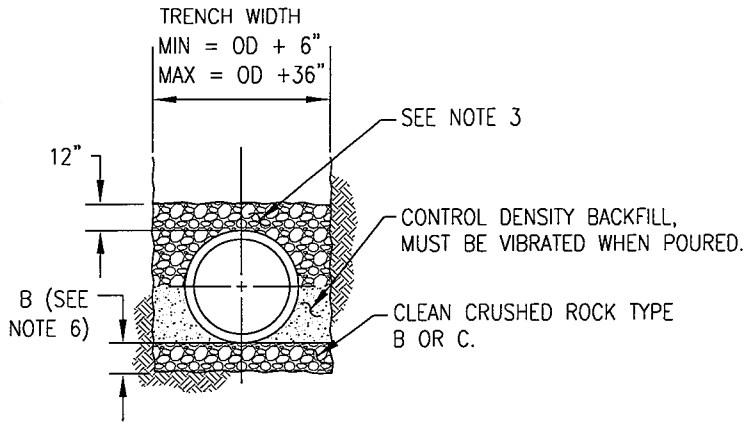
RIGID PIPE

REINFORCED CONCRETE
PIPE C-76



FLEXIBLE PIPE

PVC, CORRUGATED
AND RIBBED METAL

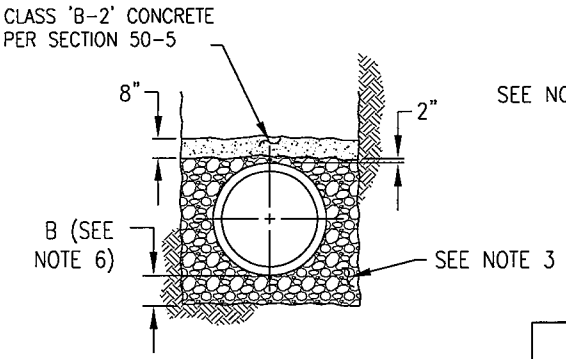


CONTROL DENSITY
BACKFILL FOR FLEXIBLE PIPE

SEE NOTE 4

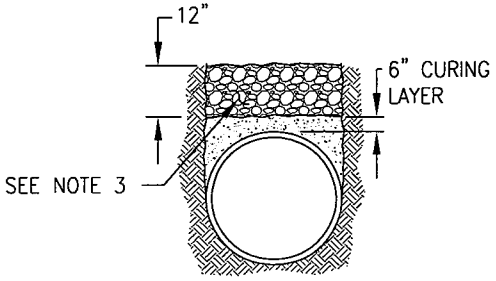
GENERAL NOTES:

1. AREA ABOVE BEDDING AND INITIAL BACKFILL PER DRAWING 4-31.
2. SEE SECTION 19 "TRENCH EXCAVATION BEDDING AND BACKFILL".
3. BACKFILL WITH CLEAN CRUSHED ROCK TYPE B OR C.
4. IF MINIMUM TRENCH WIDTH CANNOT BE ACHIEVED, CONTROL DENSITY BACKFILL, PER SECTION 50-15 SHALL BE USED (UP TO SPRING LINE) IN LIEU OF CLEAN CRUSHED ROCK AT NO EXTRA COST (WITH APPROVAL OF THE DIRECTOR).
5. COVER LESS THAN STANDARD WILL ONLY BE ALLOWED IF THE MINIMUM COVER OVER THE PIPE BELL IS LESS THAN TABLE 38-1 AND WITH THE APPROVAL OF THE DIRECTOR.
6. B=4" FOR PIPES 12"-54" ID AND B=6" FOR PIPES >54" ID OR MINIMUM DEPTH OF BEDDING MATERIAL SHALL BE 1-1/2" BELOW THE PIPE BELL, WHICHEVER IS GREATER.
7. THE TRENCH WIDTH ABOVE THE PIPE MAY BE INCREASED FOR CONSTRUCTION PURPOSES.
8. THE MINIMUM TRENCH WIDTH CALCULATIONS ARE BASED ON THE PIPE PLACED IN THE CENTER OF A TRENCH. IF A PIPE CAN NOT BE PLACED IN THE CENTER OF A TRENCH, THE TRENCH SHALL BE WIDENED SO THAT ON BOTH SIDES OF THE PIPE, THE DISTANCE FROM THE TRENCH WALL TO THE OUTSIDE OF THE PIPE IS EQUAL TO (TRENCH WIDTH - PIPE OD)/2.



COVER LESS THAN STANDARD

SEE NOTE 5



CAST IN PLACE
CONCRETE PIPE (CIPCP)

Michael L Peterson

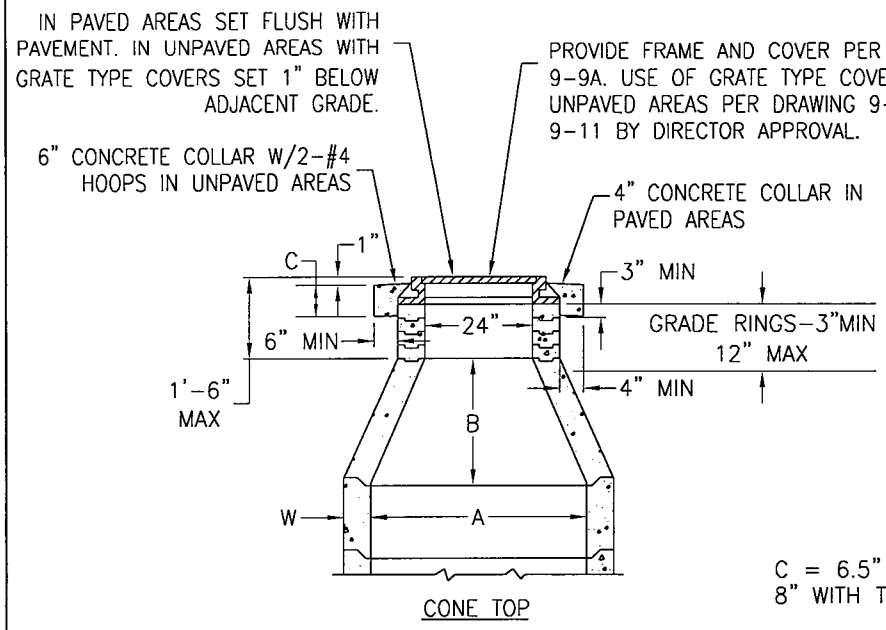
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

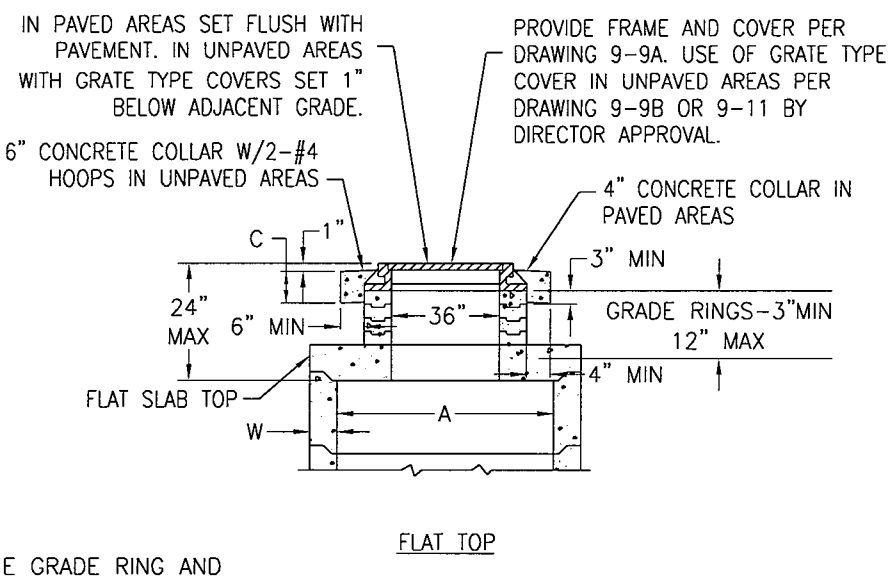
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

STORM DRAIN PIPE BEDDING AND INITIAL BACKFILL

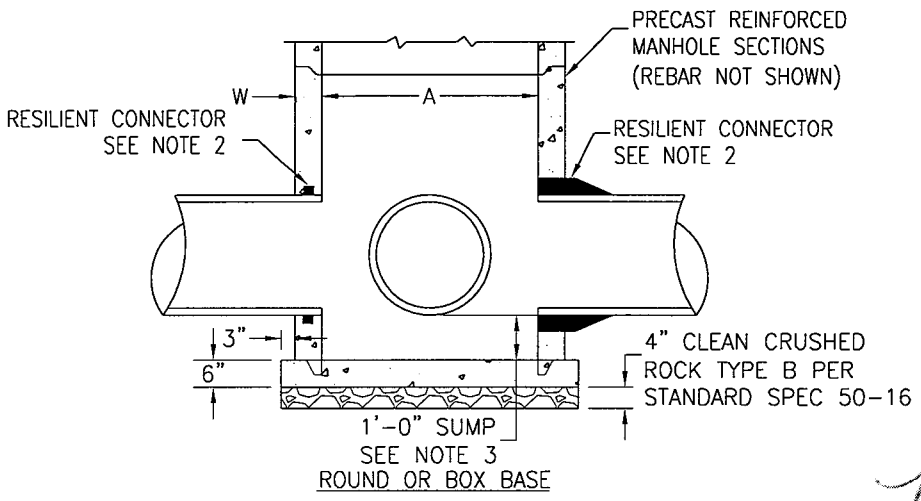
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

9-1





C = 6.5" WITH ONE GRADE RING AND 8" WITH TWO OR MORE GRADE RINGS.



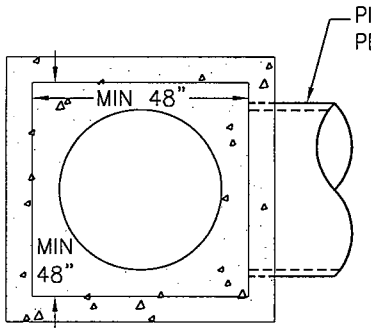


TABLE OF MINIMUM DIMENSIONS FOR ROUND MANHOLES

M.H.	A	B	W
48"	48"	18"	5"
60"	60"	30"	6"
72"	72"	**	7"
84"	84"	54"	8"
96"	96"	---	9"

** – TRANSITION SLAB REDUCES THE INSIDE DIAMETER FROM 72" TO 60"

Michael L. Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

STANDARD PRECAST CONCRETE DRAINAGE MANHOLE

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 08/10

9-7A
SHEET 1 OF 2

NOTES:

1. ALL MANHOLES SHALL MEET H-20 LOAD SPECIFICATIONS.

2. PRECAST MANHOLES SHALL USE FLEXIBLE COMPRESSION GASKET OR BOOT CONNECTOR CONFORMING TO ASTM C-923. (CONNECTION SHALL BE WATER AND SOIL TIGHT). FOR PIPES GREATER THAN 30" I.D., BASE MAY BE CAST-IN-PLACE WITH A WATER STOP CONFORMING TO ASTM C-923.

3. SUMP SHALL BE 1'-0" DEEP, MEASURED FROM INVERT OF OUTFALL PIPE. SUMP NOT REQUIRED IF OUTFALL PIPE IS 24" I.D. OR LARGER. SUMPS SHALL NOT BE ALLOWED OUT OF THE COUNTY RIGHT OF WAY.

4. RISER SECTIONS, CONES, AND ADJUSTING RINGS SHALL CONFORM TO ASTM C-478.

5. ALL JOINTS SHALL BE MADE WITH PREFORMED PLASTIC JOINT SEALING COMPOUND OR PRE-LUBRICATED GASKET. FOLLOWING INSTALLATION, GROUT ALL INTERIOR AND EXTERIOR JOINTS.

6. CONCENTRIC COMPONENTS SHALL BE USED UNLESS OTHERWISE SPECIFIED ON THE PLANS.

7. PRECAST MANHOLES SHALL BE SIZED TO PROVIDE THE FOLLOWING: THE ANNULAR SPACE ON THE INSIDE OF THE MANHOLE BARREL BETWEEN CORED PIPE CONNECTION HOLES SHALL BE A MINIMUM OF 12-INCHES OR HALF THE DIAMETER OF THE SMALLER CORED HOLE (WHICHEVER IS GREATER). IF THE CONNECTION HOLE IS CAST MONOLITHICALLY WITH THE MANHOLE BARREL THE MEASUREMENT SHALL BE TAKEN FROM THE FINISHED CONCRETE CONNECTION SURFACE.

8. SEE SECTION 39, "MANHOLES".

9. CONSTRUCT WITH FLAT SLAB TOP WHEN HEIGHT IS TOO SHALLOW TO CONSTRUCT WITH CONES.

10. FOR THE SLAB REDUCER OF THE BOX MANHOLE (BOX TO ROUND DIAMETER), THE DIAMETER OF THE ROUND REDUCER SHALL NOT BE MORE THAN 12" SMALLER THAN THE INSIDE BOX WIDTH.

11. FLAT SLAB TOP MANHOLES SHALL HAVE A 36" MANHOLE FRAME AND COVER PER DRAWING 9-10.

Michael L Peterson

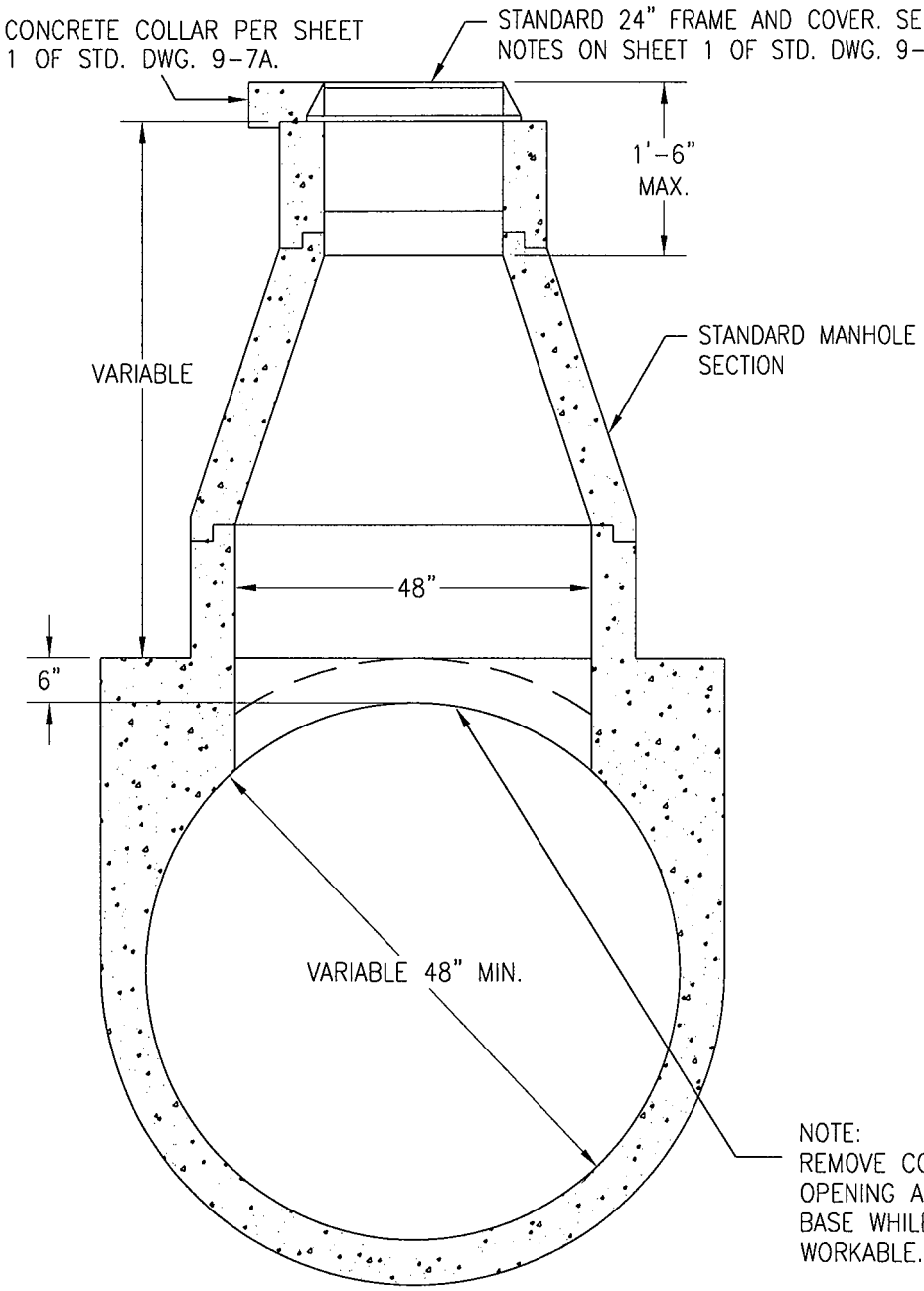
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

STANDARD PRECAST CONCRETE DRAINAGE MANHOLE

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 08/10

9-7A
SHEET 2 OF 2



NOTE:
REMOVE CONCRETE IN MANHOLE OPENING AND CONSTRUCT RISER BASE WHILE CONCRETE IS STILL WORKABLE.

PLACE RISER SECTION AFTER CONCRETE HAS SET.

SEE SECTION 39, "MANHOLES," AND SECTION 36, "CAST-IN-PLACE CONCRETE PIPE."

TYPE A
CAST-IN-PLACE PIPE ONLY

Michael L Peterson

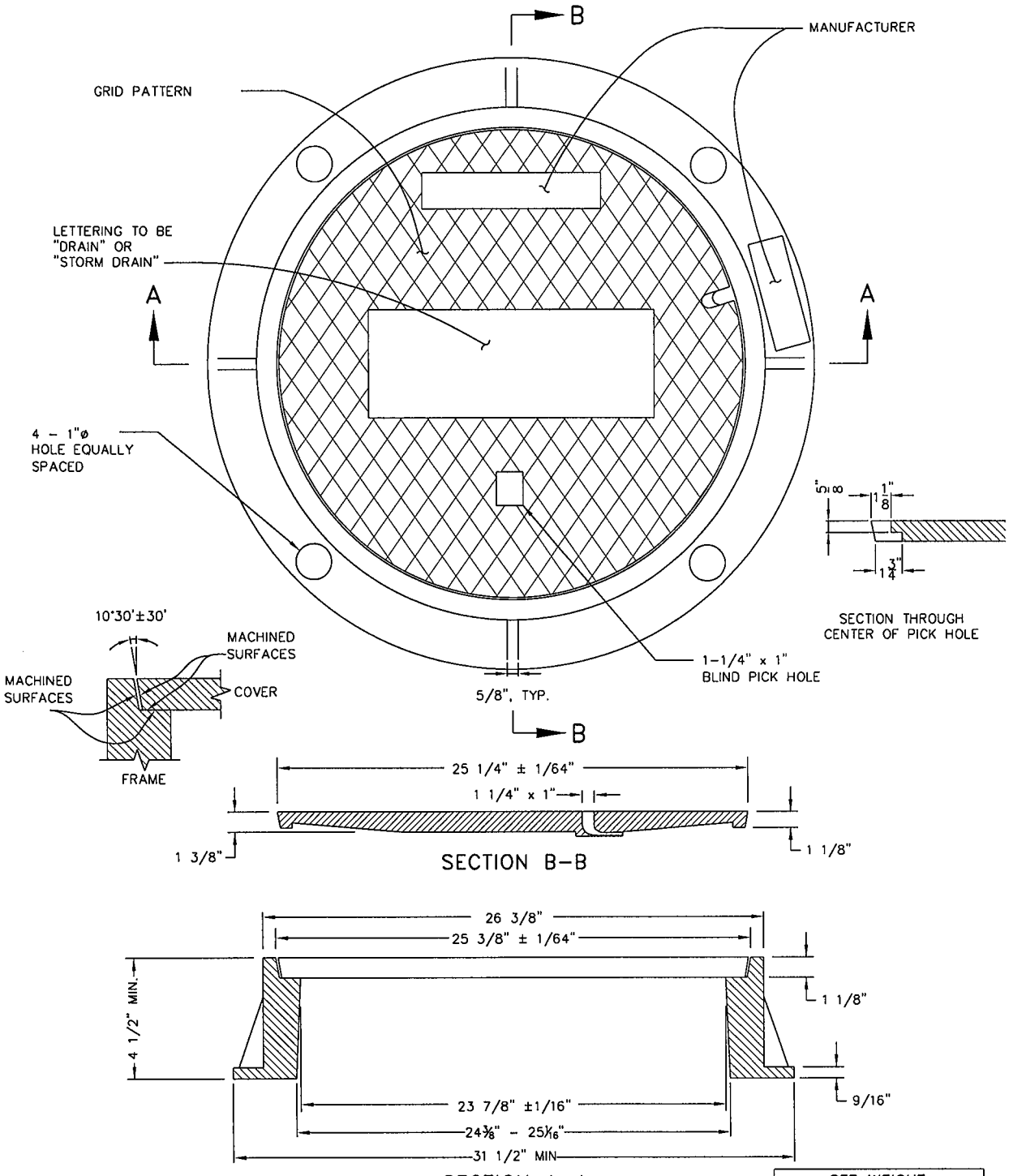
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

TYPE A
SADDLE MANHOLE

DRAWN BY: M.FIELDS
SCALE: NONE
REVISION DATE: 11/98

9-8A



NOTES:

1. ALL CASTINGS TO CONFORM TO ASTM A48, CLASS 35B.
2. FRAME AND COVER TO MEET H-20 LOAD SPECIFICATIONS.
3. EXPOSED SURFACES OF THE CASTING WITH THE PARTS ASSEMBLED AND DISASSEMBLED SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.
4. LOCKING COVER TYPE FRAME AND COVERS SHALL BE USED IN EASEMENT AREAS UNLESS OTHERWISE APPROVED.
5. SHALL NOT BE USED ON FLAT SLAB TOP MANHOLES.
6. MACHINED HORIZONTAL AND VERTICAL BEARING SURFACES NOT TO EXCEED 1/64" TOLERANCE.

SET WEIGHT	
FRAME	140 LBS
COVER	130 LBS
TOTAL	270 LBS

Michael L. Peterson

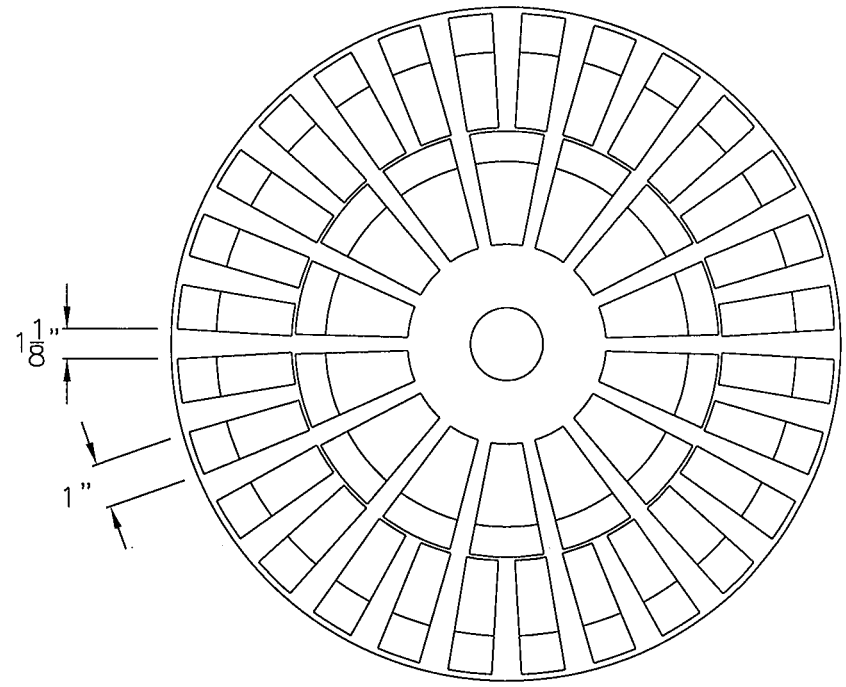
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

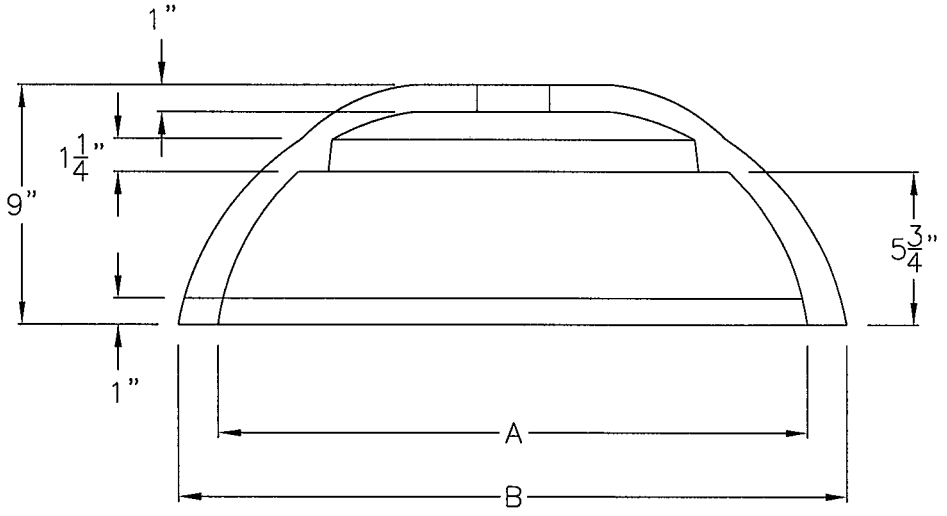
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

GREY CAST IRON STANDARD 24" MANHOLE FRAME & COVER

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

9-9A





DIMENSION TABLE

LID	A	B
24"	22 5/16"	25 5/16"
36"	35 1/4"	38 1/4"

GENERAL NOTES:

1. CAST IRON TO CONFORM TO ASTM A-48, CLASS 35B.
2. NOT TO BE USED IN COUNTY RIGHT-OF-WAY.
3. EXPOSED SURFACES OF THE CASTING WITH THE PARTS ASSEMBLED AND DISASSEMBLED SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.
4. LOCKING COVER TYPE FRAME AND COVERS SHALL BE REQUIRED UNLESS OTHERWISE APPROVED.
5. MANHOLE COVER SHALL FIT FRAME SHOWN ON DRAWING 9-9A OR 9-10.
6. THIS COVER MAY ONLY BE USED WITH APPROVAL OF THE DIRECTOR.

Michael L Peterson

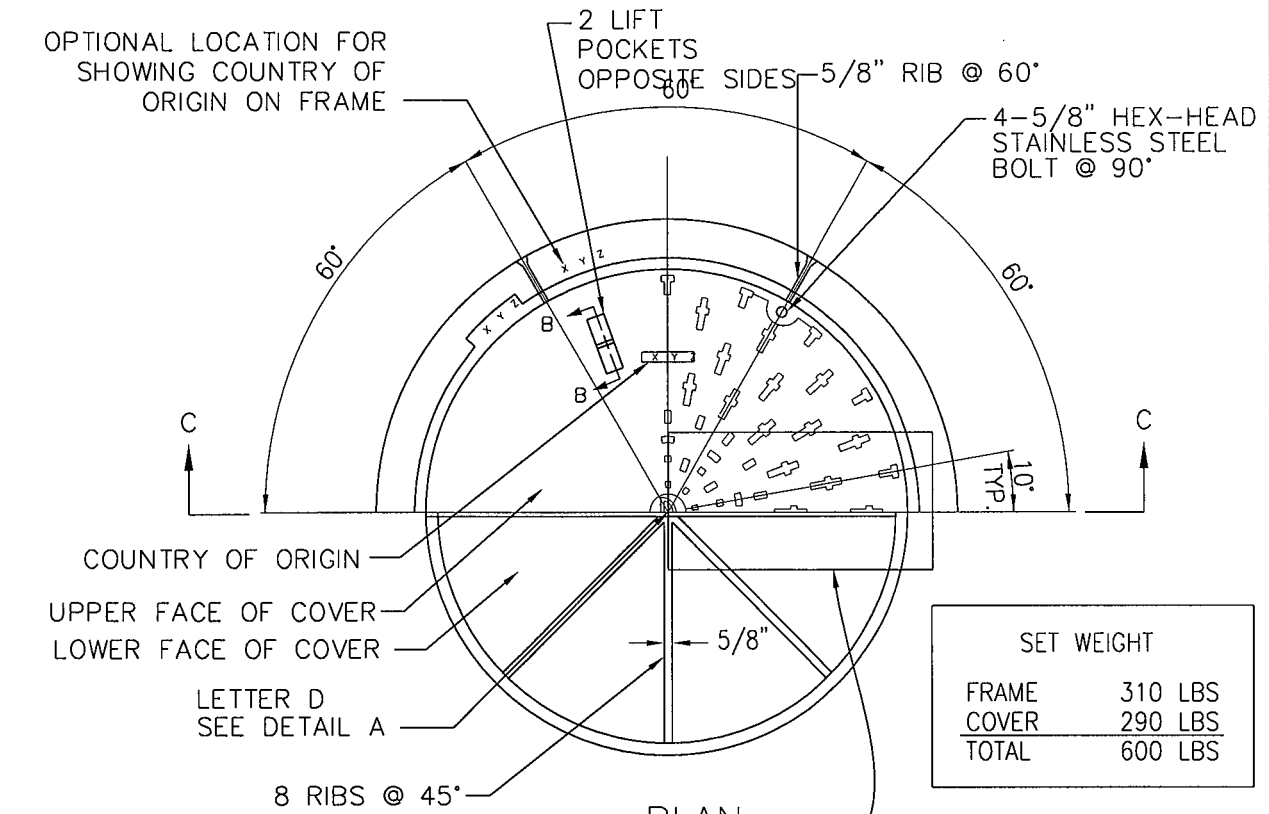
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

BEEHIVE GRATE FOR STANDARD 24"/36" MANHOLE COVER

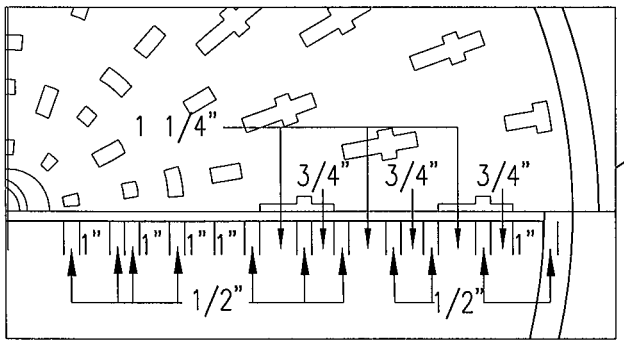
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 08/10

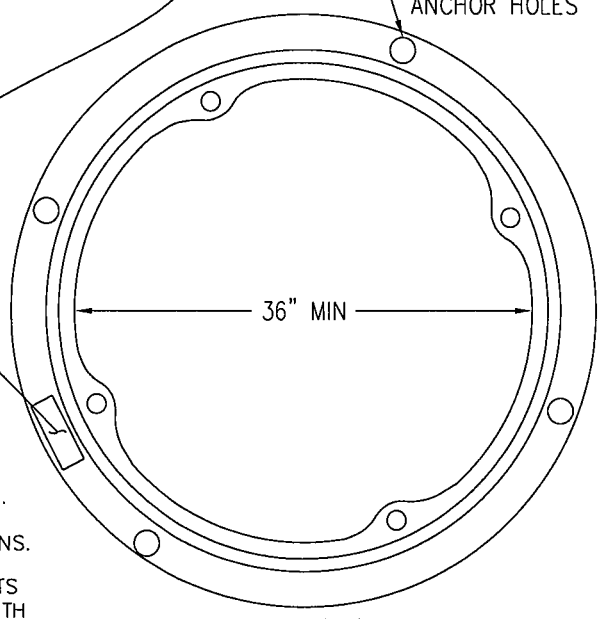
9-9B



PLAN

SET WEIGHT	
FRAME	310 LBS
COVER	290 LBS
TOTAL	600 LBS





MANUFACTURER

NOTES:

1. MACHINED HORIZONTAL AND VERTICAL BEARING SURFACES NOT TO EXCEED 1/64" TOLERANCE.
2. ALL CASTINGS TO CONFORM TO ASTM A48, CLASS 35B.
3. FRAME AND COVER TO MEET H-20 LOAD SPECIFICATIONS.
4. EXPOSED SURFACES OF THE CASTINGS, WITH THE PARTS ASSEMBLED AND DISASSEMBLED, SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.
5. LOCKING COVER TYPE FRAME AND COVERS SHALL BE USED WHEN SPECIFIED IN CONTRACT DOCUMENTS.
6. H-20 RATED SLOTTED GRATE OR GRATE TYPE MANHOLE COVER MAY BE SUBSTITUTED FOR COVER WHEN SPECIFIED IN CONTRACT DOCUMENTS OR UPON APPROVAL OF DIRECTOR.
7. SHALL BE USED ON ALL FLAT SLAB TOP MANHOLES.
8. FOR BOLT DOWN COVER - DRILL AND TAP, NO BOSS REQUIRED. USE EXISTING STANDARD PATTERN.

Michael L. Peterson

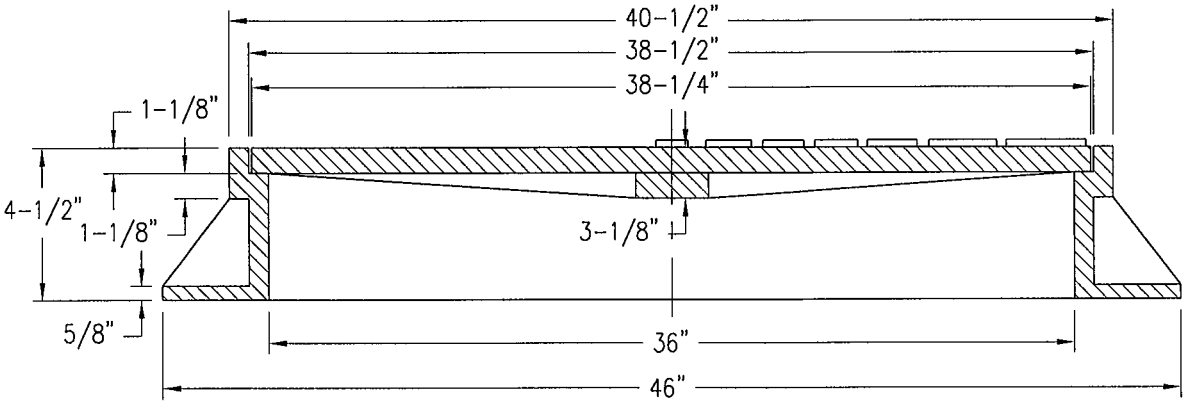
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

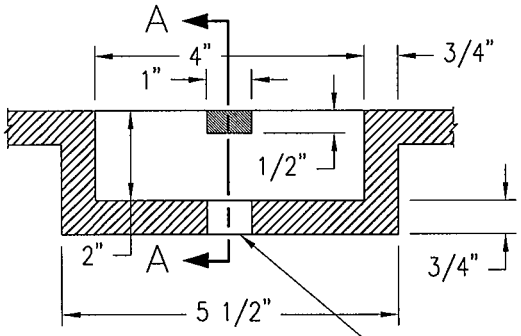
GREY CAST IRON STANDARD 36" MANHOLE FRAME & COVER

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 08/10

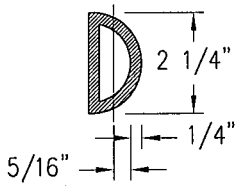
9-10
SHEET 1 OF 2



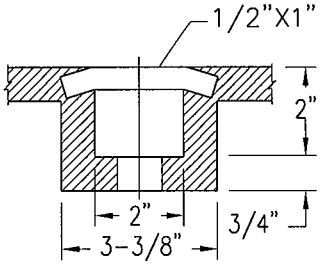
SECTION C-C



SECTION B-B
NTS.



DETAIL A
NTS.



SECTION A-A
NTS.

Michael L Peterson

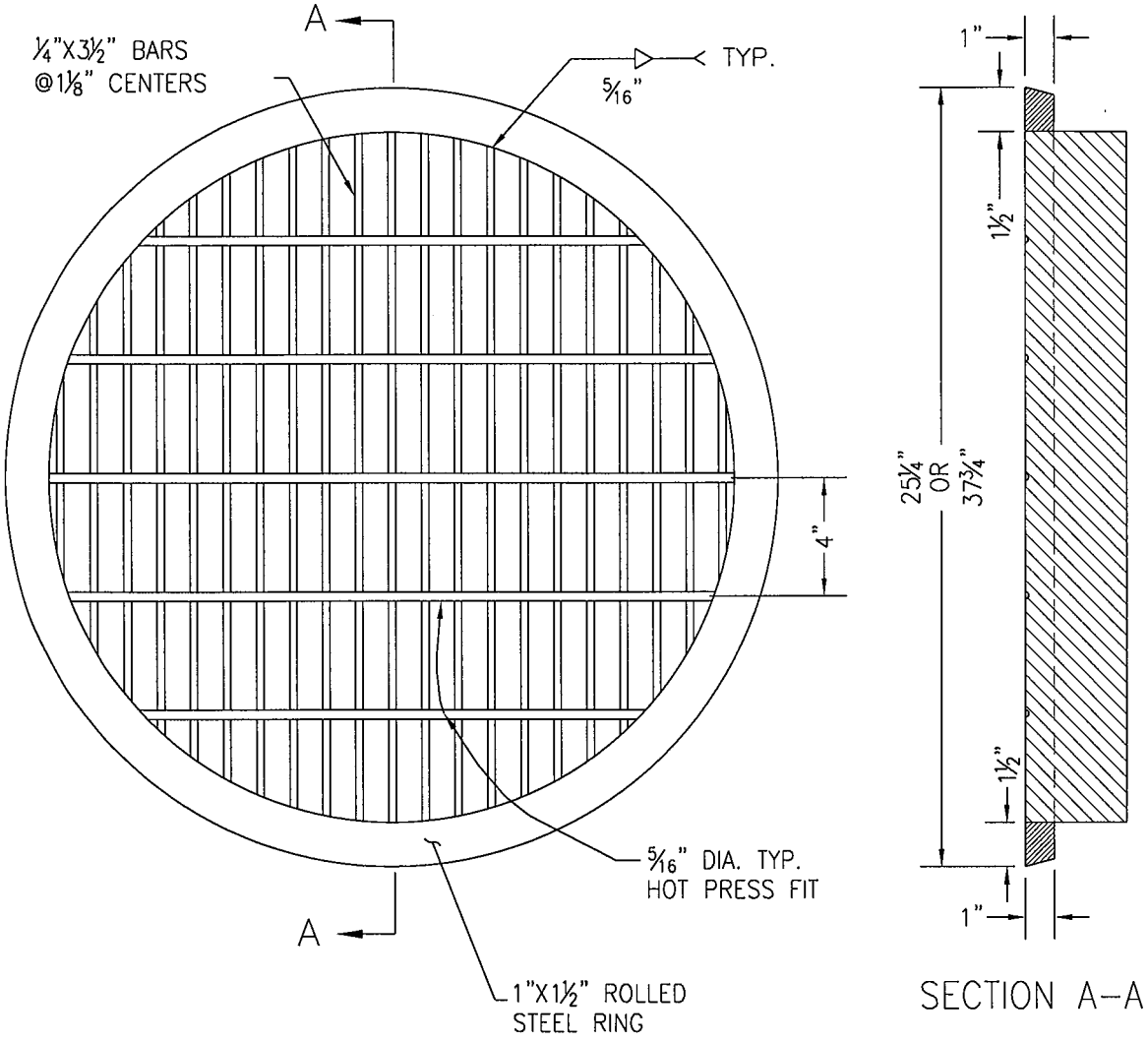
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

GREY CAST IRON STANDARD 36" MANHOLE FRAME & COVER

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 08/10

9-10
SHEET 2 OF 2



NOTES

1. MANHOLE COVER SHALL FIT FRAME SHOWN ON DRAWING 9–9A or 9–10.

2. SEATING SURFACES SHALL BE MACHINED AS SHOWN IN DETAIL ON DRAWING 9–9.

3. THIS COVER MAY BE USED ONLY WITH APPROVAL OF THE DIRECTOR.

4. EXPOSED SURFACES OF THE CASTINGS, WITH THE PARTS ASSEMBLED AND DISASSEMBLED, SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.

5. COVER TO MEET H–20 LOAD SPECIFICATIONS.

Michael L Peterson

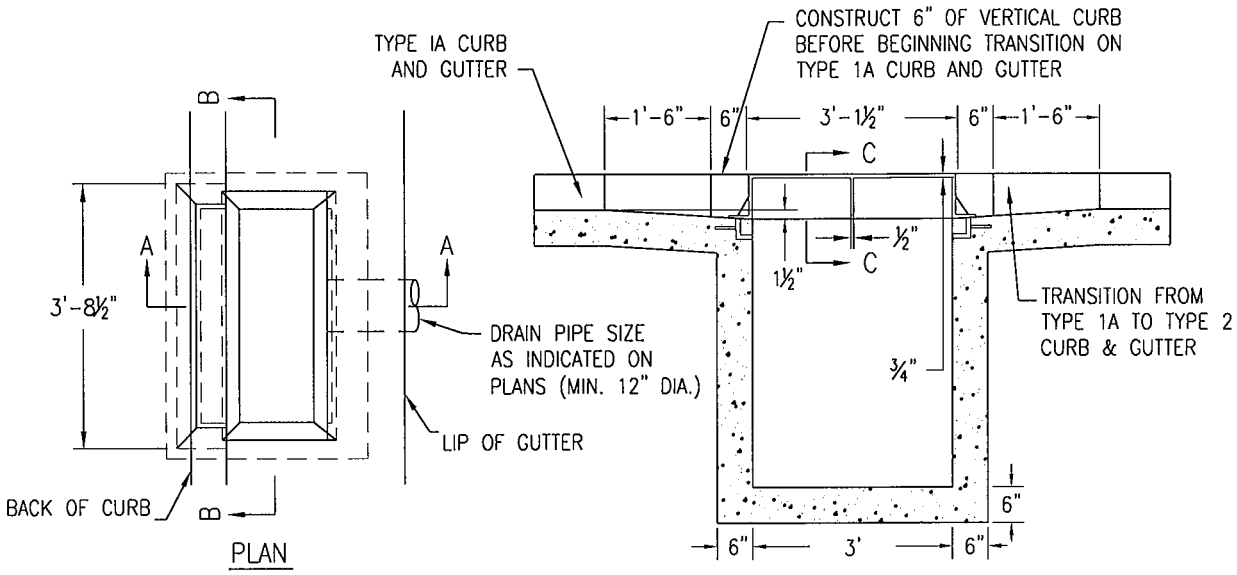
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

GRATE TYPE MANHOLE COVER

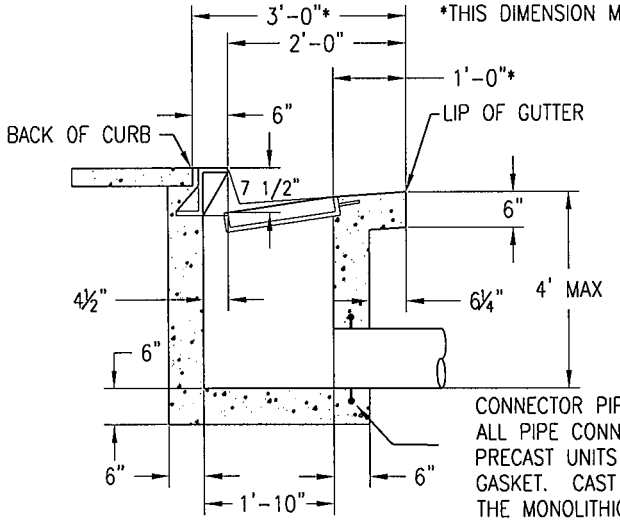
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 08/10

9-11

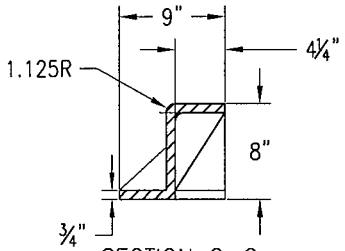


PLAN

SECTION B–B

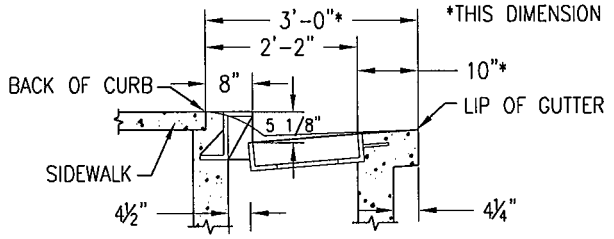


SECTION A–A
TYPE 2–VERTICAL C&G



SECTION C–C
OPEN–BACK HOOD

CONNECTOR PIPE OR MONOLITHIC CATCH BASIN CONNECTION (DRAWING 308–0). ALL PIPE CONNECTIONS SHALL CONFORM TO ASTM C–923. PRECAST UNITS SHALL BE BOOT TYPE OR INTEGRAL COMPRESSION GASKET. CAST IN PLACE UNITS SHALL INCLUDE A WATER STOP IF THE MONOLITHIC CATCH BASIN CONNECTION IS NOT REQUIRED.



SECTION A–A
TYPE 1A–ROLLED C&G

NOTES

1. STANDARD DEPRESSION FOR INLET IS 1–1/2".
2. FRAME AND GRATE SHALL CONFORM TO DRAWINGS 9–14 AND 9–15.
3. OPEN–BACK HOOD SHALL BE H–20 RATED.
4. ALL EXPOSED EDGES SHALL HAVE A 1/8" R (MINIMUM).
5. AN EDGING TOOL SHALL BE USED ON ALL EDGES WHERE THE CONCRETE SIDEWALK AND CURB MEET THE TOP OF THE HOOD.
6. EXPOSED SURFACES OF THE GRATES, FRAMES AND HOODS WITH THE PARTS ASSEMBLED AND DISASSEMBLED SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.
7. CAST IRON HOODS SHALL BE 3/4" THICK, NO GALVANIZING REQUIRED.

Michael L Peterson

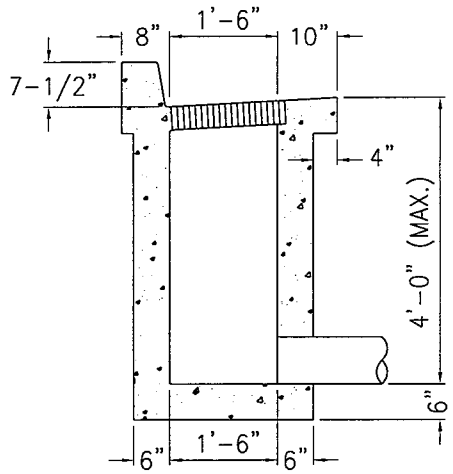
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

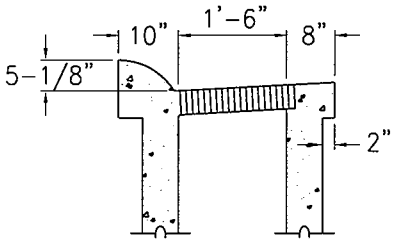
DROP INLET
TYPE B

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

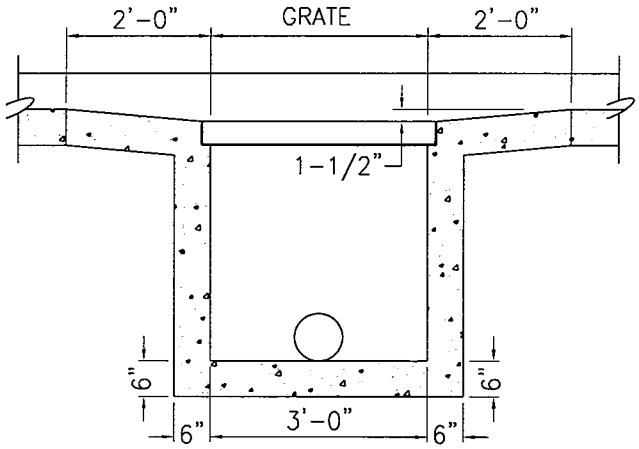
9-13B



TYPE 2 CURB

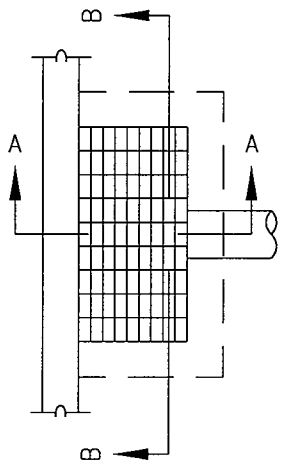


TYPE 1A CURB



SECTION B-B

SECTION A-A



NOTES:

1 SEE DRAWINGS 9-14 AND 9-15 FOR FRAME AND GRATE DETAILS.

2 BOTTOM OF INLET SHALL BE PLACED PRIOR TO OR AT THE SAME TIME AS SIDE WALLS.

3 SEE NOTE 1 OF DRAWING 9-13B FOR GUTTER DEPRESSION.

Michael L Peterson

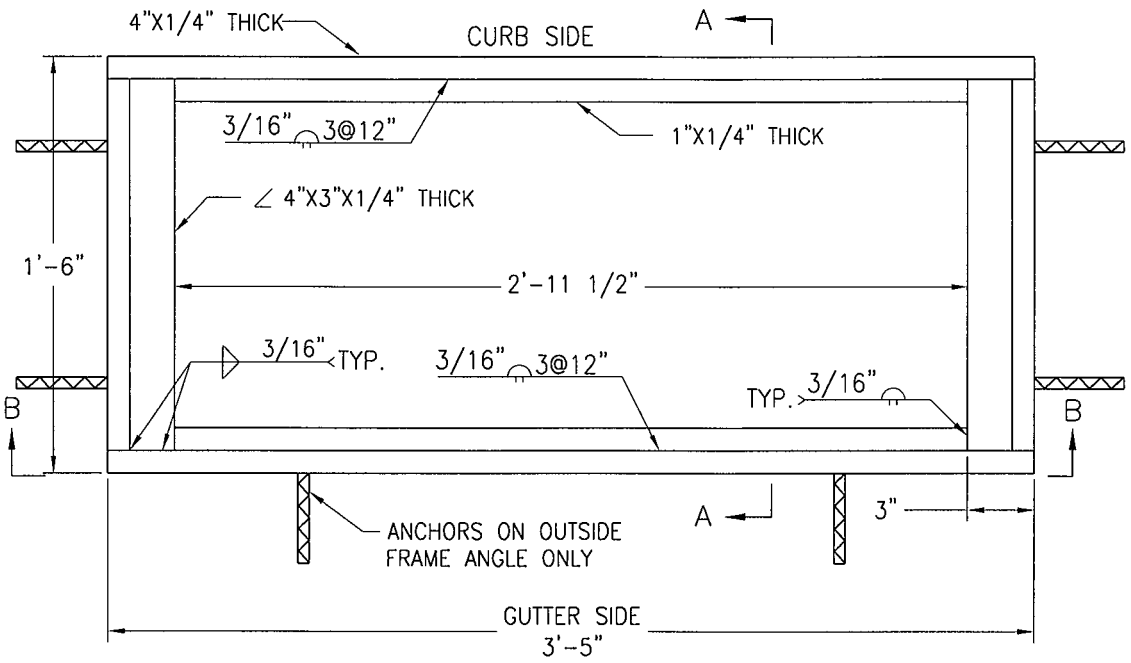
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

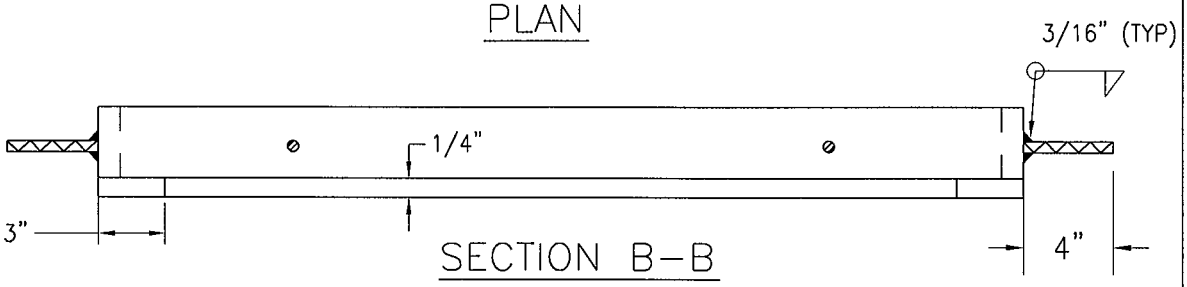
DROP INLET
TYPE C

DRAWN BY: C. OGREN
SCALE: NONE
REVISION DATE: 10/09

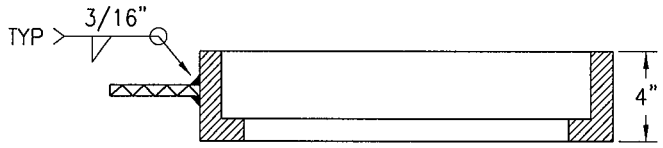
9-13C



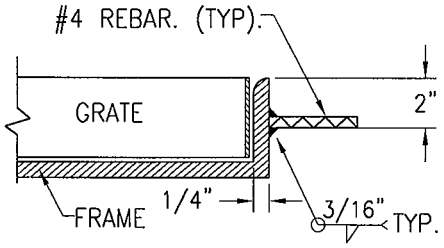
PLAN



SECTION B-B



SECTION A-A



FRAME ANCHOR DETAIL

NOTES:

1. OMIT 1/2" FRAME ANCHORS OVER CENTER SUPPORT ASSEMBLY WHEN MULTIPLE FRAMES ARE USED.
2. MATERIAL: ASTM A36 MILD STEEL.
3. SEE ARTICLE 50-34, "SEWER AND STORM DRAIN CASTINGS," OF SECTION 50.
4. EXPOSED SURFACES OF THE GRATES, FRAMES AND HOODS WITH THE PARTS ASSEMBLED AND DISASSEMBLED SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.

Michael L. Peters

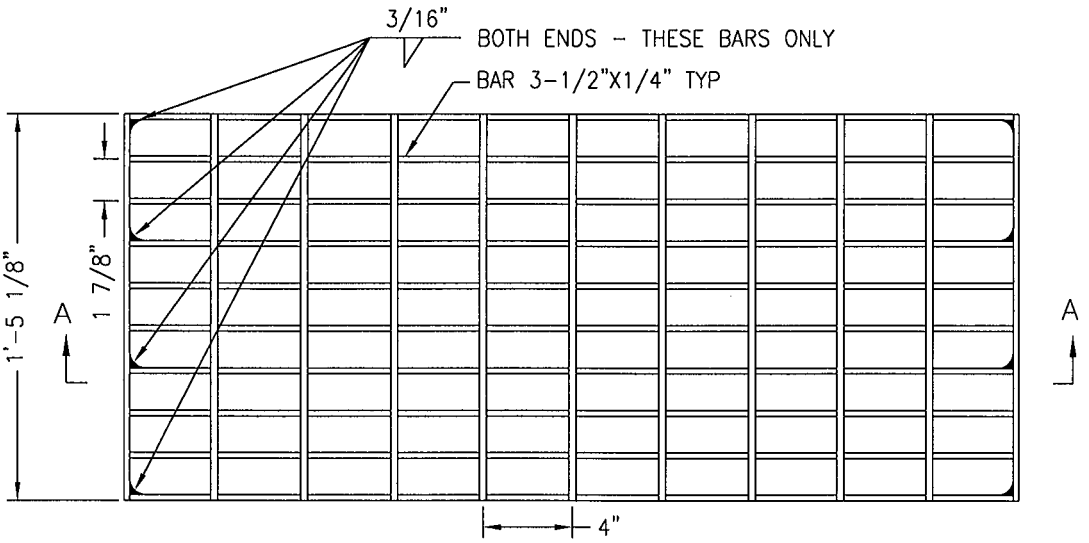
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

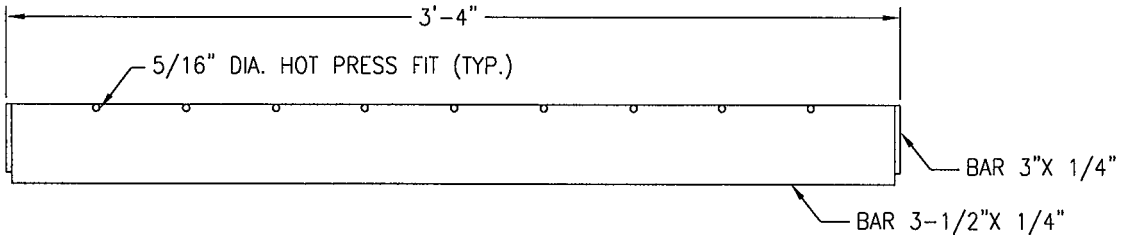
WELDED STEEL GRATE FRAME

DRAWN BY: L. PETERS
SCALE: NONE
REVISION DATE: 04/07

9-14



PLAN



SECTION A-A

NOTES:
1. DIMENSIONS TO CENTERLINE OF BARS UNLESS OTHERWISE NOTED.

2. EXPOSED SURFACES OF THE GRATES, FRAMES AND HOODS, WITH THE PARTS ASSEMBLED AND DISASSEMBLED, SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.

Michael L Peterson

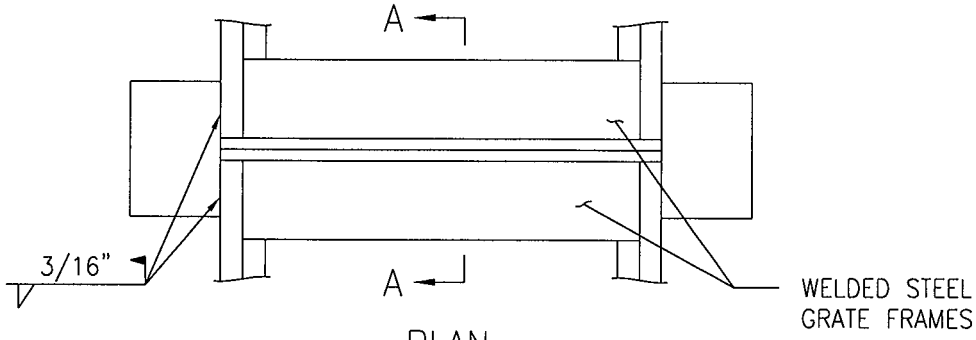
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

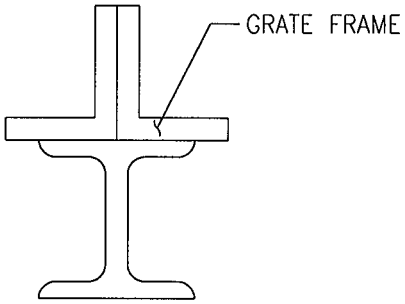
WELDED STEEL GRATE

DRAWN BY: M. FIELDS
SCALE: NONE
REVISION DATE: 04/07

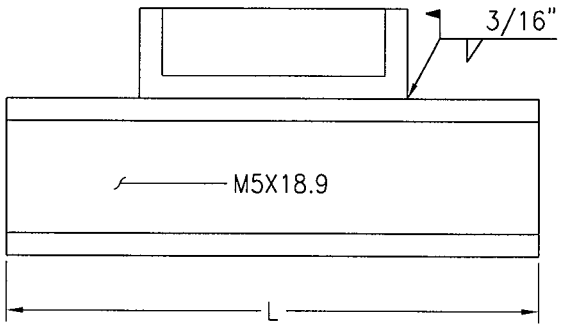
9-15



PLAN



SECTION A–A



ELEVATION

NOTES:

1. OMIT 1/2" FRAME ANCHORS OVER CENTER SUPPORT

2. L=57 INCHES FOR CURB OPENING CATCH BASIN WITH GRATING(S) AND DEBRIS SKIMMER (STANDARD PLAN 301).

3. EXPOSED SURFACES OF THE GRATES , FRAMES AND HOODS, WITH PARTS ASSEMBLED AND DISASSEMBLED, SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.

Michael L. Peterson

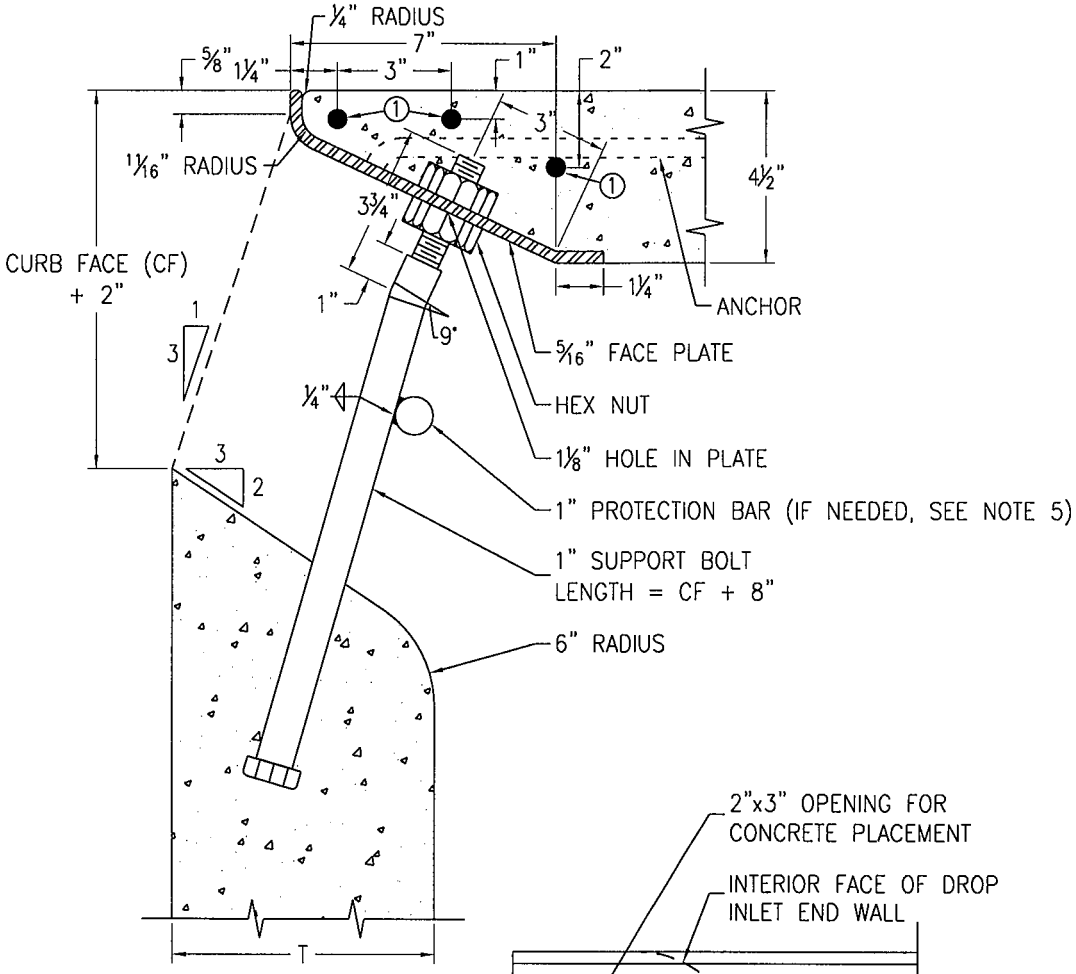
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

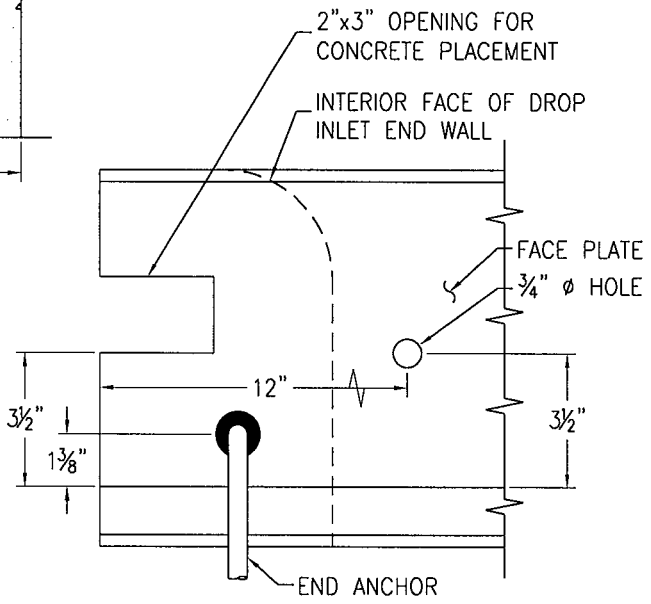
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CENTER SUPPORT
ASSEMBLY FOR
MULTIPLE GRATES

DRAWN BY: M. FIELDS
SCALE: NONE
REVISION DATE: 04/07

9-16





END DETAIL

① #4 BAR x W+6". IN addition TO REINFORCING STEEL PER DRAWING 301-1.

Michael L Peterson

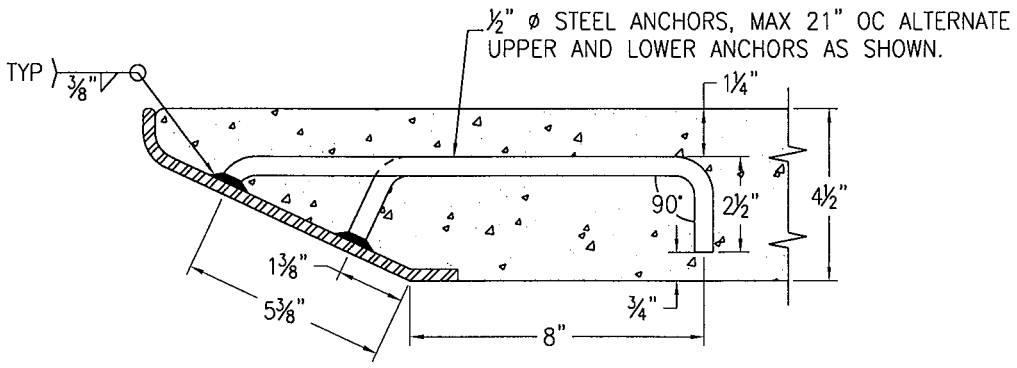
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR

DRAWN BY: S. PIMENTEL
SCALE: NONE
REVISION DATE: 5/12

9-17
SHEET 1 OF 2



FACE PLATE ANCHORS

GENERAL NOTES:

1. TO BE USED ONLY IN TYPE 2 CURB AND GUTTER WITH A 2" DEPRESSION. USE IN TYPE 1A CURB AND GUTTER ONLY UPON APPROVAL OF THE DIRECTOR. ALTERNATE ANGLE IRON SIZE, DEPRESSION DEPTH, AND SLAB THICKNESS MAY BE USED UPON APPROVAL OF THE DIRECTOR.
2. ALL PARTS SHALL BE STEEL, EXCEPT SET SCREWS, WHICH SHALL BE STAINLESS STEEL OR BRASS.
3. EXPOSED SURFACES OF THE GRATES, FRAMES AND HOODS WITH THE PARTS ASSEMBLED AND DISASSEMBLED SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.
4. FACE PLATE LENGTHS SHALL BE CAST INTO THE STRUCTURE CONTINUOUS FOR THE FULL LENGTH + 12".
5. WHEN CURB INLET OPENING HEIGHT EXCEEDS: 6" INSTALL 1" ø STEEL PROTECTION BAR, 12" INSTALL 2-1" ø STEEL PROTECTION BARS (EQUALLY SPACED), 17" INSTALL 3-1" ø STEEL PROTECTION BARS (EQUALLY SPACED).
6. WHEN CURB INLET OPENING LENGTH EXCEEDS 7' INSTALL 1" ø STEEL SUPPORT BOLTS, SPACED AT NOT MORE THAN 5' O.C.
7. ALTERNATE ANGLE IRON SIZE, DEPRESSION DEPTH, AND SLAB THICKNESS MAY BE USED UPON APPROVAL OF THE DIRECTOR.
8. TOP SLAB OVER INLET SHALL BE 4½".

Michael L Peterson

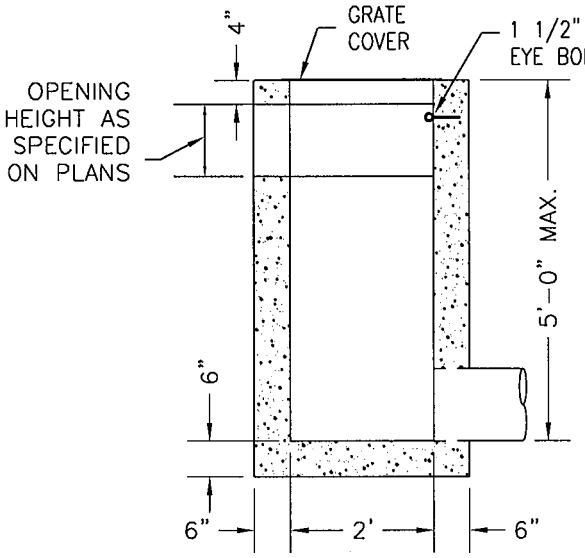
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

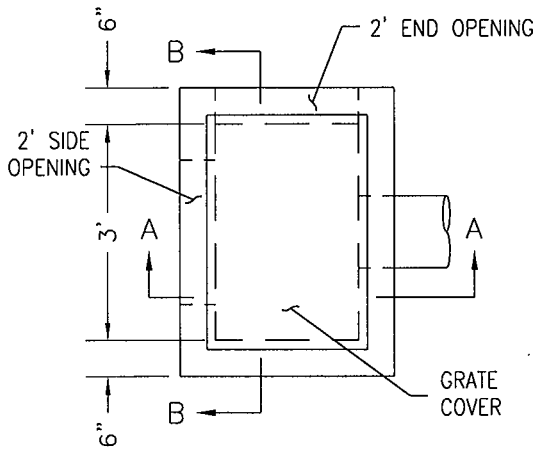
CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR

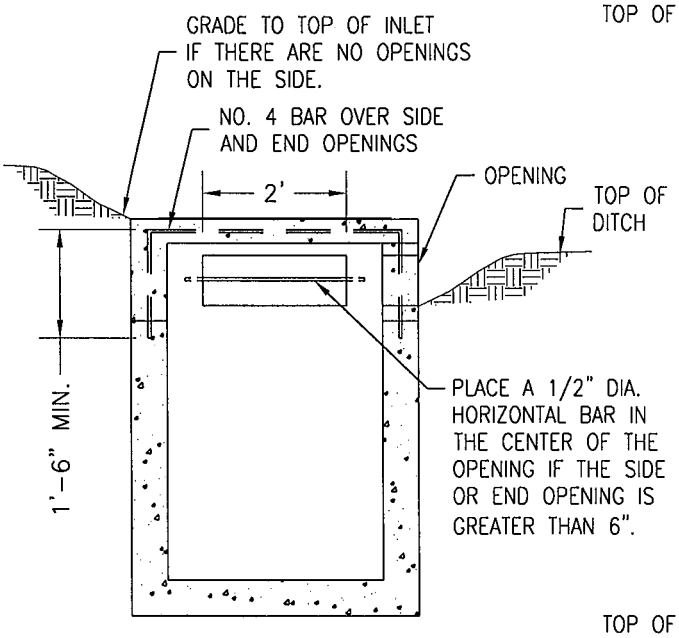
DRAWN BY: S. PIMENTEL
SCALE: NONE
REVISION DATE:10/09

9-17
SHEET 2 OF 2

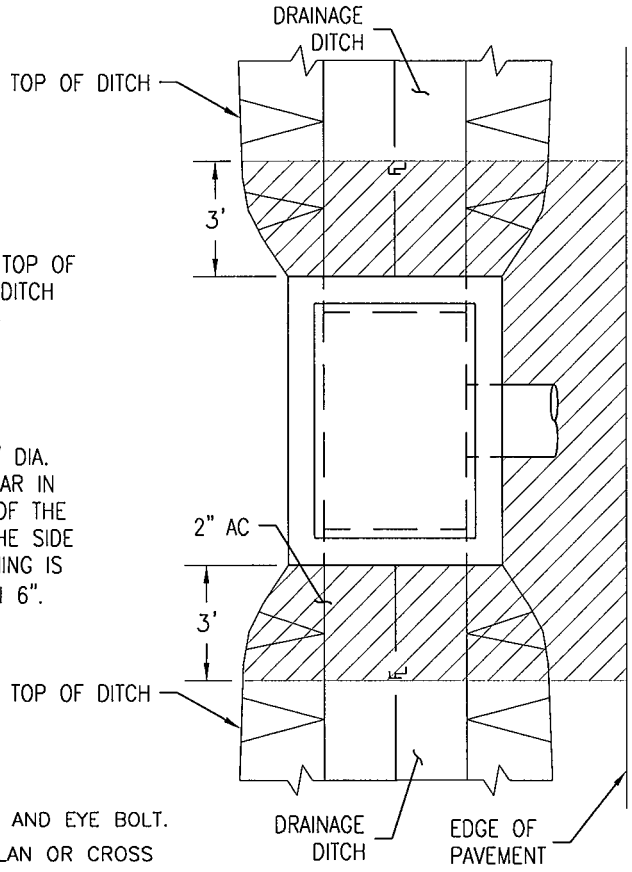


SECTION A-A





SECTION B-B



NOTES:

1. PROVIDE 1/4" X 18" GALV. CHAIN WELD TO COVER AND EYE BOLT.
2. PROVIDE END OR SIDE OPENINGS AS SHOWN ON PLAN OR CROSS SECTION.
3. TOP OF ALL WALLS TO BE FINISHED TO A FLAT PLANE TO PROVIDE EVEN BEARING FOR THE GRATE COVER.
4. ALL METAL SHALL BE GALVANIZED PER ASTM A123.
5. INSTALL A GREEN CARSONITE UTILITY MARKER PRODUCT NUMBER CRM306607 OR EQUIVALENT. UTILITY MARKER SHALL HAVE A 3"X12" SILVER/WHITE HIGH INTENSITY STRIP ON THE FRONT AND A 3"X3" SILVER/WHITE HIGH INTENSITY STRIP ON THE BACK. INSTALL THE UTILITY MARKER PER MANUFACTURER'S STANDARDS. THE MARKER SHALL BE INSTALLED 1' FROM THE EDGE OF PAVEMENT AT THE CENTERLINE OF THE DROP INLET.

Michael L Peterson

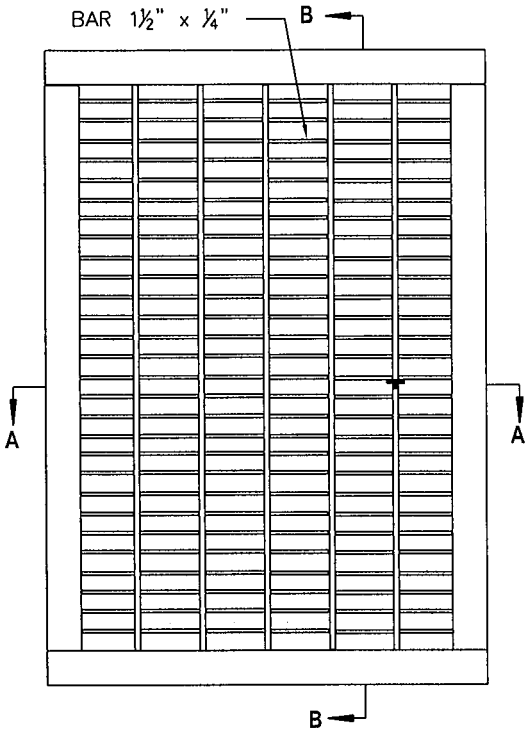
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

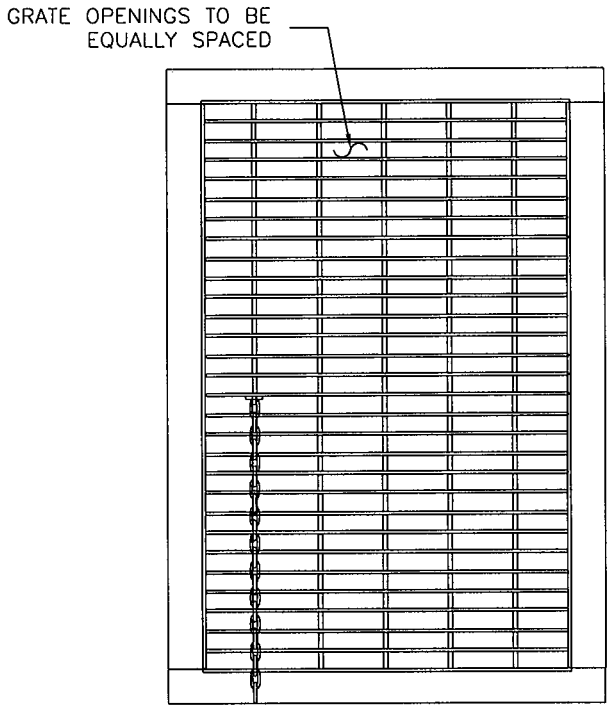
DROP INLET TYPE F

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

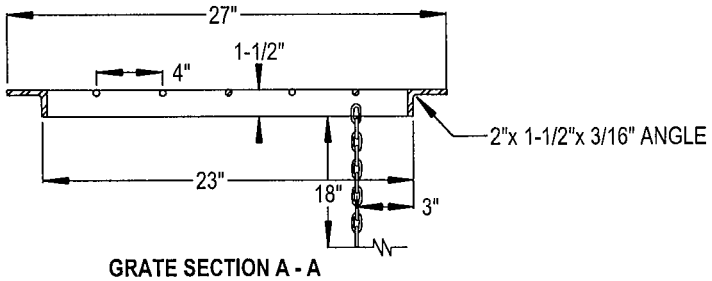
9-18
SHEET 1 OF 2



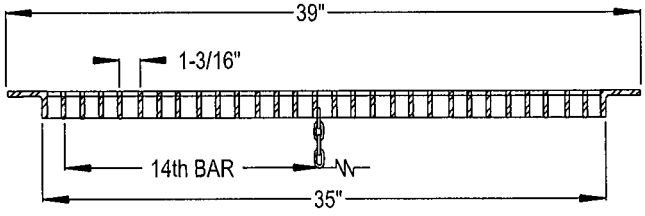
GRATE TOP VIEW



GRATE BOTTOM VIEW



GRATE SECTION A - A



GRATE SECTION B - B

Michael L Peterson

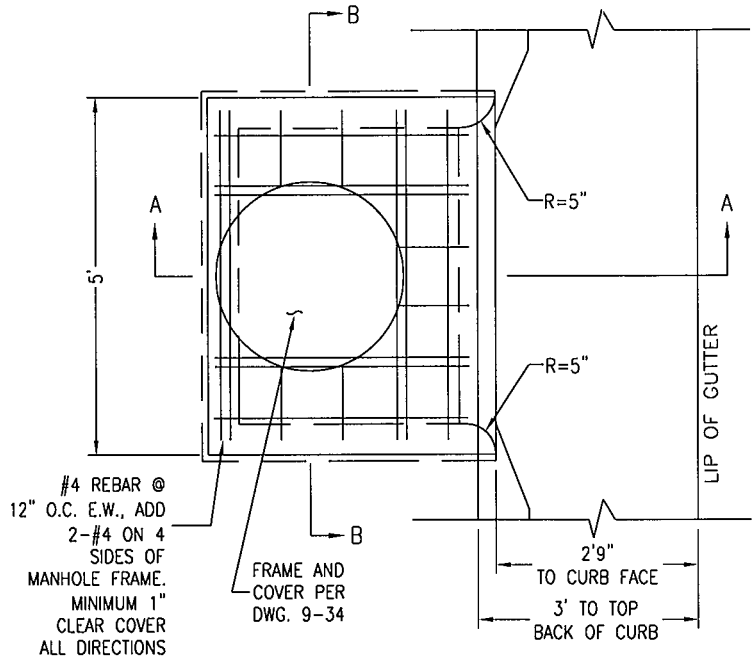
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

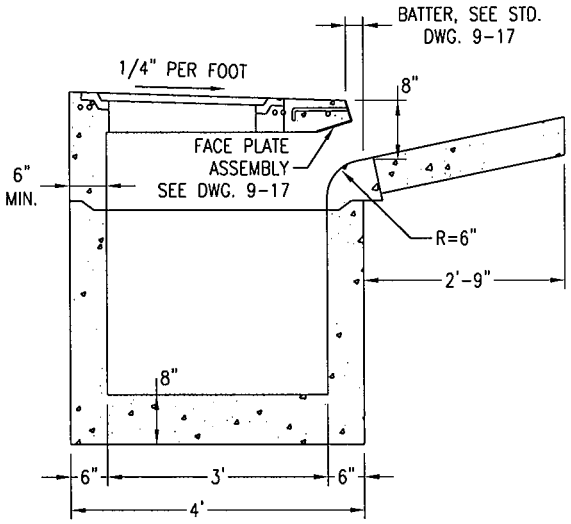
DROP INLET
TYPE F

DRAWN BY: S. PIMENTEL
SCALE: NONE
REVISION DATE: 04/07

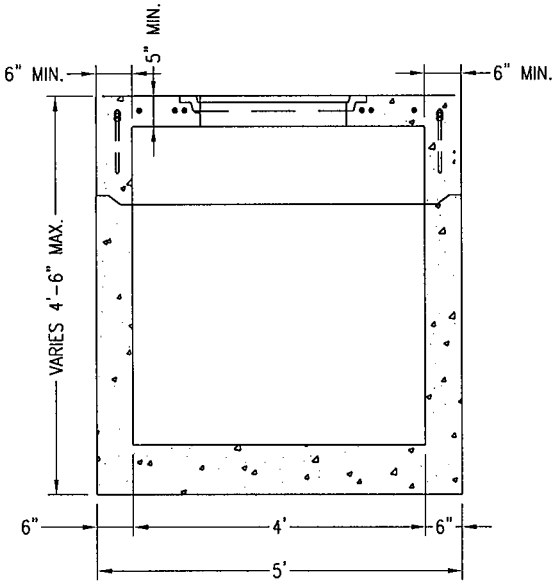
9-18
SHEET 2 OF 2



PLAN



SECTION A-A



SECTION B-B

NOTES:

1. CURB INLET ASSEMBLY MAY BE PRECAST CONCRETE, OR FORMED AND CAST-IN-PLACE P.C.C.

2. EXPOSED SURFACES OF THE GRATES, FRAMES AND HOODS, WITH THE PARTS ASSEMBLED AND DISASSEMBLED, SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.

3. SEE STD. DWG. 9-17 FOR FACE PLATE ASSEMBLY.

Michael L. Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

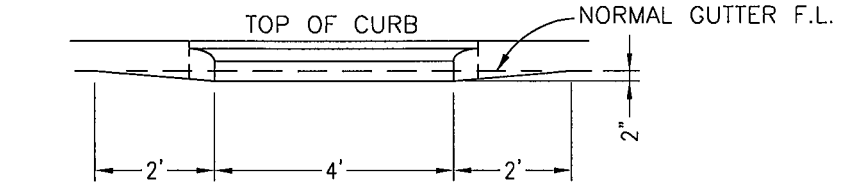
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

DROP INLET
TYPE G

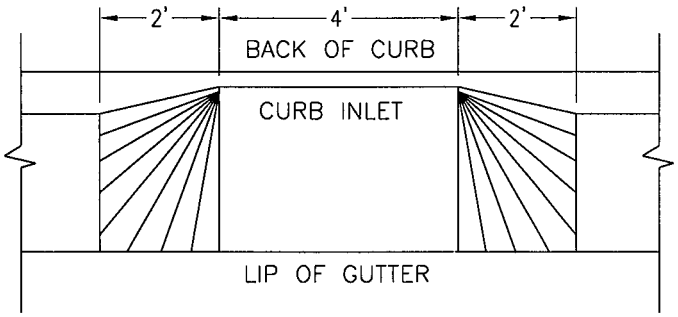
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

9-19
SHEET 1 OF 3

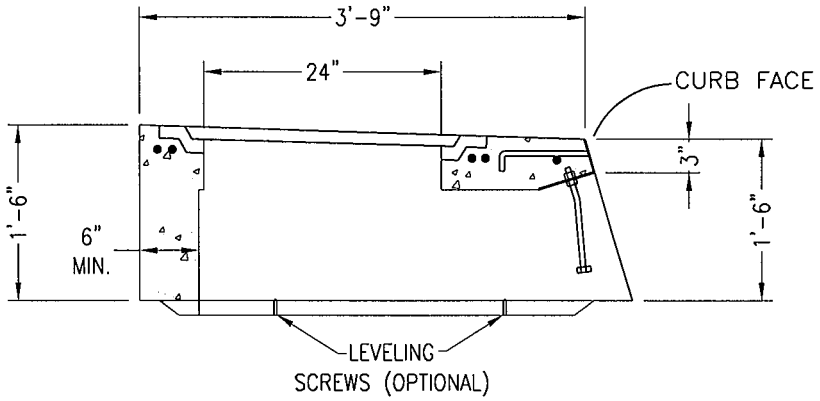
FOR VERTICAL CURB (TYPE 2)



GUTTER TRANSITION ELEVATION



GUTTER TRANSITION PLAN



CURB INLET DETAIL

NOTES:

1. CURB INLET ASSEMBLY MAY BE PRECAST CONCRETE, OR FORMED AND CAST-IN-PLACE P.C.C.

2. EXPOSED SURFACES OF THE GRATES, FRAMES AND HOODS, WITH THE PARTS ASSEMBLED AND DISASSEMBLED, SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.

Michael L Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

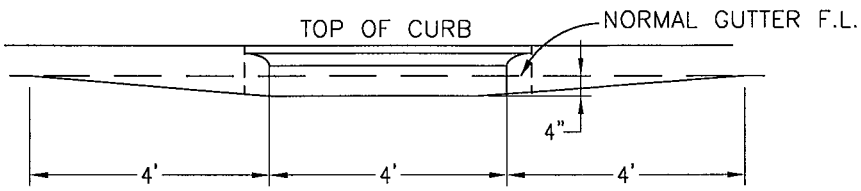
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

DROP INLET
TYPE G
Type 2 C & G

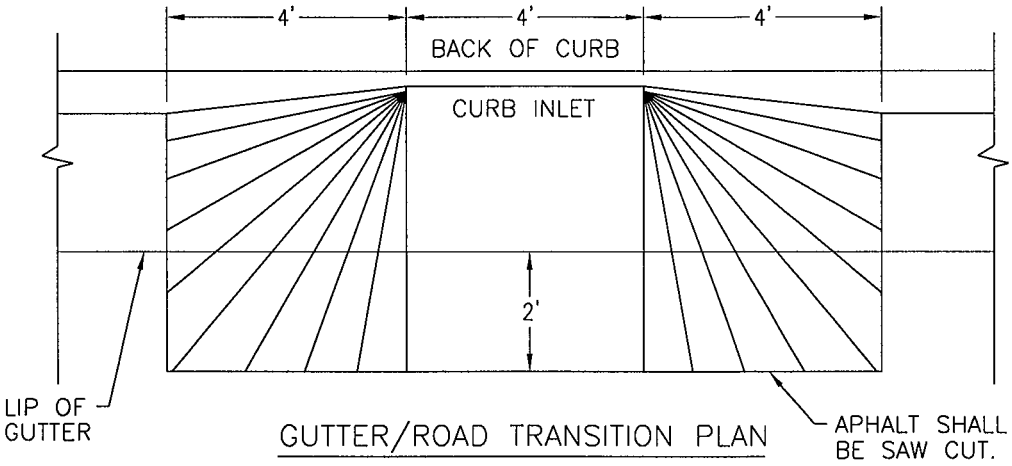
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

9-19
SHEET 2 OF 3

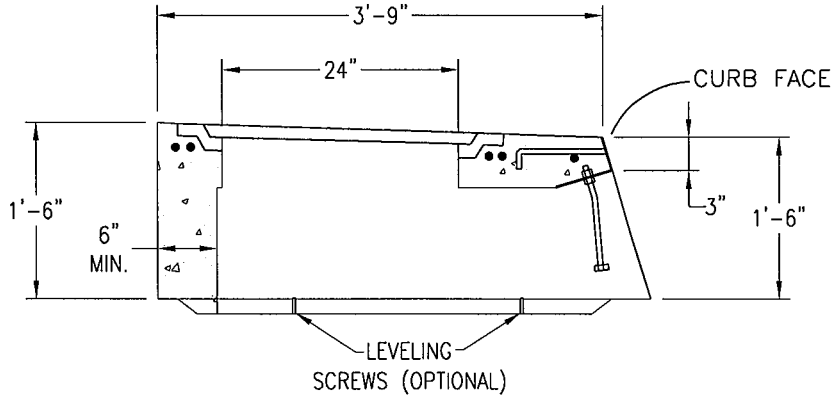
FOR ROLLED CURB (TYPE 1A)



GUTTER TRANSITION ELEVATION



GUTTER/ROAD TRANSITION PLAN



CURB INLET DETAIL

NOTES:

1. CURB INLET ASSEMBLY MAY BE PRECAST CONCRETE, OR FORMED AND CAST-IN-PLACE P.C.C.

2. EXPOSED SURFACES OF THE GRATES, FRAMES AND HOODS, WITH THE PARTS ASSEMBLED AND DISASSEMBLED, SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.

3. USE OF TYPE G INLET IN TYPE 1A C&G ONLY WITH APPROVAL FROM THE DIRECTOR.

Michael L Peterson

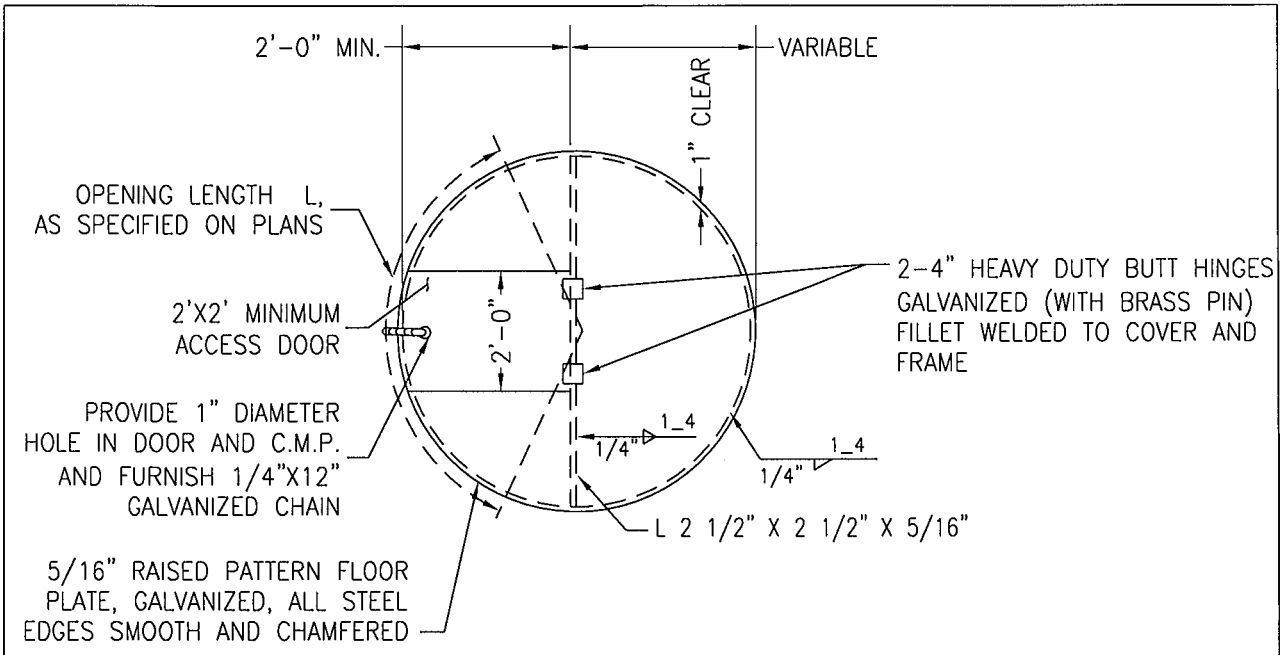
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

DROP INLET
TYPE G
Type 1A C & G

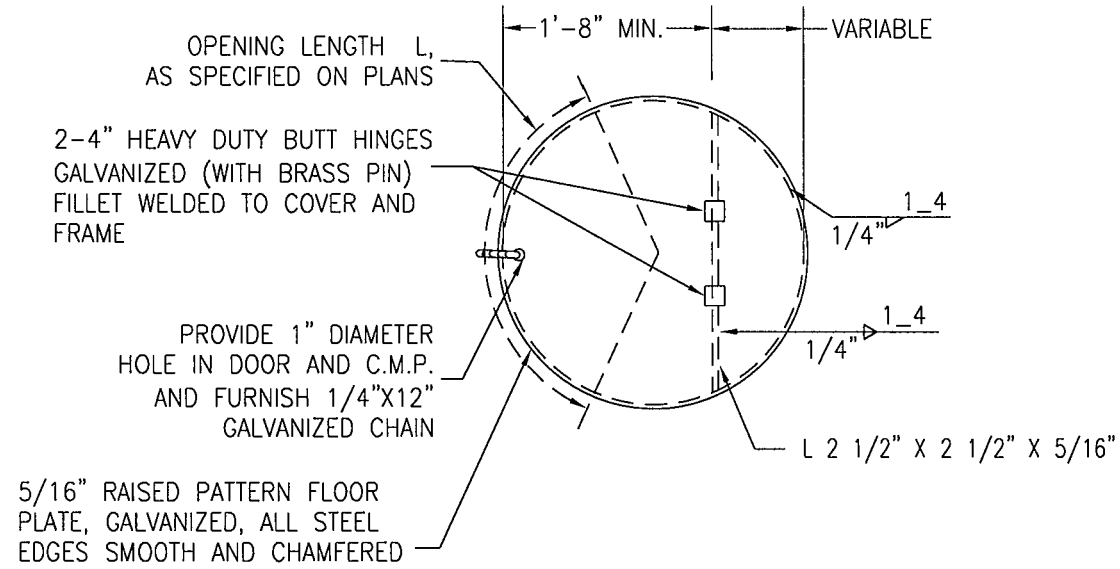
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

9-19
SHEET 3 OF 3



PLAN

42" DIAMETER TO 72" DIAMETER
C.M.P. INLET



PLAN

24" DIAMETER TO 36" DIAMETER
C.M.P. INLET

Michael L Peterson

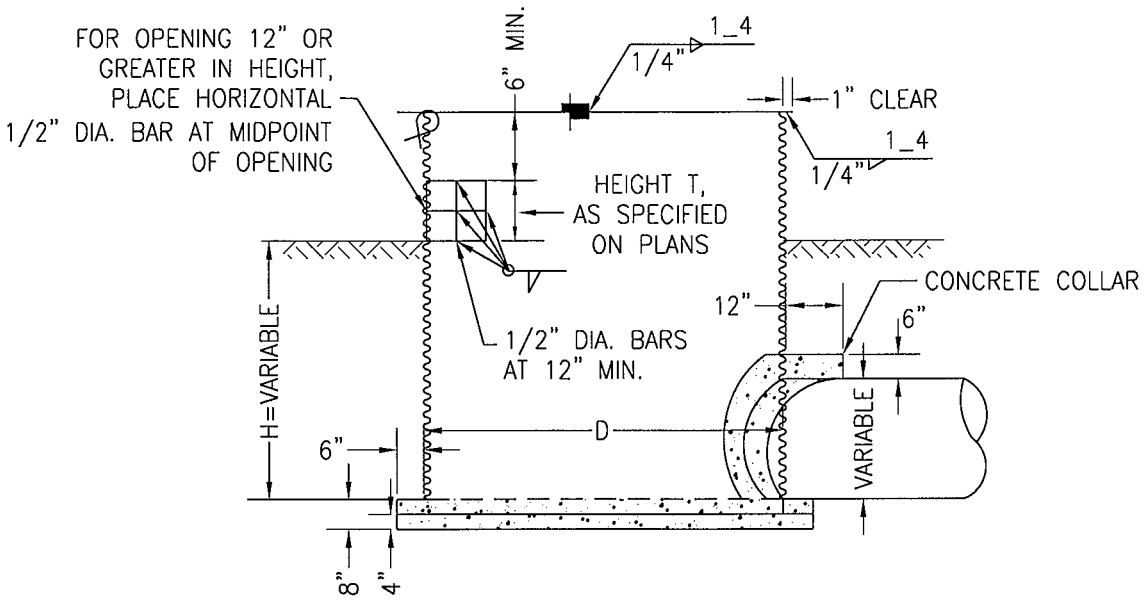
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CORRUGATED METAL PIPE
DRAINAGE INLET
TYPE I

DRAWN BY: M. FIELDS
SCALE: NONE
REVISION DATE: 10/09

9-20
SHEET 1 OF 2



SECTION
24" DIAMETER TO 36" DIAMETER C.M.P. INLET

NOTES

1. LOCATIONS, HEIGHTS, AND LENGTH OF OPENINGS SHALL BE AS SHOW ON THE PLANS.
2. AREA OF THE OPENING SHALL NOT BE LESS THAN THE AREA OF OUTFALL PIPE.
3. OUTFALL PIPE TO BE CUT FLUSH WITH INSIDE OF RISER.
4. NOT TO BE USED AS A JUNCTION STRUCTURE.
5. DIAMETER OF RISER PIPE SHALL BE AT LEAST ONE SIZE LARGER THAN OUTFALL PIPE.
6. TO BE USED ONLY WITH THE SPECIFIC APPROVAL OF THE DIRECTOR.
7. INSTALL A GREEN CARSONITE UTILITY MARKER PRODUCT NUMBER CRM306607 OR EQUIVALENT. UTILITY MARKER SHALL HAVE A 3"X12" SILVER/WHITE HIGH INTENSITY STRIP ON THE FRONT AND A 3"X3" SILVER/WHITE HIGH INTENSITY STRIP ON THE BACK. INSTALL THE UTILITY MARKER PER MANUFACTURER'S STANDARDS. THE POST SHALL BE INSTALLED 1' FROM THE EDGE OF PAVEMENT AT THE CENTERLINE OF THE DROP INLET.

RISER DIAMETER,D	H, MAX.	HEIGHT T, MAX.	GAGES (MINIMUM)
24"	4'	8"	0.079"
30"	4'	8"	0.079"
36"	5'	8"	0.109"
42"	8'	12"	0.109"
48"	8'	12"	0.109"
54"	10'	18"	0.109"
60"	10'	18"	0.109"
72"	10'	18"	0.109"

Michael L Peterson

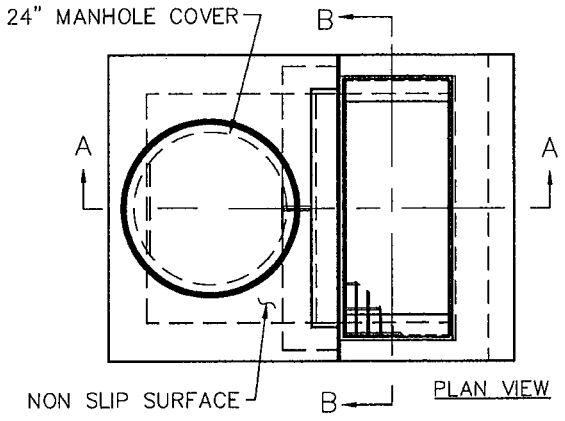
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

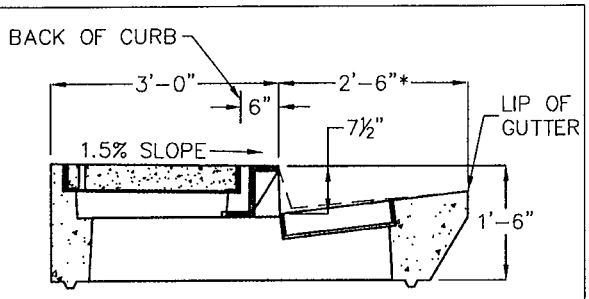
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CORRUGATED METAL PIPE DRAINAGE INLET TYPE I

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

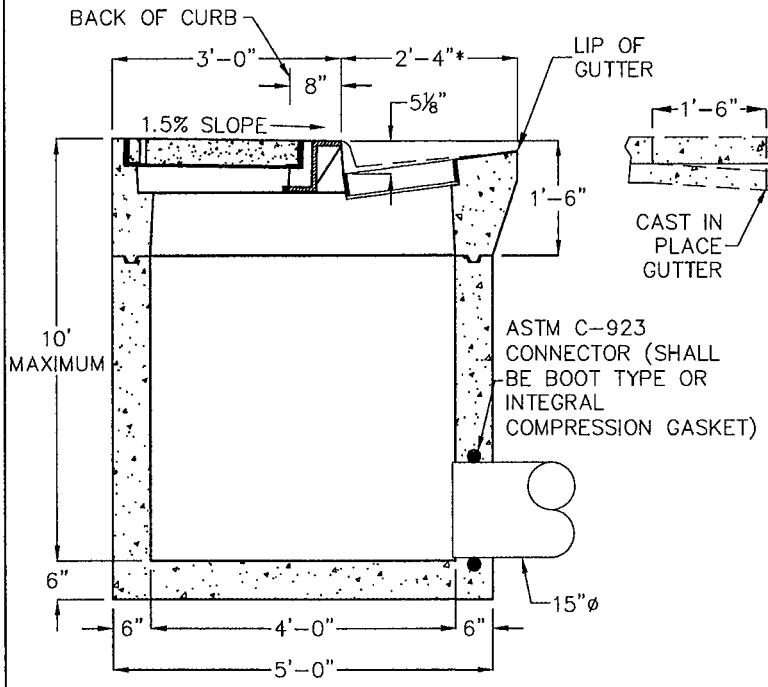
9-20
SHEET 2 OF 2





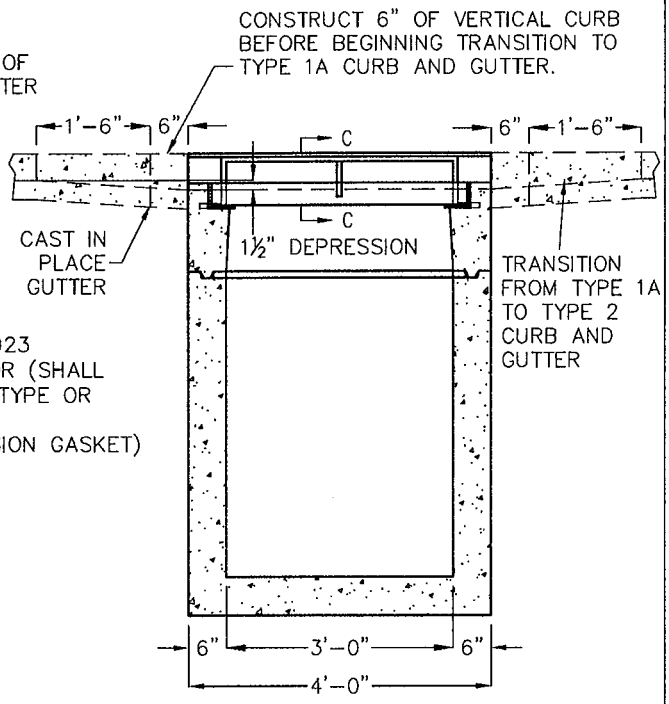
SECTION A-A

TYPE 2 - VERTICAL CURB & GUTTER
(FOR INFORMATION NOT SHOWN OR NOTED REFER TO SECTION A-A TYPE 1A CURB & GUTTER)



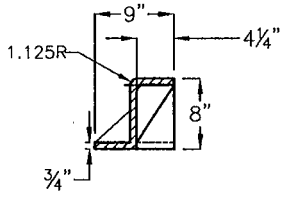
SECTION A-A

TYPE 1A - ROLLED CURB & GUTTER



SECTION B-B

*THIS DIMENSION MAY VARY WITHIN EXISTING STREETS.



SECTION C-C
OPEN-BACK HOOD

NOTES:

1. STANDARD DEPRESSION FOR INLET IS 1 ½".
2. MANHOLE FRAME AND COVER SHALL CONFORM TO DRAWING 9-36.
3. FRAME AND GRATE SHALL CONFORM TO DRAWINGS 9-14 AND 9-15.
4. ALL EXPOSED EDGES SHALL HAVE A ⅛" RADIUS (MINIMUM).
5. AN EDGING TOOL SHALL BE USED ON ALL EDGES WHERE THE CONCRETE SIDEWALK AND CURB MEET THE TOP OF THE HOOD.
6. EXPOSED SURFACES OF THE GRATE, FRAMES AND HOOD WITH THE PARTS ASSEMBLED AND DISASSEMBLED SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY OR GALVANIZED.
7. INLET SHALL NOT BE CAST IN PLACE.

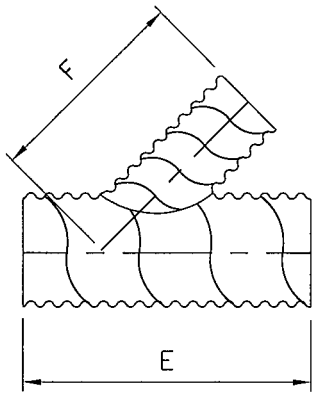
DIRECTOR, DEPARTMENT OF WATER RESOURCES
NOVEMBER 2015

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

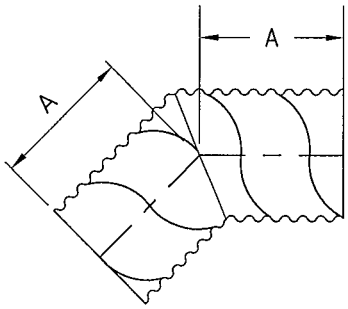
PRECAST DROP INLET TYPE J

DRAWN BY: STAFF
SCALE: NONE
DATE: 10/15

9-21



WYE LATERAL



ELBOW
0° to 45°

FITTING SIZES

DIA (in)	A (ft)	E (ft)	F (ft)
12	1	4	2
15	1	4	4
18	1	4	4
21	2	6	4
24	2	6	4
30	2	6	4
36	2	8	6
42	2	8	6
48	2	10	8
54	3	10	8
60	3	12	10
66	3	12	10
72	3	14	10
78	3	14	10
84	3	16	12
90	3	16	12
96	3	16	12

NOTES

1. To use table, refer to diagram and select letter representing desired dimension, then enter table at correct pipe dimension and read dimension in column under appropriate letter heading.

2. Dimensions on table allow for use of standard 12 inch wide band coupler on sizes 12 inch through 54 inch and 24 inch wide band on 60 inch and larger sizes.

3. For pipe-arch fittings, choose pipe diameter equal to or greater than arch span. (Example: 35 inch x 24 inch pipe-arch; use dimensions for 36 inch pipe).

4. Structural reinforcement may be required on some larger sizes.

Michael L Peterson

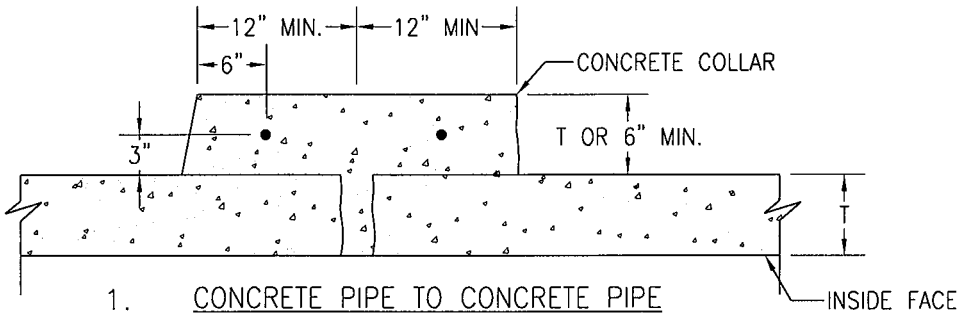
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

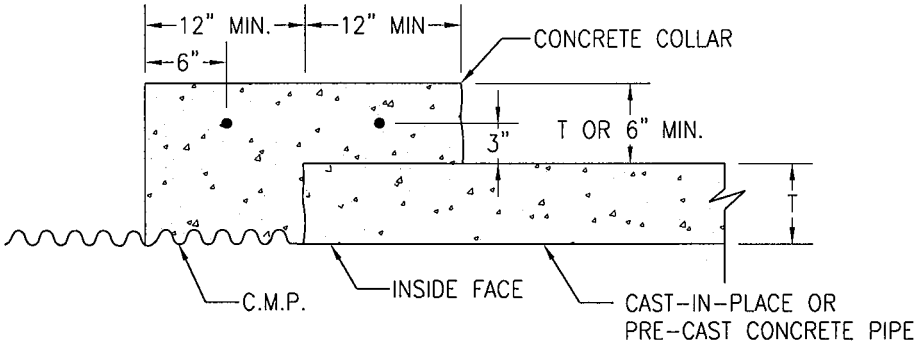
CORRUGATED PIPE FITTINGS

DRAWN BY: C. SCHUMAKER
SCALE: NONE
REVISION DATE: 11/98

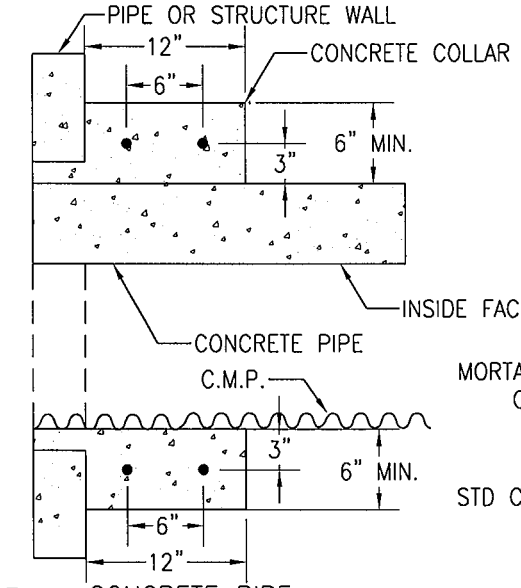
9-22



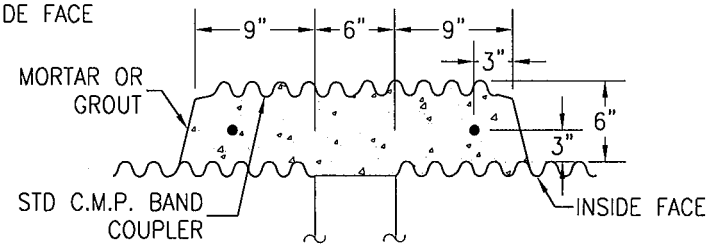
1. CONCRETE PIPE TO CONCRETE PIPE WITHOUT STANDARD JOINT



2. CAST-IN-PLACE OR PRE-CAST CONCRETE PIPE TO CSP



3. CONCRETE PIPE, C.M.P. INTO EXISTING PIPE OR STRUCTURE



4. PIPES OF DISSIMILAR METALS

NOTES:

1. TO CONNECT HDPE TYPE S OR D PIPE TO OTHER PIPES USE COLLAR SHOWN IN DETAIL 1 OR USE MANUFACTURERS STANDARD HDPE REPAIR COUPLING.
2. ALL REINFORCEMENT SHALL BE #3 REBAR.

Michael L Peterson

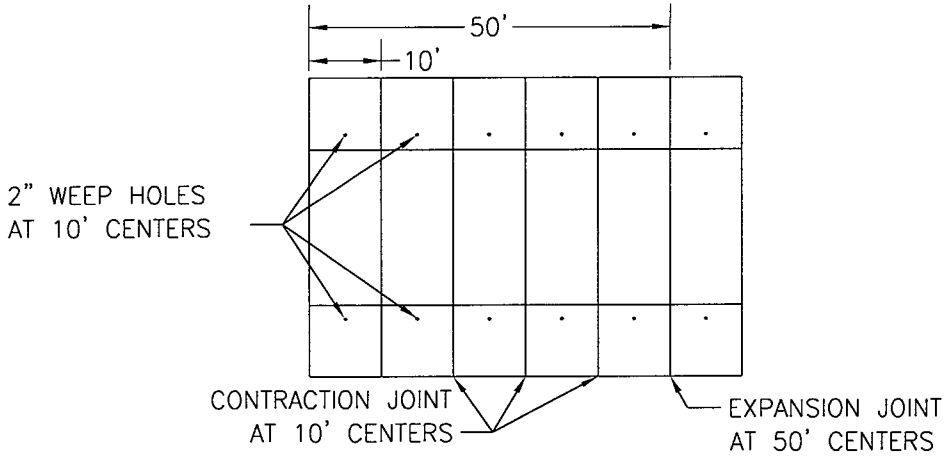
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

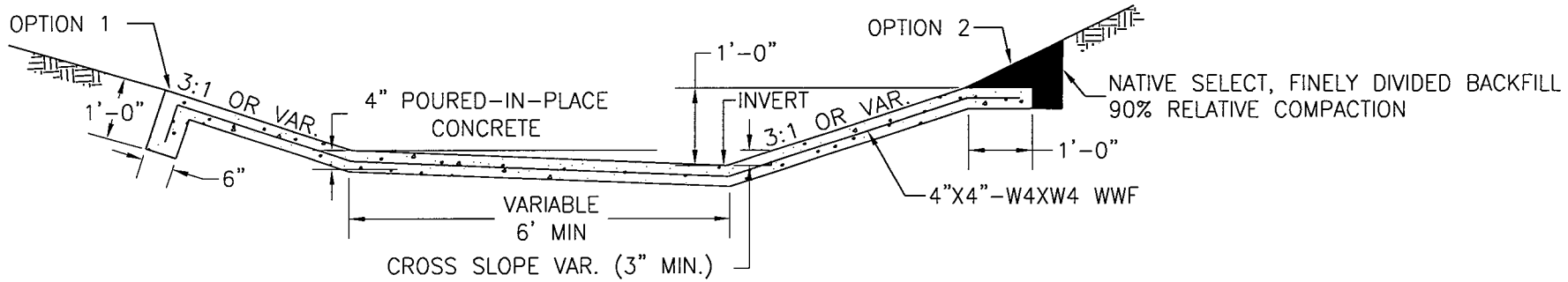
PIPE CONNECTIONS

DRAWN BY: M.FIELDS
SCALE: NONE
REVISION DATE: 1/03

9-23



PLAN VIEW



TYPICAL BOTTOM LINING

Michael L Peterson

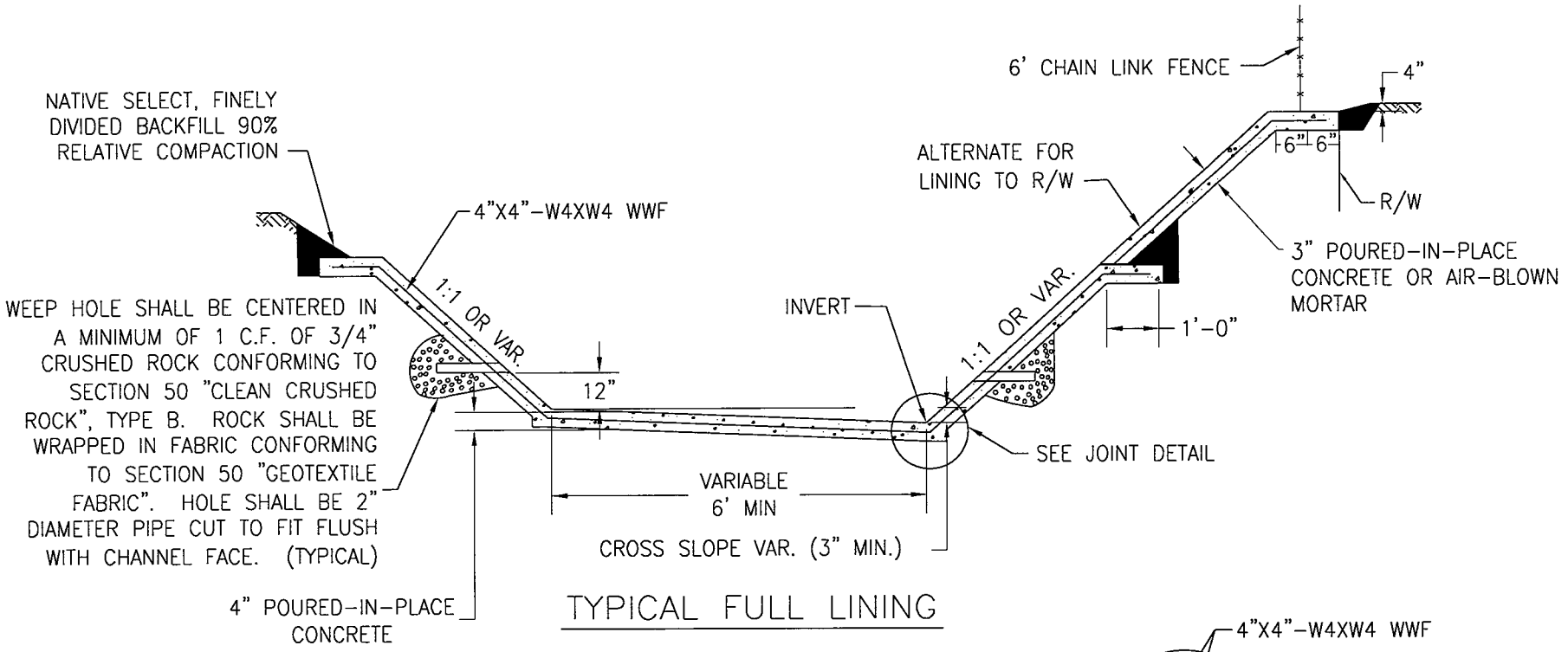
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

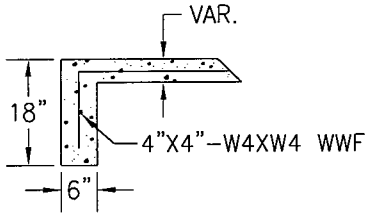
LINED CHANNEL SECTION

DRAWN BY: MYRA FIELDS
SCALE: NONE
REVISION DATE: 10/09

9-24
SHEET 1 OF 2

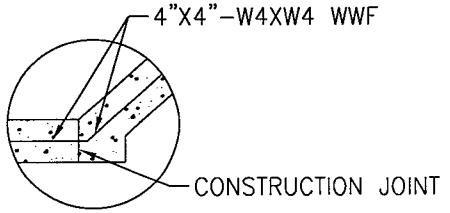


TYPICAL FULL LINING



CUTOFF WALL

TO BE PLACED ALONG ENTIRE END OF LINED SECTION AT BEGINNING AND AT END OF LINING



JOINT DETAIL

Michael L Peterson

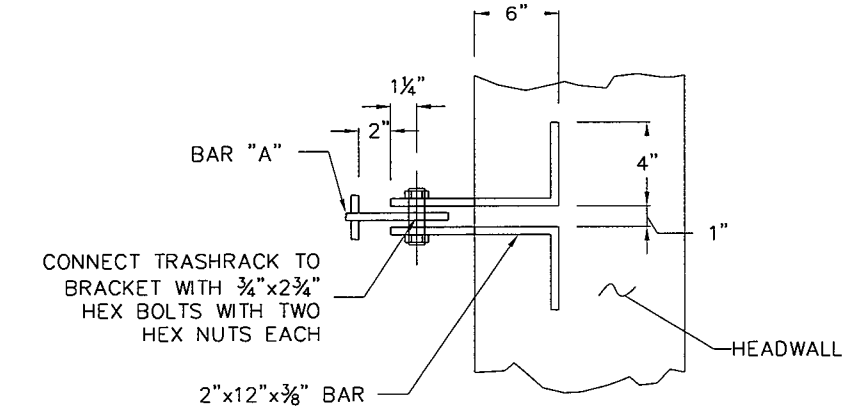
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

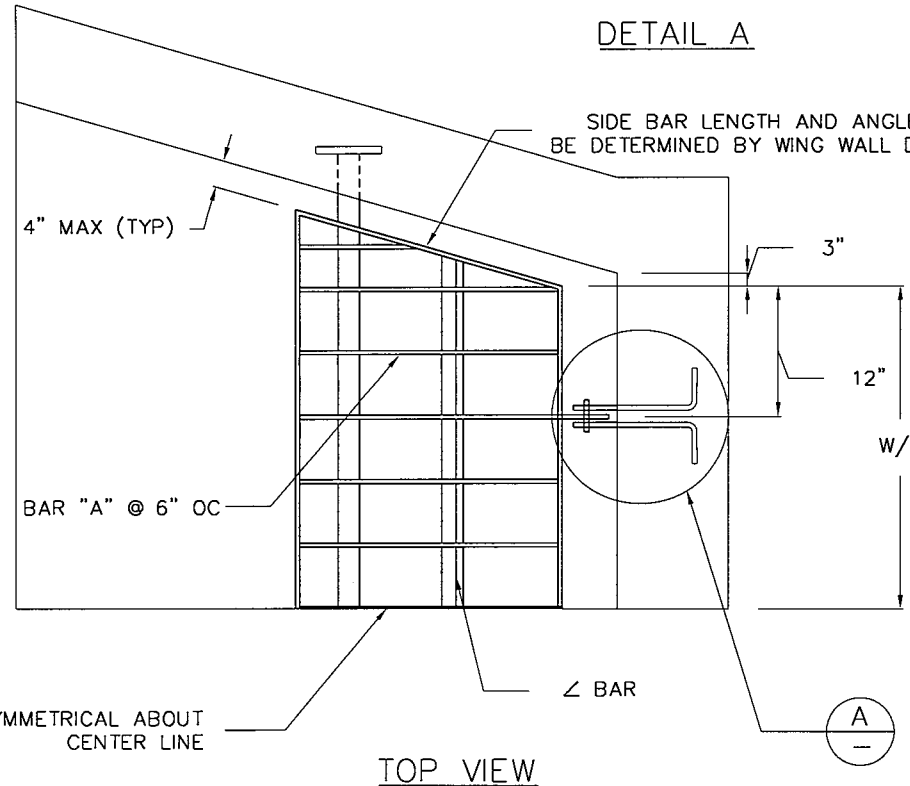
LINED CHANNEL SECTION

DRAWN BY: MYRA FIELDS
SCALE: NONE
REVISION DATE: 10/09

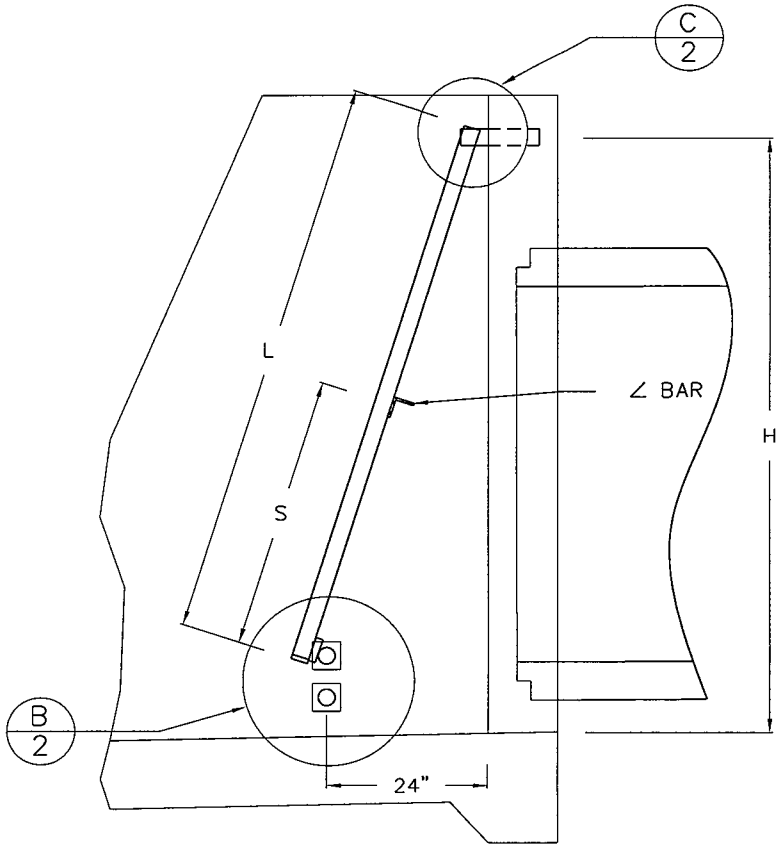
9-24
SHEET 2 OF 2



DETAIL A



TOP VIEW



SIDE VIEW

Michael L Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

TRASH RACK
24" - 36" PIPE

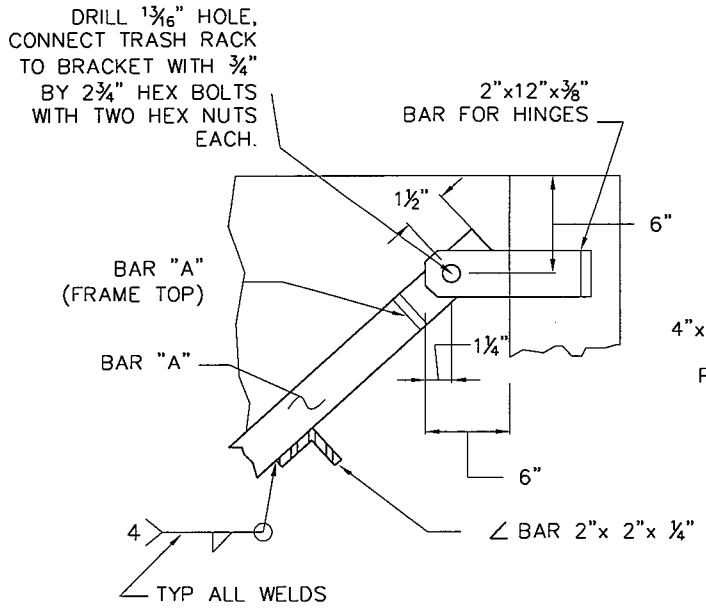
DRAWN BY: J. ESLABON
SCALE: NONE
REVISION DATE: 10/09

9-26G
SHEET 1 OF 4

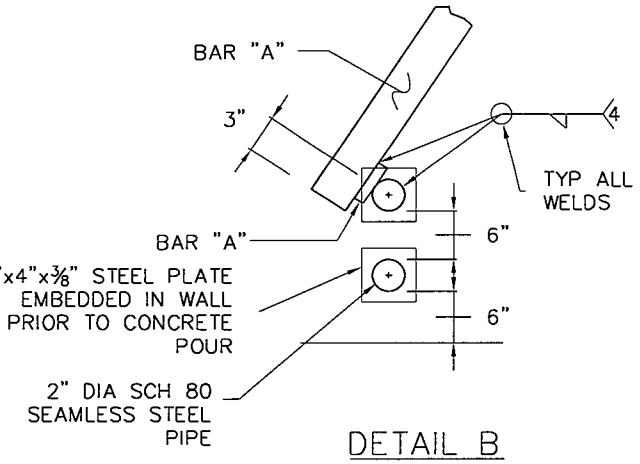
TRASH RACK DIMENSIONS

PIPE DIA (IN)	PIPE OD (IN)	QUANTITY* BAR "A"	BAR "A" SIZE (IN)	H (IN)	W (IN)	L (IN)	S (IN)
24	30	11	3/8x2 1/2	46	48	40	18
27	33.5	11	3/8x2 1/2	50	48	42	19
30	37	11	3/8x2 1/2	53	48	46	21
33	40.5	11	3/8x2 1/2	57	48	52	24
36	44	13	3/8x2 1/2	60	60	52	24

Includes outside frame



DETAIL C



DETAIL B

NOTES:

1. SEE FIGURE 9-26H FOR PIPE HEADWALL DETAILS.
2. MATERIAL TO CONFORM TO ASTM DESIGNATION A-36. GALVANIZE ALL EXPOSED FERROUS PARTS AFTER FABRICATION.
3. ALL FILLET WELDS TO BE 3/16".
4. ALL STEEL SHALL CONFORM TO SECTION 75 OF THE STATE SPECIFICATIONS AND ASTM A36, A575 AND A576.

Michael L Peterson

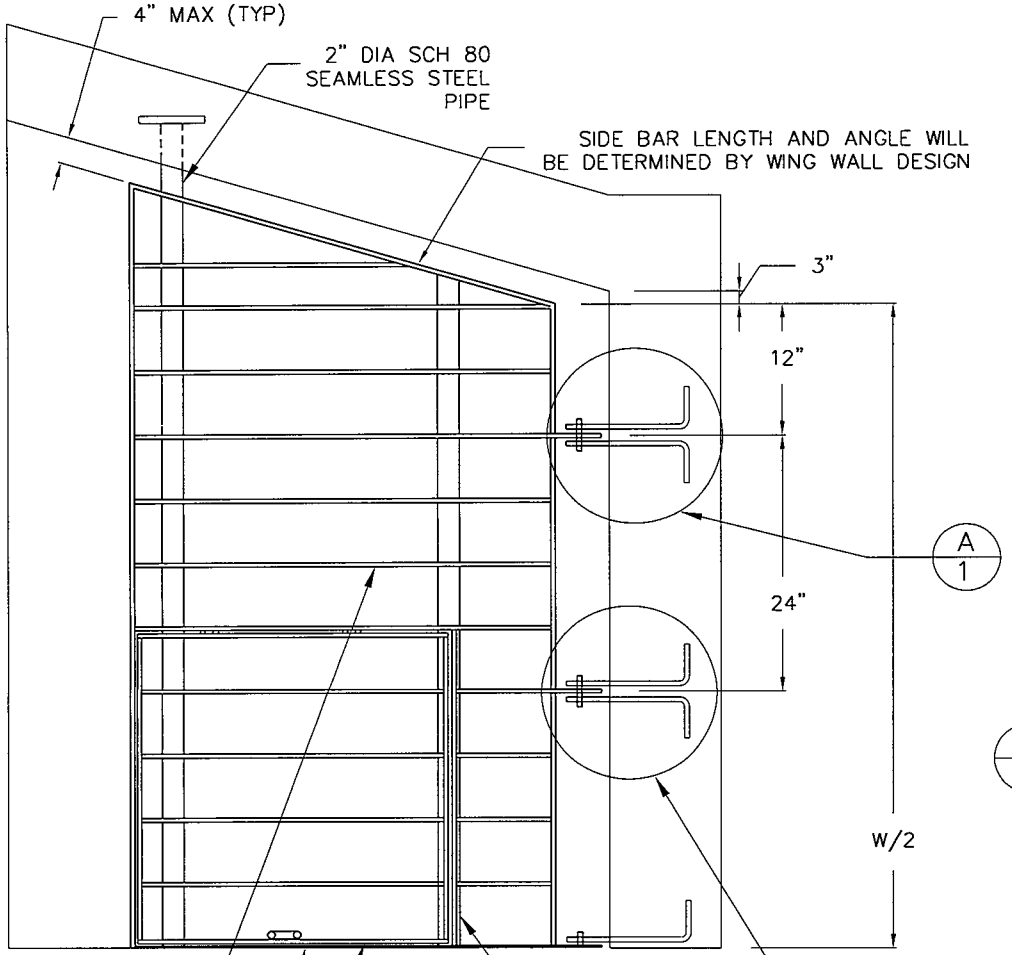
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

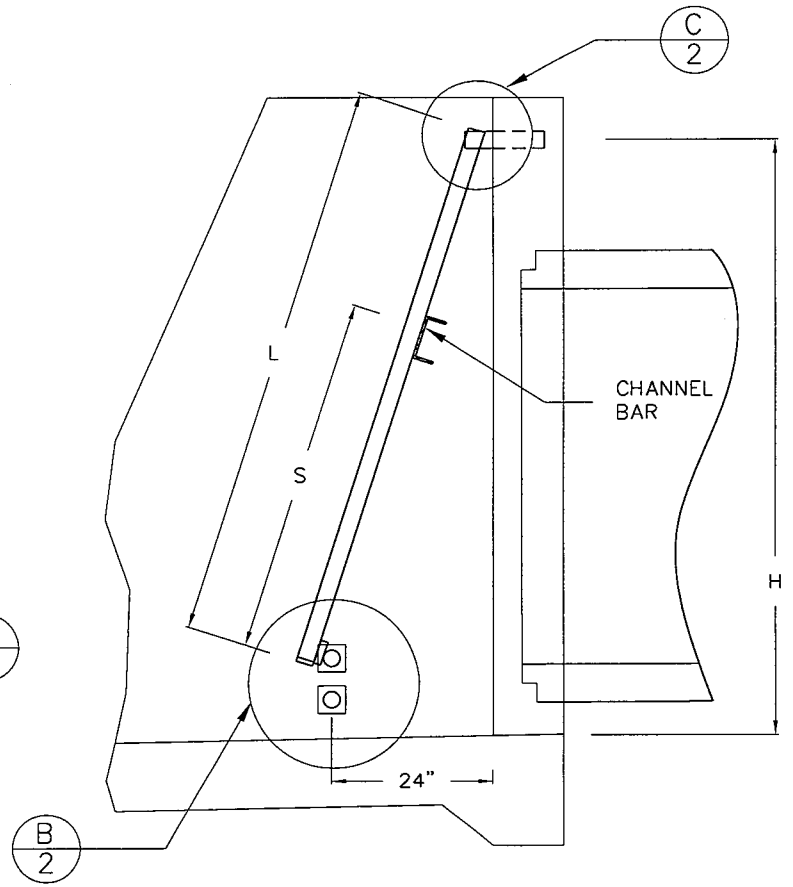
TRASH RACK
24" - 36" PIPE

DRAWN BY: J. ESLABON
SCALE: NONE
REVISION DATE: 10/09

9-26G
SHEET 2 OF 4



TOP VIEW



SIDE VIEW

Michael L Peterson

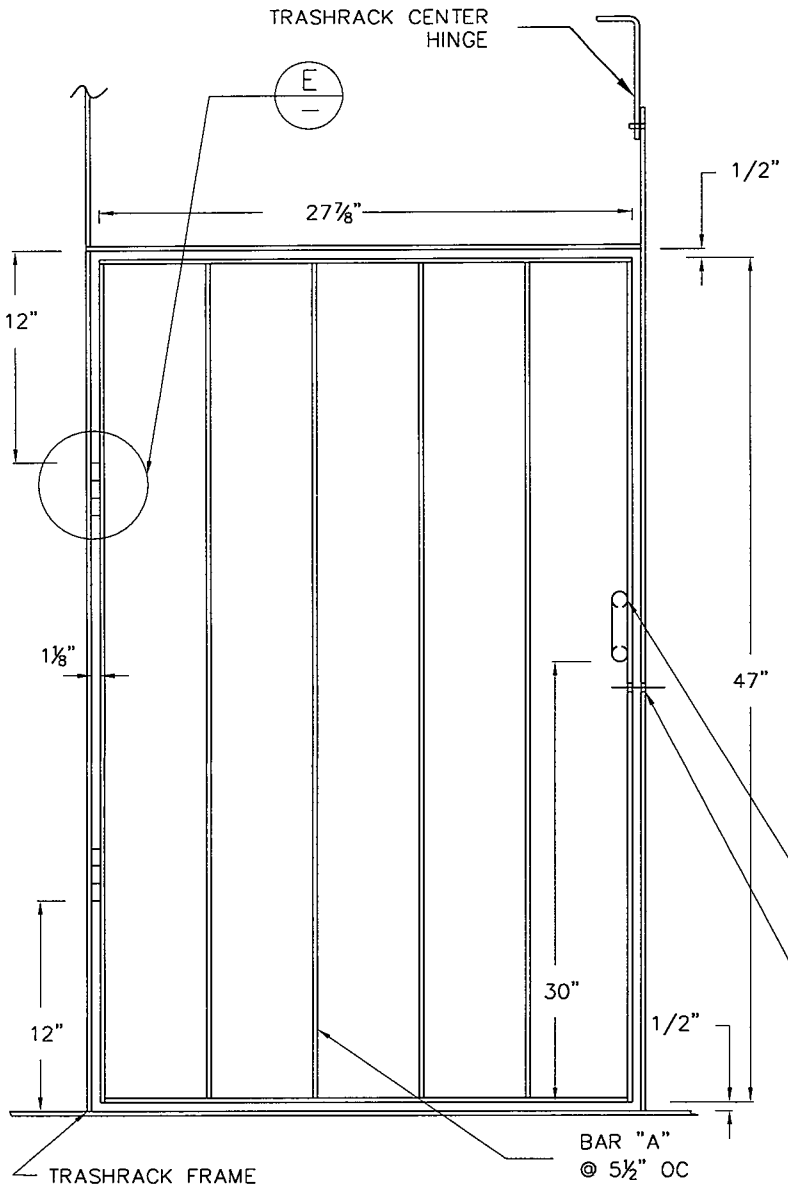
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

TRASH RACK
42" PIPE AND LARGER

DRAWN BY: J. ESLABON
SCALE: NONE
REVISION DATE: 1/03

9-26G
SHEET 3 OF 4

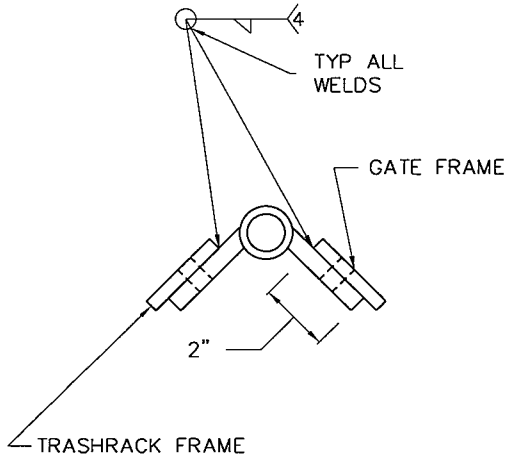


ACCESS GATE DETAIL

TRASH RACK DIMENSIONS

PIPE DIA (IN)	PIPE OD (IN)	QUANTITY* BAR "A"	BAR "A" SIZE (IN)	H (IN)	W (IN)	L (IN)	S (IN)
42	51	15	3/8x2-1/2	67	72	60	47-3/4
48	58	17	3/8x2-1/2	74	84	70	47-3/4
54	65	21	3/8x2-1/2	81	108	72	47-3/4
60	72	23	3/8x2-1/2	88	120	80	47-3/4
72	86	27	3/8x2-1/2	102	144	96	47-3/4

*Includes outside frame



DETAIL E

½" ROLLED STEEL HANDLE WELDED TO GATE FRAME

DRILL ½" DIA HOLE FOR HEAVY DUTY PAD LOCK

NOTES:

1. SEE FIGURE 9-26H FOR PIPE HEADWALL DETAILS.
2. MATERIAL TO CONFORM TO ASTM DESIGNATION A-36. GALVANIZE ALL EXPOSED FERROUS PARTS AFTER FABRICATION.
3. ALL FILLET WELDS TO BE 3/16".
4. ALL STEEL SHALL CONFORM TO SECTION 75 OF THE STATE SPECIFICATIONS AND ASTM A36, A575 AND A576.
5. GATE HINGES TO BE COATED TO RESIST CORROSION.

Michael L Peterson

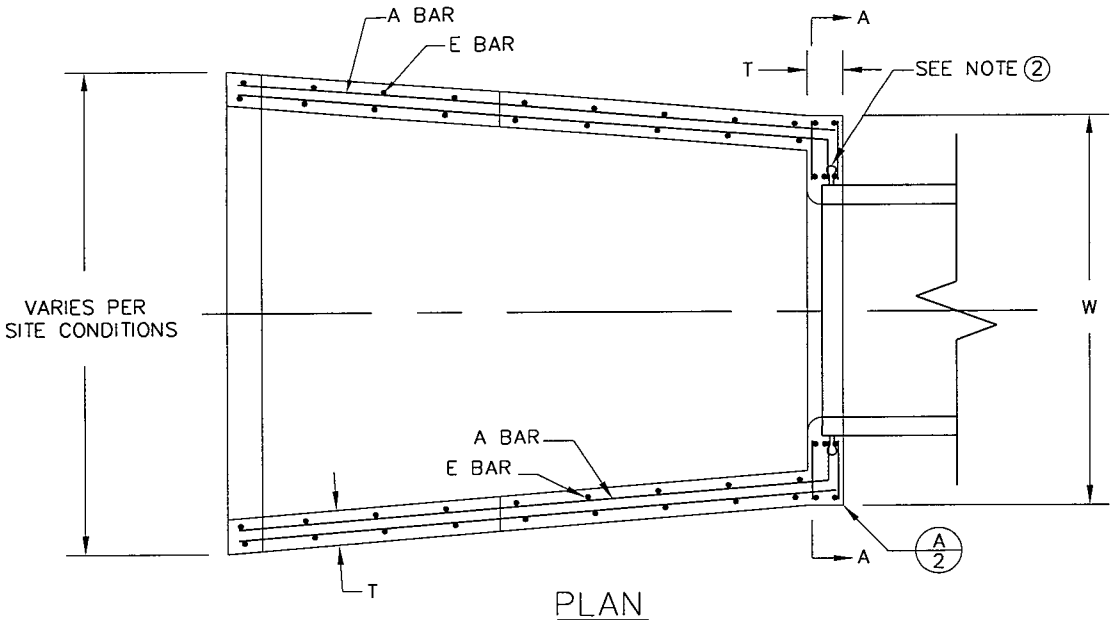
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

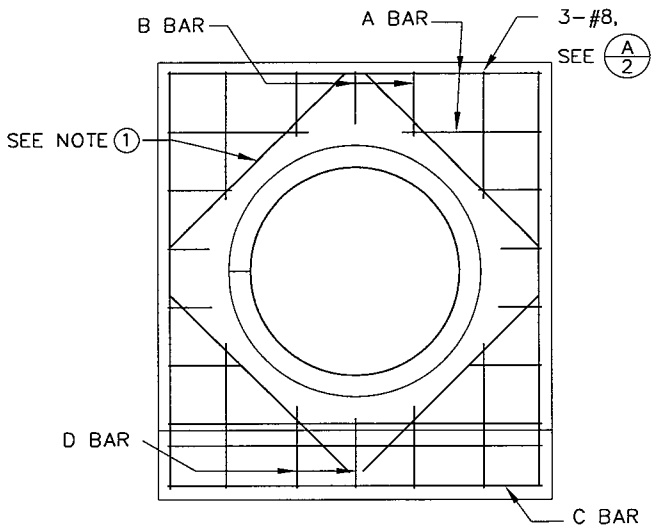
TRASH RACK
42" PIPE AND LARGER

DRAWN BY: J. ESLABON
SCALE: NONE
REVISION DATE: 1/03

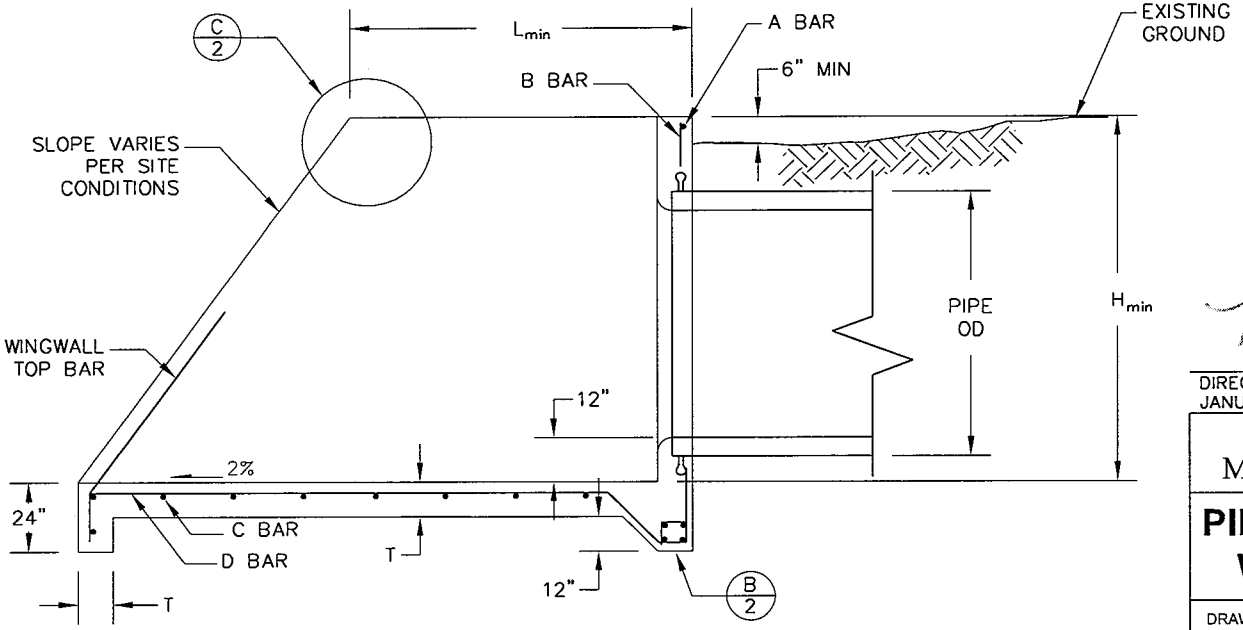
9-26G
SHEET 4 OF 4



PLAN



SECTION A–A



SIDE ELEVATION

NOTE

SEE DWG 9–26G FOR EMBEDMENT OF TRASH RACK COMPONENTS PRIOR TO POURING CONCRETE

Michael L Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

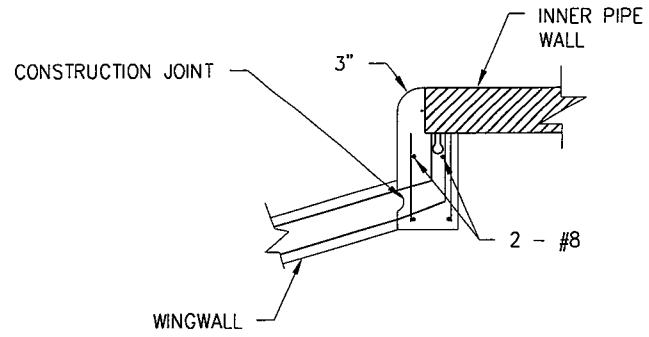
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

PIPE HEADWALL, ENDWALL WINGWALL STRUCTURE

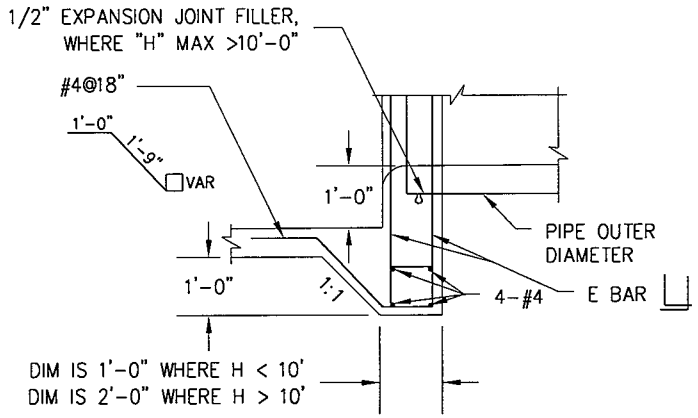
DRAWN BY: B. FORRESTER
SCALE: NONE
REVISION DATE: 10/09

9-26H

SHEET 1 OF 3



DETAIL A



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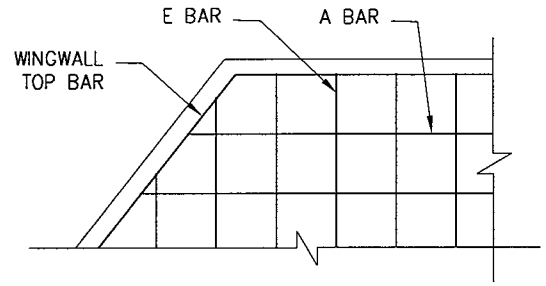


DETAIL C

NOTES

1. PLACE #5 REBAR ON DIAGONALS @ 4" FROM PIPE OD.
2. PIPE CONNECTIONS SHALL CONFORM TO ASTM C-923. UNITS SHALL INCLUDE A WATER STOP.
3. CHAMFER ALL EXPOSED EDGES ¾".
4. ALL STEEL MINIMUM 2" FROM CONCRETE EDGES.
5. ALL LAP SPLICES MINIMUM 12".

HEADWALL DIMENSIONS

PIPE DIA	PIPE OD	W	H_{min}	T*	L_{min}
24"	31.5"	4'-6"	4'-10"	10"	2'-9"
27"	35"	4'-6"	5'-1"	10"	3'-0"
30"	38.5"	4'-6"	5'-5"	10"	3'-3"
33"	42"	4'-6"	5'-8"	10"	3'-6"
36"	45.5"	5'-6"	5'-11"	10"	3'-9"
42"	52.5"	6'-6"	6'-6"	10"	4'-3"
48"	59.5"	7'-6"	7'-0"	10"	5'-3"
54"	66.5"	9'-6"	7'-7"	10"	5'-9"
60"	73.5"	10'-6"	8'-1"	10"	6'-0"
72"	87.5"	12'-6"	9'-2"	10"	7'-3"

REINFORCING STEEL DIMENSIONS AND DATA

	A BAR	B BAR	C BAR	D BAR	E BAR	WINGWALL TOP BAR
H ≤ 7'	#4@12"OC	#4@12"OC	#4@12"OC	#4@12"OC	#4@12"OC	#4
7' < H ≤ 8'	#4@12"OC EF	#4@12"OC EF	#4@12"OC EF	#4@12"OC EF	#4@12"OC EF	#4
8' < H ≤ 10'	#5@12"OC EF	#5@6"OC EF	#5@12"OC EF	#5@12"OC EF	#5@12"OC EF	#5

Michael L Peterson

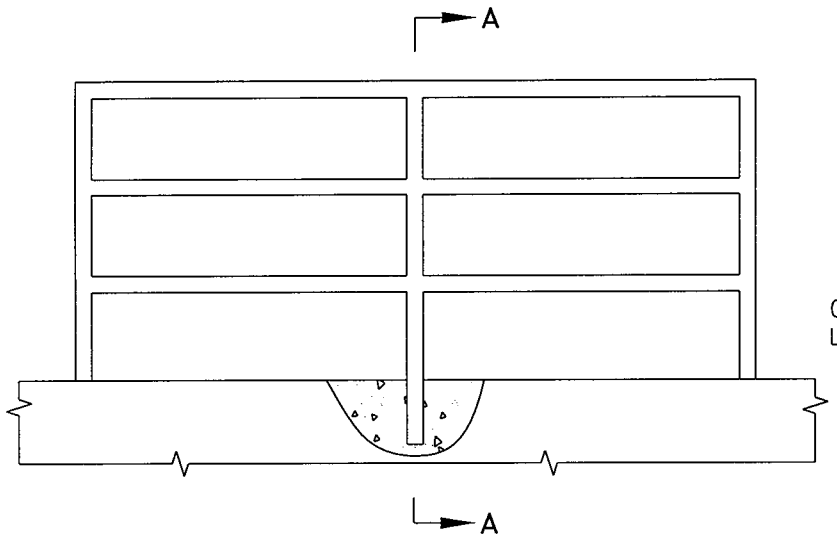
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

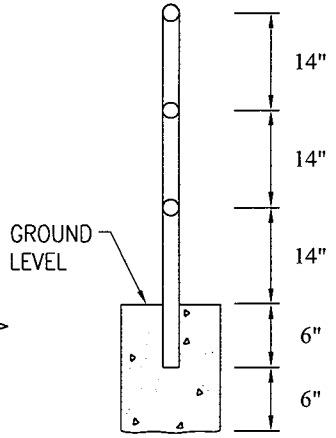
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

PIPE HEADWALL, ENDWALL WINGWALL STRUCTURE

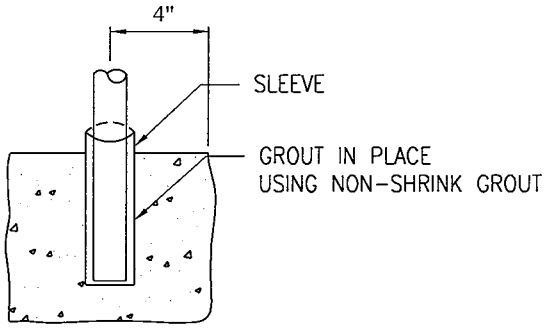
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

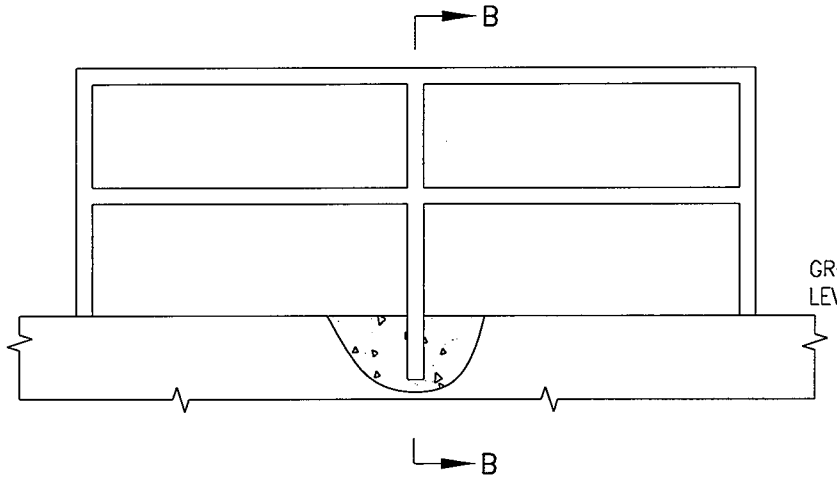
9-26H

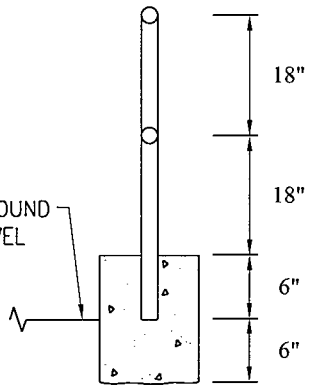




SECTION A–A







SECTION B–B

GENERAL NOTES:

1. GUARDRAIL – 1½" SEAMLESS STEEL PIPE ASTM 53 GRADE B, HOT DIP GALVANIZED. PAINT COLOR (IF NEEDED) TO BE SPECIFIED ON PLANS AT NO EXTRA COST.
2. ALL GUARDRAIL WELDS $\frac{3}{16}$" FILLET GROUND SMOOTH.
3. MAXIMUM SPACING OF POSTS SHALL BE 6'.
4. TO BE SHOWN ON IMPROVEMENT PLANS FOR PLACEMENT.

Michael L Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

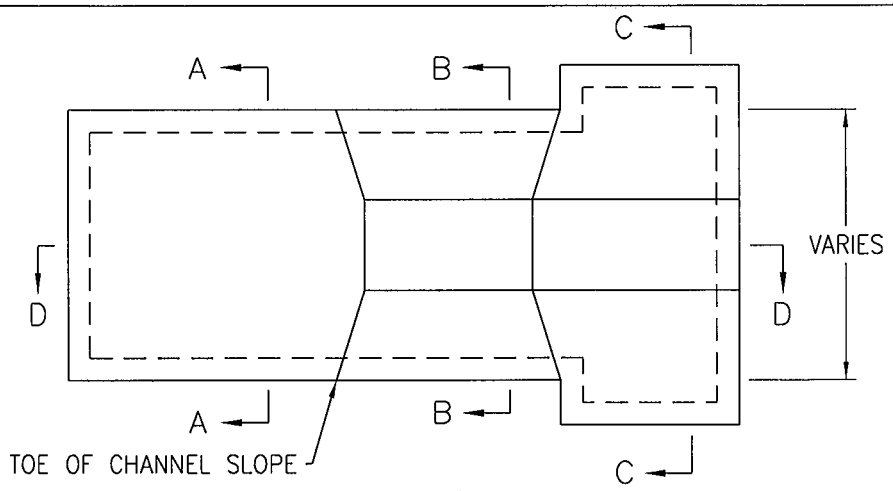
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

PIPE HEADWALL, ENDWALL WINGWALL STRUCTURE

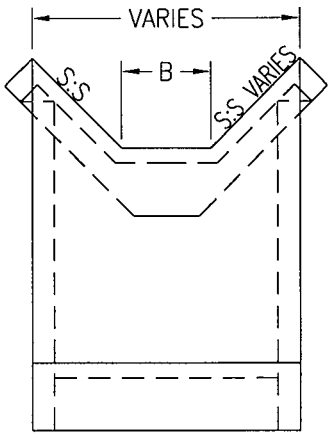
DRAWN BY: S. PIMENTEL
SCALE: NONE
REVISION DATE: 10/09

9-26H

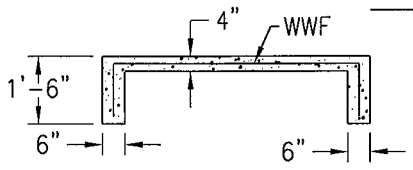
SHEET 3 OF 3



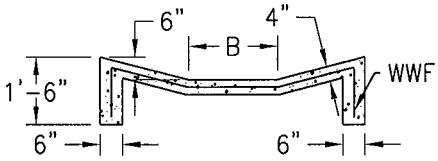
TOP VIEW



FRONT VIEW



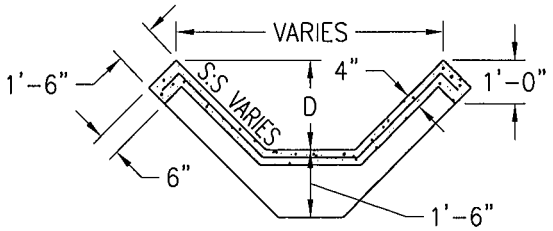
SECTION A–A



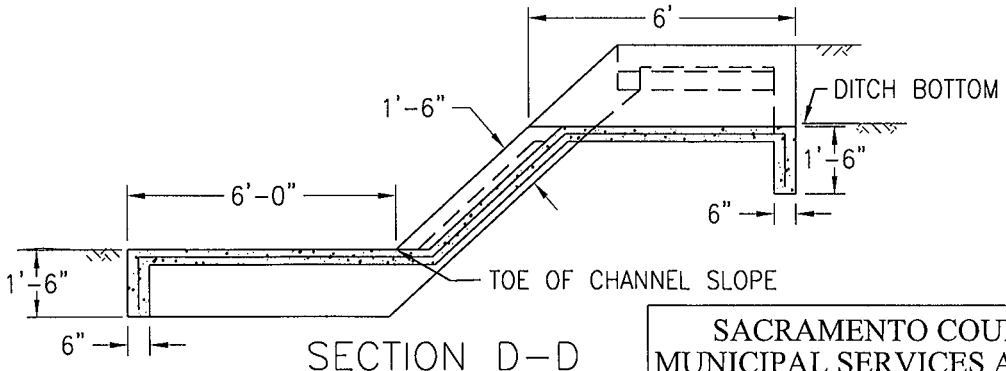
SECTION B–B

NOTES

1. USE CLASS "B" CONCRETE OR GROUTED COBBLES AS SPECIFIED.
2. 4"X4"–W4XW4 WWF THROUGHOUT CONCRETE
3. ON LINED CHANNELS APRON SHALL CONNECT TO SIDE LINING.
4. B=DITCH BOTTOM WIDTH OR AS SHOWN ON PLANS.
5. D=DITCH WATER DEPTH PLUS ONE FOOT OF FREEBOARD.



SECTION C–C



SECTION D–D

Michael L Peterson

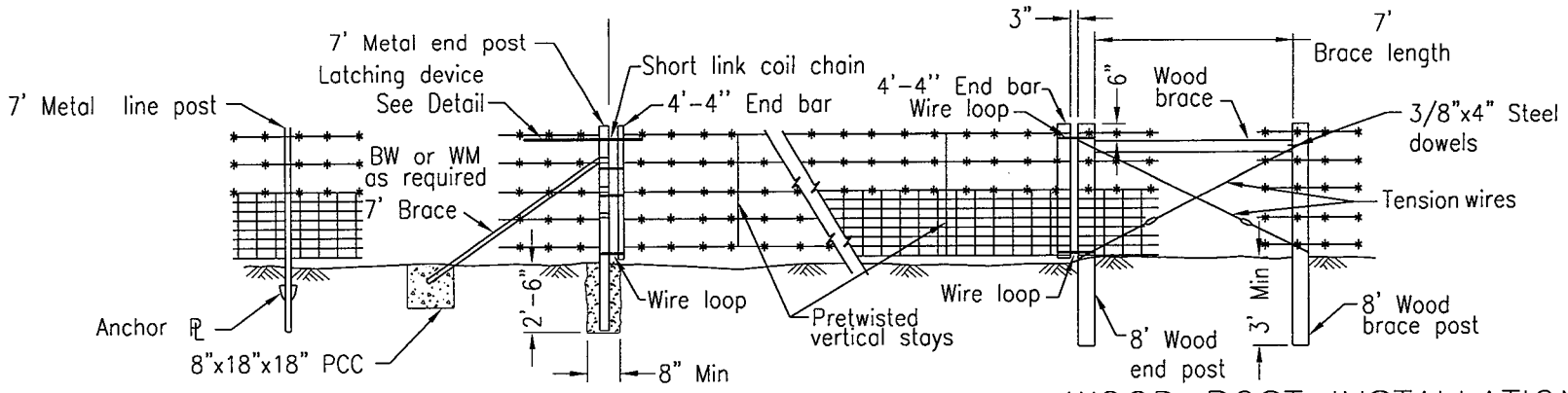
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

EROSION CONTROL
DITCH DISCHARGE

DRAWN BY: M.FIELDS
SCALE: NONE
REVISION DATE: 10/09

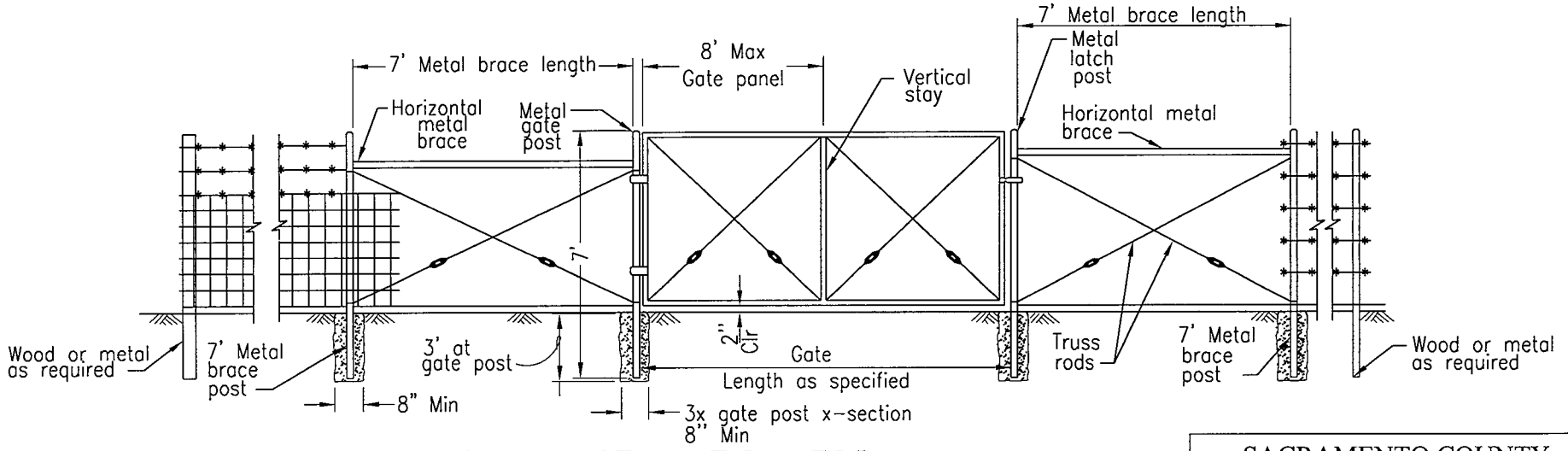
9-27



METAL POST INSTALLATION

WOOD POST INSTALLATION

GATEWAY
See Note 3



WIRE MESH GATE INSTALLATION FOR
EITHER WOOD OR METAL POST FENCES

Michael L Peterson

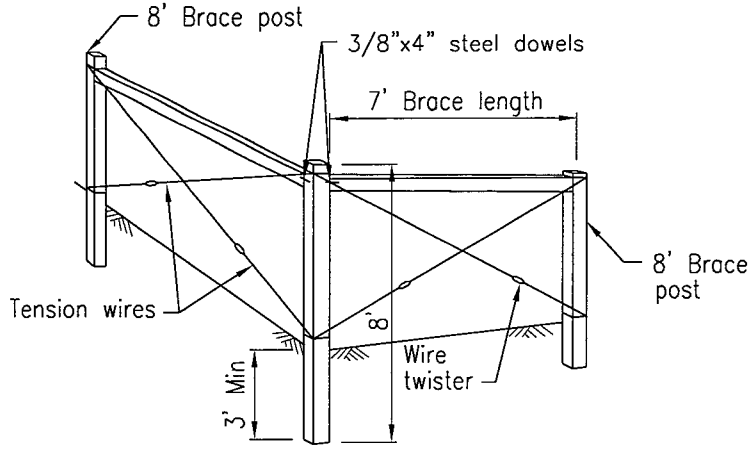
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

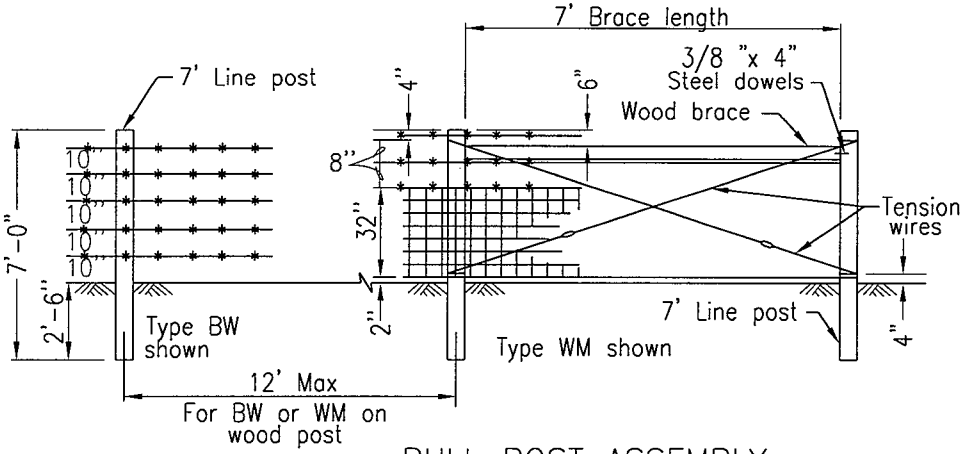
BARBED WIRE AND WIRE MESH FENCES

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 11/98

9-28
SHEET 1 OF 3



END AND CORNER POST ASSEMBLY

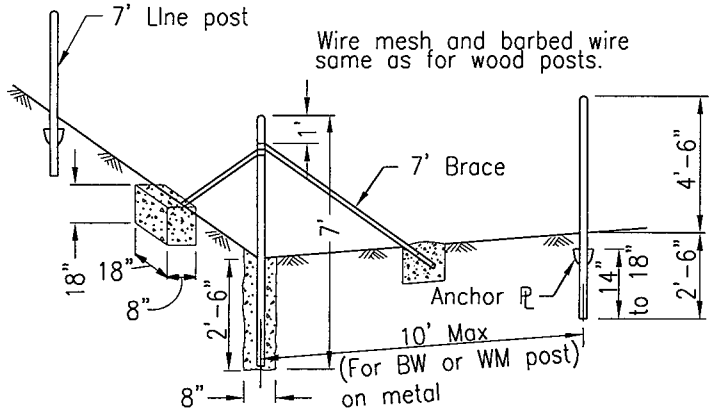


Type BW = 5 lines of barbed wire.
Type WM = Wire mesh and 3 lines of barbed wire.

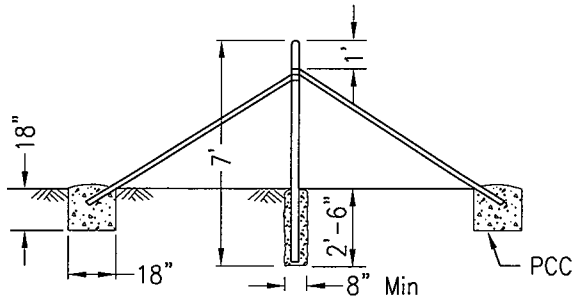
PULL POST ASSEMBLY

At 660' maximum intervals for WM fence.
At 1320' maximum intervals for BW fence.

WOOD POST INSTALLATION



END AND CORNER POST ASSEMBLY



PULL POST ASSEMBLY

At 660' maximum intervals for WM fence.
At 1320' maximum intervals for BW fence.

METAL POST INSTALLATION

Michael L Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

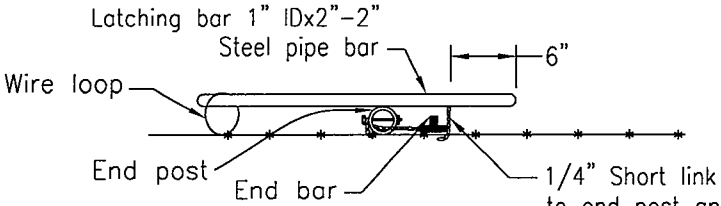
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

BARBED WIRE AND WIRE MESH FENCES

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 11/98

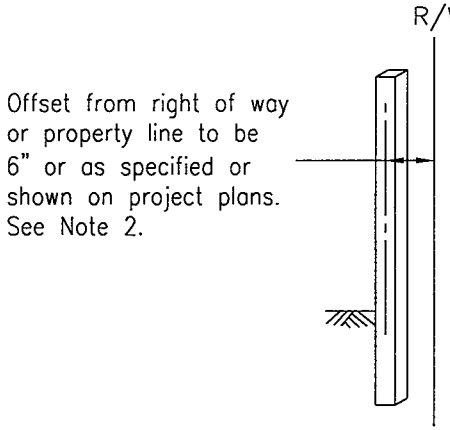
9-28
SHEET 2 OF 3

WIRE MESH GATE POST (See Note 4)		
GATE WIDTHS	NOMINAL OD	WEIGHT PER FT
Up thru 6'	2-7/8"	5.79
Over 6' thru 12'	4"	9.11
Over 12' thru 18'	5 -9/16"	14.62
Over 18' to 24' Max	6-5/8"	18.97



LATCHING DEVICE FOR GATEWAYS

See Note 1



FENCE LOCATION

NOTES

1. Metal end post and end bar shown. Use wood end post and end bar for wood post installation.

2. Offset to be 2' at monument locations, measured at right angles to R/W lines. Taper to achieve offset to be at least 20' long.

3. Gateway to be used when specified in the special provisions.

4. Post dimensions and weights are minimums. Larger sizes may be used on approval of Engineer.

5. Line post spacing for wood post equals 12' maximum. Line post spacing for metal post equals 10' maximum.

Michael L Peterson

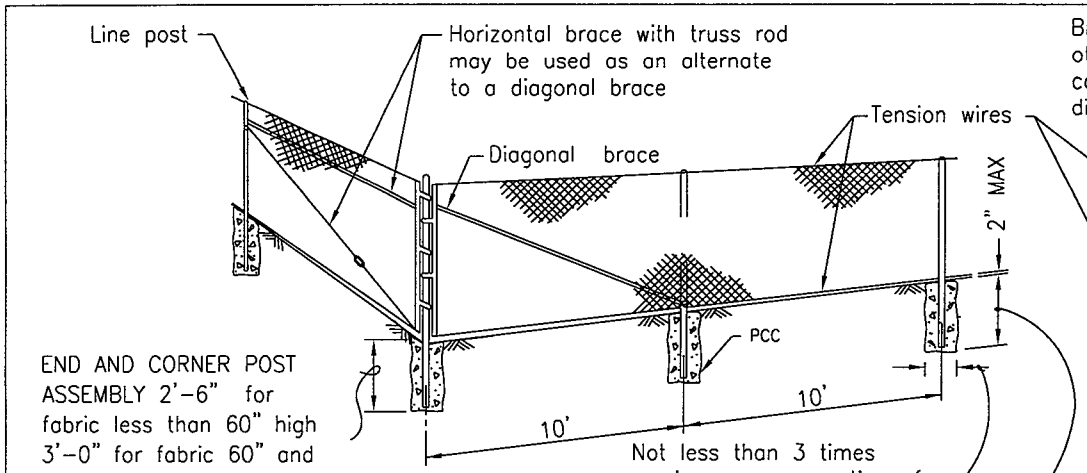
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

BARBED WIRE AND WIRE MESH FENCES

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 4/07

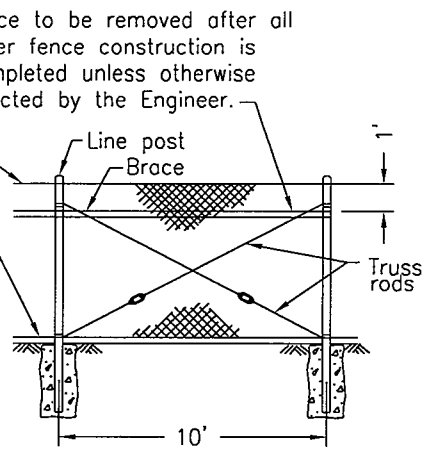
9-28
SHEET 3 OF 3



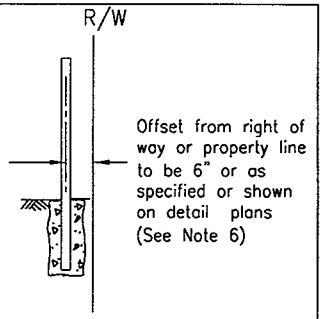
END AND CORNER POST ASSEMBLY 2'–6" for fabric less than 60" high 3'–0" for fabric 60" and over

Not less than 3 times maximum cross section of post with minimum of 8"

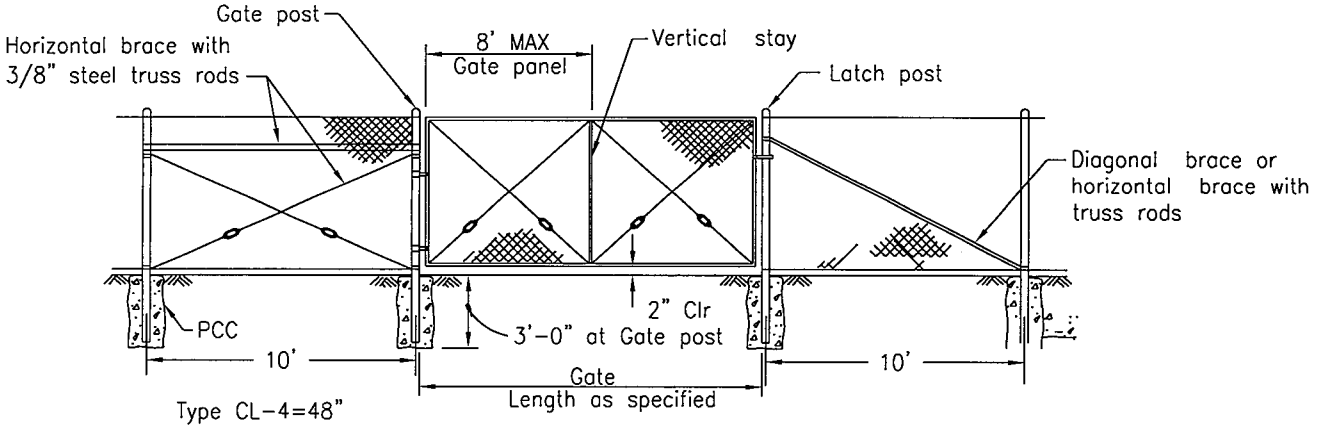
2'–6" for fabric less than 60" high 3'–0" for fabric 60" and over



Line posts at 1000' maximum intervals braced and trussed in both directions except that this bracing and trussing may be omitted when the fabric is stretched by the equipment



FENCE LOCATION



Type CL–4=48" fabric Type CL–6=72" fabric

Notes:

1. Chain link fabric shall be zinc coated steel manufactured in compliance with ASTM Standard A 392 with a 2 inch mesh of 9 gauge wire with knuckled selvage.

2. Tension wire shall be 7 gauge.

3. Where barbed wire is specified, it shall include 3 strands of galvanized 4 point wire attached with extension arms set at 45 degrees.

Michael L Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CHAIN LINK FENCE

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 12/99

9-29
SHEET 1 OF 2

TYPICAL MEMBER DIMENSIONS (See Notes)											
FENCE HEIGHT	LINE POSTS			END, LATCH & CORNER POSTS				RAILS & BRACES			
	NOMINAL ROUND O.D. (NOTES 7 & 8)	H	ROLL FORMED	NOMINAL ROUND O.D. (NOTES 7 & 8)	ROLL FORMED			NOMINAL ROUND O.D. (NOTES 7 & 8)	H	ROLL FORMED	
6' & less	2-3/8"	1-7/8"x 1-5/8"	1-7/8"x 1-5/8"	2-7/8"	3-1/2" x 3-1/2"	2" x 1-3/4"		1-5/8"	1-1/2" x 1-5/16"	1-5/8" x 1-1/4"	1-3/4" x 1-1/4"
Over 6'	2-3/8"	2-1/4" x 2"	2" x 1-3/4"	2-7/8"	3-1/2" x 3-1/2"	2-1/2" x 2-1/2"		1-5/8"	1-1/2" x 1-5/16"	1-5/8" x 1-1/4"	1-3/4" x 1-1/4"

GATE POST (NOTE 7)			
FENCE HEIGHT	GATE WIDTHS	NOMINAL O.D.	WEIGHT PER FOOT
6'-0" and Less	Up thru 6'	2-7/8"	5.79
	Over 6' thru 12'	4-1/2"	10.79
	Over 12' thru 18'	5-11/16"	14.62
	Over 18' to 24' max	6-5/8"	18.97
Over 6'-0"	Up thru 6'	3-1/2"	7.58
	Over 6' thru 12'	5-11/16"	14.62
	Over 12' thru 18'	6-5/8"	18.97
	Over 18' to 24' max	8-5/8"	28.55

Above post dimensions and masses are minimums. Larger sizes may be used on approval of the Engineer.

NOTES

1. The above table shows examples of post and brace sections which may comply with the Standard Construction Specifications.
2. Sections shown in the tables must also comply with the strength requirements and other provisions of the Standard Construction Specifications.
3. Other sections which comply with the strength requirements and other provisions of the Standard Construction Specifications may be used on approval of the Engineer.
4. Options exercised shall be uniform on any one project.
5. Dimensions shown are nominal.
6. Offset to be 2'-0" at monument locations, measured at right angles to R/W lines. Taper to achieve offset to be at least 20' long.
7. Pipe sections for posts, rails, braces, and gates shall be schedule 40 galvanized pipe manufactured in conformance with ASTM F 1083.
8. Weight per foot values for 1-5/8" O.D. pipe = 2.27 lbs/ft, 2-3/8" O.D. pipe = 3.65 lbs/ft, 2-7/8" O.D. pipe = 5.79 lbs/ft.
9. Chain link gate frames shall be a minimum of 1-7/8" pipe weighing 2.72 lbs/ft.
10. Galvanized gate holders of heavy cast construction with counterbalanced latches shall be provided for all gates. Gate holders shall be anchored with a minimum 24" length of 1-5/8" schedule 40 pipe set in 8" ø concrete base.
11. Double gate assemblies shall also be fitted with heavy duty hinges and lift bar interlocking device with drop anchor at midspan that latches to embedded pipe.

Michael L Peterson

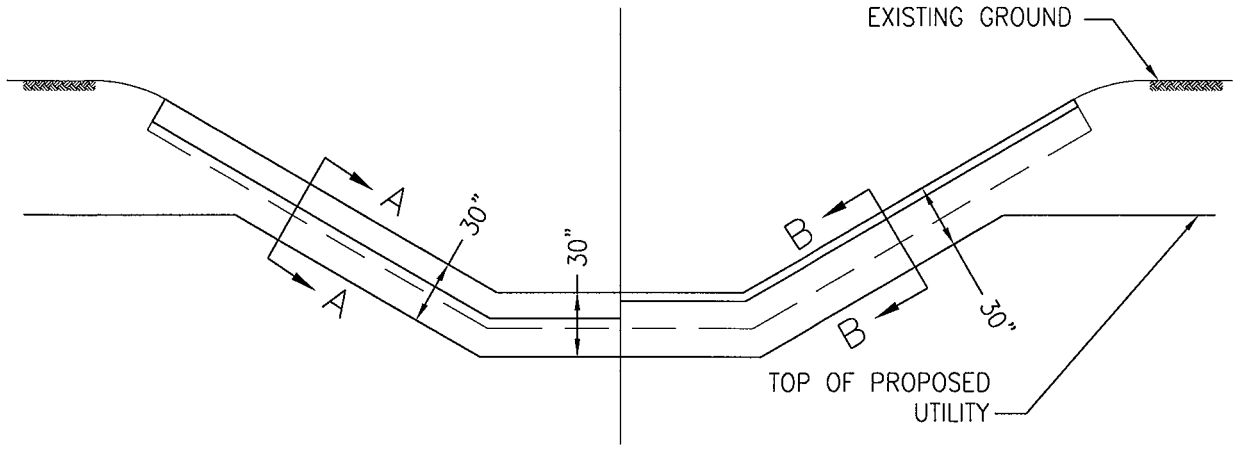
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

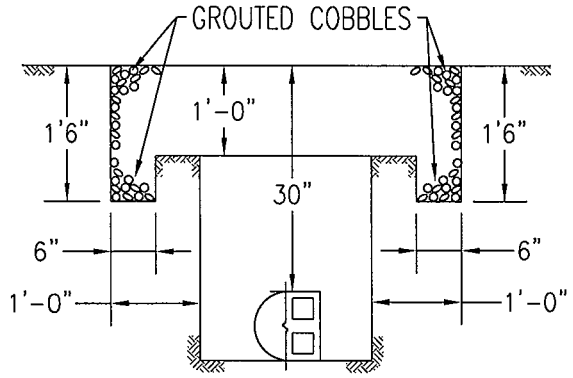
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CHAIN LINK FENCE

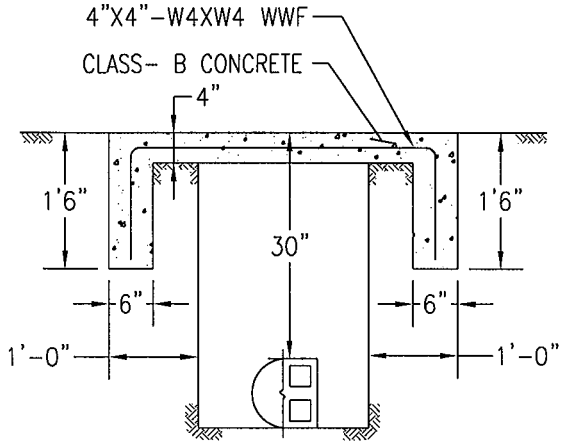
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 2/07

9-29
SHEET 2 OF 2





SECTION A–A



SECTION B–B

NOTES

1. ALL UTILITY CROSSINGS OF EXISTING STREAMS SHALL BE AT LEAST 30" BELOW EXISTING CHANNEL SIDES AND BOTTOMS. DEEPER PLACEMENT MAY BE REQUIRED IF FUTURE CHANNEL IMPROVEMENTS ARE ANTICIPATED.

2. THE CUT SHALL BE SEALED AS SHOWN WITH GROUTED COBBLES OR CLASS B CONCRETE TO A WIDTH OF 1' ON EACH SIDE OF THE UTILITY TRENCH. ALL NATURAL STREAMS, AS SHOWN ON THE NATURAL STREAMS PLAN, SHALL UTILIZE GROUTED COBBLES.

3. CONSTRUCTION IS TO CONFORM TO SECTION 44 OF THE COUNTY CONSTRUCTION SPECIFICATIONS WITH CUT OFF WALLS CONFORMING TO STANDARD DRAWING 9-24.

Michael L Peterson

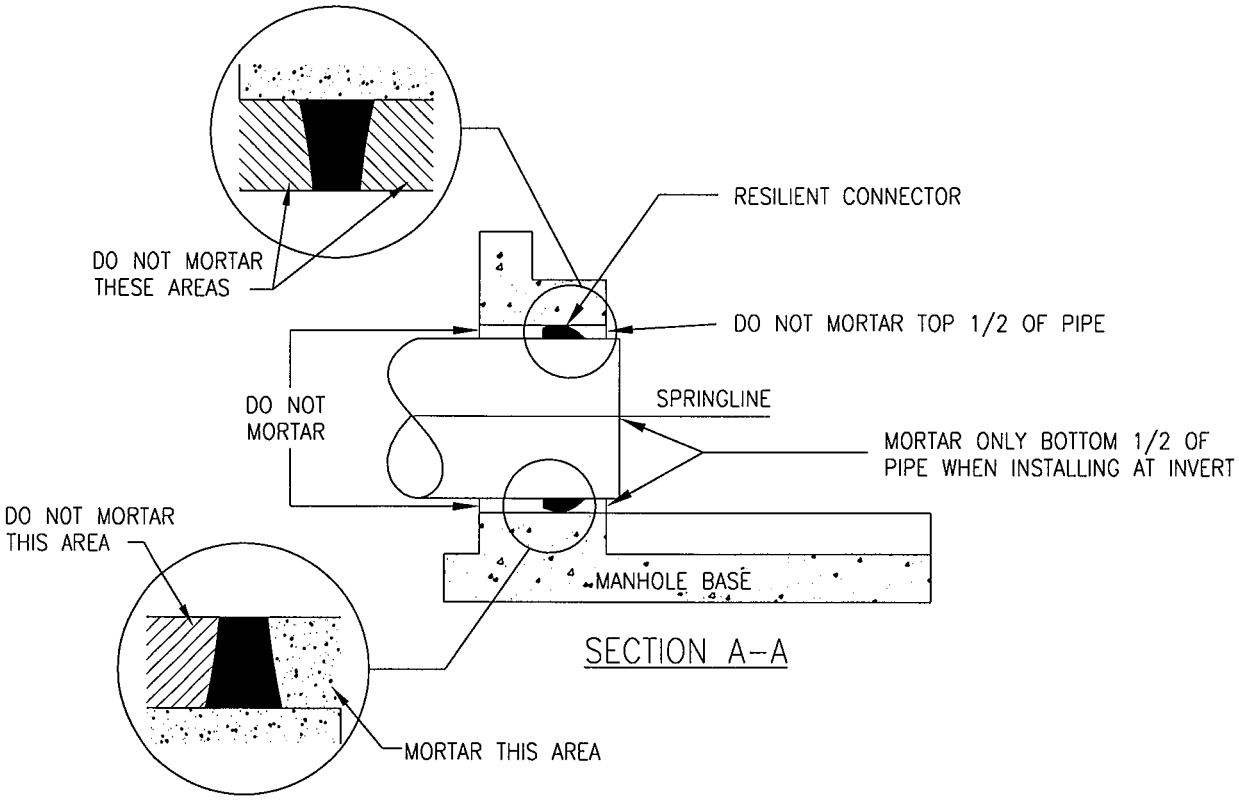
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

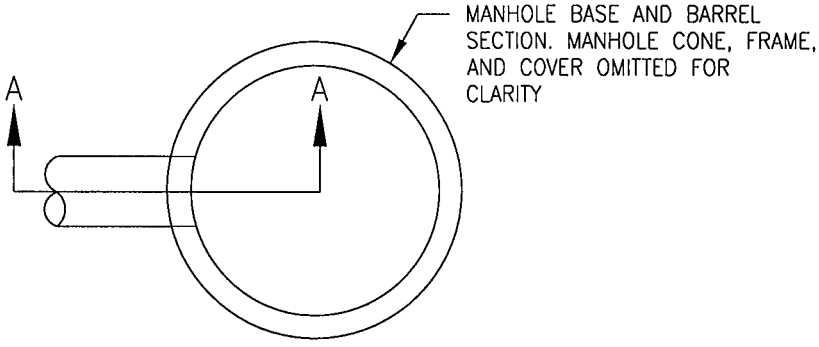
UTILITY STREAM CROSSING

DRAWN BY: M.FIELDS
SCALE: NONE
REVISION DATE: 10/09

9-30



SECTION A–A



PLAN

NOTES:

1. TO HELP CREATE A FLEXIBLE, WATERTIGHT JOINT, DO NOT PLACE MORTAR AROUND THE CONNECTOR ON THE OUTSIDE OF THE STRUCTURE. ALSO, DO NOT PLACE MORTAR AROUND THE TOP HALF OF THE CONNECTOR ON THE INSIDE WHEN COMPLETING THE INVERT WORK.
2. RESILIENT CONNECTORS SHALL BE A FLEXIBLE COMPRESSION GASKET OR BOOT CONNECTOR PER SECTION 39 "MANHOLES" OF THE COUNTY CONSTRUCTION SPECIFICATIONS.
3. BOOT CONNECTORS SHALL NOT BE GROUTED.
4. ALL CONNECTORS SHALL MEET OR EXCEED THE REQUIREMENTS OF ASTM C-923

Michael L Peterson

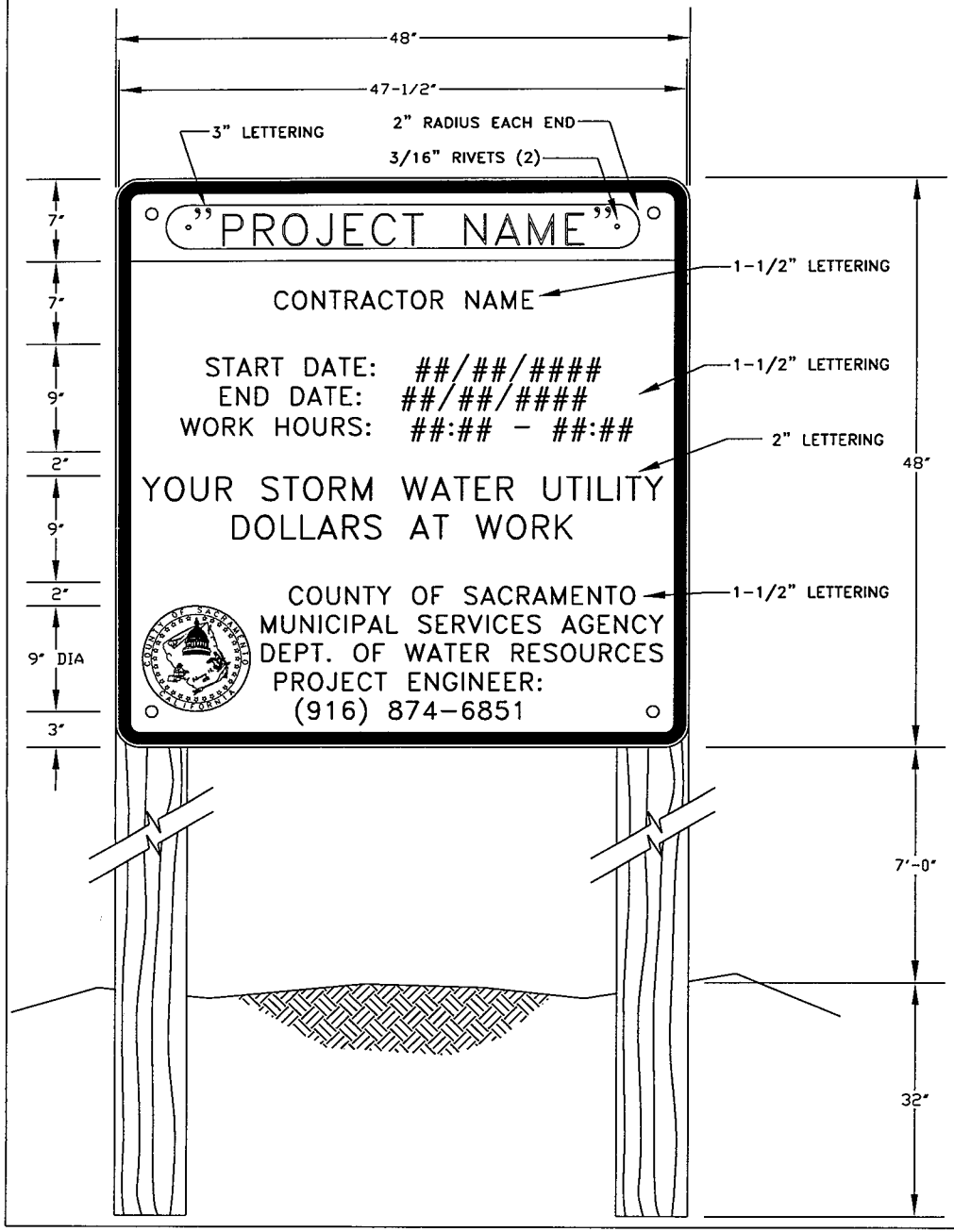
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

FLEXIBLE CONNECTOR PIPE TO MANHOLE

DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

9-31



CONSTRUCTION NOTES

1. Fabricate and install in conformance with Section 12-3.06A of the State Standard Specifications.
2. Sign panel shall conform to Type IIIA minimum reflective sheeting requirements of Section 12-3.06A of the State Standard Specifications.
3. Sign panel colors shall be black letters and border on a white background. Letter height and weight as follows:

Letter Height	Line Weight
1-1/2"	5/16"
2"	1/4"
3"	3/8"

4. The County Seal emblem shall be provided by the County and installed as shown by the Contractor.
5. 4x4 Wood post shall be installed in conformance with Section 12-3.06A of the State Standard Specifications.

Michael L Peterson

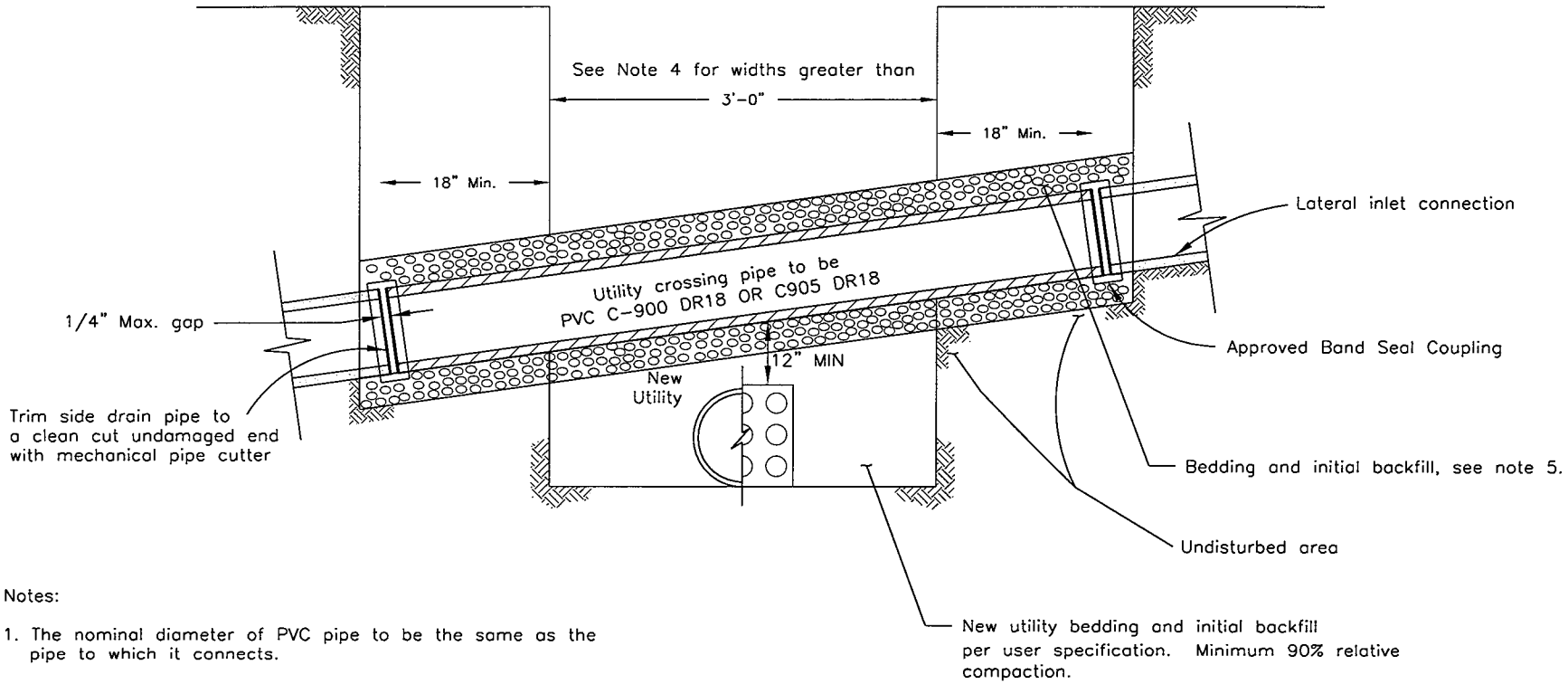
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CONSTRUCTION SITE SIGN

SCALE: NONE
REVISION DATE: 2/07
DRAWN BY: S.R.P.

9-32



Notes:

1. The nominal diameter of PVC pipe to be the same as the pipe to which it connects.
2. Use PVC pipe when the lateral connectiion is cut or damaged.
3. Alteration of pipe grades will be permitted only after written permission has been received from the engineer.
4. Whenever the span, whether caused by trench width or crossing angle of the PVC pipe, exceeds 3'-0",. Replacement procedure and material shall be as directed by the engineer.
5. Bedding and initial backfill material shall be imported 3/4-inch crushed rock or gravel conforming to the requirements of Article 50-16, Type "B". For pipe 10" or less in diameter use 1/2-inch crushed rock or gravel conforming to Article 50-16, Type "A". Place per Standard Drawing 9-1A.
6. PVC pipe shall conform to section 50-26.04, "Polyvinyl Chloride Pipe (PVC) For Drainage", of the Standard Specifications.

Michael L Peterson

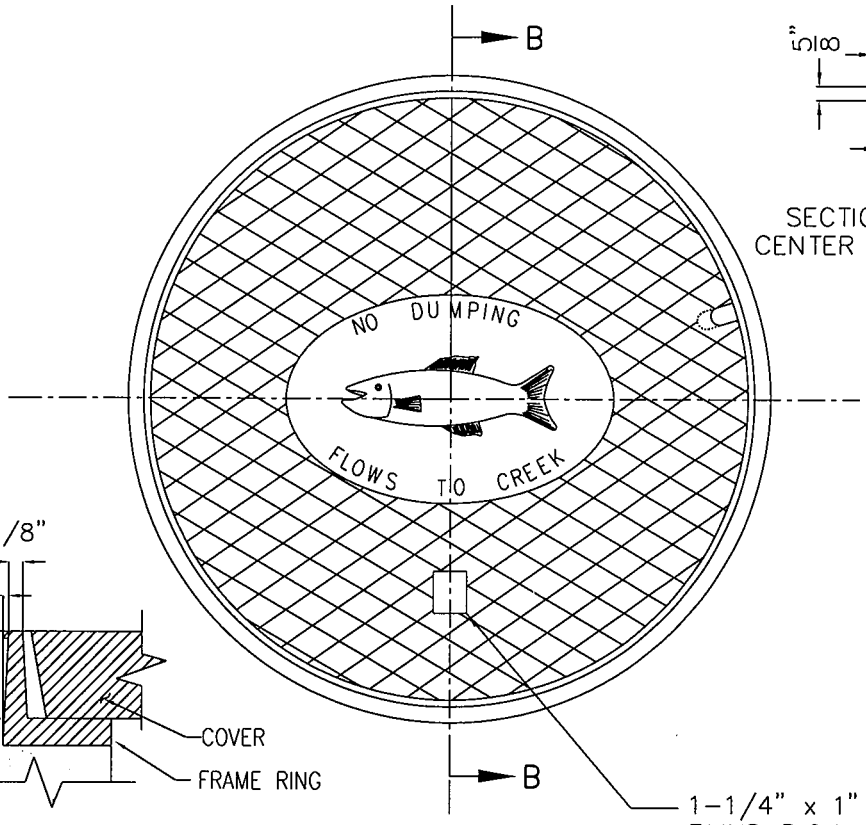
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

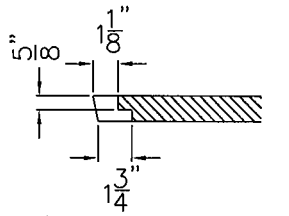
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

UTILITY CROSSING

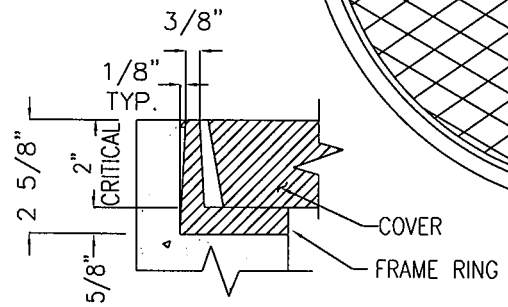
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 4/97

9-33

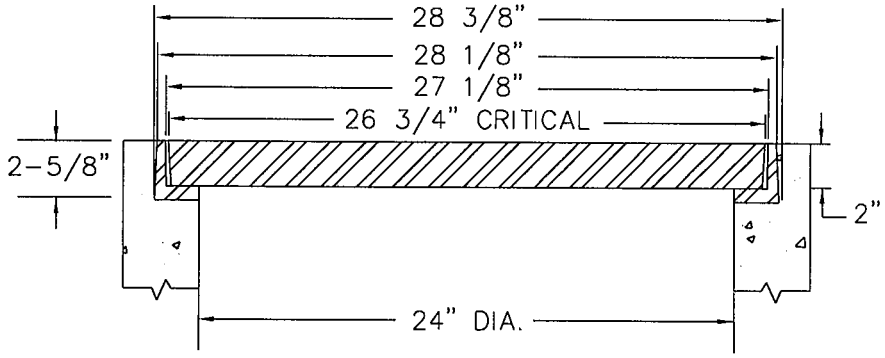


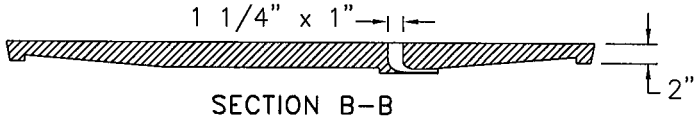


SECTION THROUGH
CENTER OF PICK HOLE



FRAME RING AND LID DETAIL





SECTION B-B

NOTES:

1. TO BE USED ONLY WITH TYPE G OR 300-1 INLET.
2. ALL CASTINGS TO CONFORM TO ASTM A48, CLASS 35B.
3. FRAME AND COVER TO MEET H-20 LOAD SPECIFICATIONS.
4. BEARING SURFACES ARE MACHINED BEVELED TO ASSURE A CLOSE, NON ROCKING SURFACE.
5. EXPOSED SURFACES OF THE CASTINGS WITH THE PARTS ASSEMBLED AND DISASSEMBLED SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY.
6. SEE ARTICLE 50-34, "SEWER AND STORM DRAIN CASTINGS", OF SECTION 50.

WEIGHT	
CAST IRON COVER	91 LBS.
CAST IRON FRAME RING	52 LBS.

Michael L. Peterson

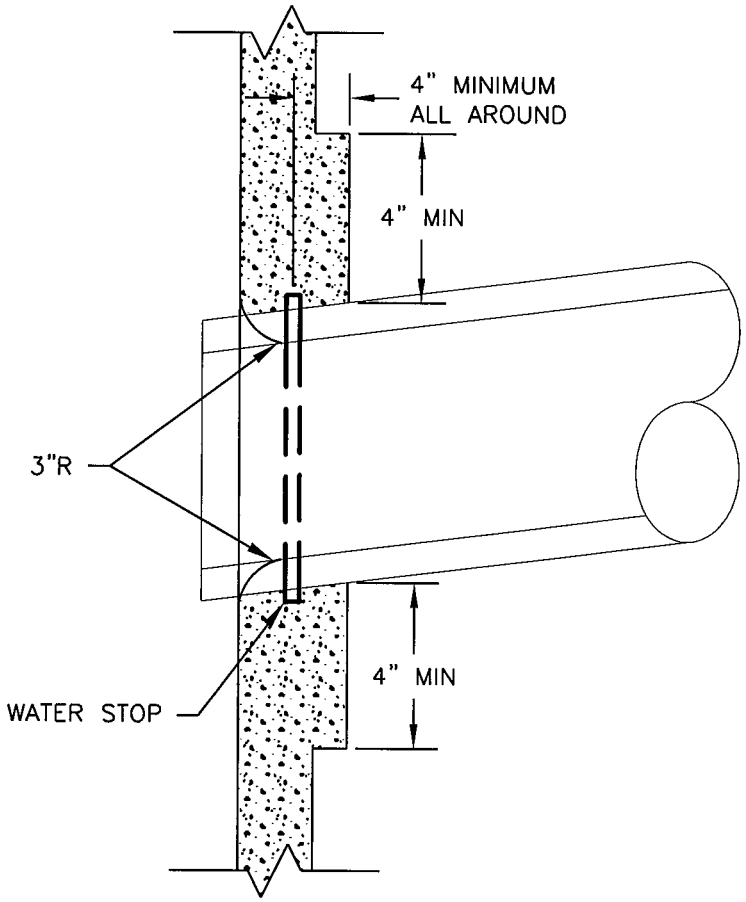
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CAST IRON 24" MANHOLE FRAME & COVER FOR TYPE G AND 300-1 INLET

DRAWN BY: S. PIMENTEL
SCALE: NONE
REVISION DATE: 04/07

9-34



NOTES:

1 EMBED PIPE 3" MINIMUM INTO STRUCTURE.

2 CENTER WATERSTOP WITHIN STRUCTURE WALL. REMOVE ALL PORTIONS OF PIPE PROTRUDING INTO THE STRUCTURE IN ORDER TO FORM 3" RADIUS BETWEEN PIPE AND STRUCTURE WALL.

3 INCREASE WALL THICKNESS OF STRUCTURE BY ADDING A 4" CONCRETE COLLAR AROUND PIPE, AS NEEDED TO ACCOMMODATE MINIMUM EMBEDMENT REQUIREMENTS.

4 TO BE USED ON ALL CAST-IN-PLACE STRUCTURES. NOT ALLOWED ON PRE-CAST STRUCTURES.

Michael L Peterson

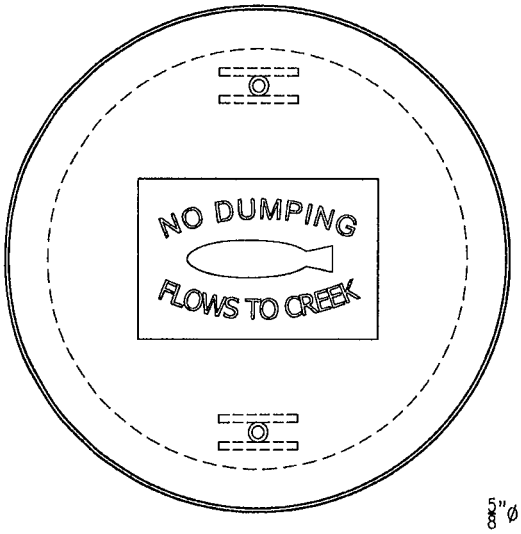
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

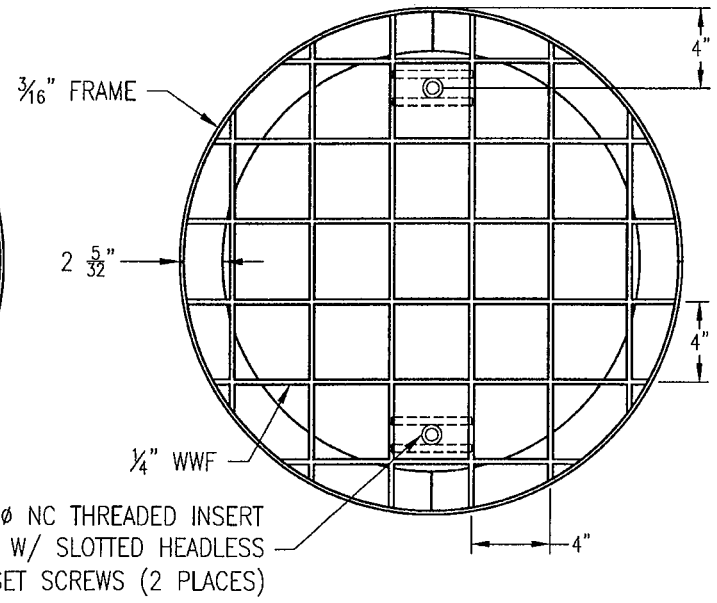
WATER STOP

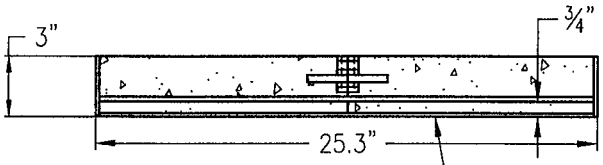
DRAWN BY: STAFF
SCALE: NONE
REVISION DATE: 10/09

9-35



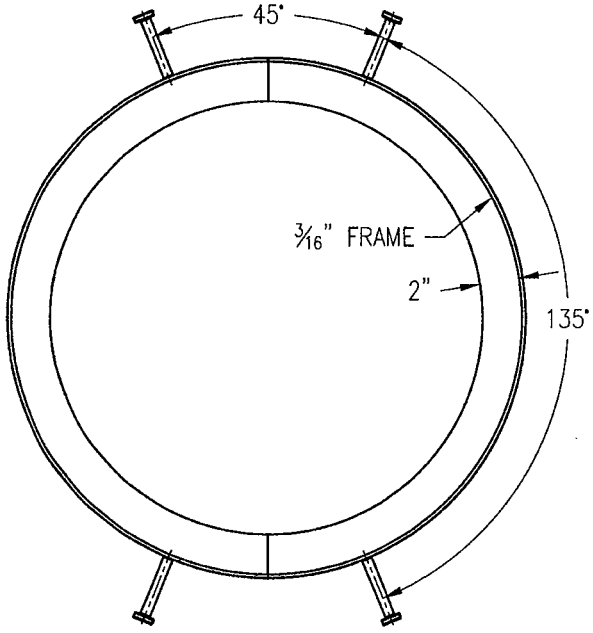
PLAN VIEW



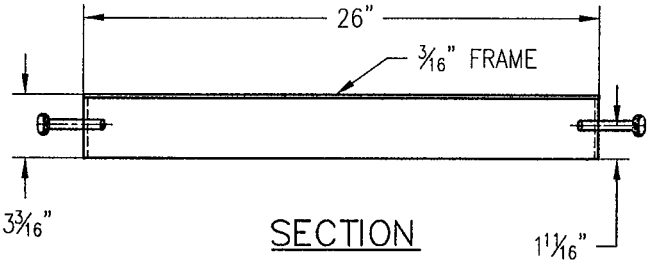


SECTION

3/16" FRAME



PLAN VIEW



SECTION

DIRECTOR, DEPARTMENT OF WATER RESOURCES
NOVEMBER 2015

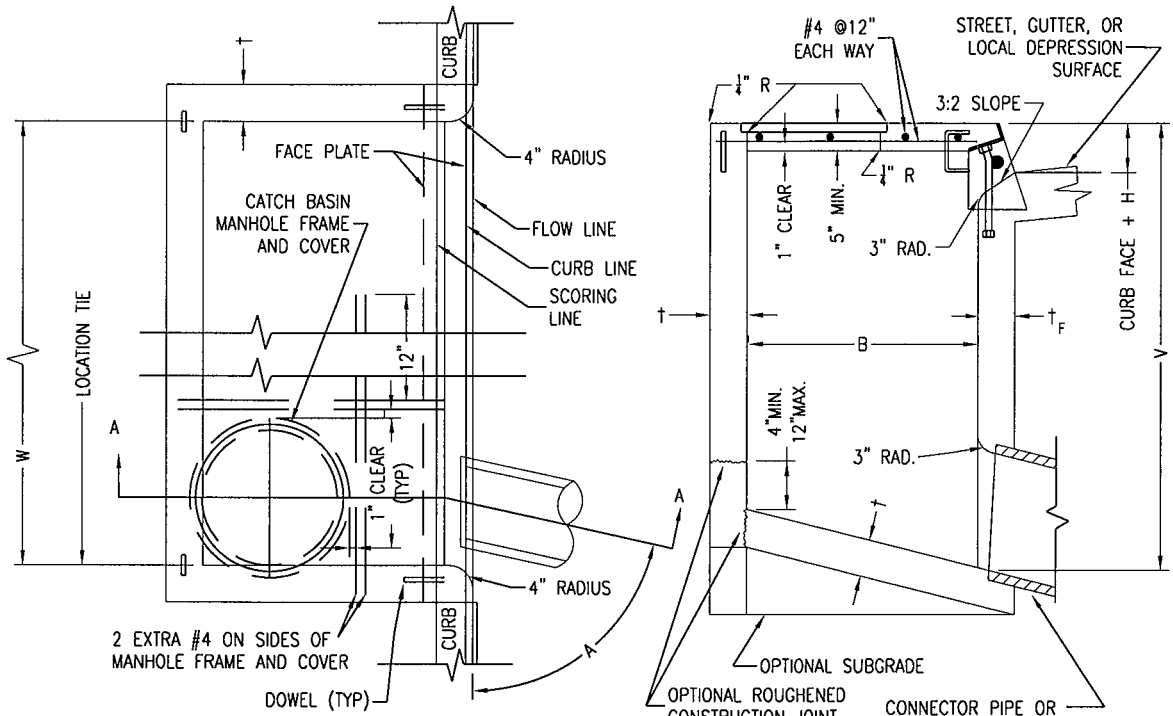
NOTES:
1. ALL CASTINGS TO CONFORM TO ASTM A48, CLASS 35B.
2. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.
3. SHALL ONLY BE USED ON TYPE J INLETS.
4. EXPOSED SURFACES OF THE CASTING WITH THE PARTS ASSEMBLED AND DISASSEMBLED SHALL BE PAINTED WITH COMMERCIAL QUALITY ASPHALTUM PAINT AFTER TESTING AND ASSEMBLY. FRAME CAN BE GALVANIZED STEEL CONFORMING TO ASTM A36 AND A123.
5. WELDED WIRE FABRIC SHALL BE TACK WELD TO FRAME.
6. MANHOLE COVER SHALL HAVE A NON SLIP SURFACE.

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

24" MANHOLE FRAME & COVER FOR TYPE J INLET

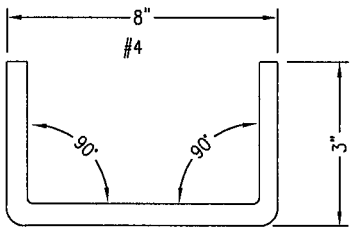
DRAWN BY: STAFF
SCALE: NONE
DATE: 10/15

9-36



PLAN

SECTION A-A



DOWEL DETAIL

STRUCTURAL DATA							
WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS							
MAX W	MAX V	†	$†_F$	REINFORCEMENT REQUIRED IN			
				FRONT WALL	REAR WALL	BOTTOM SLAB	END WALL
3.5'	8'	6"	6"	NO REINFORCEMENT REQUIRED			
3.5'	12'	6"	8"				
7'	6'	6"	6"				
7'	12'	8"	8"				
14'	4'	6"	6"	REINFORCEMENT REQUIRED			
14'	8'	6"	8"				
14'	12'	8"	10"				
21' AND 28'	4'	6"	6"				
	6'	6"	8"				
	8'	8"	8"				
	10'	8"	10"				
	12'	8"	10"				
FOR W > 28', V >12', OR B> 4' SEE PROJECT PLANS							

Michael L Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CURB OPENING CATCH BASIN

DRAWN BY: L.PETERS
SCALE: NONE
REVISION DATE: 12/02

300-1
SHEET 1 OF 2

NOTES:

1. WHERE THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF EXISTING OR PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH SIDEWALK, THE TOP SLAB OF THE BASIN MAY BE POURED EITHER MONOLITHIC WITH THE SIDEWALK OR SEPARATELY, USING THE SAME CLASS OF CONCRETE AS IN THE BASIN. WHEN POURED MONOLITHICALLY, THE SIDEWALK SHALL BE PROVIDED WITH A WEAKENED PLANE OR A 1-INCH DEEP SAWCUT CONTINUOUSLY AROUND THE EXTERNAL PERIMETER OF THE CATCH BASIN WALLS, INCLUDING ACROSS THE FULL WIDTH OF THE SIDEWALK. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN.
2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.
3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8 PERCENT, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.
4. DIMENSIONS:
   - B = 3 FEET 2 INCHES
   - V = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE CATCH BASIN AT THE OUTLET. NOTED ON THE PROJECT PLANS.
   - V_u = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT AT THE UPSTREAM END OF THE BASIN, AND SHALL BE DETERMINED BY THE REQUIREMENTS OF NOTE 3, BUT SHALL NOT BE LESS THAN CURB FACE PLUS 12 INCHES.
   - V_t = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE INLET. NOTED ON THE PROJECT PLANS.
   - H = NOTED ON THE PROJECT PLANS.
   - W = NOTED ON THE PROJECT PLANS.
   - A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.
5. PLACE CONNECTOR PIPE AS INDICATED ON THE PROJECT PLANS UNLESS OTHERWISE SPECIFIED. THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECESSARY TO INSURE MINIMUM 3-INCH PIPE EMBEDMENT ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3-INCH RADIUS OF ROUNDING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70 DEGREES OR GREATER THAN 110 DEGREES, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.
6. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7 FEET ON CENTER (MAXIMUM) ALONG THE BACKWALL.
7. THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:
   - 308 MONOLITHIC CATCH BASIN CONNECTION
   - 309 CATCH BASIN REINFORCEMENT
   - 9-17 CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
   - 9-34 CATCH BASIN MANHOLE FRAME AND COVER

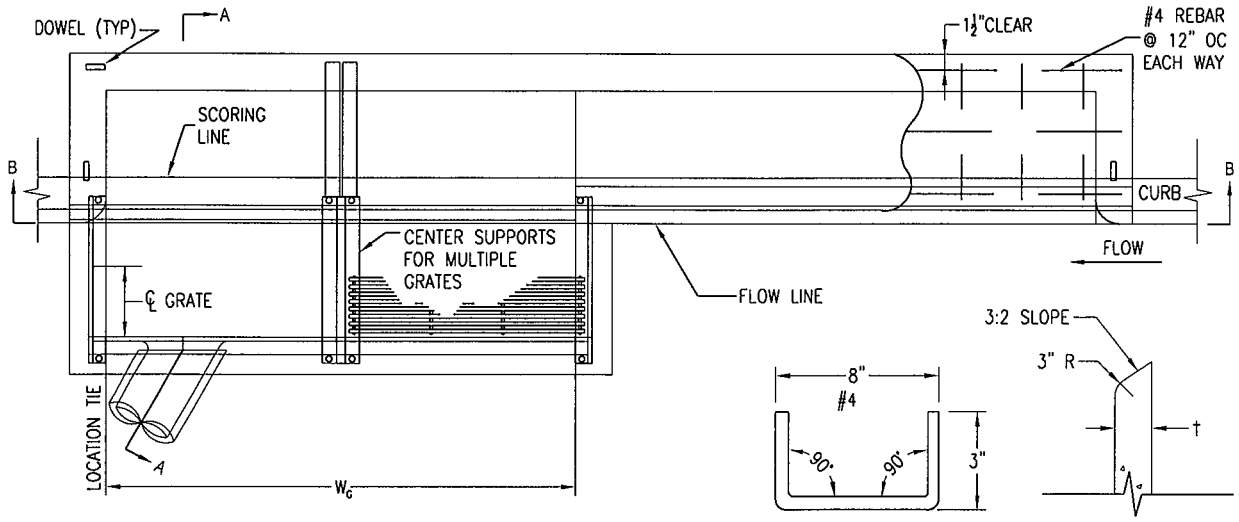
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

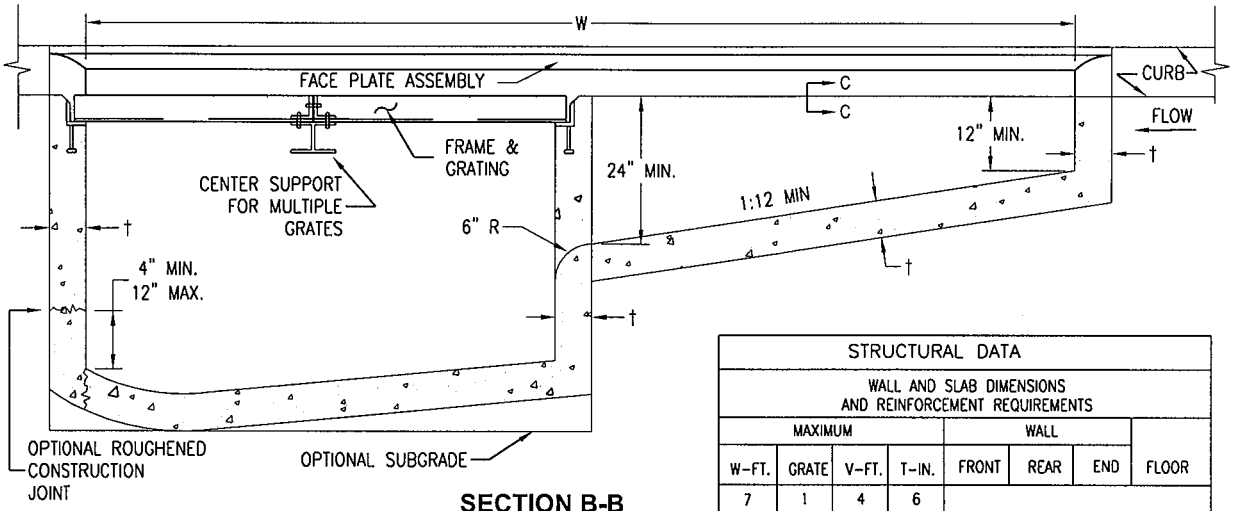
CURB OPENING
CATCH BASIN

DRAWN BY: L.PETERS
SCALE: NONE
REVISION DATE: 10/09

300-1
SHEET 2 OF 2

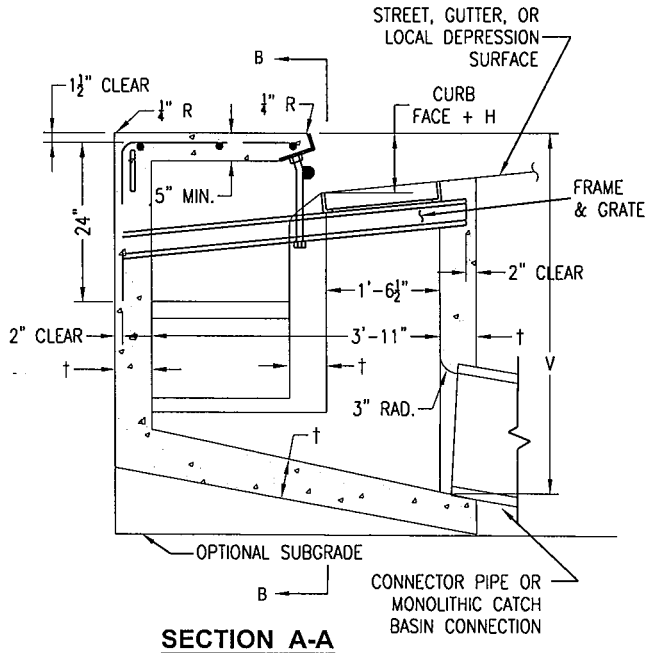


PLAN **DOWEL DETAIL** **SECTION C-C**



SECTION B-B

STRUCTURAL DATA							
WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS							
MAXIMUM				WALL			
W-FT.	GRATE	V-FT.	T-IN.	FRONT	REAR	END	FLOOR
7	1	4	6	NO REINFORCEMENT REQUIRED			
7	1	8	8				
7	1	10	10				
14	3	4	6				
14	2	8	8	REINFORCEMENT REQUIRED			
14	2	10	10				
14	2	12	10				
28	6	4	6				
28	6	6	8				
28	7	4	6				
28	7	8	8				
28	7	10	10				
28	7	12	10				
FOR W > 28', V >12', OR NO. OF GRATES > 7, SEE PROJECT PLANS							



SECTION A-A

Michael L Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CURB OPENING CATCH BASIN

DRAWN BY: L.PETERS
SCALE: NONE
REVISION DATE: 12/02

301-1
SHEET 1 OF 2

NOTES:

1. WHERE THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF EXISTING OR PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH SIDEWALK, THE TOP SLAB OF THE BASIN MAY BE POURED EITHER MONOLITHIC WITH THE SIDEWALK OR SEPARATELY, USING THE SAME CLASS OF CONCRETE AS IN THE BASIN. WHEN POURED MONOLITHICALLY, THE SIDEWALK SHALL BE PROVIDED WITH A WEAKENED PLANE OR A 1-INCH DEEP SAWCUT CONTINUOUSLY AROUND THE EXTERNAL PERIMETER OF THE CATCH BASIN WALLS, INCLUDING ACROSS THE FULL WIDTH OF THE SIDEWALK. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN.
2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.
3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH. FLOOR OF GRATING PORTION SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8 PERCENT, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.
4. DIMENSIONS:
   - V = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE CATCH BASIN AT THE OUTLET. NOTED ON THE PROJECT PLANS.
   - V_t = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE INLET. NOTED ON THE PROJECT PLANS.
   - H = NOTED ON THE PROJECT PLANS.
   - W = NOTED ON THE PROJECT PLANS.
   - W_G = 2 FEET 11-3/8 INCHES FOR ONE GRATING; ADD 3 FEET 5-3/8 INCHES FOR EACH ADDITIONAL GRATING. ONE GRATING IS REQUIRED UNLESS OTHERWISE SHOWN ON THE PROJECT PLANS.
   - A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.
5. PLACE CONNECTOR PIPE AS INDICATED ON THE PROJECT PLANS UNLESS OTHERWISE SPECIFIED. THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECESSARY TO INSURE MINIMUM 3-INCH PIPE EMBEDMENT ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3-INCH RADIUS OF ROUNDING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70 DEGREES OR GREATER THAN 110 DEGREES, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.
6. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7 FEET ON CENTER (MAXIMUM) ALONG THE BACKWALL.
7. THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:
   - 308 MONOLITHIC CATCH BASIN CONNECTION
   - 309 CATCH BASIN REINFORCEMENT
   - 9-14,15 FRAME AND GRATING FOR CATCH BASINS
   - 9-16 CENTER SUPPORT ASSEMBLY FOR MULTIPLE GRATES
   - 9-17 CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
8. THE GRATE SHALL BE PLACED 6" FROM THE BACK OF CURB FOR TYPE 2 CURB AND 8" FROM THE BACK OF CURB FOR TYPE 1 OR 1A CURB.

Michael L Peterson

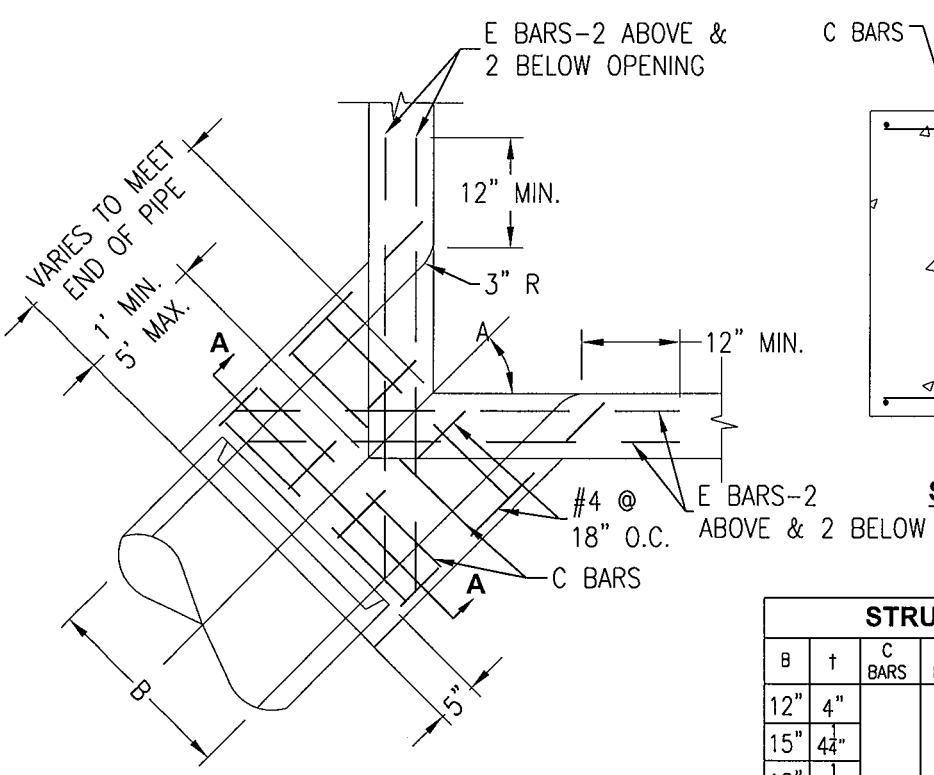
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

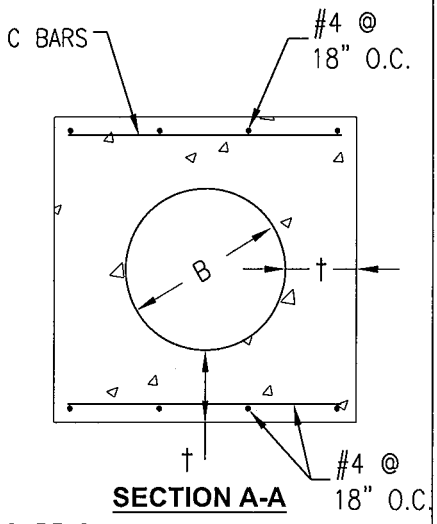
CURB OPENING CATCH BASIN WITH GRATING(S) AND DEBRIS SKIMMER

DRAWN BY: L.PETERS
SCALE: NONE
REVISION DATE: 10/09

301-1
SHEET 2 OF 2

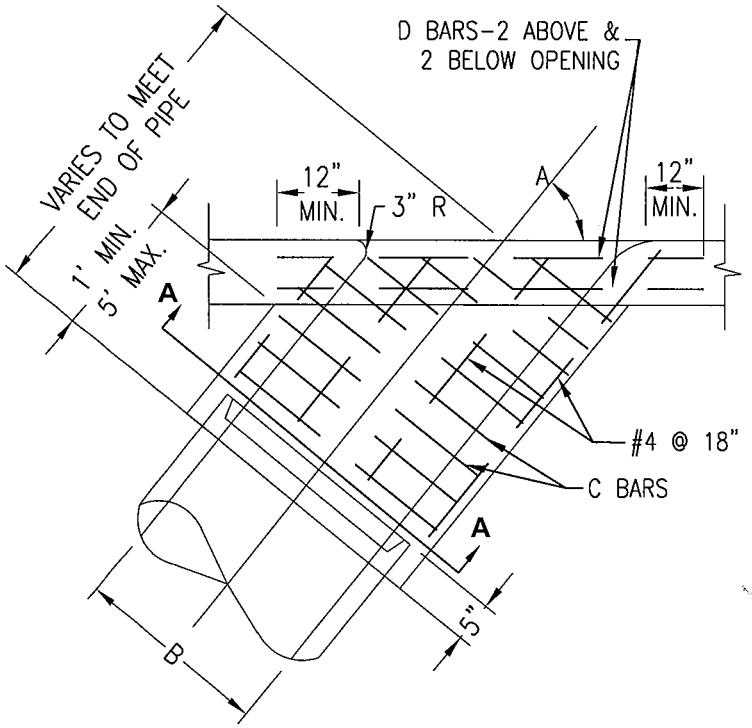


PLAN
CORNER CONNECTION



SECTION A-A

STRUCTURAL DATA							
B	t	C BARS	D&E BARS	B	t	C BARS	D&E BARS
12"	4"	#4 @ 6" O.C.	#5	42"	7 1/2"	#5 @ 6" O.C.	#6
15"	4 1/4"			45"	7 3/4"		
18"	4 1/2"			48"	8"		
21"	5"			51"	8 1/2"		
24"	5 1/4"			54"	9"		
27"	5 1/2"			57"	9 1/4"		
30"	6"			60"	9 1/2"		
33"	6 1/4"			63"	10"		
36"	6 1/2"			66"	10 1/4"		
39"	7"			69"	10 3/4"		
				72"	11"		
FOR B GREATER THAN 72" SEE PROJECT PLAN							



PLAN
SIDE CONNECTION

Michael L. Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

MONOLITHIC CATCH BASIN CONNECTION

DRAWN BY: D. BOLEN
SCALE: NONE
REVISION DATE: 3/07

308-0
SHEET 1 OF 2

NOTES:

1. REINFORCING STEEL SHALL BE 1-1/2 INCHES CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN.
2. REINFORCING STEEL FOR INSIDE FACE OF CATCH BASIN SHALL BE CUT AT CENTER OF OPENING AND BENT INTO WALLS OF MONOLITHIC CATCH BASIN CONNECTION. REINFORCING STEEL FOR OUTSIDE FACE OF CATCH BASIN SHALL BE CUT 2 INCHES CLEAR OF OPENING.
3. CONNECTION SHALL BE PLACED MONOLITHIC WITH CATCH BASIN. THE ROUNDED EDGE OF OUTLET SHALL BE CONSTRUCTED BY PLACING CONCRETE WITH THE SAME CLASS OF CONCRETE AS THE CATCH BASIN AGAINST A CURVED FORM WITH A RADIUS OF 3 INCHES.
4. CONNECTIONS SHALL BE CONSTRUCTED WHEN:
   (A) PIPES INLET OR OUTLET THROUGH CORNER OF CATCH BASIN.
   (B) ANGLE A FOR PIPES THROUGH 30 INCHES IN DIAMETER IS LESS THAN 70 DEGREES OR GREATER THAN 110 DEGREES.

Michael L Peters

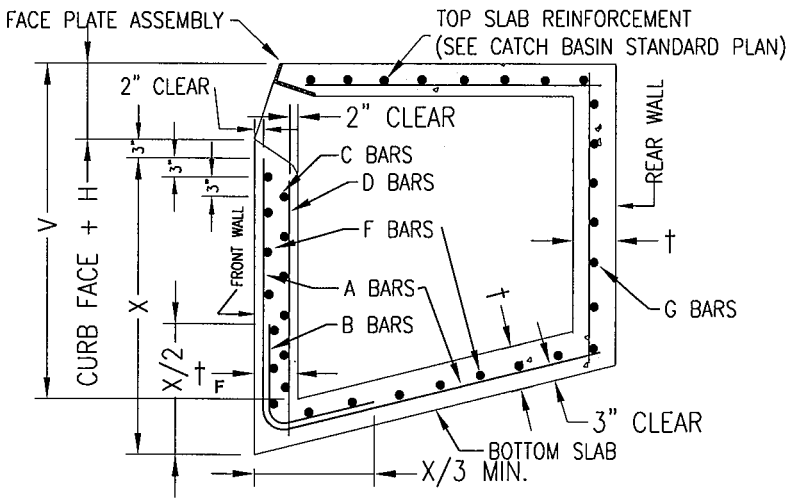
DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

MONOLITHIC CATCH BASIN CONNECTION

DRAWN BY: L.PETERS
SCALE: NONE
REVISION DATE: 01/02

308-0
SHEET 2 OF 2



TYPICAL REINFORCEMENT DETAILS

MAX. W	MAX. V	†	$†_F$	A&B BARS	C BARS	D BARS	E BARS	F BARS	G BARS
3.5'	8'	6"	–	–	–	–	–	–	–
3.5'	12'	8"	8"	–	–	–	–	–	–
7'	6'	6"	6"	–	–	–	–	–	–
7'	12'	8"	8"	–	–	–	–	–	–
14'	4'	6"	6"	–	#4@12"	#4@18"	–	–	–
14'	8'	6"	8"	–	#4@12"	#4@18"	–	–	–
14'	12'	8"	10"	–	#4@6"	#4@18"	–	–	–
28'	4'	6"	6"	#4@24"	–	–	–	#4@18"	–
28'	5'	6"	8"	#4@24"	–	–	–	#4@18"	–
28'	6'	6"	8"	#4@18"	–	–	–	#4@18"	–
28'	7'	8"	8"	#4@17"	–	–	–	#4@18"	–
28'	8'	8"	8"	#4@13"	–	–	–	#4@18"	–
28'	9'	8"	10"	#4@15"	–	–	–	#4@18"	–
28'	10'	8"	10"	#4@12"	–	–	–	#4@18"	–
28'	11'	8"	10"	#5@15"	–	–	#4@10"	#4@18"	#4@18"
28'	12'	8"	10"	#6@18"	–	–	#4@9"	#4@18"	#4@18"
FOR W>28', V>12' OR B>4' SEE PROJECT PLANS									

CURB OPENING CATCH BASIN REINFORCEMENT

NOTE: UNLESS OTHERWISE SPECIFIED REINFORCEMENT FOR CURB OPENING CATCH BASIN SHALL TERMINATE 2 INCHES FROM FACE OF CONCRETE.

Michael L Peterson

DIRECTOR, DEPARTMENT OF WATER RESOURCES
JANUARY 2014

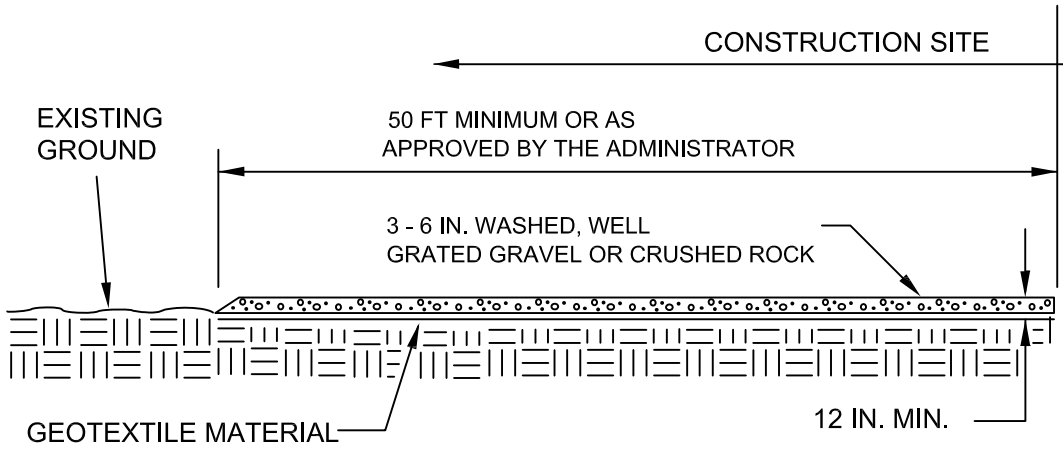
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

CATCH BASIN REINFORCEMENT

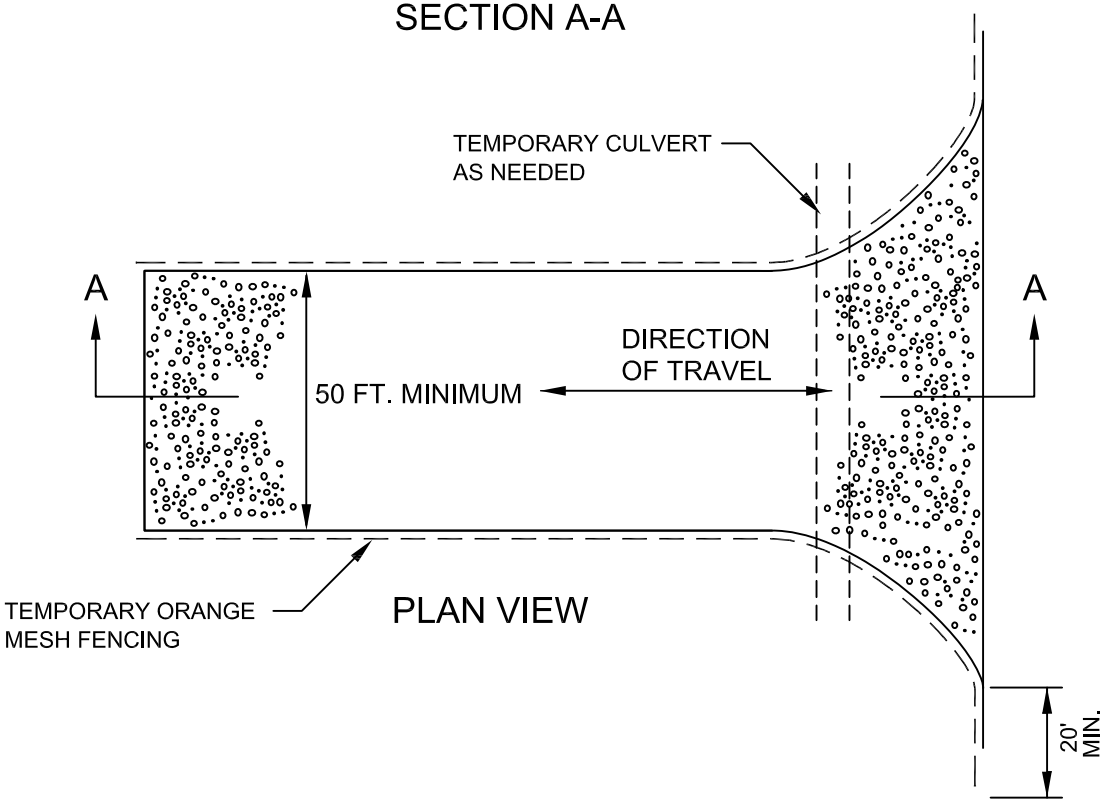
DRAWN BY: B.FORRESTER
SCALE: NONE
REVISION DATE: 01/06

309-0
SHEET 1 OF 1

DRAWING NUMBER	TITLE
11-1	STABALIZED CONSTRUCTION SITE ACCESS
11-4	FIBER ROLLS
11-5	SILT FENCE
11-6	CONCRETE WASHOUT
11-7	INLET SEDIMENT CONTROL
11-9	EROSION CONTROL BLANKETS/MATS CHANNEL INSTALLATION
11-10	EROSION CONTROL BLANKETS/MATS SLOPE INSTALLATION



SECTION A-A



PLAN VIEW

NOTES

1. STABLIZED CONSTRUCTION SITE ACCESS SHALL BE CONSTRUCTED OF 3-6 INCH WASHED, WELL GRATED GRAVEL OR CRUSHED ROCK. MATERIAL SHALL BE PLACED TO A MINIMUM THICKNESS OF 12 INCHES.

2. LENGTH OF ENTRANCE SHALL BE A MINIMUM OF 50 FT. WIDTH SHALL BE A MINIMUM OF 10 FT. OR GREATER IF NECESSARY TO COVER ALL VEHICULAR INGRESS AND EGRESS. PROVIDE AMPLE TURNING RADII.

3. THE ENTRANCE SHALL BE KEPT IN GOOD CONDITION BY OCCASIONAL TOP DRESSING WITH MATERICAL AS SPECIFIED IN NOTE 1.

4. ACCESSES SHALL BE INSPECTED DAILY DURING PERIODS OF HEAVY USAGE, WEEKLY DURING NORMAL USAGE, AND AFTER EACH RAINFALL, WITH MAINTENANCE PROVIDED AS NECESSARY. PERIODIC TOP DRESSING SHALL BE DONE AS NEEDED.

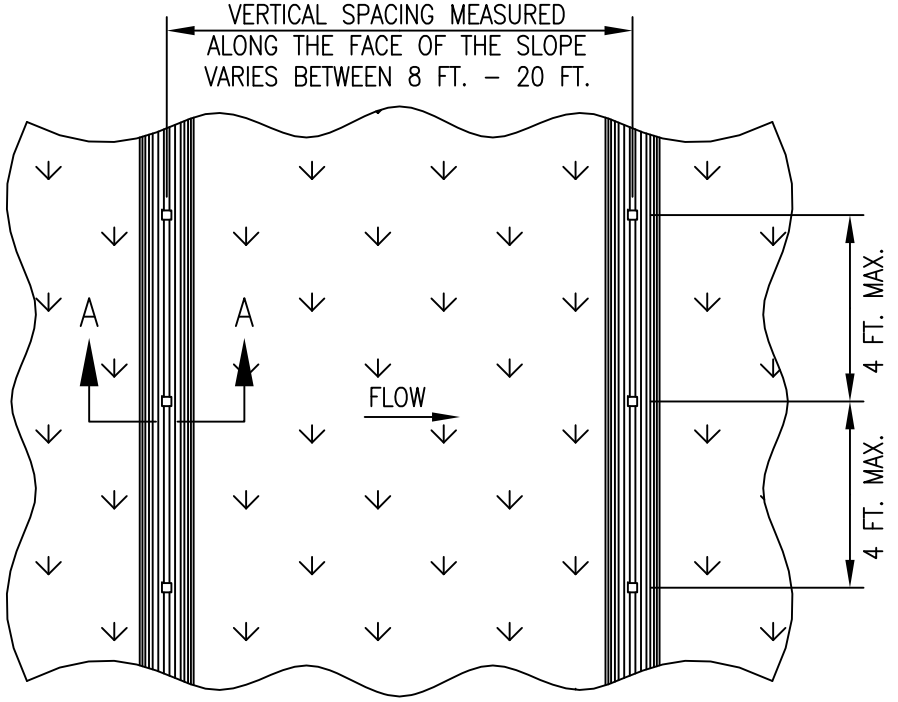
THIS DRAWING SUPERCEDES ALL PREVIOUS VERSIONS

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

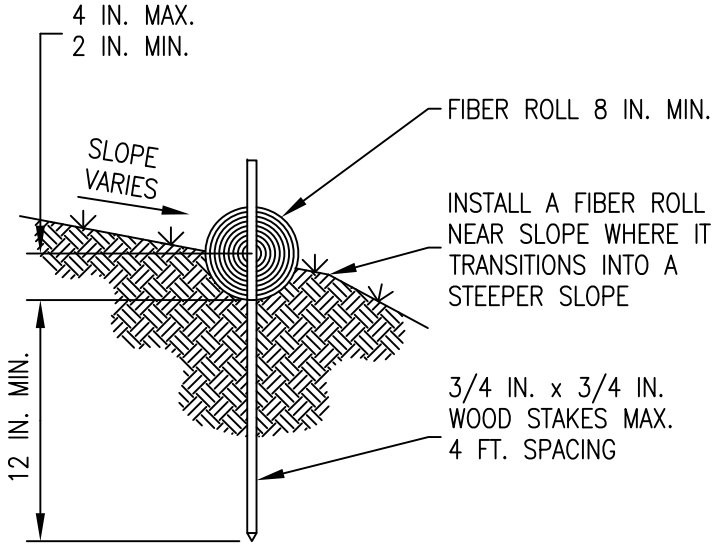
STABILIZED CONSTRUCTION SITE ACCESS

SCALE: NONE
DATE : REV. Nov.2015
DRAWN BY: AW

11-1



TYPICAL FIBER ROLL INSTALLATION



SECTION A – A

NOTES:

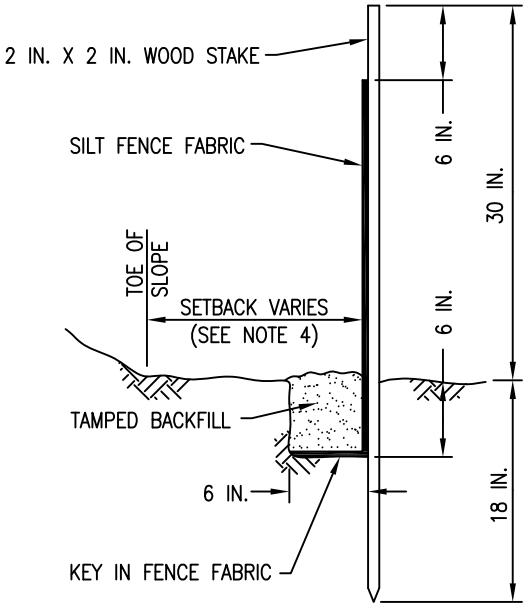
1.) INSTALL FIBER ROLLS IN A ROW ALONG A LEVEL CONTOUR.
2.) AT ENDS OF A ROW TURN THE LAST TWO FEET UP SLOPE SLIGHTLY.
3.) FIBER ROLLS SHALL BE OVERLAPED TIGHTLY AT THE JOINTS, NOT ABUTTED.

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

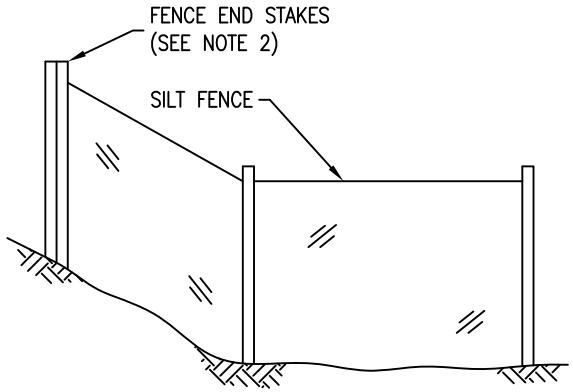
FIBER ROLLS

DRAWN BY: AW
SCALE: NONE
DATE: REV. Nov. 2015

11-4



FENCE SECTION DETAIL



FENCE END DETAIL

NOTES:

1.) CONSTRUCT THE LENGTH OF EACH REACH SO THAT THE CHANGE IN BASE ELEVATION ALONG THE REACH DOES NOT EXCEED 1/3 THE HEIGHT OF THE LINEAR BARRIER. IN NO CASE SHALL THE REACH LENGTH EXCEED 150M.

2.) THE LAST 8 FT. OF FENCE SHALL BE TURNED UP SLOPE.

3.) STAKE DIMENSIONS ARE NOMINAL.

4.) DIMENSIONS MAY VARY TO FIT FIELD CONDITION.

5.) STAKES SHALL BE SPACED AT 8 FT. MAXIMUM AND SHALL BE POSITIONED ON THE DOWNSTREAM SIDE OF THE FENCE.

6.) OVERLAP STAKES, AND FOLD FENCE FABRIC TO AROUND EACH STAKE ONE FULL TURN.

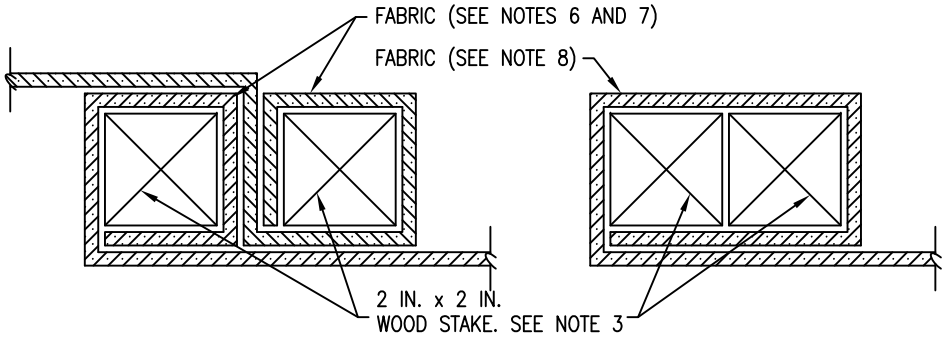
7.) STAKES SHALL BE DRIVEN TIGHTLY TOGETHER TO PREVENT POTENTIAL FLOW THROUGH OF SEDIMENT AT THE JOINT.

8.) FOR END STAKE CONDITION FOLD FENCE FABRIC AROUND (2) STAKES (1) FULL TURN AND SECURE WITH (4) STAPLES.

9.) MINIMUM (4) STAPLES PER STAKE.

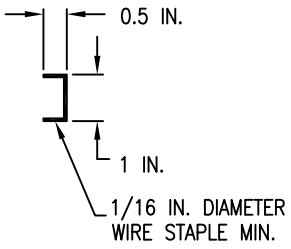
10.) CROSS BARRIERS SHALL BE A MINIMUM OF 1/3 AND A MAXIMUM OF 1/2 THE HEIGHT OF THE LINEAR BARRIER.

11.) BOTTOM OF SILT FENCE SHALL BE KEYED–IN A MINIMUM OF 12".



JOINT DETAIL

END STAKE DETAIL



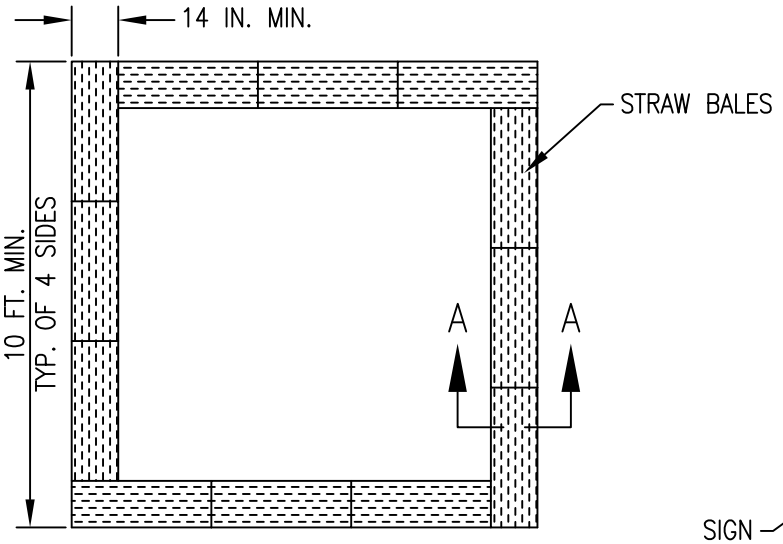
STAPLE DETAIL

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

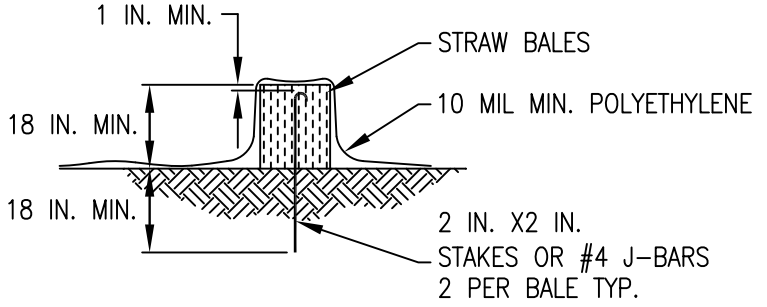
SILT FENCE

DRAWN BY: AW
SCALE: NONE
DATE: REV. Nov. 2015

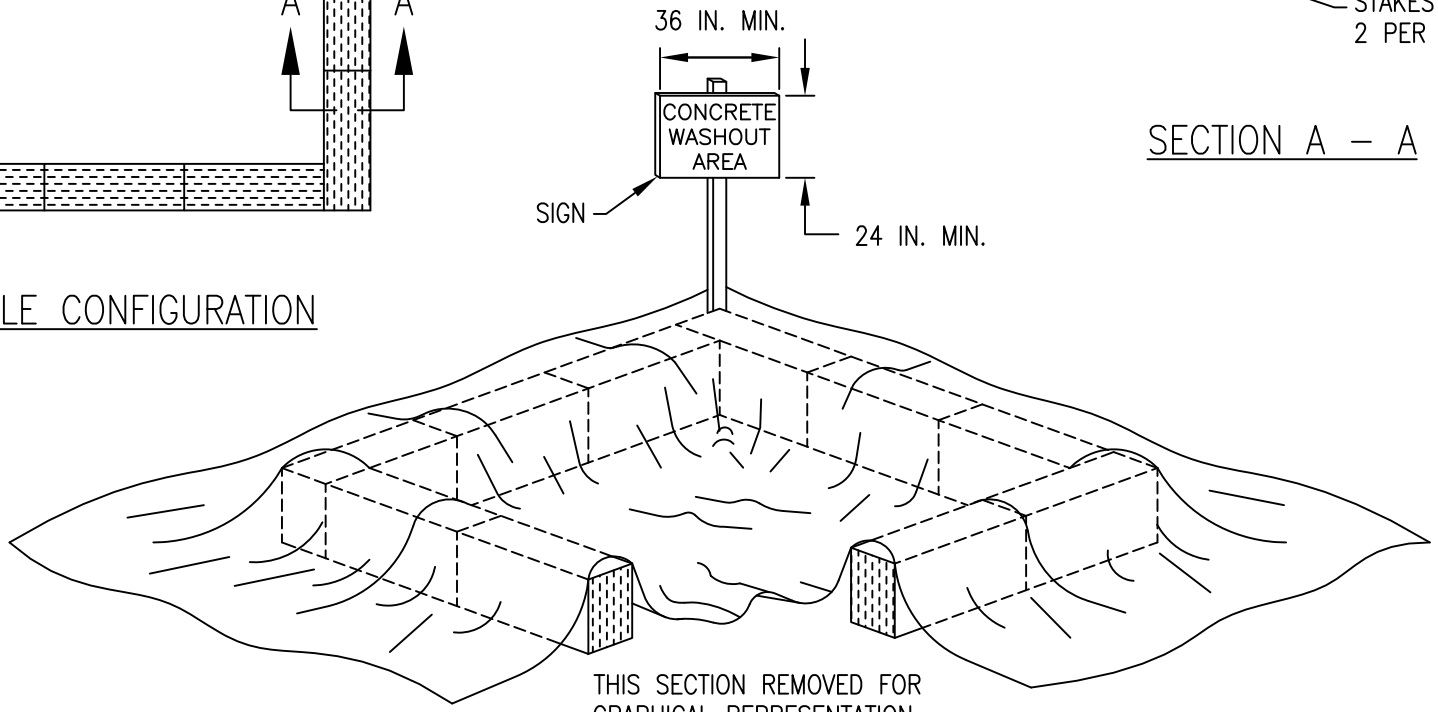
11-5



BALE CONFIGURATION



SECTION A – A



THIS SECTION REMOVED FOR GRAPHICAL REPRESENTATION ONLY. STRAW BALE PERIMETER SHALL BE CONTINUOUS.

NOTES:

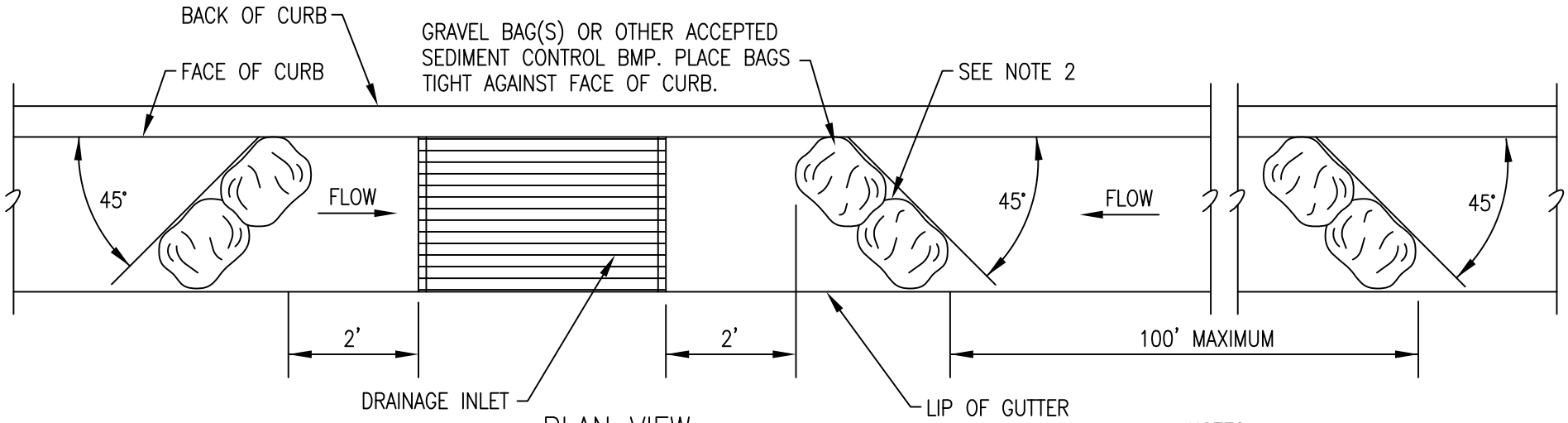
1.) FACE SIGN TOWARD NEAREST STREET OR ACCESS POINT.
2.) CONCRETE WASHOUT SHALL BE LOCATED BEHIND THE CURB AND 50 FT. MINIMUM FROM DRAINAGE INLETS OR WATERCOURSES

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

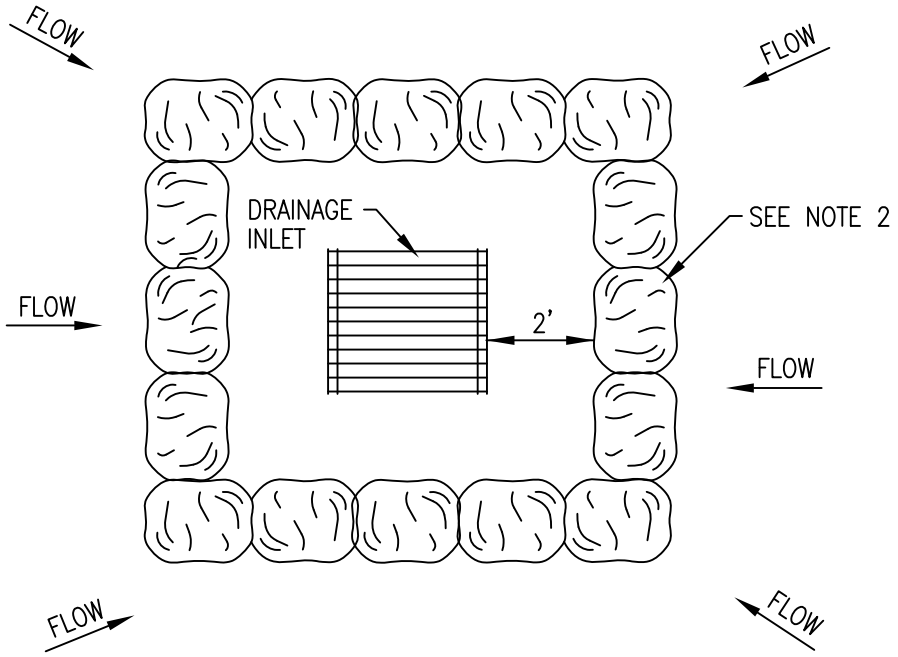
CONCRETE WASHOUT

DRAWN BY: AW
SCALE: NONE
DATE: REV. Nov. 2015

11-6



PLAN VIEW



NOTES:

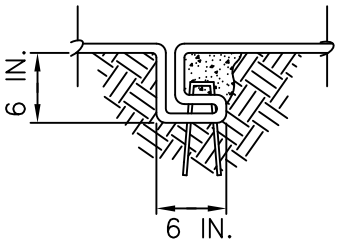
1.) SEDIMENT TRAPPED UPSTREAM OF SEDIMENT CONTROL BMP SHALL BE REMOVED WEEKLY AND PRIOR TO A RAINFALL EVENT.
2.) PLACE BMP'S TIGHTLY TOGETHER AT JOINTS TO PREVENT OR MINIMIZE SEEPAGE AT JOINTS.
3.) STORM DRAIN INLET FILTER BAGS ARE NOT ALLOWED UNLESS APPROVED BY THE MUNICIPAL SEPARATE STORM SEWER SYSTEM PERMIT ADMINISTRATOR.

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

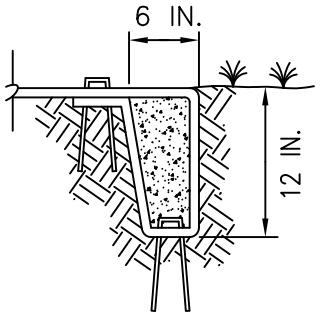
INLET SEDIMENT CONTROL

DRAWN BY: AW
SCALE: NONE
DATE: REV. Nov. 2015

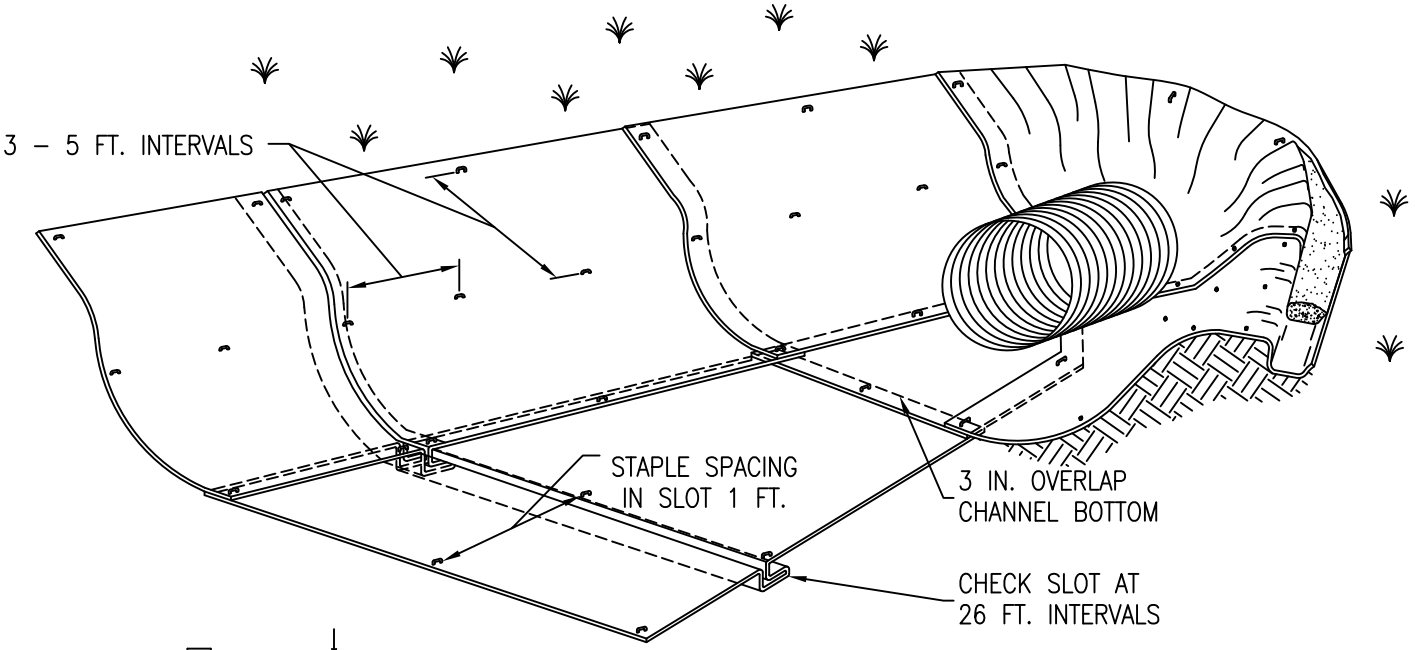
11-7



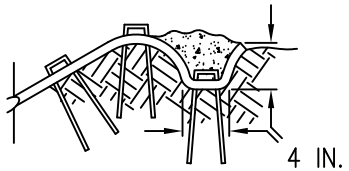
CHECK SLOT



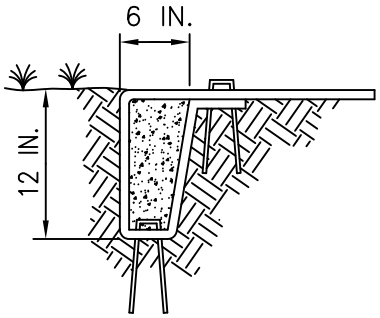
INITIAL CHANNEL
ANCHOR TRENCH



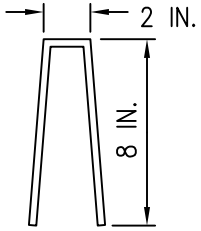
TYPICAL CHANNEL
SOIL STABILIZATION



LONGITUDAL
ANCHOR TRENCH



TERMINAL SLOPE AND
CHANNEL ANCHOR TRENCH



WIRE STAPLES

NOTE:

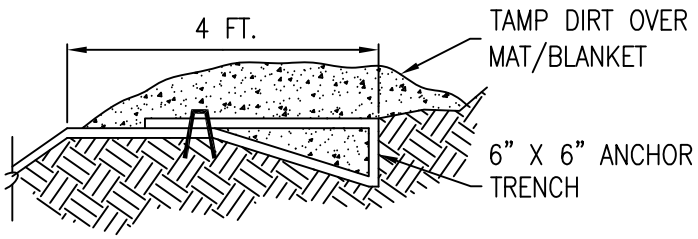
1.) CONSTRUCTION OF CHECK SLOTS, STAKING, STAPLING LAYOUT, AND MAT INSTALLATION ALL TO BE DONE PER MANUFACTURER'S SPECIFICATIONS.

SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

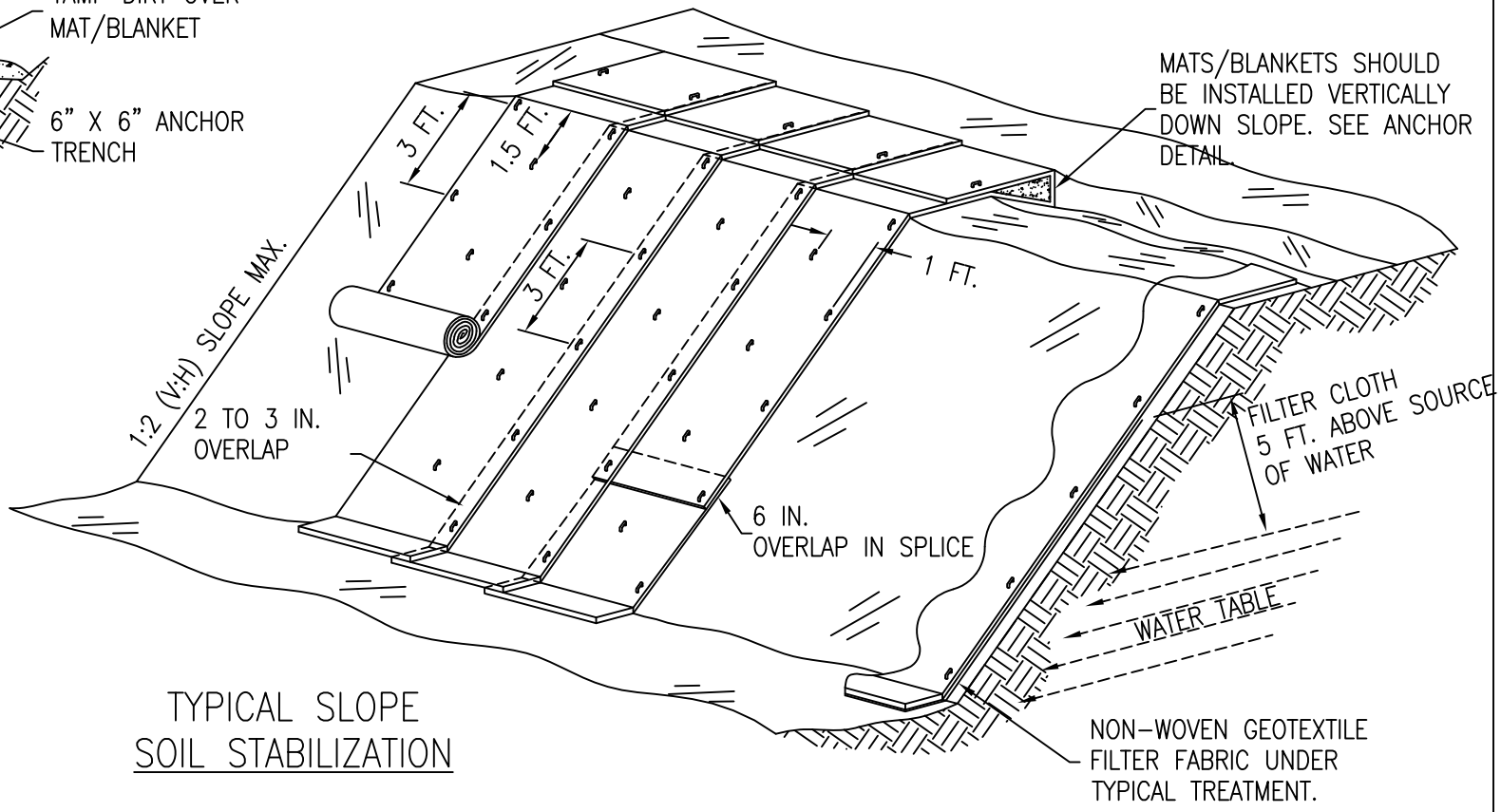
EROSION CONTROL BLANKETS / MATS CHANNEL INSTALLATION

DRAWN BY: AW
SCALE: NONE
DATE: REV Nov. 2015

11-9



ANCHOR DETAIL



TYPICAL SLOPE SOIL STABILIZATION

WET SLOPE LINING

NOTES:

1.) SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2.) LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
3.) INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

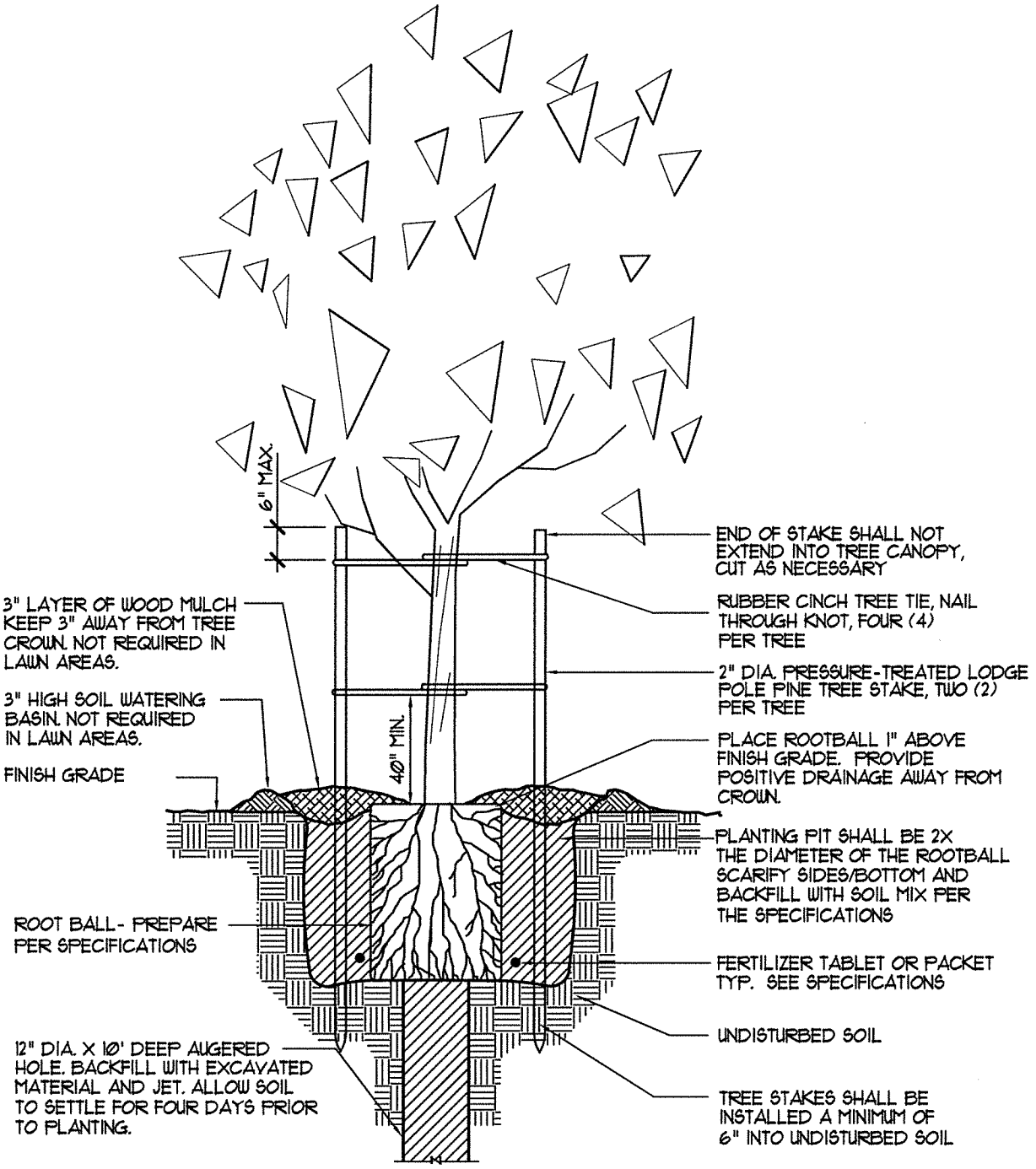
SACRAMENTO COUNTY
MUNICIPAL SERVICES AGENCY

EROSION CONTROL BLANKETS / MATS SLOPE INSTALLATION

DRAWN BY: AW
SCALE: NONE
DATE: REV. Nov. 2015

11-10

DRAWING NUMBER	TITLE
L-1	TREE PLANTING
L-2	SHRUB PLANTING
L-3	REMOTE CONTROL VALVE)
L-4	DRIP IRRIGATION VALVE ASSEMBLY
L-5	GATE VALVE
L-6	QUICK COUPLING VALVE
L-7	MASTER VALVE/FLOW SENSOR (BELOW GRADE)
L-7A	1-1/2" & 2" SIZE MASTER VALVE/FLOW SENSOR (ABOVE GRADE)
L-7B	3" SIZE AND LARGER MASTER VALVE/FLOW SENSOR (ABOVE GRADE)
L-8	FLUSH VALVE
L-9	AIR RELIEF VALVE
L-10	POP-UP ROTOR SPRINKLER
L-11	POP-UP SPRAY SPRINKLER
L-12	BUBBLER ON RISER
L-13	ROOT ZONE BUBBLER
L-14	DRIP IRRIGATION MULTI-OUTLET EMITTER
L-15	SUBSURFACE IN-LINE DRIP IRRIGATION LAYOUT
L-16	SUBSURFACE IN-LINE DRIP IRRIGATION CENTER-FEED SUPPLY MANIFOLD
L-17	SUBSURFACE IN-LINE DRIP IRRIGATION END-FEED SUPPLY MANIFOLD
L-18	DEEP WATERING PIPE FOR TREES
L-19	IRRIGATION CONTROLLER ENCLOSURE
L-20	IRRIGATION SYSTEM TRENCHING
L-21	VALVE BOX/PLANTING LAYOUT
L-22	DRINKING FOUNTAIN
L-23	POST AND CABLE FENCING
L-24	KNOCK-DOWN BOLLARD & STATIONARY BOLLARD
L-25	REMOVABLE BOLLARD
L-26	CONCRETE WALK
L-27	CONCRETE MOWSTRIP
L-28	BIKETRAIL PAVING SECTION
L-29	ROADWAY MEDIAN SECTION
L-30	REDWOOD HEADERBOARD
L-31	DOUBLE PIPE GATE
L-32	SINGLE PIPE GATE



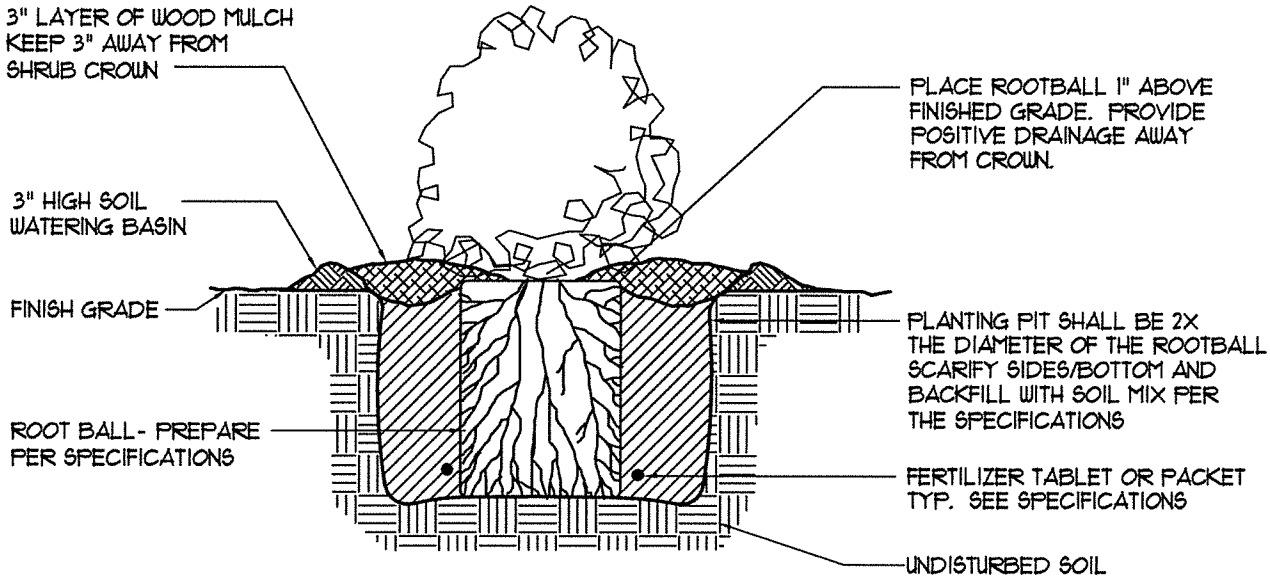
NOTE:
1. FOR 36" BOX TREES, STAKE WITH TWO 2" X 12' LONG SCHEDULE 40 GALVANIZED STEEL PIPES, PAINTED WITH TWO COATS OF DARK GREEN PAINT. TIE TREE WITH A METAL TWIST BRACE BOLTED TO THE STAKES OR OTHER APPROVED TREE TIE AS SPECIFIED.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

TREE PLANTING

SCALE: NONE DATE: 11/2013	DRAWN BY: GMM/HY CHECKED BY: HY	SHEET: L-1

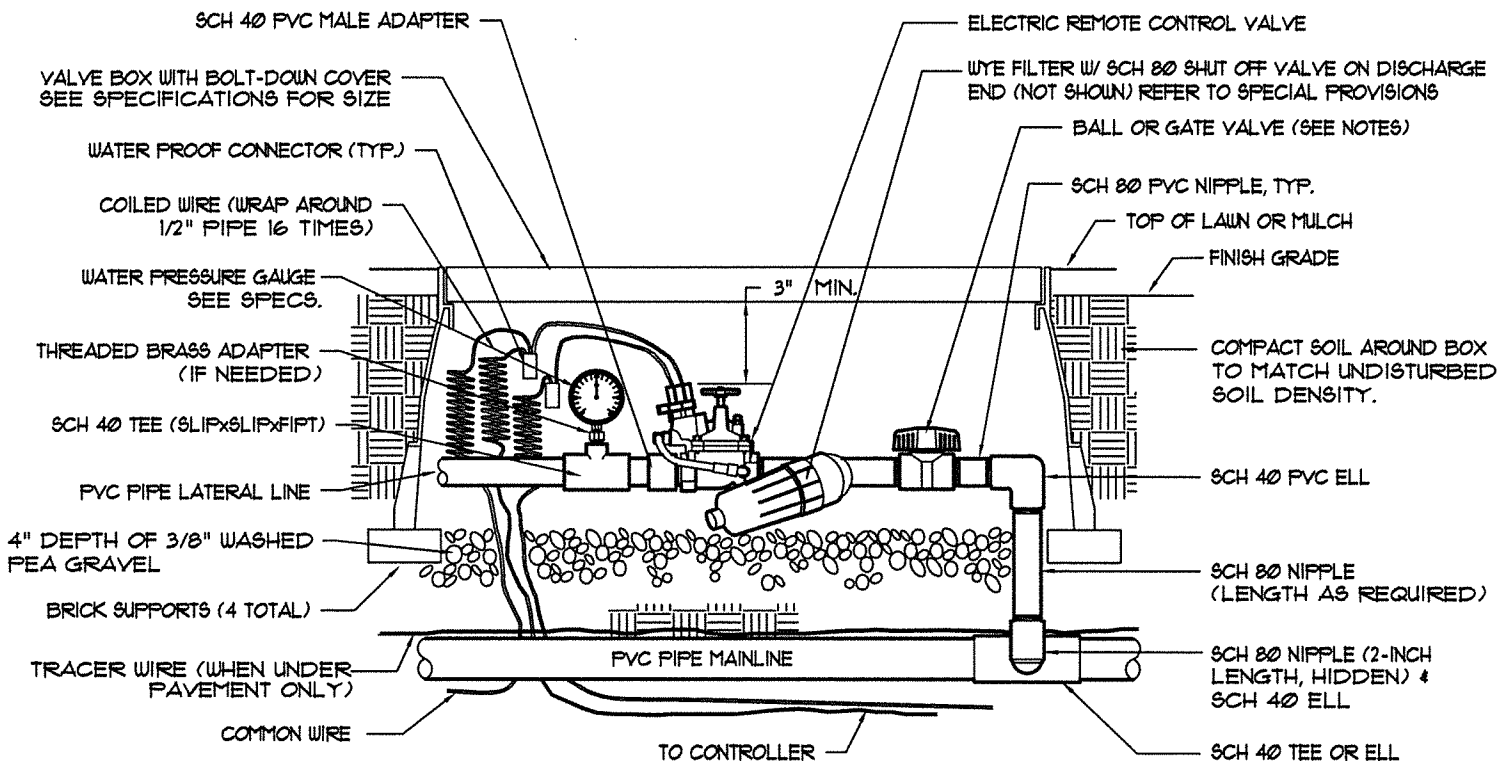


CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

SHRUB PLANTING

SCALE: NONE DATE: 11/2013	DRAWN BY: GMM/HY CHECKED BY: HY	SHEET: L-2



NOTES:

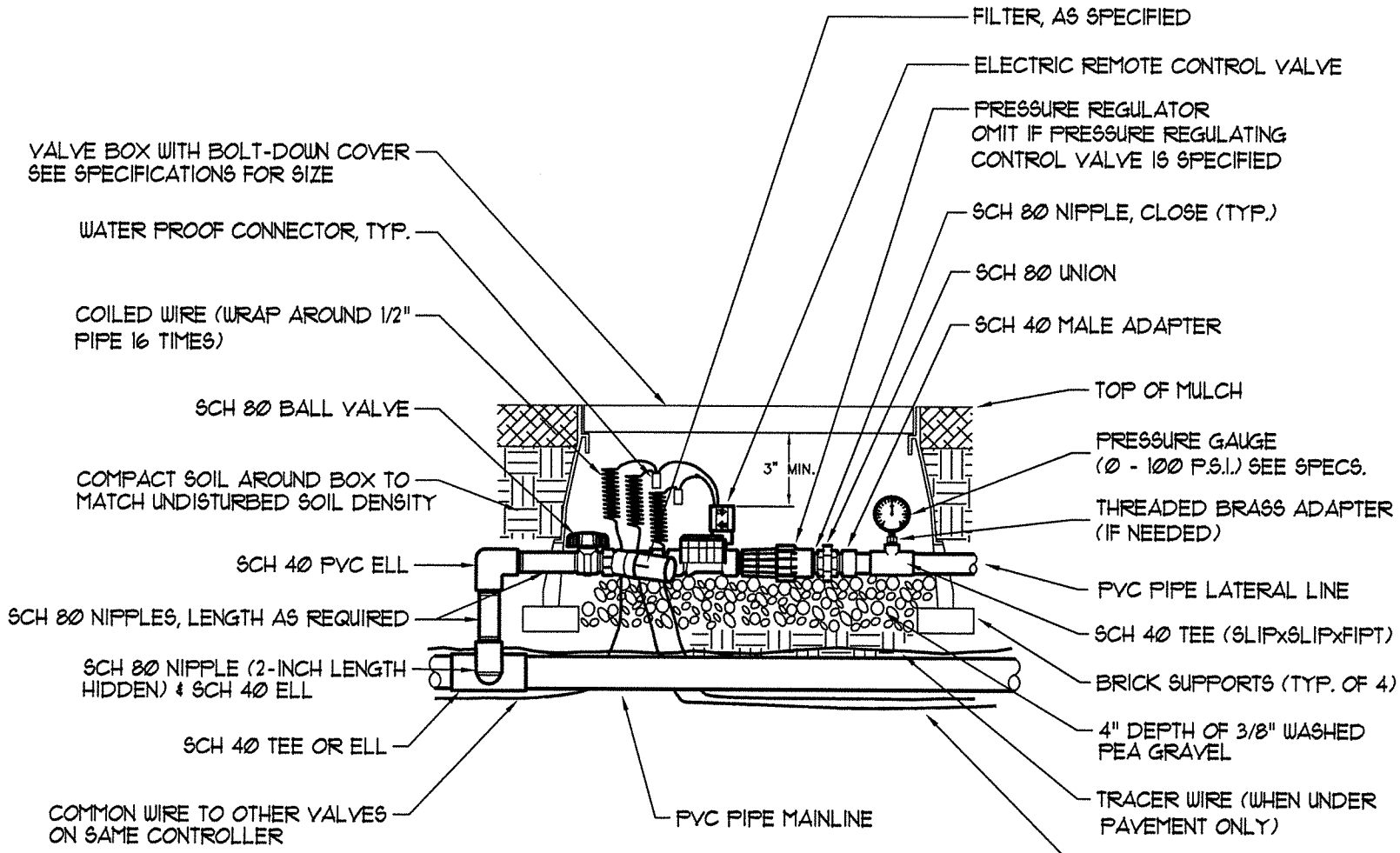
1. ALL WIRE SHALL BE TAPED AND BUNDLED EVERY TEN FEET AND SHALL BE INSTALLED IN COMPLIANCE WITH LOCAL CODE.
2. ONE SPARE WIRE (NOT SHOWN) SHALL BE PULLED TO EACH VALVE AND COILED IN BOX.
3. SHUT-OFF VALVES 3" AND SMALLER SHALL BE SCH 80 BALL VALVES. VALVES LARGER THAN 3" SHALL BE BRASS GATE VALVES.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES AGENCY

REMOTE CONTROL VALVE

SCALE: NONE DATE: 11/2013	DRAWN BY: GMM/HY CHECKED BY: HY	SHEET: L-3



NOTES:

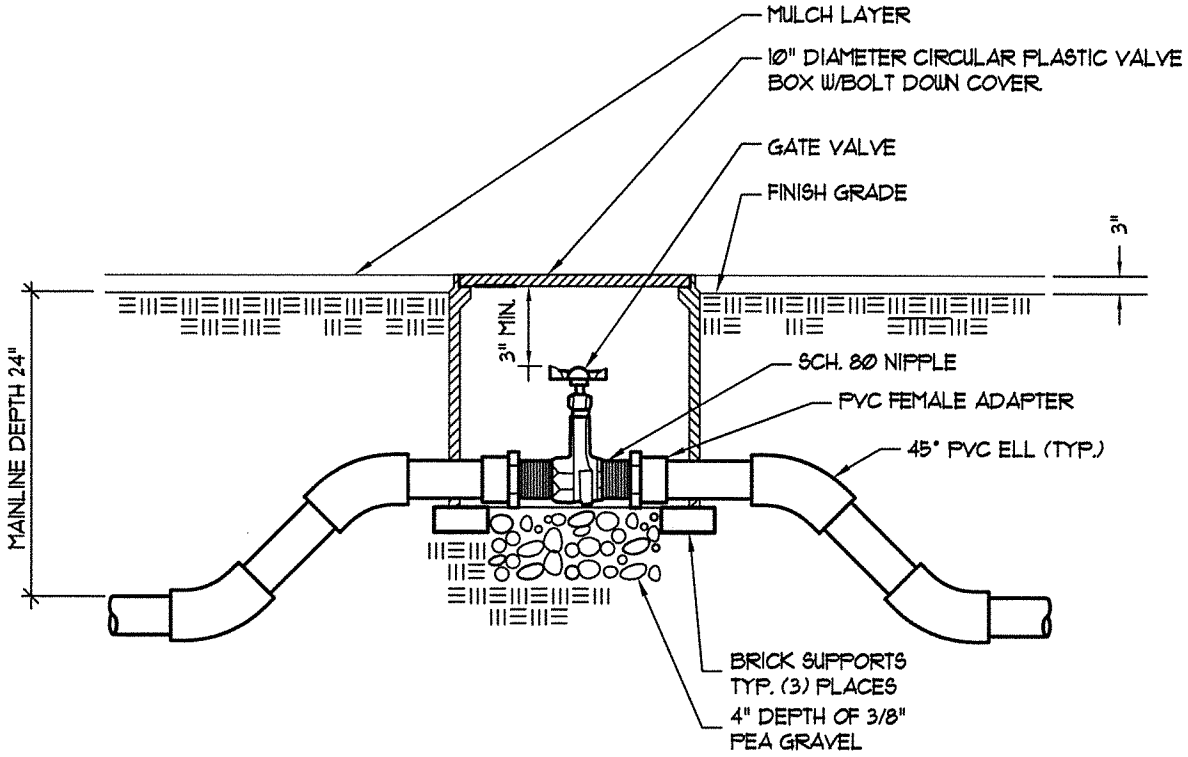
1. ALL WIRE SHALL BE TAPED AND BUNDLED EVERY TEN FEET AND SHALL BE INSTALLED AS PER LOCAL CODE.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

DRIP IRRIGATION VALVE ASSEMBLY

SCALE: NONE DATE: 11/2013	DRAWN BY: GMM/HY CHECKED BY: HY	SHEET: L-4



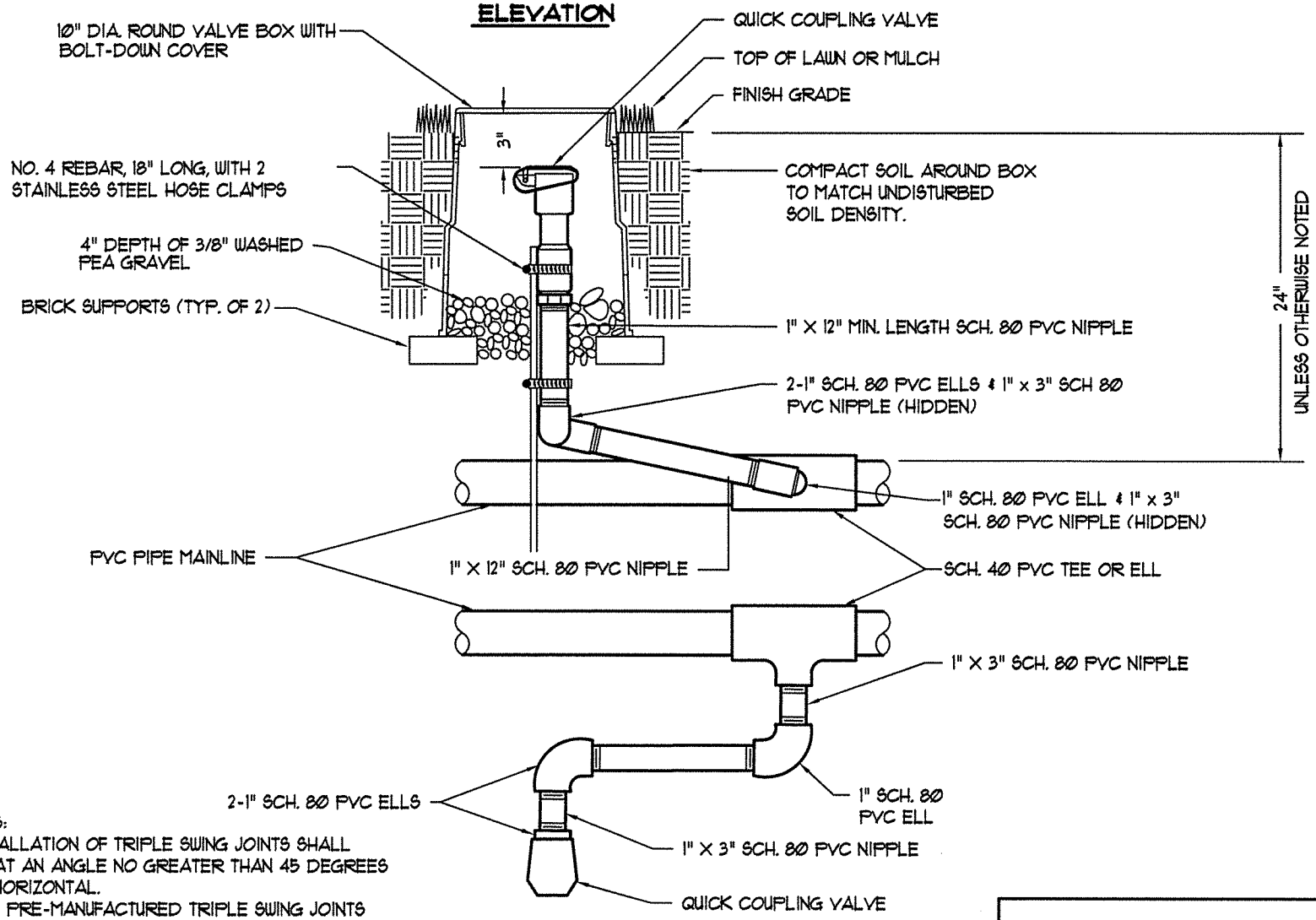
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

GATE VALVE

SCALE: NONE DATE: 11/2013	DRAWN BY: SB CHECKED BY: HY	SHEET: L-5

ELEVATION



PLAN VIEW

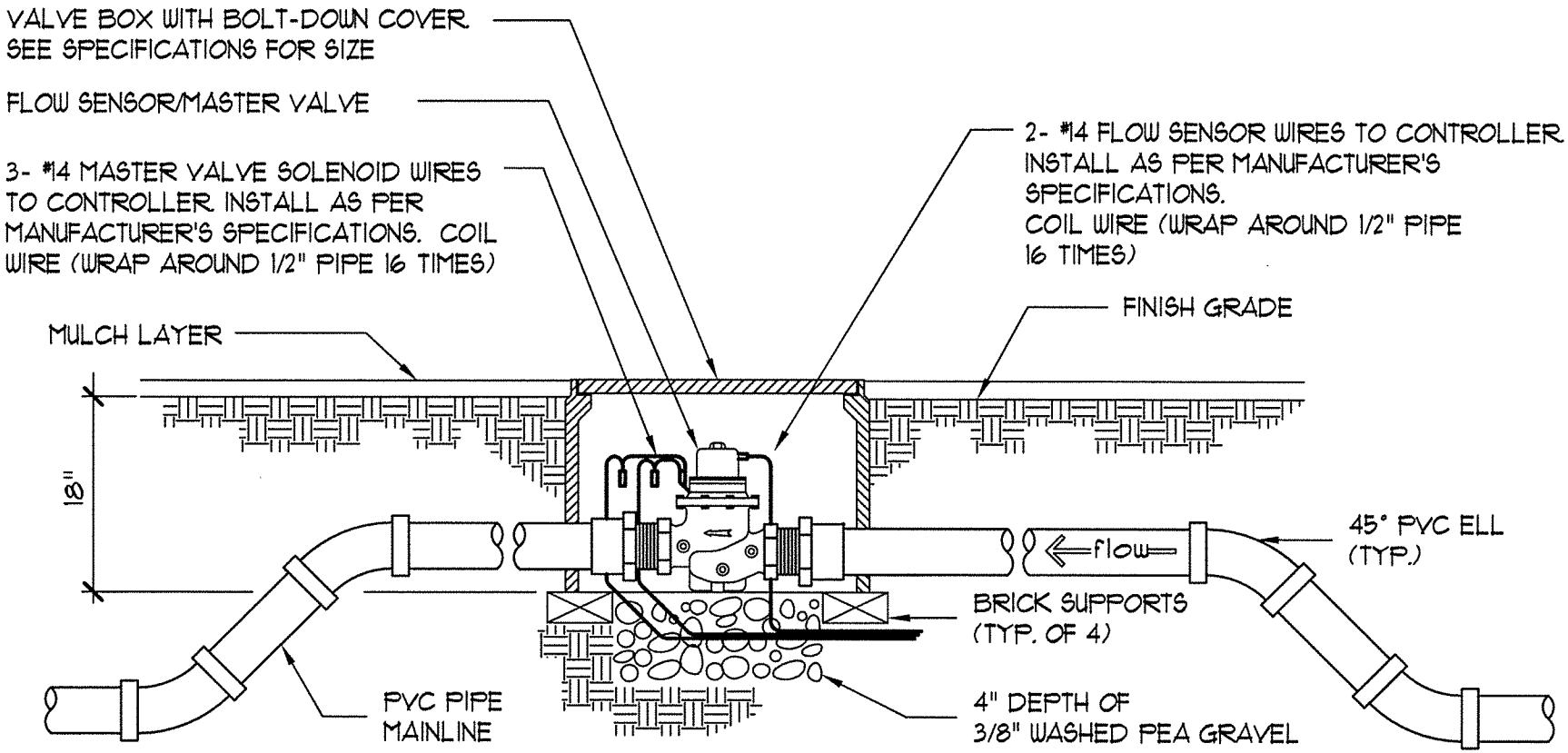
NOTES:
1. INSTALLATION OF TRIPLE SWING JOINTS SHALL BE AT AN ANGLE NO GREATER THAN 45 DEGREES TO HORIZONTAL.
2. ALL PRE-MANUFACTURED TRIPLE SWING JOINTS SHALL BE MANUFACTURED WITH O-RINGS AND SHALL BE RATED AT 200 PSI.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

QUICK COUPLING VALVE

SCALE: NONE	DRAWN BY: GMM	SHEET:
DATE: 11/2013	CHECKED BY: HY	L-6

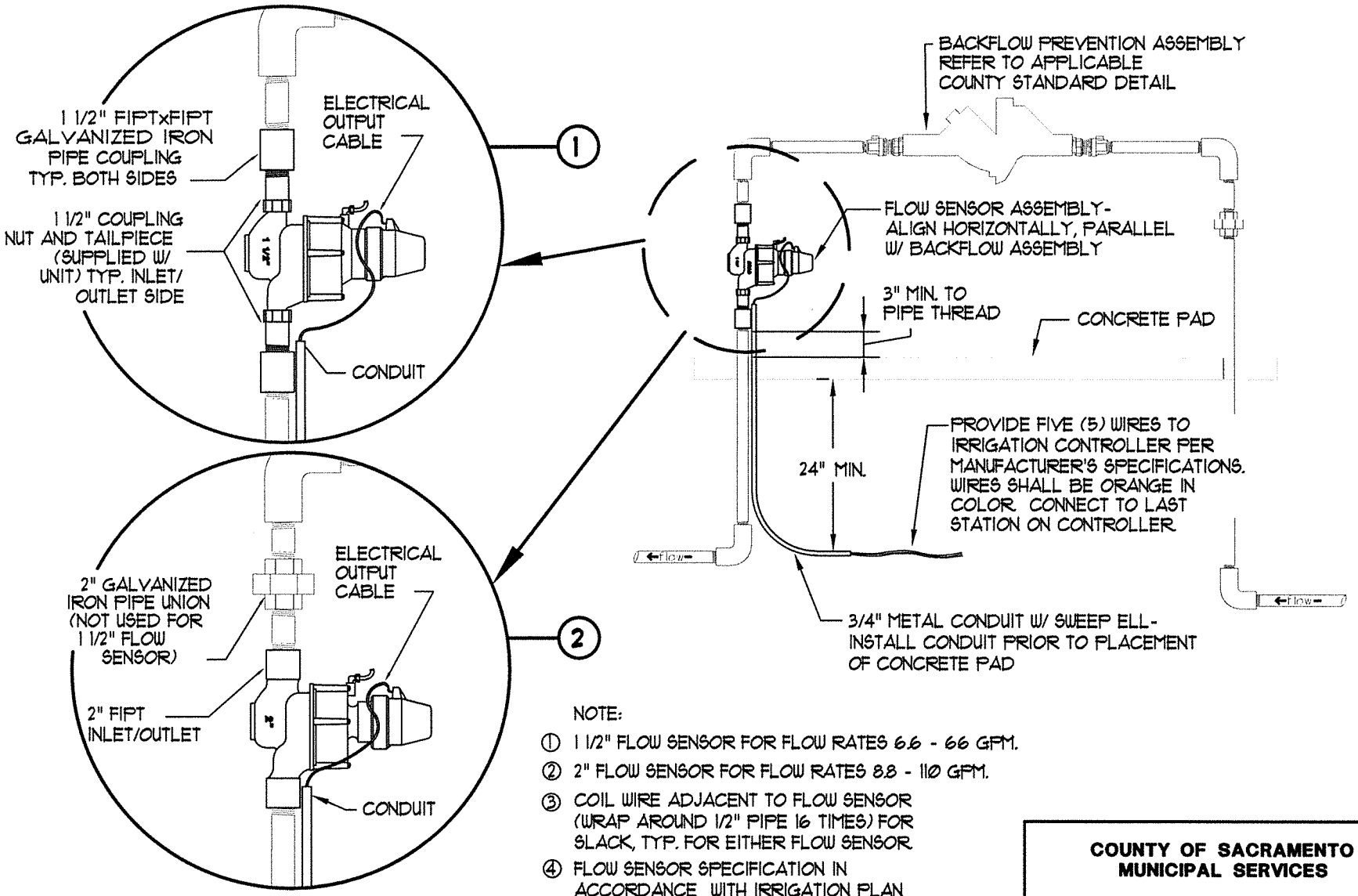


CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

MASTER VALVE/ FLOW SENSOR (BELOW GRADE)

SCALE: NONE DATE: 11/2013	DRAWN BY: GA CHECKED BY: HY	SHEET: L-7



NOTE:

① 1 1/2" FLOW SENSOR FOR FLOW RATES 6.6 - 66 GPM.

② 2" FLOW SENSOR FOR FLOW RATES 8.8 - 110 GPM.

③ COIL WIRE ADJACENT TO FLOW SENSOR (WRAP AROUND 1/2" PIPE 16 TIMES) FOR SLACK, TYP. FOR EITHER FLOW SENSOR.

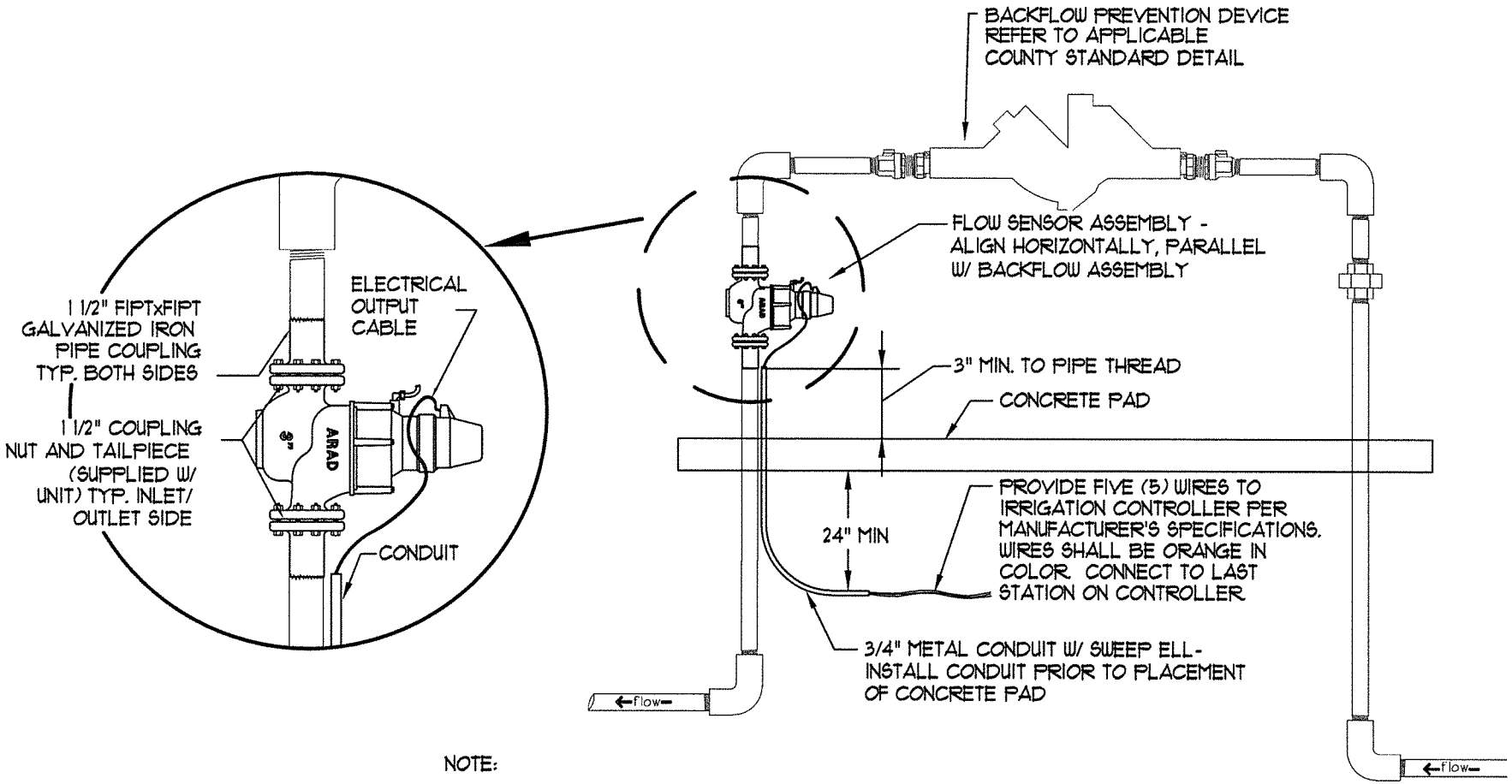
④ FLOW SENSOR SPECIFICATION IN ACCORDANCE WITH IRRIGATION PLAN

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

1-1/2" & 2" SIZE MASTER VALVE/FLOW SENSOR (ABOVE GRADE)

SCALE: NONE DATE: 12/2007	DRAWN BY: SF/HY CHECKED BY: HY	SHEET: L-7A



NOTE:

① COIL WIRE ADJACENT TO FLOW SENSOR (WRAP AROUND 1/2" PIPE 16 TIMES) FOR SLACK, TYP.

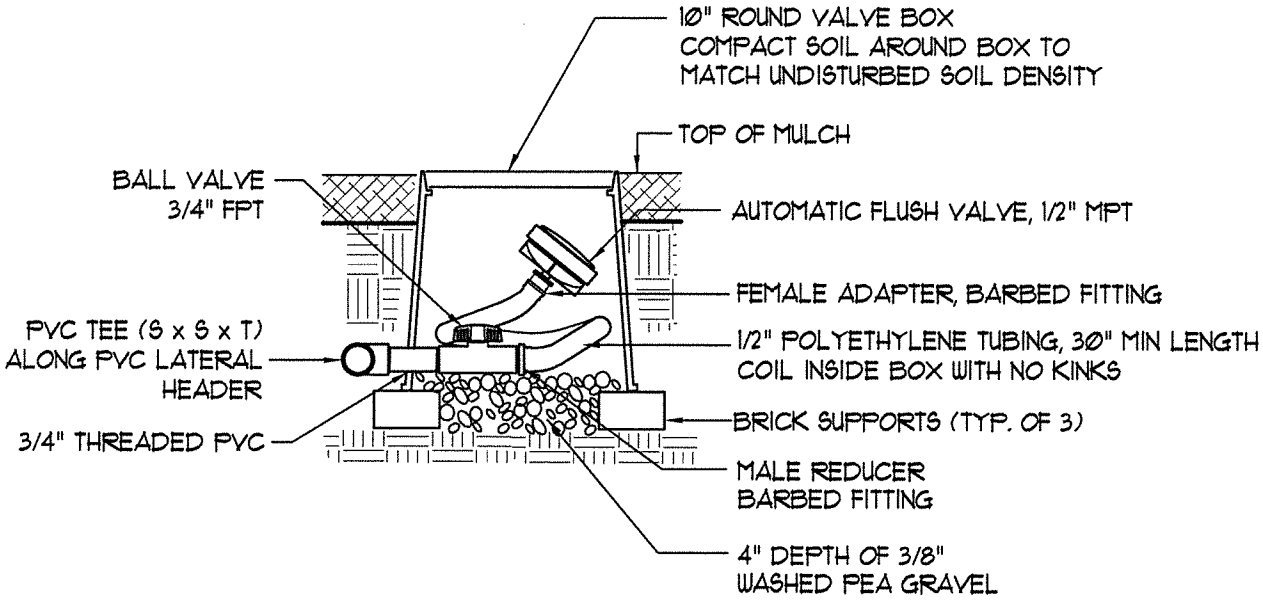
② FLOW SENSOR SPECIFICATION IN ACCORDANCE WITH IRRIGATION PLAN

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

3" SIZE AND LARGER MASTER VALVE/FLOW SENSOR (ABOVE GRADE)

SCALE: NONE DATE: 12/2007	DRAWN BY: SF/HY CHECKED BY: HY	SHEET: L-7B

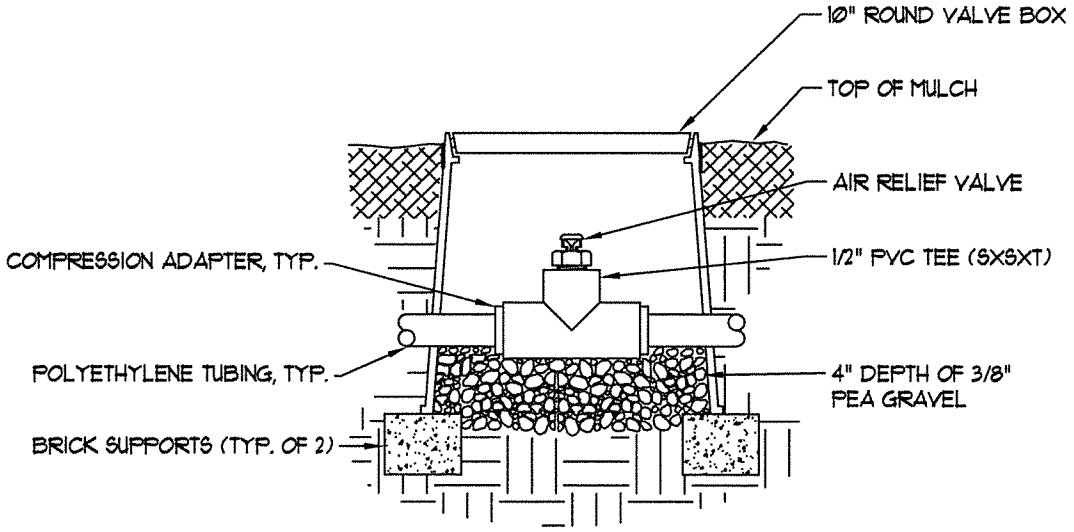


CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

FLUSH VALVE

SCALE: NONE	DRAWN BY: HY	SHEET:
DATE: 11/2013	CHECKED BY: HY	L-8



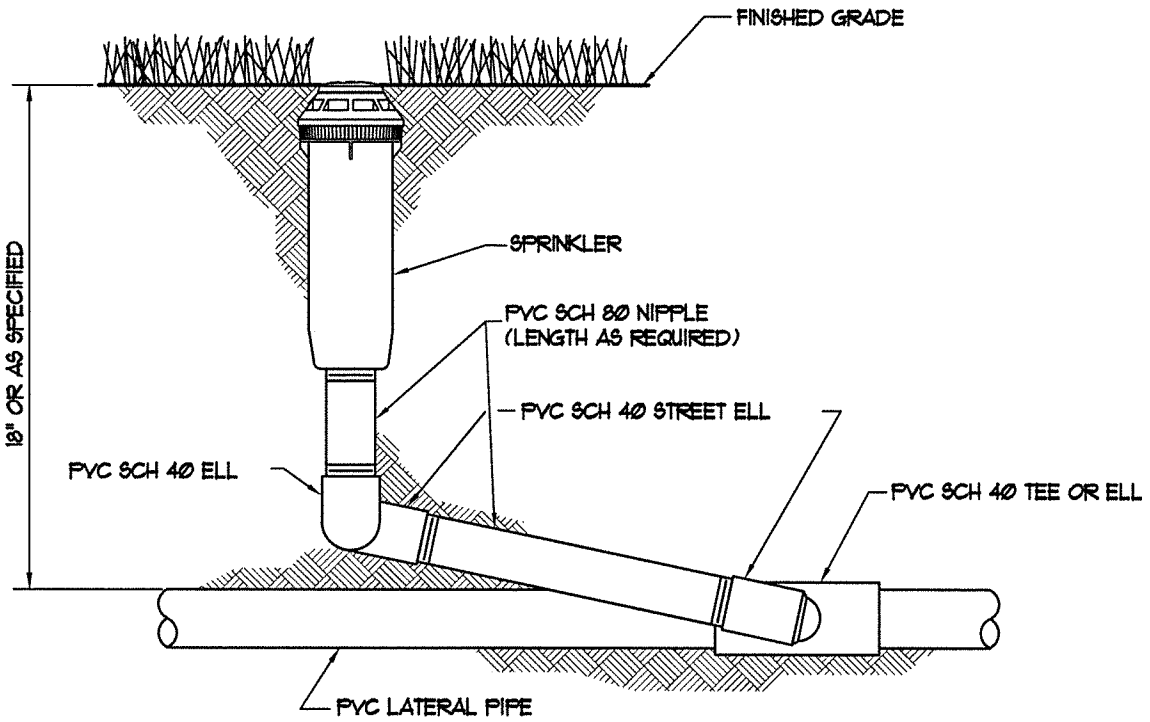
NOTE:
1. AIR RELIEF VALVE SHALL BE INSTALLED AT THE HIGHEST POINT OF THE SYSTEM, ABOVE ALL DRIPLINE LATERALS.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

AIR RELIEF VALVE

SCALE: NONE DATE: 11/2013	DRAWN BY: GMM/HY CHECKED BY: HY	SHEET: L-9



NOTES:

1. INSTALLATION OF TRIPLE SWING JOINTS SHALL BE AT AN ANGLE NO GREATER THAN 45 DEGREES TO HORIZONTAL.

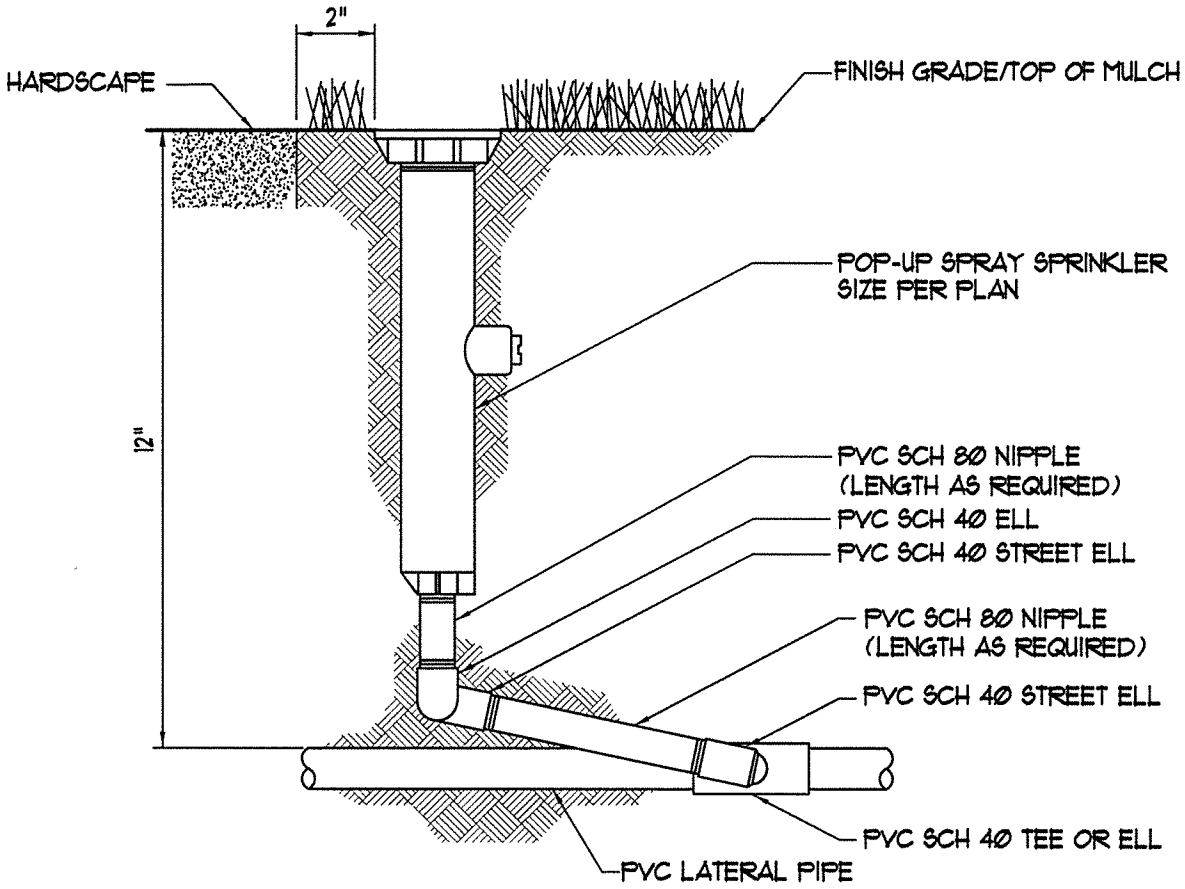
2. ALL PRE-MANUFACTURED TRIPLE SWING JOINTS SHALL BE MANUFACTURED WITH O-RINGS AND SHALL BE RATED AT 200 PSI.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

POP-UP ROTOR SPRINKLER

SCALE: NONE	DRAWN BY: TRU P.	SHEET:
DATE: 11/2000	CHECKED BY: GMM	L-10



NOTES:

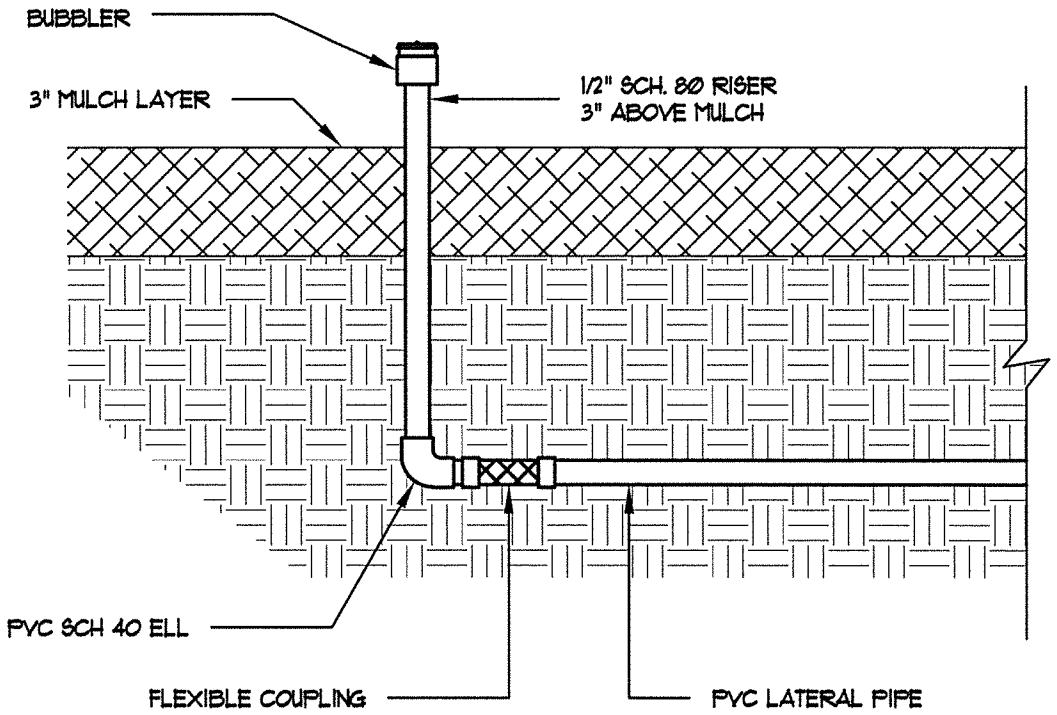
1. INSTALLATION OF TRIPLE SWING JOINTS SHALL BE AT AN ANGLE NO GREATER THAN 45 DEGREES TO HORIZONTAL.
2. ALL PRE-MANUFACTURED TRIPLE SWING JOINTS SHALL BE MANUFACTURED WITH O-RINGS AND SHALL BE RATED AT 200 PSI.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

POP-UP SPRAY SPRINKLER

SCALE: NONE	DRAWN BY: TRU P.	SHEET:
DATE: 11/2000	CHECKED BY: GMM	L-11

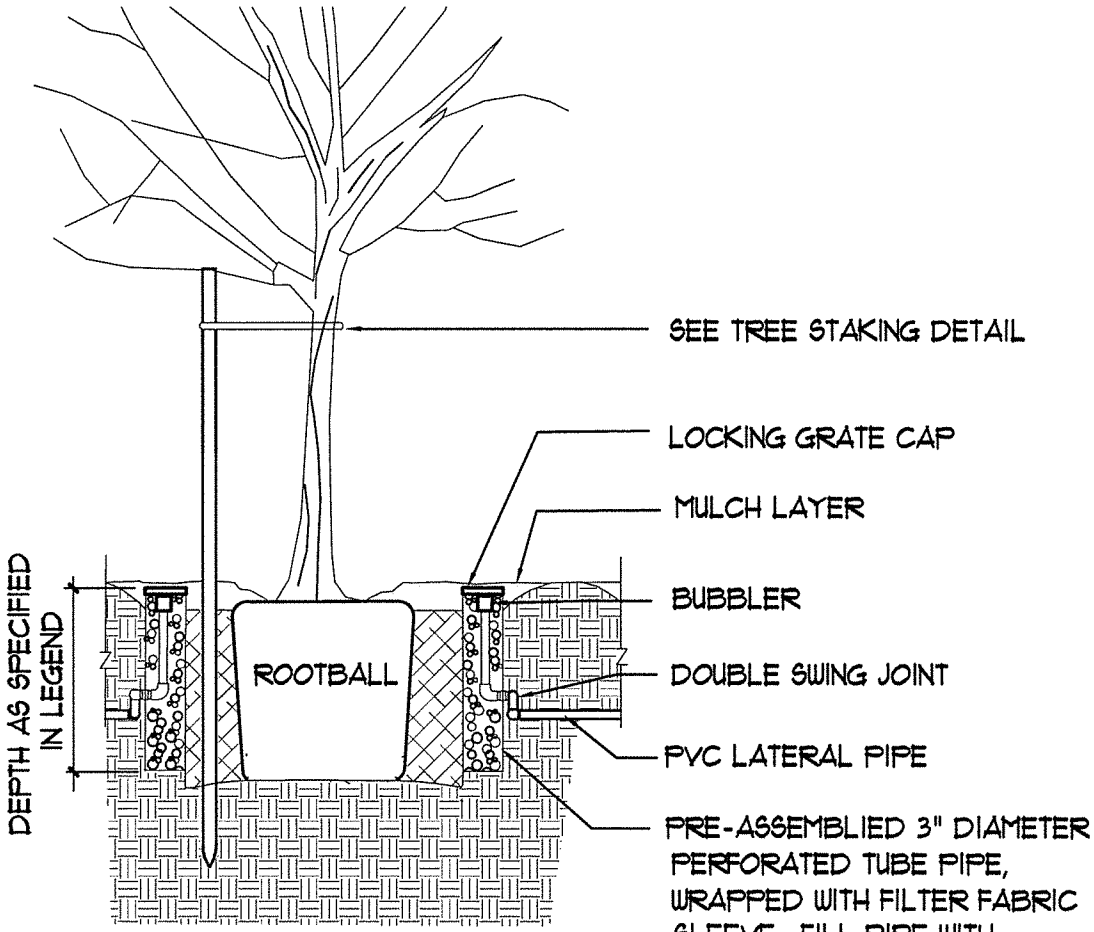


CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

BUBBLER ON RISER

SCALE: NONE	DRAWN BY: G.A.	SHEET:
DATE: 11/2000	CHECKED BY: GMM	L-12



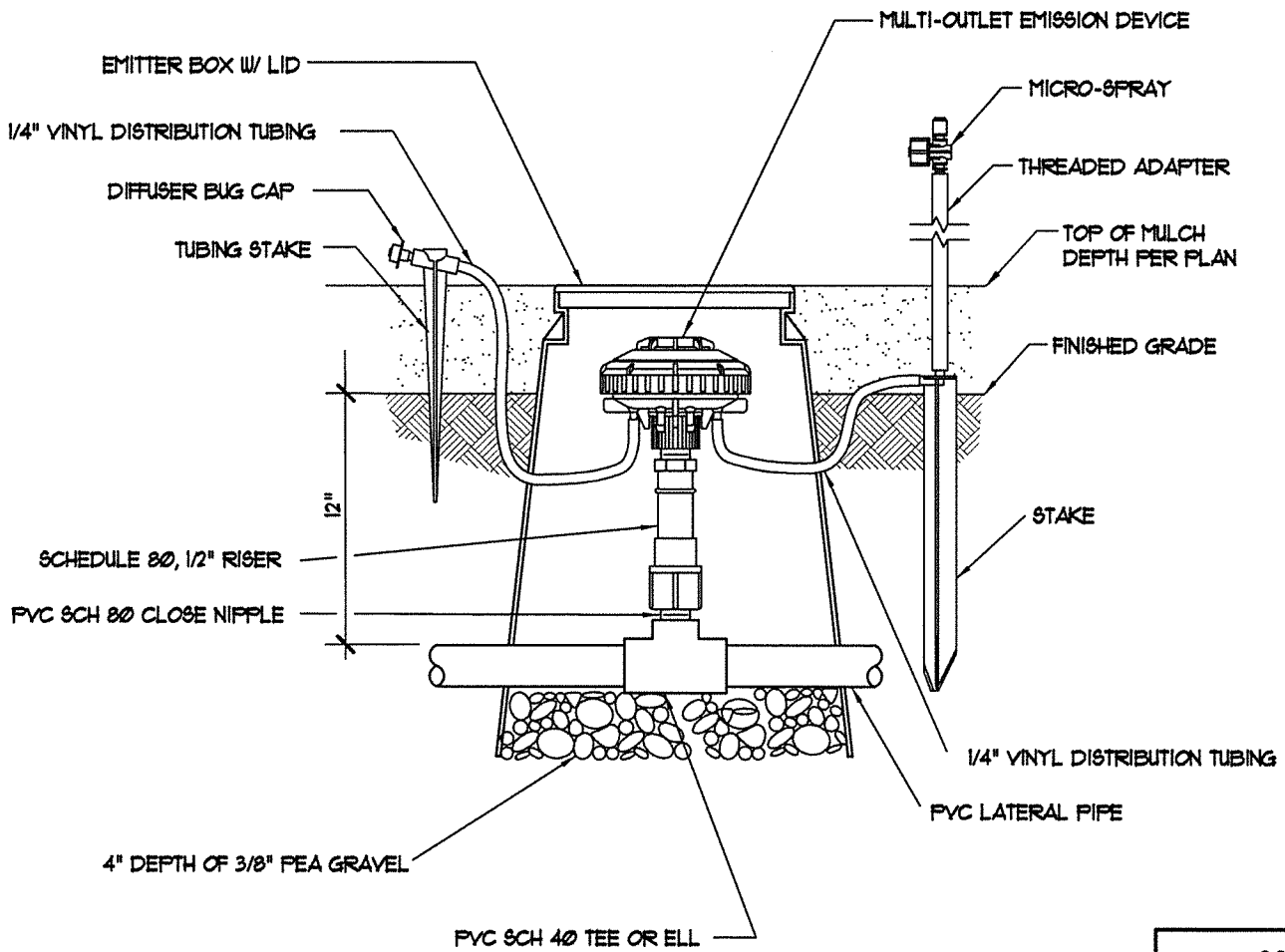
INSTALL BUBBLERS NEAR EDGE OF ROOT BALL, WITHIN TREE WATERING BASIN.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

ROOT ZONE BUBBLER

SCALE: NONE	DRAWN BY: HY	SHEET:
DATE: 11/2013	CHECKED BY: HY	L-13

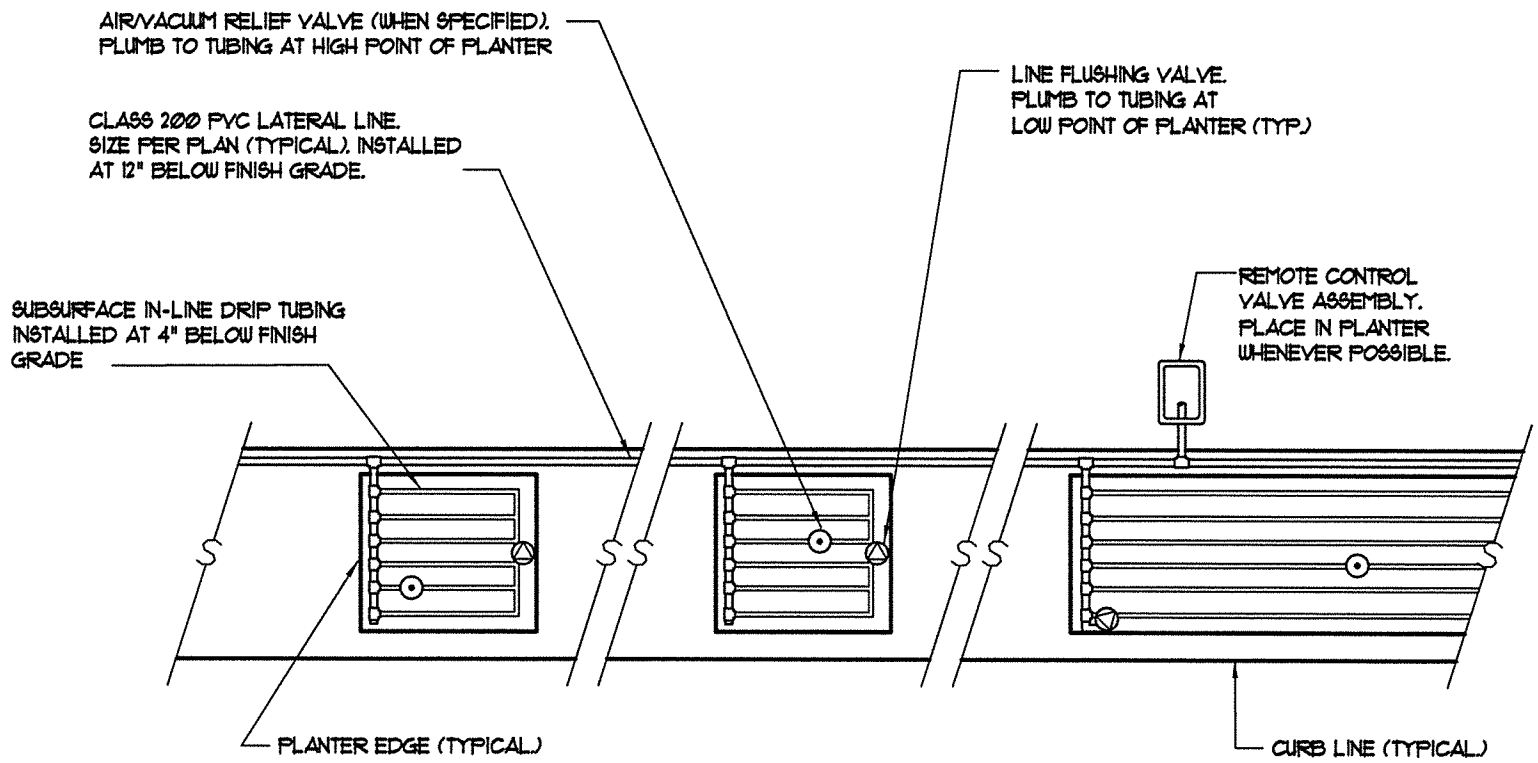


CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

DRIP IRRIGATION
MULTI-OUTLET EMITTER

SCALE: NONE DATE: 11/2013	DRAWN BY: TP/HY CHECKED BY: HY	SHEET: L-14



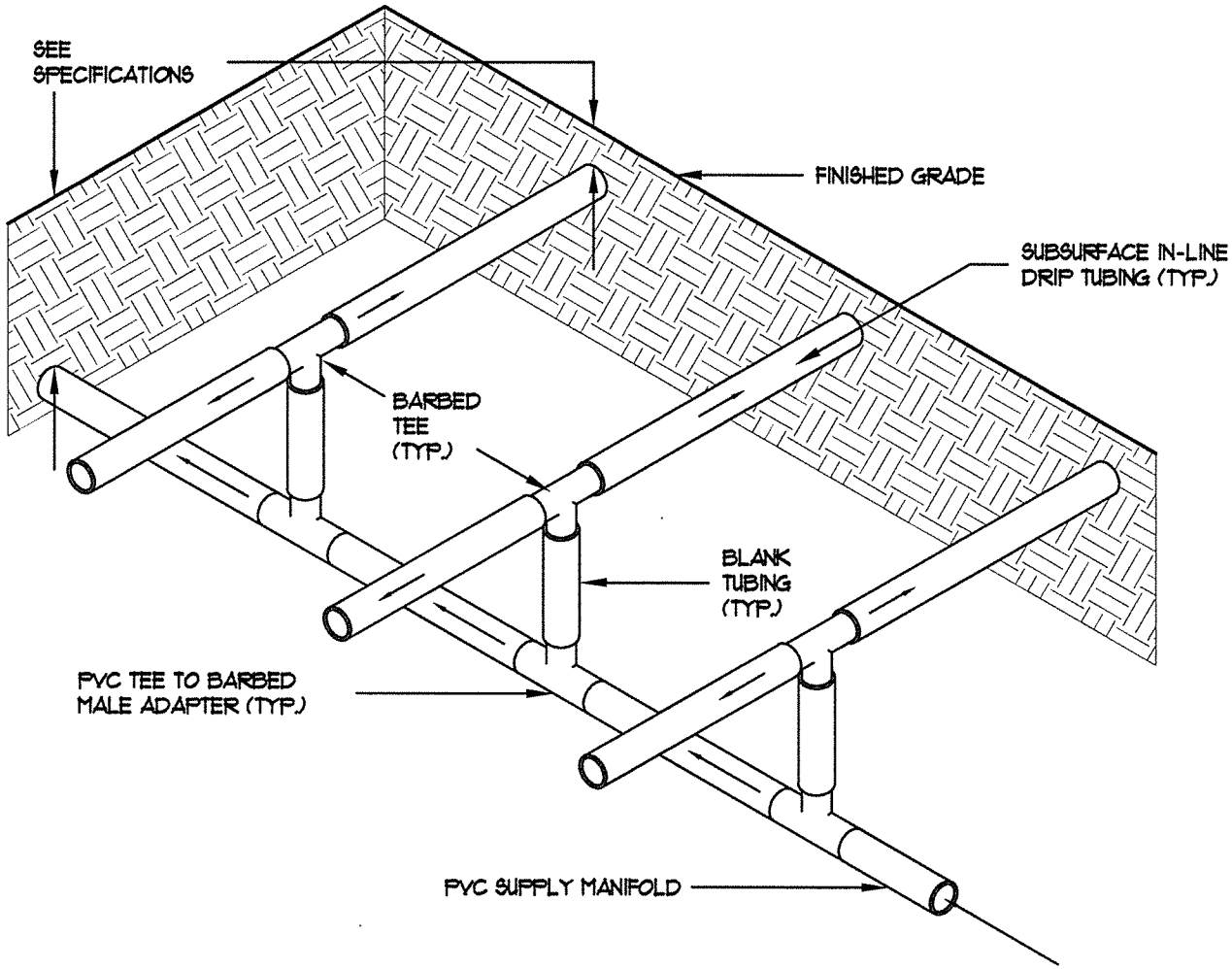
NOTE: ALL DRIP TUBING FITTINGS SHALL BE BARBED.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

SUBSURFACE IN-LINE DRIP IRRIGATION LAYOUT

SCALE: NONE DATE: 11/2013	DRAWN BY: TRU P. CHECKED BY: HY	SHEET: L-15

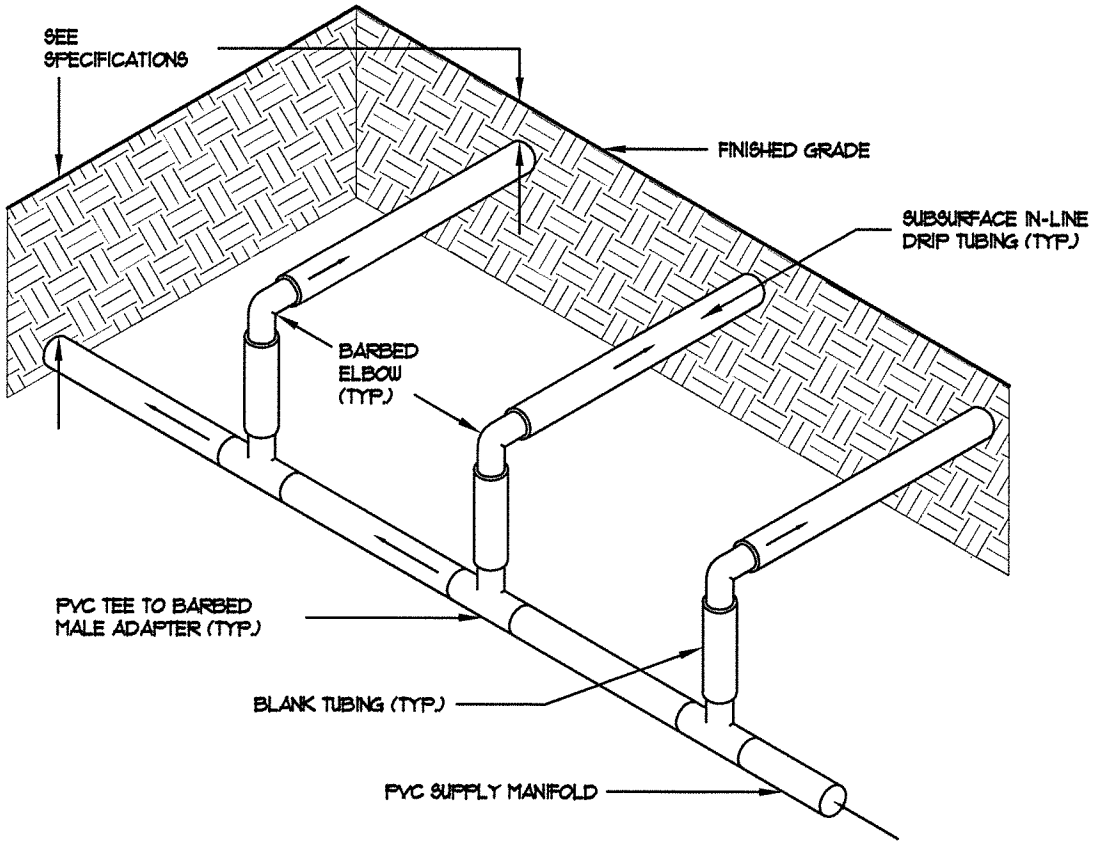


CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

SUBSURFACE IN-LINE DRIP IRRIGATION CENTER-FEED SUPPLY MANIFOLD

SCALE: NONE DATE: 11/2000	DRAWN BY: G.A. CHECKED BY: GMM	SHEET: L-16

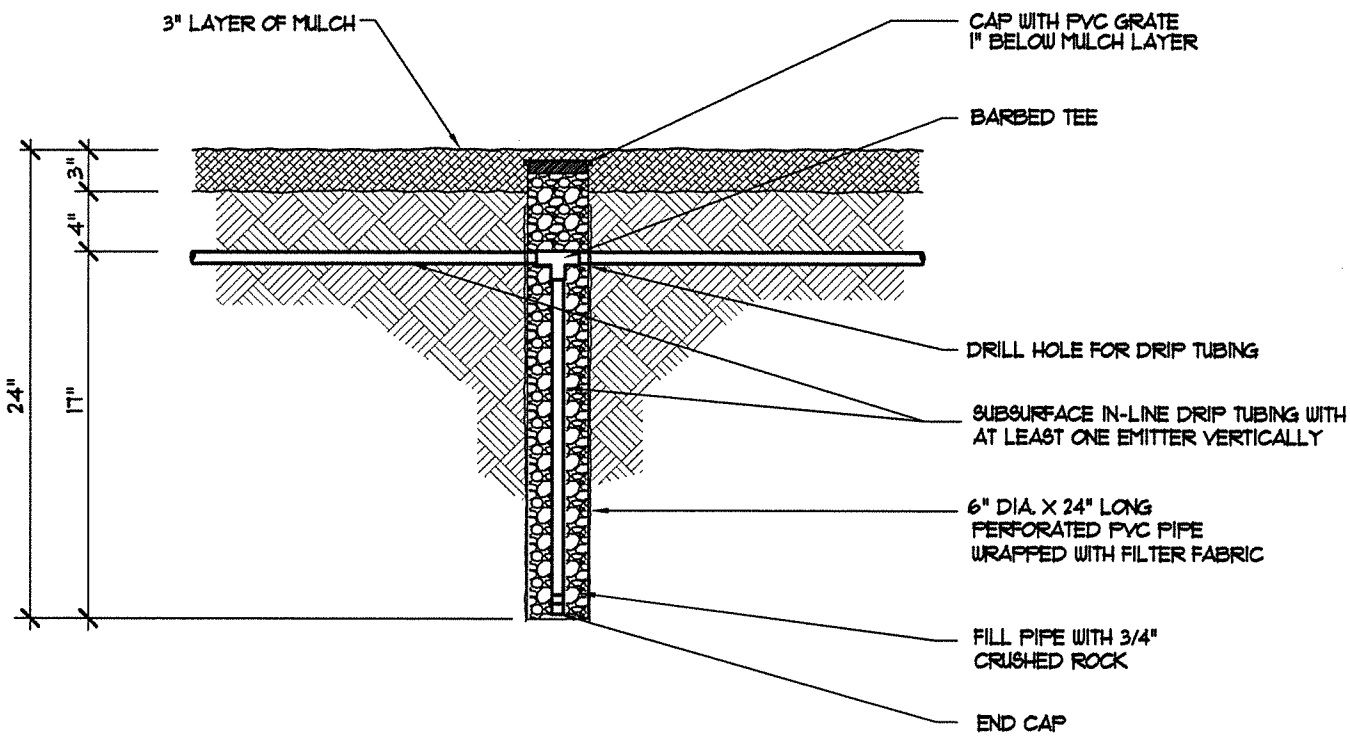


CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

SUBSURFACE IN-LINE DRIP IRRIGATION END-FEED SUPPLY MANIFOLD

SCALE: NONE	DRAWN BY: GA	SHEET:
DATE: 11/2000	CHECKED BY: GMM	L-17

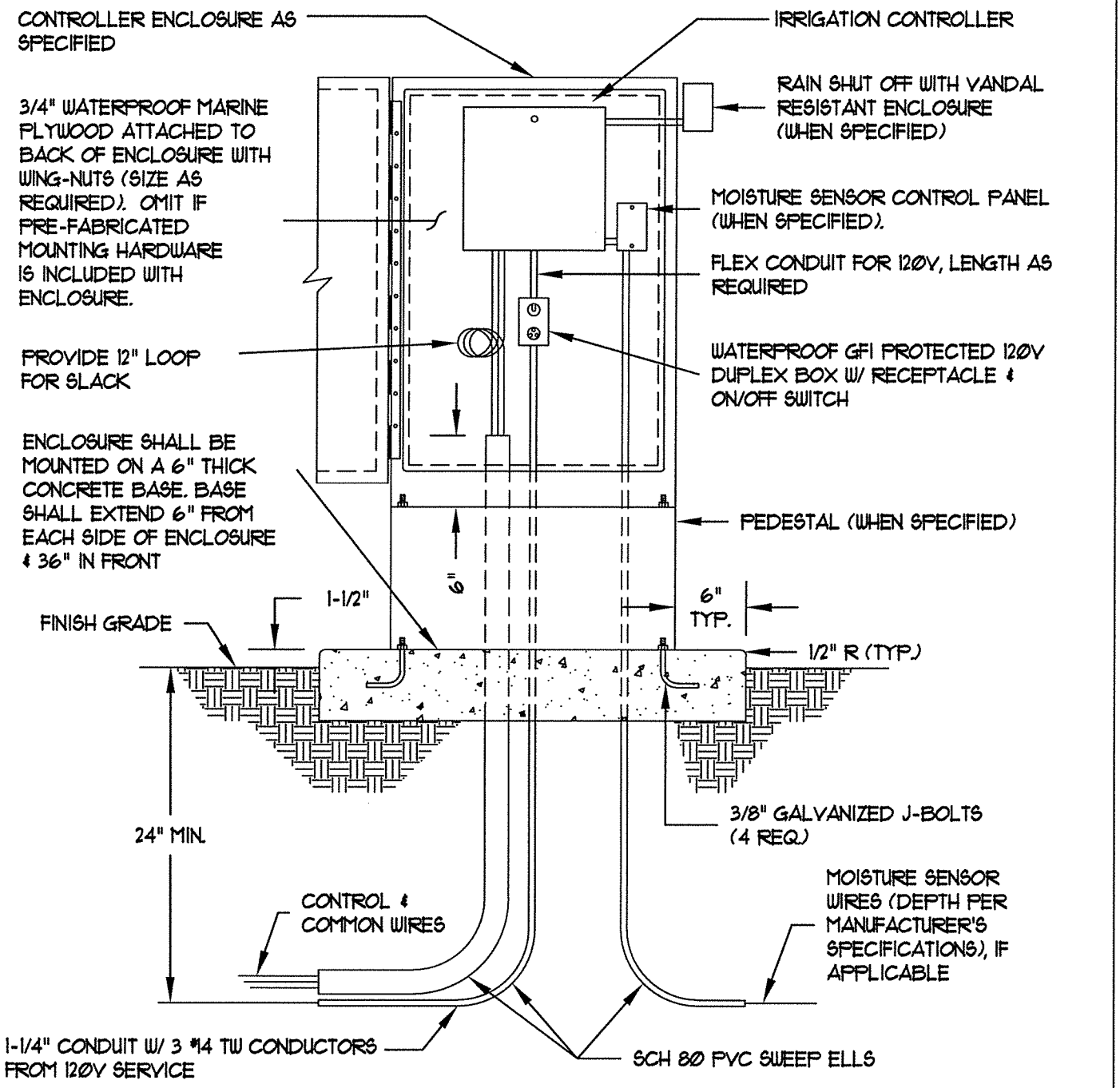


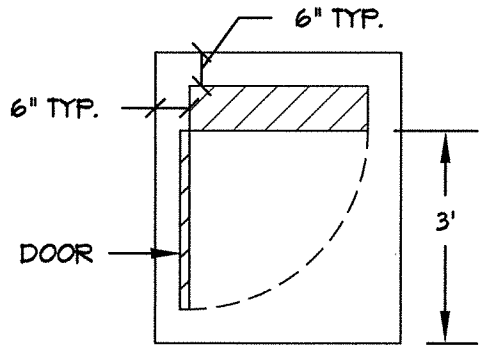
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

DEEP WATERING PIPE FOR TREES

SCALE: NONE DATE: 11/2013	DRAWN BY: TRU P. CHECKED BY: HY	SHEET: L-18





PLAN VIEW

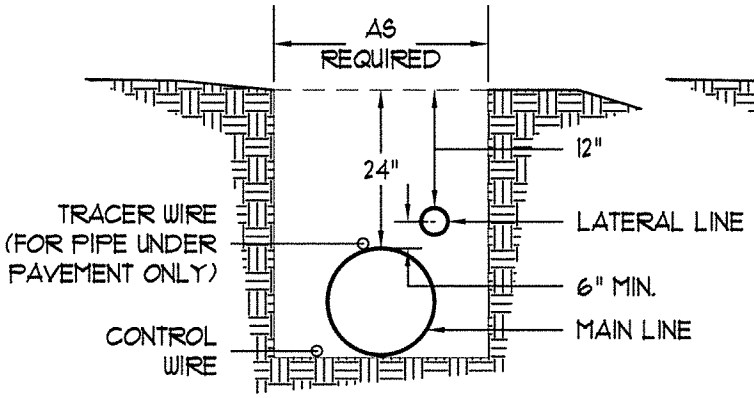
CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

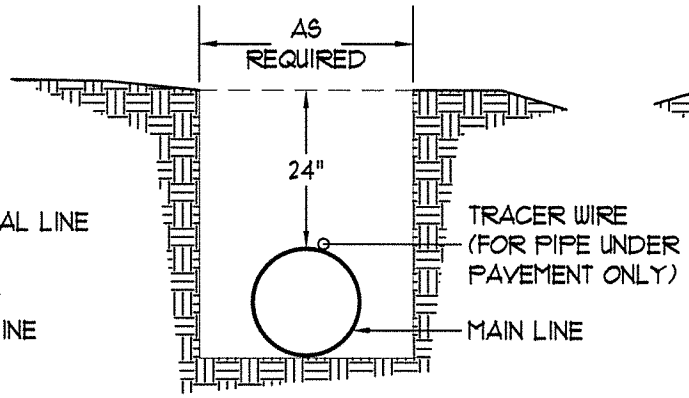
IRRIGATION CONTROLLER ENCLOSURE

SCALE: NONE	DRAWN BY: GA	SHEET:
DATE: 11/2000	CHECKED BY: GMM	L-19

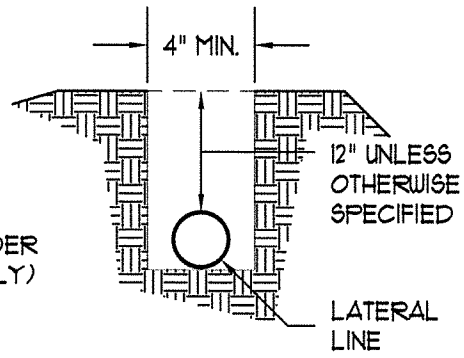
MAIN SUPPLY, LATERAL,
CONTROL WIRE & TRACER WIRE

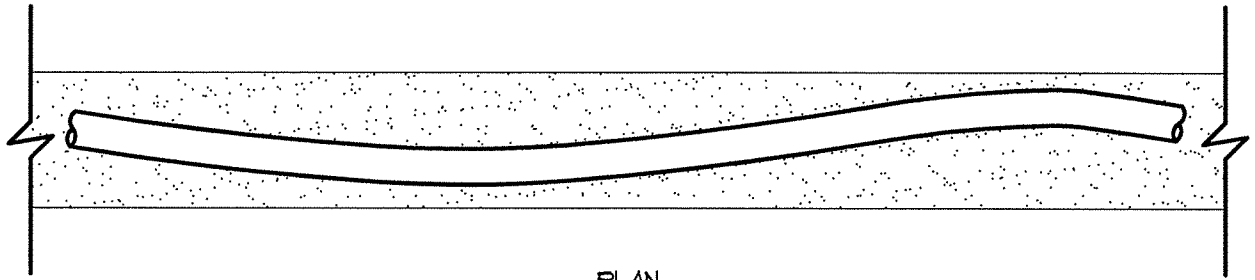


MAIN SUPPLY



PLASTIC LATERAL





ALL PLASTIC PIPES
TO BE SNAKED
IN TRENCHES
AS SHOWN.

PLAN

CHIEF, DEPT. OF TRANSPORTATION

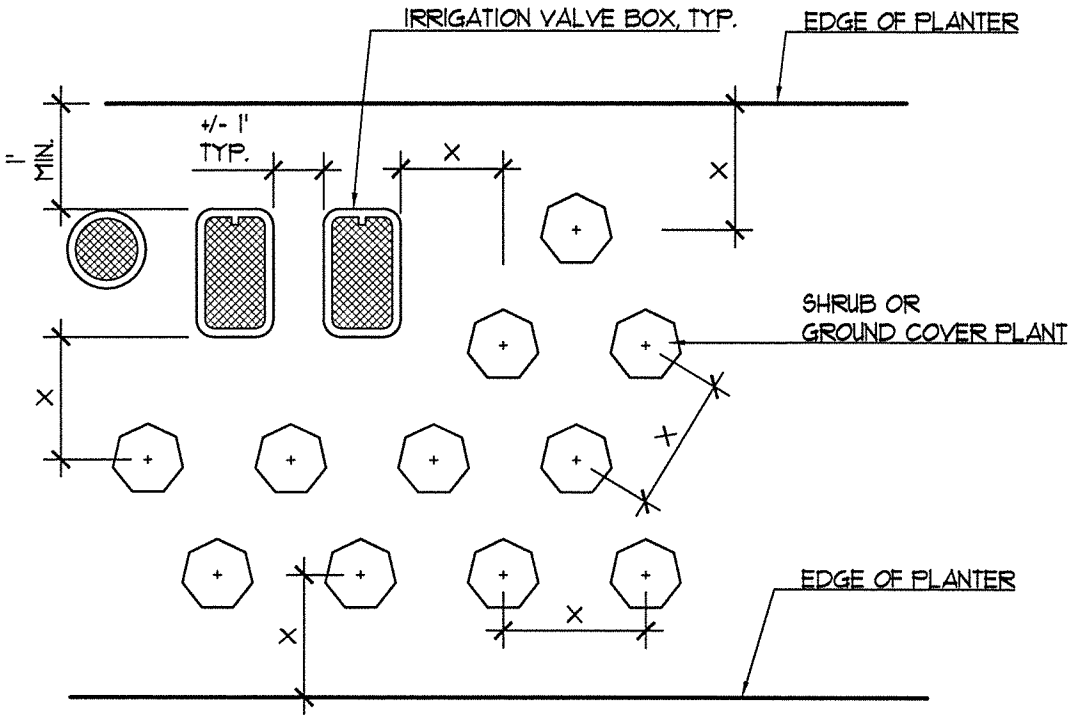
NOTES:

1. ALL TRENCH DEPTHS ARE MEASURED FROM WITHIN TOP OF FINISH GRADE.
2. TRACER WIRE SHALL BE REQUIRED ONLY WHEN PIPES ARE INSTALLED UNDER PAVEMENT.
3. ALL PIPE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION SPECIFICATIONS.
4. IF SPRINKLER HEAD AND NIPPLE HEIGHT EXCEED 11", LATERAL LINE DEPTH SHALL BE 18".
5. INSTALL PIPE BEDDING UNDER PIPING, WHEN SPECIFIED.
6. INSTALL SLEEVING UNDER PAVING PER PLANS.

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

IRRIGATION SYSTEM TRENCHING

SCALE: NONE	DRAWN BY: GA	SHEET:
DATE: 11/2000	CHECKED BY: GMM	L-20



NOTES:
'X' VALUE SHALL BE SPACING INDICATED ON PLANTING PLAN. LAYOUT TRIANGULAR SPACING TYPICAL, UNLESS OTHERWISE SHOWN OR NOTED.

OFFSETS FOR IRRIGATION BOXES ARE INTENDED AS A GENERAL GUIDE FOR INSTALLATION.

CLEARANCES AROUND IRRIGATION EQUIPMENT MAY BE GREATER THAN 'X' DEPENDING UPON SPRINKLER/ DRIP SYSTEM LAYOUT AND ACTUAL FIELD CONDITIONS.

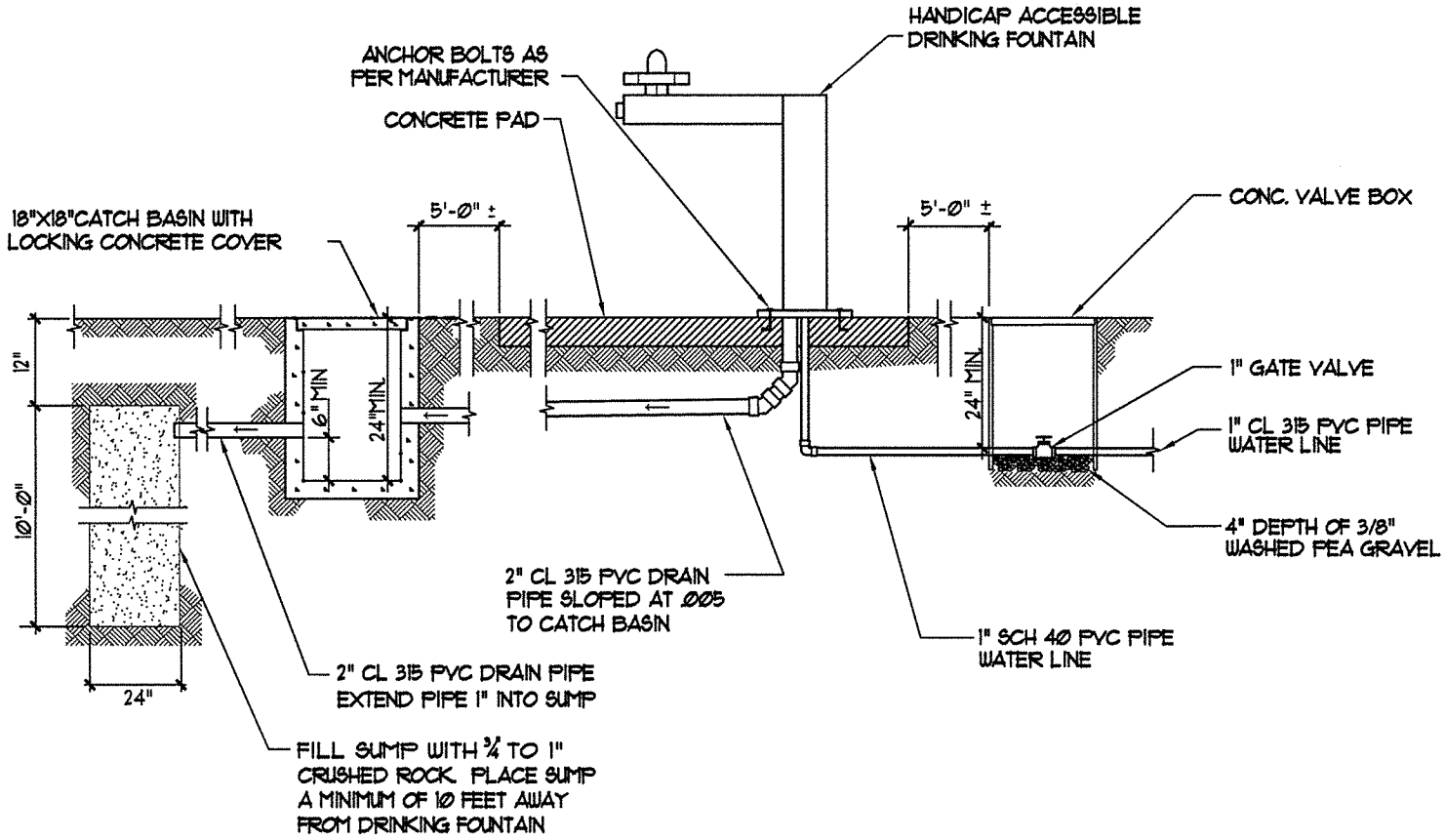
CLEARANCES FOR IRRIGATION AND PLANTING AROUND UTILITIES MAY VARY AND SHALL BE VERIFIED BY CONTRACTOR PRIOR TO INSTALLATION.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

VALVE BOX/PLANTING LAYOUT

SCALE: NONE DATE: 11/2013	DRAWN BY: HY/HMA CHECKED BY: HY	SHEET: L-21

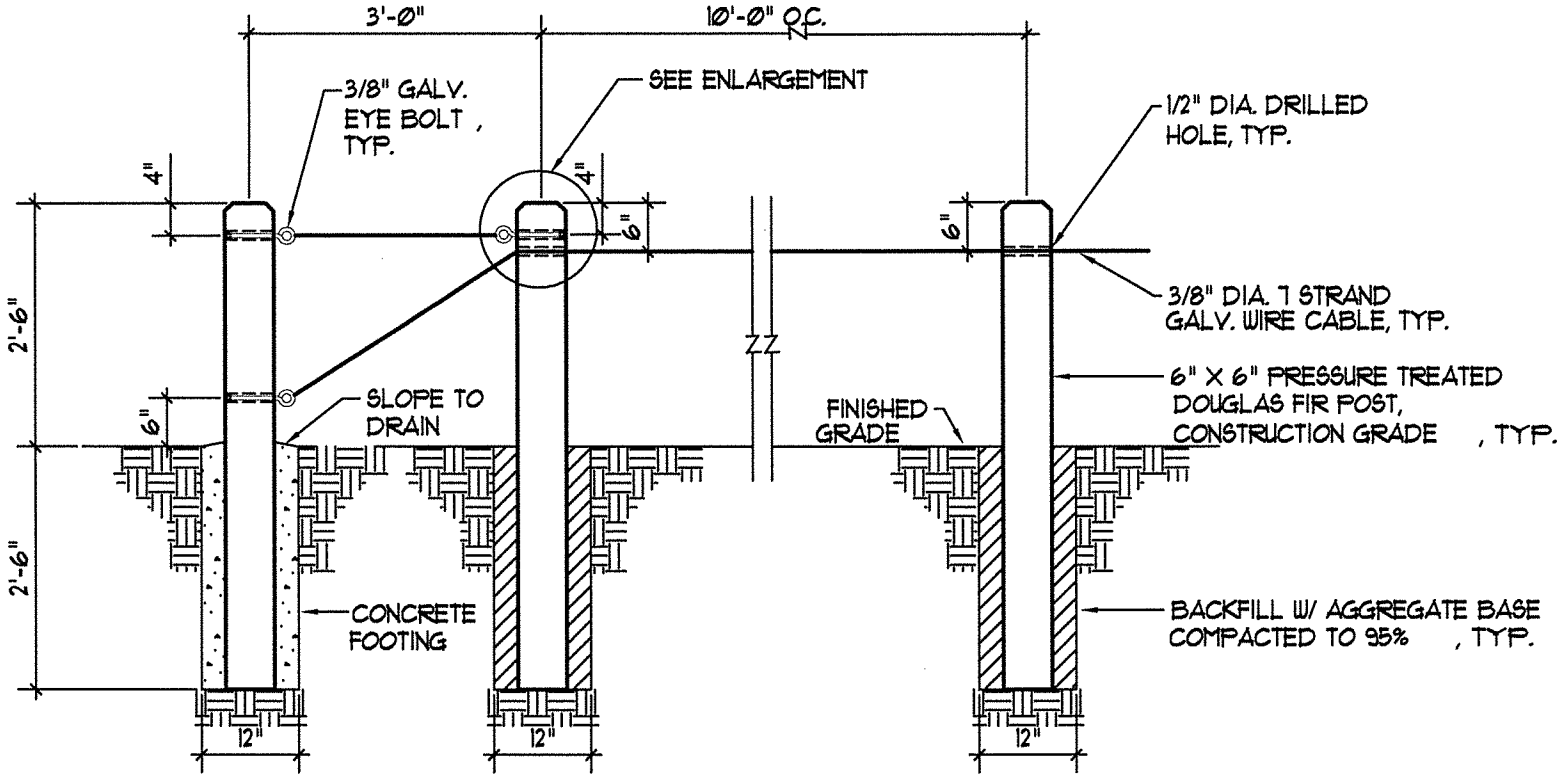


CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

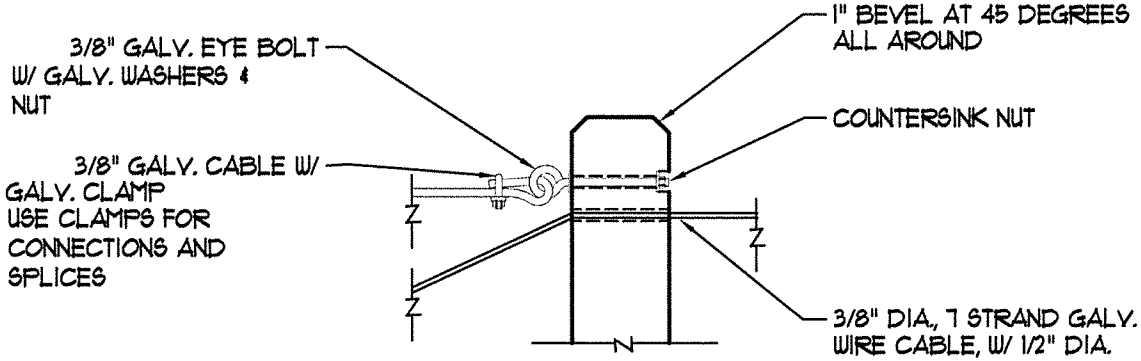
DRINKING FOUNTAIN

SCALE: NONE DATE: 11/2013	DRAWN BY: TP/HY CHECKED BY: GMM/HY	SHEET: L-22



TERMINAL POST **LINE POST**

SCALE: 1/2" = 1'-Ø"



ENLARGEMENT
SCALE: 1" = 1'-Ø"

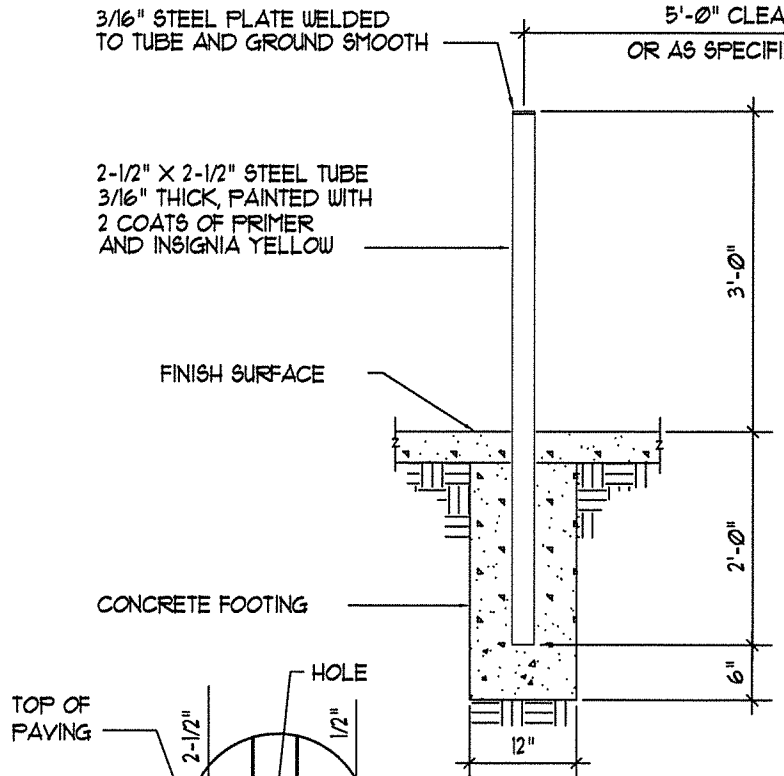
NOTE: CONCRETE FOOTINGS SHALL BE INSTALLED AT ALL TERMINAL POSTS AND AT ALL BENDS.

CHIEF, DEPT. OF TRANSPORTATION

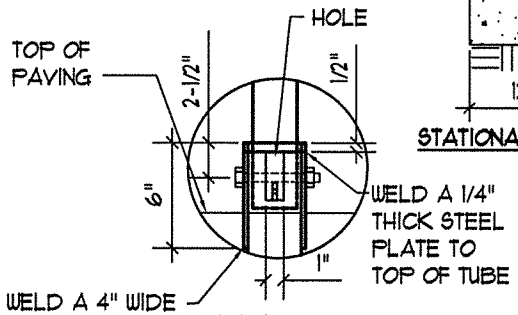
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

POST AND CABLE FENCING

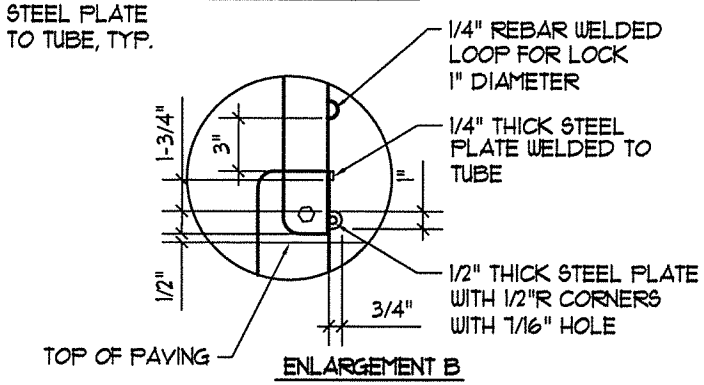
SCALE: NONE DATE: 11/2000	DRAWN BY: GMM CHECKED BY: GMM	SHEET: L-23



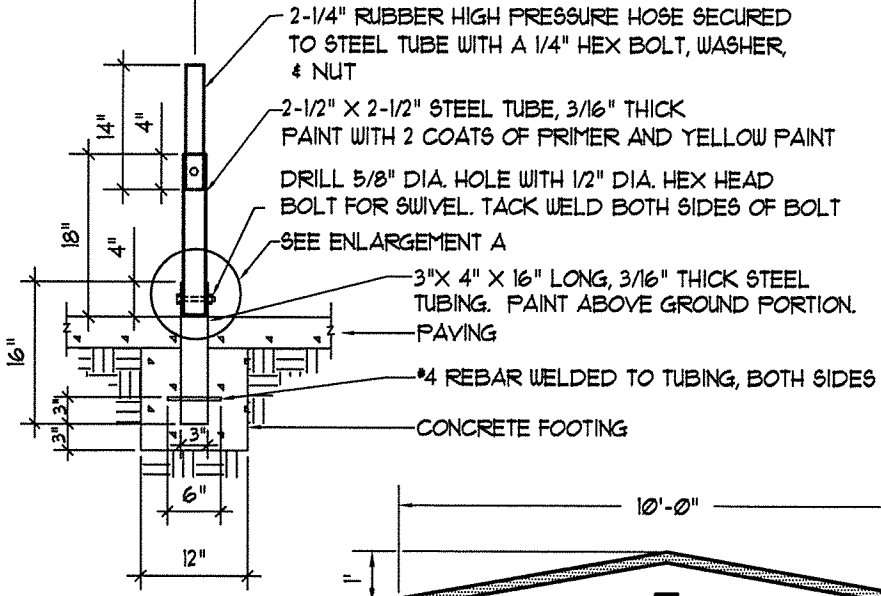
STATIONARY BOLLARD



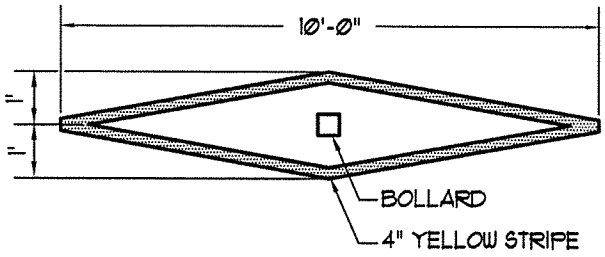
ENLARGEMENT A



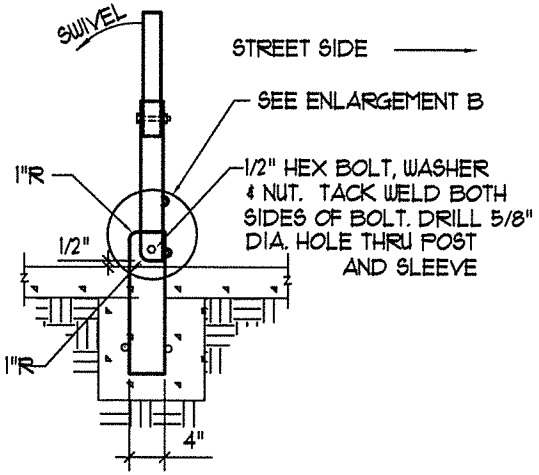
ENLARGEMENT B



KNOCK-DOWN BOLLARD
FRONT VIEW



BOLLARD STRIPING
IF REQUIRED



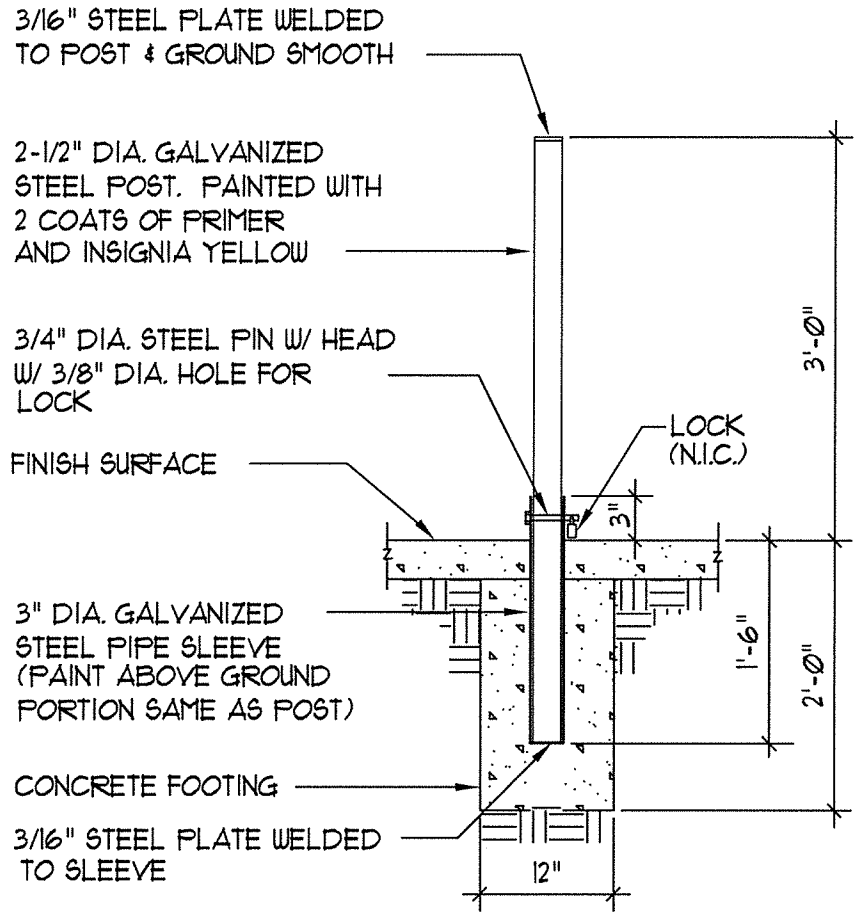
KNOCK-DOWN BOLLARD
SIDE VIEW

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

KNOCK-DOWN BOLLARD & STATIONARY BOLLARD

SCALE: NONE	DRAWN BY: GMM	SHEET:
DATE: 11/2000	CHECKED BY: GMM	L-24



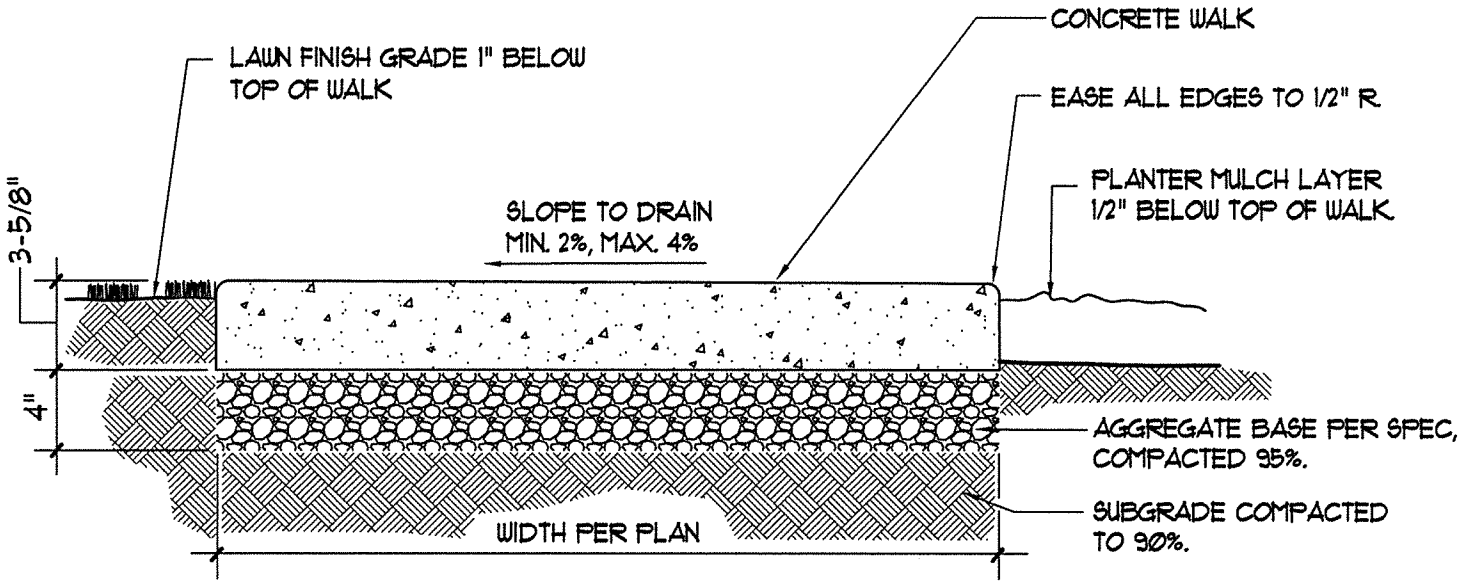
NOTE: DRILL A 13/16" DIA. HOLE THRU BOTH THE POST AND SLEEVE FOR PIN PLACEMENT.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

REMOVABLE BOLLARD

SCALE: NONE DATE: 11/2000	DRAWN BY: GMM CHECKED BY: GMM	SHEET: L-25



NOTES:

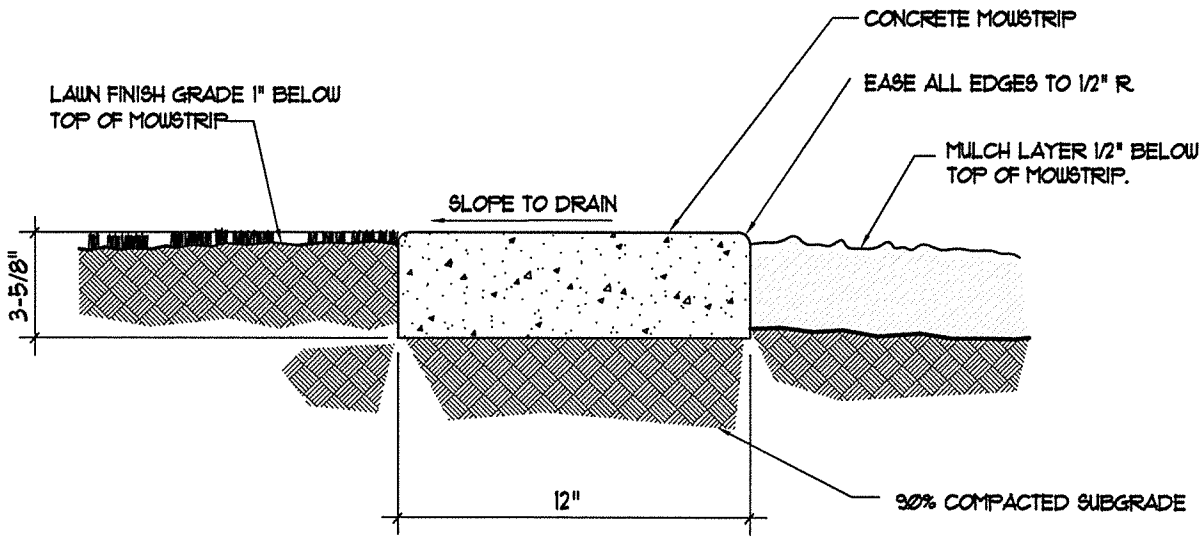
1. PROVIDE 1" DEEP SCORE JOINTS AT 10'-0" ON CENTER.
2. PROVIDE EXPANSION JOINTS AT 20'-0" INTERVALS.
3. USE CLASS "B" CONCRETE, TYP.
4. MEDIUM BROOM FINISH PERPENDICULAR TO WALK EDGE, UNLESS OTHERWISE SPECIFIED.
5. PROVIDE FULL DEPTH FELT EXPANSION JOINTS WHEN ABUTTING WALKS, WALLS AND BUILDINGS.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

CONCRETE WALK

SCALE: NONE DATE: 11/2013	DRAWN BY: TP/HY CHECKED BY: HY	SHEET: L-26



NOTES:

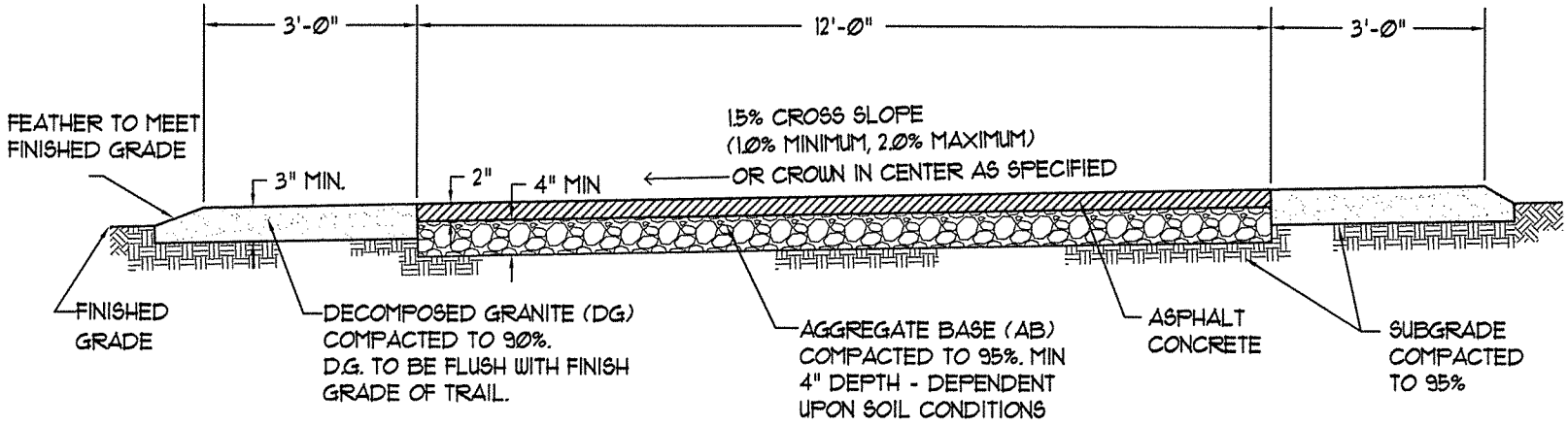
1. PROVIDE 1" DEEP SCORE JOINTS AT 10'-0" ON CENTER.
2. PROVIDE EXPANSION JOINTS AT 20'-0" INTERVALS AND AT CHANGES OF DIRECTION ALONG CURVILINEAR FORMS.
3. USE CLASS "B" CONCRETE, TYP.
4. MEDIUM BROOM FINISH UNLESS OTHERWISE SPECIFIED.
5. PROVIDE FULL DEPTH FELT EXPANSION JOINTS WHEN ABUTTING WALKS, WALLS AND BUILDINGS.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

CONCRETE MOWSTRIP

SCALE: NONE DATE: 11/2013	DRAWN BY: TRU P. CHECKED BY: HY	SHEET: L-27



NOTES:

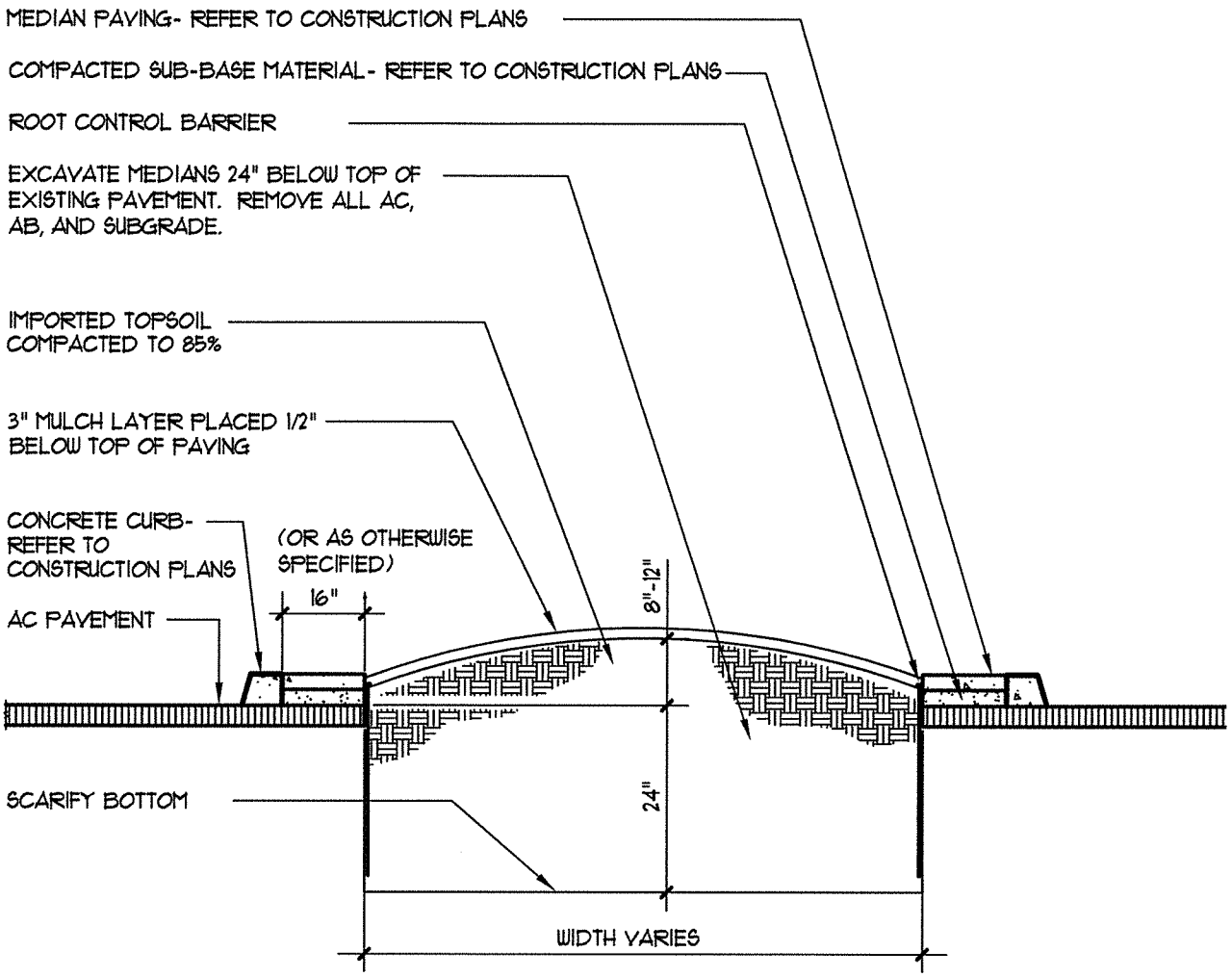
1. APPLY PRE-EMERGENT HERBICIDE TO ANY EXPOSED SUBGRADE UNDER D.G. PRIOR TO INSTALLING IT.
2. APPLY PRE-EMERGENT HERBICIDE TO AGGREGATE BASE PRIOR TO PAVING ASPHALT.
3. APPLY A 4" WIDE SOLID YELLOW CENTERLINE STRIPE CONTINUOUSLY DOWN THE CENTER OF THE BIKE TRAIL.
4. OTHER DIRECTIONAL AND INFORMATIONAL PAVEMENT MARKING MUST FOLLOW CALTRANS STANDARDS.
5. DEPTH OF AB AND DG MAY REQUIRE GREATER DEPTHS IN ACCORDANCE WITH SOILS ANALYSIS.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

BIKE TRAIL PAVING SECTION

SCALE: NONE	DRAWN BY: STAFF	SHEET:
DATE: 01/2010	CHECKED BY: GK	L-28



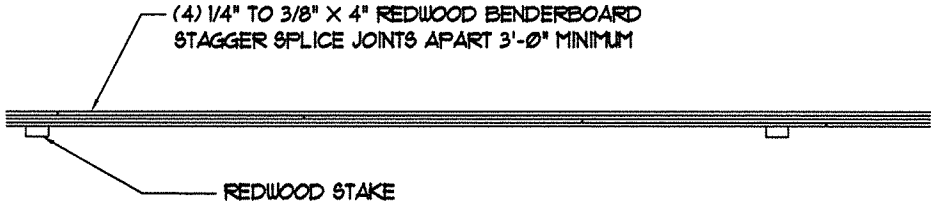
NOTE: CONTOUR OF MEDIAN WILL VARY DEPENDING UPON MEDIAN WIDTH. DO NOT EXCEED BID QUANTITY OF IMPORTED TOPSOIL TO ACHIEVE 12" HEIGHT.

CHIEF, DEPT. OF TRANSPORTATION

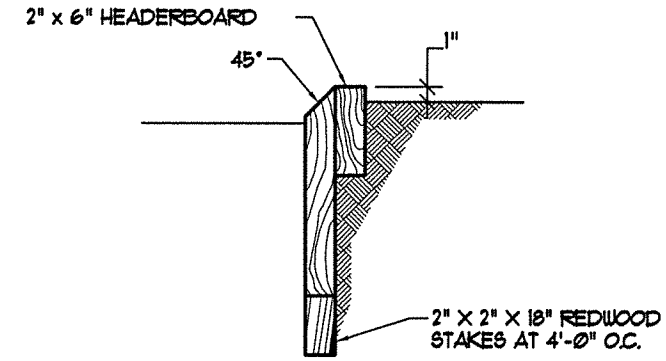
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

ROADWAY MEDIAN SECTION

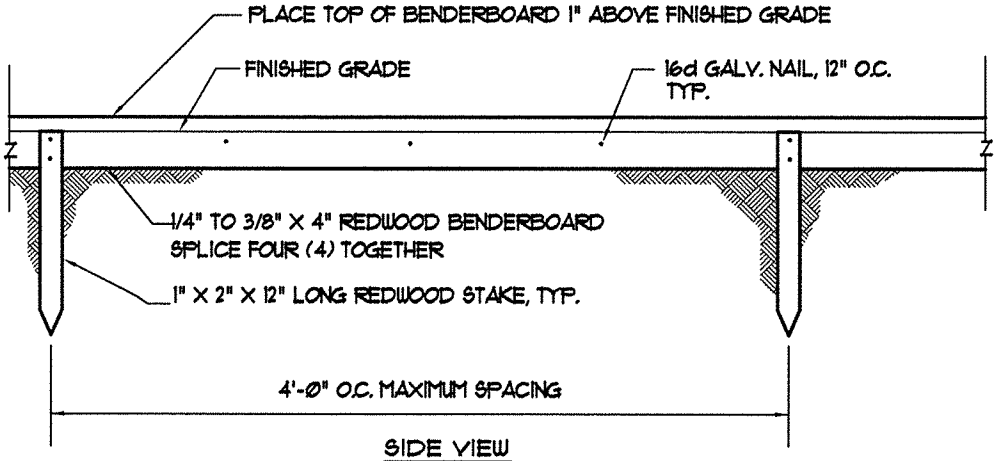
SCALE: NONE DATE: 11/2013	DRAWN BY: SLN/HY CHECKED BY: HY	SHEET: L-29



PLAN VIEW

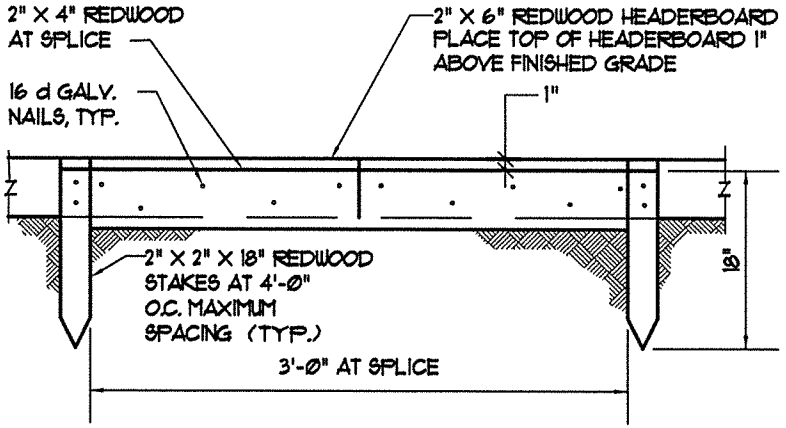


SECTION



SIDE VIEW

1/4" TO 3/8" x 4" BENDERBOARD



SPLICE DETAIL

2" x 6" HEADERBOARD

NOTES:

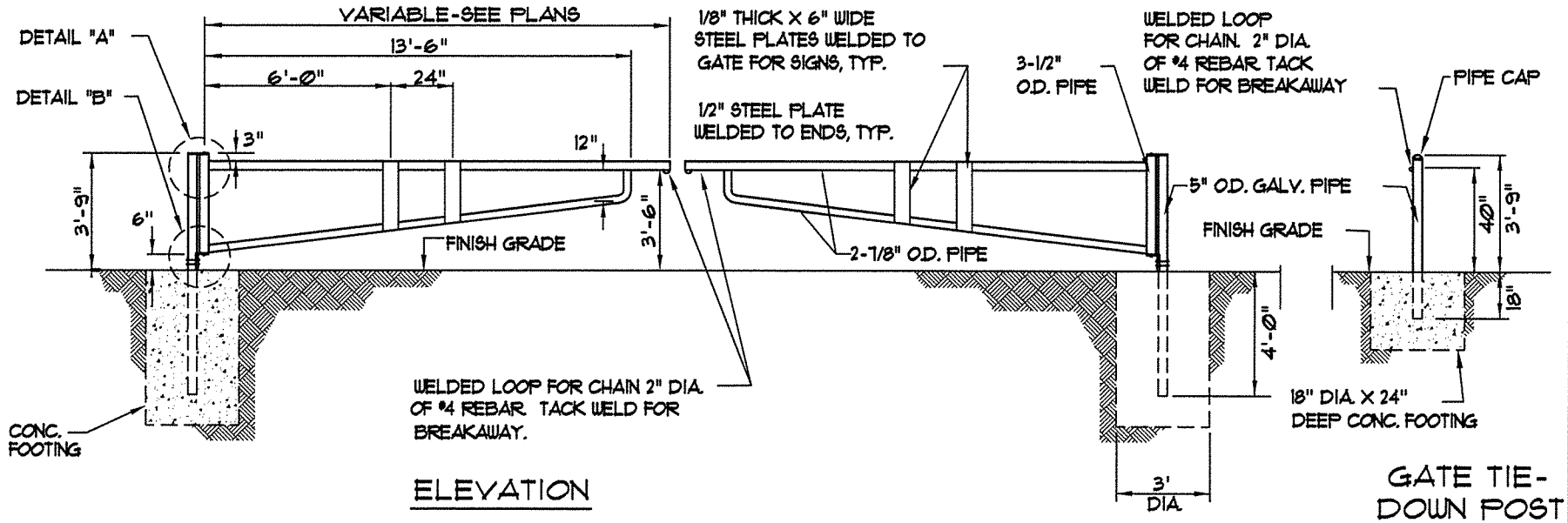
1. INSTALL ALL STAKES AND SPLICES ON PLANTING SIDE OF HEADERBOARD.
2. ALL NAILS SHALL BE GALVANIZED.
3. ALL REDWOOD SHALL BE ROUGH CONSTRUCTION COMMON GRADE IN ACCORDANCE TO CALIFORNIA REDWOOD ASSOCIATION GRADING RULES.
4. DRIVE STAKES TO RESISTANCE AND CUT TOP AT 45 DEGREE ANGLE.

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

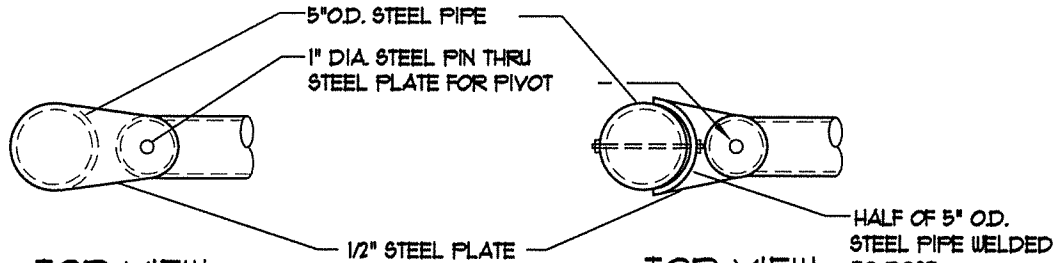
REDWOOD HEADERBOARD

SCALE: NONE	DRAWN BY: TRU P.	SHEET:
DATE: 11/2000	CHECKED BY: GMM	L-30



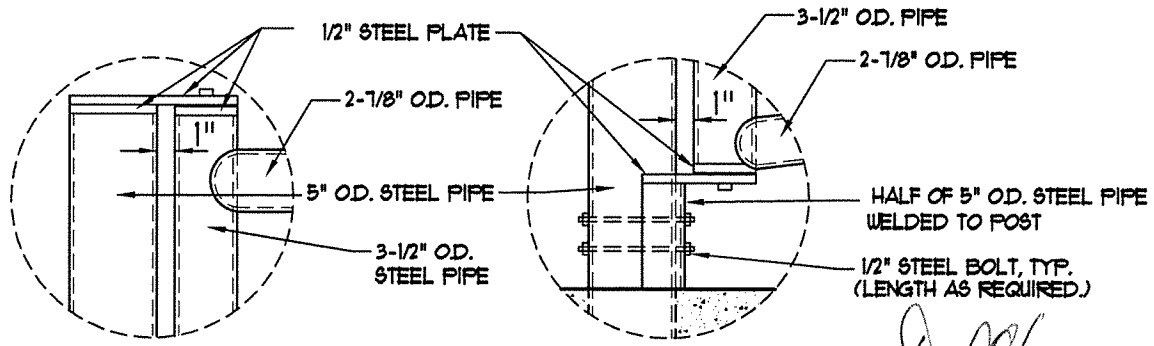
ELEVATION

GATE TIE-DOWN POST



TOP VIEW

TOP VIEW



DETAIL "A"

DETAIL "B"

NOTES:

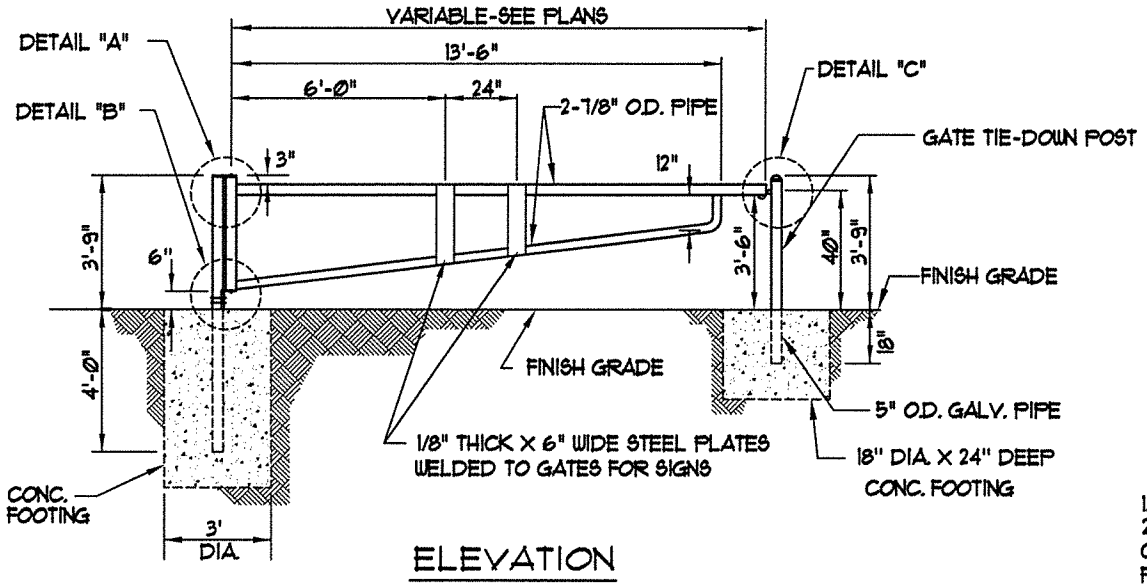
1. ALL PIPES SHALL BE BLACK STEEL PIPES. OUTSIDE DIA. (O.D.) AND WELDED.
2. ALL STEEL TO BE PAINTED WITH 2 COATS OF PRIMER AND INSIGNIA YELLOW.
3. PROVIDE 2-5" O.D. PIPE AND INSTALL WITH CONC. FOOTING (18"X24" D.) FOR TIE-DOWN WHEN GATE IS OPENED AND CLOSED.

CHIEF, DEPT. OF TRANSPORTATION

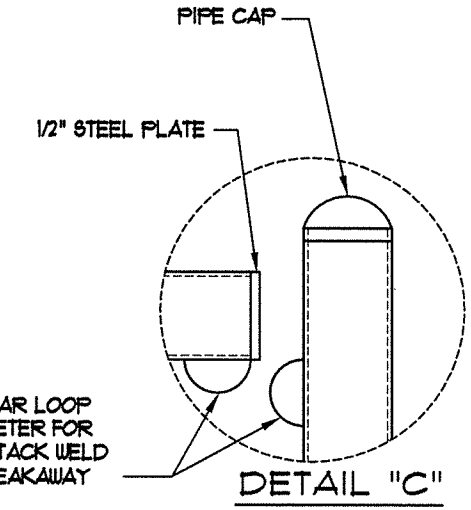
COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

DOUBLE PIPE GATE

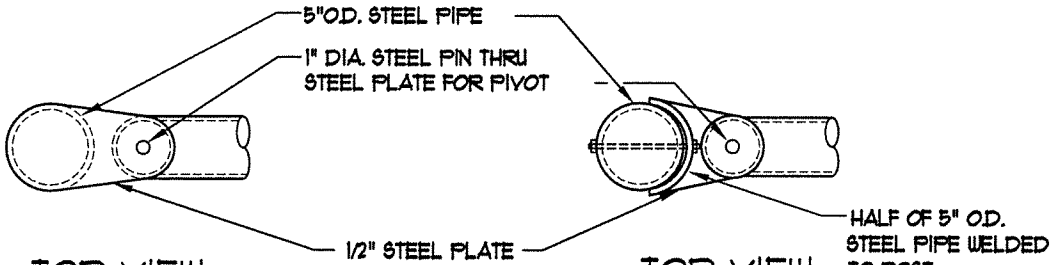
SCALE: NONE	DRAWN BY: TRU P.	SHEET:
DATE: 11/2000	CHECKED BY: MIKE M.	L-31



ELEVATION



DETAIL "C"

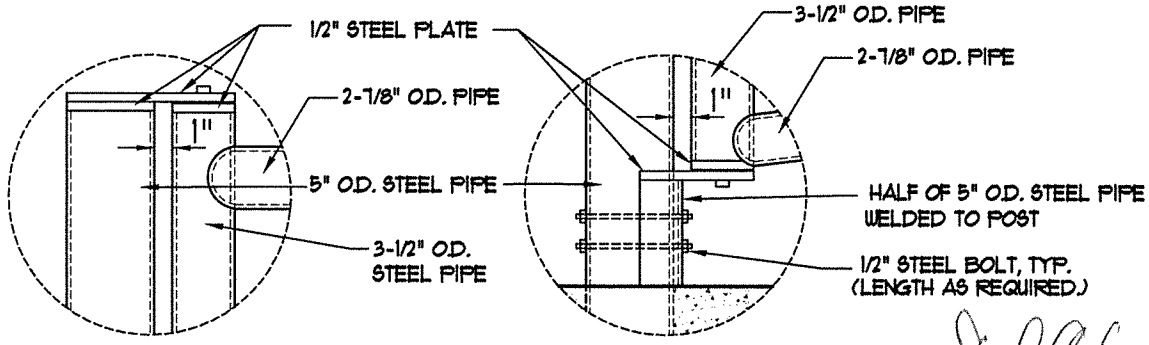


TOP VIEW

TOP VIEW

NOTES:

1. ALL PIPES SHALL BE BLACK STEEL PIPES. OUTSIDE DIA. (O.D.) AND WELDED.
2. ALL STEEL TO BE PAINTED WITH 2 COATS OF PRIMER AND INSIGNIA YELLOW.
3. PROVIDE 2-5" O.D. PIPE AND INSTALL WITH CONC. FOOTING (18"X24" D.) FOR TIE-DOWN WHEN GATE IS OPENED AND CLOSED.



DETAIL "A"

DETAIL "B"

CHIEF, DEPT. OF TRANSPORTATION

COUNTY OF SACRAMENTO
MUNICIPAL SERVICES

SINGLE PIPE GATE

SCALE: NONE	DRAWN BY: TRU P.	SHEET:
DATE: 11/2000	CHECKED BY: GMM	L-32