

# **SPECIFICATIONS**

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## **COUNTY SERVICE AREAS 30 & 32 WATER SYSTEM IMPROVEMENTS**

**STATE WATER RESOURCES CONTROL BOARD PROJECT NUMBER:  
1000359-005C**

**DEPARTMENT OF WATER RESOURCES PROJECT NUMBER:  
4600011626**

**BUDGET / ACCOUNT / PROGRAM : 9172 / 8400 / 91317**



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*Department of Public Works and Planning*

**CONTRACT NUMBER 20-10-C**

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**COUNTY SERVICE AREAS 30 & 32 WATER SYSTEM IMPROVEMENTS  
CONTRACT NUMBER: 20-10-C**

Ernest Buddy Mendes, Chairman	4th District
Steve Brandau, Vice Chairman	2nd District
Brian Pacheco	1st District
Sal Quintero	3rd District
Nathan Magsig,	5th District

Jean Rousseau, County Administrative Officer

Steven E. White, Director  
Department of Public Works and Planning



Date Signed: 8/25/2020

Supervising Engineer: \_\_\_\_\_

A handwritten signature in blue ink, appearing to be "S. Artal", written over a horizontal line.

Sebastian Artal, PE 76724  
Lic. Expiration: 12/31/20

FRESNO COUNTY  
**Department of Public Works and Planning**  
m/a 2220 Tulare Street, Suite 720  
Fresno, CA 93721-2106

**Contract Number 20-10-C**

**COUNTY SERVICE AREAS 30 & 32 WATER SYSTEM IMPROVEMENTS  
CONTRACT NUMBER 20-10-C**



Date Signed: 25 AUG 2020

Consultant Engineer: \_\_\_\_\_

Provost & Pritchard  
286 W. Cromwell Ave.  
Fresno, CA 93711

A handwritten signature in blue ink that reads "John Lawler". The signature is written over a horizontal line that extends from the "Consultant Engineer:" label to the right.

John Lawler, PE C50974  
Lic. Expiration: 9/30/2021

**BOARD OF SUPERVISORS COUNTY OF FRESNO STATE OF CALIFORNIA**

**NOTICE TO BIDDERS**

Sealed proposals will be received at:

<https://www.bidexpress.com/businesses/36473/home>

and at the Fresno County Department of Public Works and Planning (Department), Office of the Design Engineer, Seventh Floor, Fresno County Plaza Building, 2220 Tulare Street, Fresno, CA 93721 until

**2:00 P.M., (1400 hours and 00 seconds)  
Thursday, October 15, 2020**

at which time the bidding will be closed.

**Due to the COVID-19 restrictions and guidelines, the Department's bid reception desk may be closed and all bidders are encouraged submit bids online through Bid Express.**

**If a bidder is unable to submit online, please mail bid or e-mail [DesignServices@fresnocountyca.gov](mailto:DesignServices@fresnocountyca.gov) or call (559) 600-9908 in advance, so that arrangements may be made to hand deliver your bid.**

Promptly following the closing of the bidding all timely submitted bids will be publicly opened and viewable via a livestream (the link for which will be posted at <http://www.co.fresno.ca.us/planholders>) for construction in accordance with the project specifications therefor, to which special reference is made as follows:

**COUNTY SERVICE AREAS 30 & 32 WATER SYSTEM IMPROVEMENTS**

**SWRCB PROJECT NUMBER: 1000359-005C**

**DWR PROJECT NUMBER: 4600011626**

**CONTRACT NUMBER 20-10-C**

The work to be done consists, in general, of furnishing all labor, materials and equipment necessary for the installation of a new water distribution system with service lines within the service limits of Fresno County Service Areas (CSA) 30 and 32, the Cantua Elementary School and nearby properties. The construction sites are located in the communities of Three Rocks and Cantua Creek. The work includes, but is not limited to, installation of water mains, water services, fire hydrants, appurtenances, water system tie-ins to the existing tank sites, disinfecting, testing, trench resurfacing, striping, and abandonment of the existing water distribution system. The work involves removal of Asbestos Cement Pipe as necessary.

A pre-bid conference will be held at 10 a.m. on Monday, September 14, 2020. The meeting will be held online (the link for which will be posted at <http://www.co.fresno.ca.us/planholders>). A brief presentation will be made by County staff, and a discussion of the project will be held. Attendance at the pre-bid conference is not mandatory.

**Funding for this project has been provided in full or in part by the United States Environmental Protection Agency (USEPA) and the State Water Resources Control Board (SWRCB). The contents of this document do not necessarily reflect the views and policies of the USEPA or the SWRCB, nor does the USEPA or the SWRCB endorse trade names or recommend the use of commercial products mentioned in this document.**

**Bidders are advised that their Good Faith Effort implementation, as described pursuant to the Guidelines for Meeting the California State Revolving Fund (CASRF) Programs Disadvantaged Business Enterprise (DBE) Requirements (Proposal 17 of the Bid Book), will be evaluated to determine bidder responsiveness, regardless of whether fair share objectives have been met. Meeting or exceeding the objectives will not be considered evidence of adequate Good Faith Efforts. Emphasis is placed on the need for contractors to post solicitations for bids or proposals for a minimum of 30 calendar days before the bid opening date. Failure to comply with the Good Faith Efforts requirements will be considered non-responsive.**

The County of Fresno affirms that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation. Bidders are advised that Disadvantaged Business Enterprise (DBE) requirements are included in Section 2, "Bidding," under subsection 2-1.12 "Disadvantaged Business Enterprises (DBEs)".

**This project is subject to the "American Iron and Steel" provisions of the Consolidated Appropriations Act Of 2014. Unless a predominantly iron or steel product qualifies for an exemption, as listed by the United States Environmental Protection Agency, all manufactured iron and steel products must be certified as produced within the United States.**

Bidders may fill out a Request to be Added to Planholders List:

<https://www.co.fresno.ca.us/departments/public-works-planning/divisions-of-public-works-and-planning/design-division/planholders-list-request-to-be-added>

Requesters will then be listed as a planholder for the project on the website and receive email notifications regarding the project.

Planholder and exchange/publication names may be obtained from the Fresno County website at <http://www.co.fresno.ca.us/planholders>.

Electronic copies, in ".pdf" file format, of the official project plans and specifications, as well as cross sections and such additional supplemental project information as may be provided, are available to view, download, and print at <http://www.co.fresno.ca.us/planholders>. Bids may be submitted online on Bid Express: <https://www.bidexpress.com/businesses/36473/home>.

If a bidder is unable to submit a bid via Bid Express, Bid Books, which contain bid proposal sheets necessary to submit a bid, may be obtained within the Specifications documents posted on the Fresno County website.

A Summary of Bids and a list of subcontractors for the apparent low bidder will be posted at the above listed website, generally within 24 hours of the Bid Opening.

All questions regarding this project shall be in writing and shall be received by the Department of Public Works and Planning, Design Division, no later than 2:00 P.M. on the seventh (7th) calendar day before bid opening. Any questions received after this deadline will not receive a response unless the Department of Public Works and Planning elects to issue an addendum to revise the bid opening date. In the event that the bid opening date is revised, the deadline for questions will be extended to no later than 2:00 P.M. on the seventh (7th) calendar day before the revised bid opening date. Questions shall be submitted on the "CONTRACTOR REQUEST FOR CLARIFICATION" form provided on our website <http://www.co.fresno.ca.us/planholders>.

Any changes to, or clarification of, the project specifications shall be in the form of a written addendum issued to planholders of record. Questions that prompt a change or clarification shall be included in the addendum with the subsequent answer.

Any oral explanation or interpretations given to this project are not binding.

Hardcopy bids shall be submitted in a sealed envelope addressed to the Department and labeled with the name of the bidder, the name of the project and the statement 'Do Not Open Until The Time Of Bid Opening.' Electronic bids shall be submitted via the Bid Express website.

Bid security in the amount of ten (10) percent of the amount of the bid, and in the form of a bid bond issued by an admitted surety insurer licensed by the California Department of Insurance, cash, cashier's check or certified check shall accompany the bid. Bid security shall be made in favor of the County of Fresno.

No contract will be awarded to a contractor who has not been licensed in accordance with the provisions of the Contractors State License Law, California Business and Professions Code, Division 3, Chapter 9, as amended, or whose bid is not on the proposal form included in the contract document. A valid California Contractor's License, **Class A (General Engineering)** is required for this project.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at County of Fresno, Department of Public Works and Planning, 2220 Tulare Street, Sixth Floor, Fresno CA 93721-2104 and available from the California Department of Industrial Relations' Internet web site at <http://www.dir.ca.gov/DLSR/PWD>. Future effective general prevailing wage rates, which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

No contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].

No contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

This contract is subject to state contract nondiscrimination and compliance requirements pursuant to Government Code, Section 12990.

The Federal minimum wage rates for this project as predetermined by the United States Secretary of Labor are set forth in **General Decision Number CA20200018**, Dated 08/21/2020, which is incorporated in these special provisions by this reference as if fully set forth herein and which can be viewed at <https://beta.sam.gov/wage-determination/CA20200018/17/document>. Said Federal wage rates, as well as project plans, special provisions, and bid forms, may also be examined at the County of Fresno office described in the preceding paragraph. Addenda to modify the reference to Federal minimum wage rates to reflect revisions thereto, if necessary, will be issued to planholders of record.

Attention is directed to the provisions in the "Federal Requirements" section of these specifications. If there is a difference between the minimum wage rates predetermined by the Secretary of Labor and the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors shall pay not less than the higher wage rate. The Department will not accept lower State wage rates not

specifically included in the Federal minimum wage determinations. This includes "helper" (or other classifications based on hours of experience) or any other classification not appearing in the Federal wage determinations. Where Federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors shall pay not less than the Federal minimum wage rate, which most closely approximates the duties of the employees in question.

The U.S. Environmental Protection Agency (EPA) provides a toll-free "hotline" (Telephone No. 1-888-546-8740) service to report bid rigging activities. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report these activities. The "hotline" is part of the EPA's continuing effort to identify and investigate contract fraud and abuse and is operated under the direction of the EPA Inspector General. All information will be treated confidentially and caller anonymity will be respected. Additional information may be obtained at [https://www.epa.gov/office-inspector-general/epa-oig-hotline#file\\_now](https://www.epa.gov/office-inspector-general/epa-oig-hotline#file_now).

Bids are required for the entire work described herein, including a bid for the base bid and a bid for each of the additive bids. The total amount of the base bid and additive bid is the cumulative sum of the bid amounts listed for the individual line items. Bids will be compared, for purposes of identifying the apparent low bidder for proposed award of the project, on the basis of the total of the base bid plus the total of all additive bids; provided however, that the ultimate scope of the project, as subsequently determined by the Board of Supervisors at the time of award, may or may not include all or any of the additive bids.

The successful bidder shall furnish a faithful performance bond in the amount of 100 percent of the contract amount and a payment bond in the amount of 100 percent of the contract amount. Each bond specified in this Notice (bid bond, faithful performance bond and payment bond) shall meet the requirements of all applicable statutes, including but not limited to those specified in Public Contract Code section 20129 and Civil Code section 3248.

Each bond specified in this Notice shall be issued by a surety company designated as an admitted surety insurer in good standing with and authorized to transact business in this state by the California Department of Insurance, and acceptable to the County of Fresno. Bidders are cautioned that representations made by surety companies will be verified with the California Department of Insurance. Additionally, the County of Fresno, in its discretion, when determining the sufficiency of a proposed surety company, may require the surety company to provide additional information supported by documentation. The County generally requires such information and documentation whenever the proposed surety company has either a Best's Key Rating Guide of less than **A** and a financial size designation of less than **VIII**. Provided, however, that the County expressly reserves its right to require all information and documentation to which the County is legally entitled from any proposed surety company.

Pursuant to Public Contract Code Section 22300, substitution of securities for any moneys withheld by the County of Fresno to ensure performance under the contract shall be permitted.

The Board of Supervisors reserves the right to reject any or all bids.

Board of Supervisors, County of Fresno

Jean Rousseau, County Administrative Officer

Bernice E. Seidel, Clerk to the Board

Issue Date: August 25, 2020



# Special Provisions

**DIVISION I GENERAL PROVISIONS**  
**1 GENERAL**

**1-1.01 GENERAL**

**Add to the beginning of Section 1:**

The work is done in accordance with the 2015 *Standard Specifications*, 2015 *Standard Plans* and the following special provisions.

Where these special provisions indicate to replace, add to, delete, delete from, or otherwise modify a "section," or a portion thereof, the section or portion thereof to which such modification is to be applied is the section or portion thereof with the corresponding numbering in the 2015 *Standard Specifications*.

Except to the extent that they may conflict with these special provisions, revised standard specifications apply if included in the project details section of the book entitled "Specifications."

Revised standard plans apply if listed on the "List of Revised Standard Plans," if any, in these special provisions; or if shown or referenced on the project plans or in the project details section of the book entitled "Specifications."

In case of conflict between the *Standard Specifications* and these special provisions, the special provisions shall take precedence over and be used in lieu of such conflicting portions.

In case of conflict between applicable revised standard specifications and these special provisions, the special provisions shall take precedence over and be used in lieu of such conflicting portions.

**Add to the end of section 1-1.01:**

**Bid Items and Applicable Sections**

**Refer to Section 01 22 00 "EXPLANATION OF BID ITEMS"**

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**Add to the 1st table of section 1-1.06:**

APCD	air pollution control district
AQMD	air quality management district
CISS	cast-in-steel shell
CSL	crosshole sonic logging
GGL	gamma-gamma logging
METS	Caltrans Material Engineering and Testing Services

**Add to section 1-1.06:**

Abbreviations in the Bid Item List are also used in Proposal Sheet 2.

**Replace the headings and paragraphs of Section 1-1.07 with:**

**1-1.07 DEFINITIONS**

**1-1.07A General**

Interpret terms as defined in the Contract documents.

**1-1.07B Glossary**

**abandon:** Render unserviceable in place.

**acts of God:** *Acts of God* as defined in Pub Cont Code § 7105.

**activity:** Task, event, or other project element on a schedule that contributes to completing the project. An activity has a description, start date, finish date, duration, and one or more logic ties.

**adjust:** Raise or lower a facility to match a new grade line.

**aerially deposited lead:** Lead primarily from vehicle emissions deposited within unpaved areas or formerly unpaved areas.

**Authorized Facility Audit List:** Caltrans-developed list of facilities. For the Authorized Facility Audit List, go to the METS website.

**authorized laboratory:** Independent testing laboratory (1) not employed or compensated by any subcontractor or subcontractor's affiliate providing other services for the Contract and (2) authorized by the Department.

**Authorized Material List:** Caltrans-developed list of authorized materials. For the Authorized Material List go to the METS website.

**Authorized Material Source List:** Caltrans-developed list of authorized source materials. For the Authorized Material Source List go to the METS website.

**base:** Layer of specified material of planned thickness placed immediately below the pavement or surfacing.

**basement material:** Material in an excavation or embankment under the lowest layer to be placed.

**bid item:** Work unit for which the Bidder provides a price.

**Bid Item List:** List of bid items, units of measure, and the associated quantities. The verified Bid Item List is the Bid Item List with verified prices. The Contract Proposal (Proposal 2) of Low Bidder at the Department's website is the verified Bid Item List. After contract award, interpret a reference to the Bid Item List as a reference to the verified Bid Item List.

**borrow:** Fill acquired from an excavation source outside the described cut area.

1. **local borrow:** Material obtained by widening cuts or excavating from sources outside the planned or authorized cross section on the job site. The location of the local borrow is described or designated by the Engineer.
2. **imported borrow:** Borrow that is not local borrow.

**bridge:** Structure that:

1. Has a bridge number
2. Carries a (1) utility, (2) railroad, or (3) vehicle, pedestrian, or other traffic over, under, or around obstructions or waterways

**building-construction contract:** Contract that has *Building Construction* on the cover of the *Notice to Bidders and Special Provisions*.

**California Test:** Caltrans-developed test for determining work quality. For California Tests, go to the METS website.

**Caltrans:** State of California Department of Transportation

**certificate of compliance:** Certificate stating the material complies with the Contract.

**Certified Industrial Hygienist:** Industrial hygienist certified in comprehensive practice by the American Board of Industrial Hygiene.

**change order work:** Work described in a Change Order, including extra work and work described in the Contract as change order work.

**closure:** Closure of a traffic lane or lanes, including shoulder, ramp, or connector lanes, within a single traffic control system.

**commercial quality:** Quality meeting the best general practices.

**commercial source:** Established business operating as a material source for the general public.

**Contract:** Written and executed contract between the Department and the Contractor.

**Contract acceptance:** Director's written acceptance of a completed Contract.

**Contract time:** Number of original working days as adjusted by any time adjustment.

**Contractor:** Person or business or its legal representative entering into a Contract with the Department for performance of the work.

**controlling activity:** Construction activity that will extend the scheduled completion date if delayed.

**County:** The County of Fresno

**critical path:** Longest continuous chain of activities for the project that has the least amount of total float of all chains. In general, a delay on the critical path extends the scheduled completion date.

**critical path method:** Network-based planning technique using activity durations and relationships between activities to calculate a schedule for the entire project.

**culvert:** Structure other than a bridge that provides an opening under a roadway.

**data date:** Day after the date through which a schedule is current. Everything occurring earlier than the data date is as-built and everything on or after the data date is planned.

**day:** 24 consecutive hours running from midnight to midnight; calendar day.

1. **business day:** Day on the calendar except a Saturday and a holiday.
2. **working day:** Time measure unit for work progress. A working day is any 24-consecutive-hour period except:
  - 2.1. Saturday and a holiday.
  - 2.2. Day during which you cannot perform work on the controlling activity for at least 50 percent of the scheduled work shift with at least 50 percent of the scheduled labor and equipment due to any of the following:
    - 2.2.1. Adverse weather-related conditions.
    - 2.2.2. Traffic maintenance under the Contract.
    - 2.2.3. Suspension of a controlling activity that you and the Engineer agree benefits both parties.
    - 2.2.4. Unanticipated event not caused by either party, such as:
      - 2.2.4.1. Act of God
      - 2.2.4.2. Act of a public enemy.
      - 2.2.4.3. Epidemic.
      - 2.2.4.4. Fire.
      - 2.2.4.5. Flood.
      - 2.2.4.6. Governor-declared state of emergency.
      - 2.2.4.7. Landslide.
      - 2.2.4.8. Quarantine restriction.
    - 2.2.5. Issue involving a third party, including:
      - 2.2.5.1. Industry or area-wide labor strike.
      - 2.2.5.2. Material shortage.
      - 2.2.5.3. Freight embargo.
      - 2.2.5.4. Jurisdictional requirement of a law enforcement agency.
      - 2.2.5.5. Workforce labor dispute of a utility or nonhighway facility owner resulting in a nonhighway facility rearrangement not described and not solely for the

Contractor's convenience. Rearrangement of a nonhighway facility includes installation, relocation, alteration, or removal of the facility.

- 2.3. Day during a concurrent delay.
3. **original working days:**
  - 3.1. Working days to complete the work shown on the *Notice to Bidders* for a non-cost-plus-time-based bid
  - 3.2. Working days bid to complete the work for a cost-plus-time-based bid

Where working days is specified without the modifier *original* in the context of the number of working days to complete the work, interpret the number as the number of original working days as adjusted by any time adjustment.

**deduction:** Money permanently taken from a progress payment or the final payment. Deductions are cumulative and are not retentions under Pub Cont Code § 7107.

**delay:** Event that extends the completion of an activity.

1. **excusable delay:** Delay caused by the Department and not reasonably foreseeable when the work began, such as:
  - 1.1. Change in the work
  - 1.2. Department action that is not part of the Contract
  - 1.3. Presence of an underground utility main not described in the Contract or in a location substantially different from that specified
  - 1.4. Described facility rearrangement not rearranged as described, by the utility owner by the date specified, unless the rearrangement is solely for the Contractor's convenience
  - 1.5. Department's failure to obtain timely access to the right-of-way
  - 1.6. Department's failure to review a submittal or provide notification in the time specified
2. **critical delay:** Excusable delay that extends the scheduled completion date
3. **concurrent delay:** Occurrence of at least 2 of the following events in the same period of time, either partially or entirely:
  - 3.1. Critical delay
  - 3.2. Delay to a controlling activity caused by you
  - 3.3. Non-working day

**Department:** The Fresno County Board of Supervisors and its authorized representatives.

**District Office:** County of Fresno Department of Public Works and Planning

**detour:** Temporary route for traffic around a closed road part. A passageway through a job site is not a detour.

**Director:** Department's Chairman

**disadvantaged business enterprise:** Disadvantaged business enterprise as defined in 49 CFR 26.5.

**dispose of:** Remove from the job site.

**divided highway:** Highway with separated traveled ways for traffic, generally in opposite directions.

**Engineer:** The County's Director of Public Works and Planning, acting through their authorized designees.

**early completion time:** Difference in time between an early scheduled completion date and the work completion date.

**environmentally sensitive area:** Area within or near construction limits where access is prohibited or limited to protect environmental resources.

**estimated cost:** Estimated cost of the project as shown on the *Notice to Bidders*.

**extra work:** Any work, desired or performed, but not included in the original Contract.

**federal-aid contract:** Contract that has a federal-aid project number on the cover of the *Specifications*.

**final pay item:** Bid item whose quantity shown on the Bid Item List is the quantity paid.

**finished grade:** Final surface of the completed facility. If the work under the Contract includes stage construction, the relation between the finished grade and the work under the Contract is shown.

**fixed cost:** Labor, material, or equipment cost directly incurred by the Contractor as a result of performing or supplying a particular bid item that remains constant regardless of the item's quantity.

**float:** Difference between the earliest and latest allowable start or finish times for an activity.

1. **Department-owned float:** Time saved on the critical path by actions of the Department. It is the last activity shown on the schedule before the scheduled completion date.

**force account work:** Work ordered on a construction project without an existing agreement on its cost, and performed with the understanding that the contractor will bill the owner according to the cost of labor, materials, and equipment, plus a certain percentage for overhead and profit.

**grading plane:** Basement material surface on which the lowest layer of subbase, base, pavement, surfacing, or other specified layer is placed.

**highway:** Whole right-of-way or area reserved for use in constructing the roadway and its appurtenances.

**holiday:** Holiday shown in the following table:

<b>Holidays</b>	
Holiday	Date observed
Every Sunday	Every Sunday
New Year's Day	January 1 <sup>st</sup>
Birthday of Martin Luther King, Jr.	3rd Monday in January
Presidents' Day	3rd Monday in February
Cesar Chavez Day	March 31 <sup>st</sup>
Memorial Day	Last Monday in May
Independence Day	July 4 <sup>th</sup>
Labor Day	1st Monday in September
Veterans Day	November 11 <sup>th</sup>
Thanksgiving Day	4th Thursday in November
Day after Thanksgiving Day	Day after Thanksgiving Day
Christmas Day	December 25 <sup>th</sup>

If January 1st, March 31st, July 4th, November 11th, or December 25th fall on a Sunday, the Monday following is a holiday. If January 1st, March 31st, July 4th, November 11th, or December 25th fall on a Saturday, the preceding Friday is a holiday.

**hours of darkness:** Hours of darkness as defined in Veh Code § 280.

**idle equipment:** Equipment:

1. On the job site at the start of a delay
2. Idled because of the delay
3. Not operated during the delay

**informal-bid contract:** Contract that has *Informal Bid Authorized by Pub Cont Code § 10122* on the cover of the *Notice to Bidders and Special Provisions*.

**job site:** Area within the defined boundaries of a project.

**Labor Surcharge and Equipment Rental Rates:** Caltrans publication that lists labor surcharge and equipment rental rates.

**landscaping:** Practice of a landscaping contractor under 16 CA Code of Regs § 832.27.

**material:** Any product or substance specified for use in the construction of a project.

**material shortage:**

1. Shortage of raw or produced material that is area-wide and caused by an unusual market condition except if any of the following occurs:
  - 1.1. Shortage relates to a produced, nonstandard material
  - 1.2. Supplier's and the Contractor's priority for filling an order differs
  - 1.3. Event outside the United States for a material produced outside the United States
2. Unavailability of water that delays a controlling activity

**material source facility audit:** Self-audit and a Caltrans audit evaluating a facility's capability to consistently produce materials that comply with Caltrans standards.

**median:** Portion of a divided highway separating the traveled ways including inside shoulders.

**milestone:** Event activity that has zero duration and is typically used to represent the start or end of a certain stage of the project.

**mobilization:** Preparatory work that must be performed or costs incurred before starting work on the various items on the job site (Pub Cont Code § 10104).

**modify:** Add to or subtract from an appurtenant part.

**narrative report:** Document submitted with each schedule that discusses topics related to project progress and scheduling.

**near critical path:** Chain of activities with total float exceeding that of the critical path but having not more than 10 working days of total float.

**obliterate:** Place an earth cover over or root, plow, pulverize, or scarify.

**Office engineer:** The Director of Public Works and Planning for the County of Fresno

**pavement:** Uppermost layer of material placed on a traveled way or shoulder.

**plans:** Standard plans, revised standard plans, and project plans.

1. **standard plans:** Drawings standard to Department construction projects. These plans are in a book titled *Standard Plans*.
2. **revised standard plans:** New or revised standard plans. These plans are listed in the *List of Revised Standard Plans* in a book titled *Specifications*.
3. **project plans:** Drawings specific to the project, including authorized shop drawings. These plans also include a section titled *Project Details* of a book titled *Specifications*.

**plant establishment period:** Number of days shown on the *Notice to Bidders* for plant establishment.

**quality characteristic:** Characteristic of a material that is measured to determine conformance with a given requirement.

**quality control plan:** Contractor's plan to ensure QC.

**reconstruct:** Remove and disassemble and construct again at an existing or new location.

**relocate:** Remove and install or place in a new location.

**remove:** Remove and dispose of.

**reset:** Remove and install or place laterally at the same station location.

**roadbed:** Roadway portion extending from the curb line to curb line or the shoulder line to shoulder line. A divided highway has 2 roadbeds.

**roadside:** Area between the outside shoulder edge and the right-of-way limits.

**roadway:** Portion of the highway within the outside lines of curbs, sidewalks, slopes, ditches, channels, or waterways. A roadway includes the structures and features necessary for safety, protection of facilities, and drainage.

**salvage:** Remove, clean, and haul to a specified location.

**schedule:**

1. **baseline schedule:** Initial schedule showing the original work plan starting on the date of Contract approval. This schedule shows no completed work to date and no negative float or negative lag to any activity.
2. **revised schedule:** Schedule that incorporates a proposed or past change to logic or activity durations.
3. **updated schedule:** Current schedule developed from the accepted baseline and any subsequent accepted updated or revised schedules through regular monthly review to incorporate actual past progress.

**scheduled completion date:** Planned work completion date shown on the current schedule.

**shoulder:** Roadway portion contiguous with the traveled way for accommodation of a stopped vehicle, emergency use, and lateral support of base and surface courses.

**small tool:** Tool or piece of equipment not listed in Labor Surcharge and Equipment Rental Rates that has a replacement value of \$500 or less.

**specifications:** Standard specifications, revised standard specifications, and special provisions.

1. **standard specifications:** Specifications standard to Department construction projects. These specifications are in a book titled *Standard Specifications*.
2. **revised standard specifications:** New or revised standard specifications. These specifications are in a section titled *Revised Standard Specifications* of a book titled *Specifications*.
3. **special provisions:** Specifications specific to the project. These specifications are in a section titled *Special Provisions* of a book titled *Specifications*.
4. **general requirements:** Requirements specific to the project. These requirements are in a section titled *General Requirements* of a book titled *Specifications*.
5. **technical specifications:** Specifications specific to the project. These specifications are in a section titled *Technical Specifications* of a book titled *Specifications*.

**State:** State of California, including its agencies, departments, or divisions whose conduct or action is related to the work.

**Structure Design:** Offices of Structure Design of the Department of Transportation.

**subbase:** Layer of material between a base and the basement material.

**subgrade:** Roadbed portion on which pavement, surfacing, base, subbase, or a layer of any other material is placed.

**submittal:**

1. **action submittal:** Written and graphic information and samples that require the Department's response.
2. **informational submittal:** Written information that does not require the Department's response.



**substantial defects:** Defects plainly seen as damaged, displaced, or missing parts or improper functioning of materials, parts, equipment, or systems.

**substructure:** Bridge parts below the bridge seats, pier tops, and haunches for rigid-framed bridges or spring lines for arched bridges; includes abutment backwalls, abutment parapets, and wingwalls.

**superstructure:** Bridge parts except the substructure.

**supplemental project information:** Information relevant to the project, specified as supplemental project information, and made available to bidders.

**surfacing:** Uppermost layer of material placed on a traveled way or shoulders; pavement.

**time impact analysis:** Analysis using a CPM schedule developed specifically to demonstrate the effect a proposed or past change or delay has on the current scheduled completion date.

**time-scaled network diagram:** Graphic depiction of a CPM schedule comprised of activity bars with relationships for each activity represented by arrows. The tail of each arrow connects to the activity bar for the predecessor and points to the successor.

**total bid:** Sum of the item totals as verified by the Department; original Contract price.

**total float:** Amount of time that an activity or chain of activities can be delayed before extending the scheduled completion date.

**traffic:** Pedestrians, bicyclists, ridden or herded animals, vehicles, streetcars, and other conveyances either singularly or together while using any highway for purposes of travel.

**traffic lane:** Portion of traveled way used for the movement of a single line of vehicles.

**traveled way:** Portion of the roadway for the movement of vehicles, exclusive of the shoulders, berms, sidewalks, and parking lanes.

**tunnel:** Tunnel as defined in 8 CA Code of Regs § 8405 et seq.

**unauthorized work:** Work performed beyond the lines and grades described in the Contract or established by the Engineer or extra work performed without Department authorization.

**unsuitable material:** Material encountered below the natural ground surface in embankment areas or below the grading plane in excavation areas that the Engineer determines to be in any of the following conditions:

1. Of such unstable nature that it cannot be compacted to the specified density using ordinary methods at optimum moisture content.
2. Too wet to be properly compacted and cannot be dried before incorporating it into the work. Excessive moisture alone is not sufficient cause for determining that the material is unsuitable.
3. Inappropriate for the planned use.

**withhold:** Money temporarily or permanently taken from a progress payment.

**work:** Resources and activities required for Contract acceptance, including labor, materials, equipment, and the created product.

**work plan:** Detailed formulation of a program of action.

**work zone:** Area of a highway with construction, maintenance, or utility work activities.

#### **1-1.08 DISTRICTS**

##### **Add to the end of Section 1-1.09**

This project is not in a freeze-thaw area.

**Replace the headings and paragraphs of Section 1-1.10 with:**

**1-1.10 PAVEMENT CLIMATE REGIONS**

To help account for the effects of various climatic conditions on pavement performance, the State has been divided into 9 climate regions. The project's pavement climate region is inland valley.

**Replace the headings and paragraphs of Section 1-1.11 with:**

**1-1.11 WEBSITES, ADDRESSES, AND TELEPHONE NUMBERS**

**Websites, Addresses, and Telephone Numbers**

Reference or agency or department unit	Website	Address	Telephone no.
Authorized Material Lists Authorized Material Source Lists	<a href="https://dot.ca.gov/programs/engineering-services/authorized-materials-lists">https://dot.ca.gov/programs/engineering-services/authorized-materials-lists</a>	--	--
CA Unified Certification Program's list of certified DBEs	<a href="https://dot.ca.gov/programs/civil-rights/dbe-search">https://dot.ca.gov/programs/civil-rights/dbe-search</a>	--	--
<i>California MUTCD</i>	<a href="http://www.dot.ca.gov/trafficops/camutcd/">http://www.dot.ca.gov/trafficops/camutcd/</a>	--	--
Department	<a href="https://www.co.fresno.ca.us/departments/public-works-planning">https://www.co.fresno.ca.us/departments/public-works-planning</a>	2220 Tulare Street Design Division – Seventh Floor Fresno, CA 93721	(559) 600-9908
Department of Conservation, Office of Mine Reclamation	<a href="https://www.conservation.ca.gov/dmr">https://www.conservation.ca.gov/dmr</a>	--	--
Department of Industrial Relations	<a href="http://www.dir.ca.gov">http://www.dir.ca.gov</a>	455 Golden Gate Ave., San Francisco, CA 94102	--
Design Services - Contract Administration, Plan Holders, Bid Results	<a href="https://www.co.fresno.ca.us/departments/public-works-planning/contractor-bids-plan-holders-electronic-plans-bid-results">https://www.co.fresno.ca.us/departments/public-works-planning/contractor-bids-plan-holders-electronic-plans-bid-results</a>	2220 Tulare Street Design Division – Seventh Floor Fresno, CA 93721	Tel: (559) 600-9908 Fax: (559) 455-4609 Email: DesignServices@fresnocountyca.gov
Division of Accounting, Office of External Accounts Payable	<a href="https://dot.ca.gov/programs/accounting">https://dot.ca.gov/programs/accounting</a>	Major Construction Payment and Information Unit Office of External Accounts Payable Division of Accounting Department of Transportation P.O. Box 168043 Sacramento, CA 95816-8043	(916) 227-9013
Division of Construction	<a href="http://www.dot.ca.gov/hq/construc/">http://www.dot.ca.gov/hq/construc/</a>	--	--
Geotechnical Services	<a href="http://www.dot.ca.gov/hq/esc/geotech">http://www.dot.ca.gov/hq/esc/geotech</a>	Geotechnical Services Department of Transportation 5900 Folsom Blvd Sacramento, CA 95819-4612	(916) 227-7000
METS	<a href="http://www.dot.ca.gov/hq/esc/Translab/">http://www.dot.ca.gov/hq/esc/Translab/</a>	Materials Engineering and Testing Services Department of Transportation 5900 Folsom Blvd Sacramento, CA 95819-4612	(916) 227-7000
<i>MPQP</i>	<a href="http://www.dot.ca.gov/programs/construction/material-plant-quality-program">http://www.dot.ca.gov/programs/construction/material-plant-quality-program</a>	--	--

Office Engineer	--	Director of Public Works & Planning Fresno County 2220 Tulare St, 8 <sup>th</sup> Floor Fresno, CA 93721	(559) 600-4078
Offices of Structure Design, Documents Unit	--	MSC 9-4/4I Documents Unit Offices of Structure Design Department of Transportation 1801 30th St Sacramento, CA 95816-7006	(916) 227-0716
Publication Distribution Unit	--	Publication Unit Department of Transportation 1900 Royal Oaks Dr Sacramento, CA 95815-3800	--

**Replace the headings and paragraphs of Section 1-1.12 with the following:**

**1-1.12 MISCELLANY**

Make checks and bonds payable to the County of Fresno.

**2 BIDDING**

**Replace the headings and paragraphs of Section 2 with the following:**

**2-1.01 GENERAL**

Section 2 includes specifications related to bid eligibility and the bidding process.

**2-1.02 BID INELIGIBILITY**

A firm that has provided architectural or engineering services to the Department for this contract before bid submittal for this contract is prohibited from any of the following:

1. Submitting a bid
2. Subcontracting for a part of the work
3. Supplying materials

**2-1.03 CONTRACTOR REGISTRATION**

No contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].

**2-1.04–2-1.05 RESERVED**

**2-1.06 BID DOCUMENTS**

**2-1.06A General**

The *Bid* book includes bid forms and certifications and may be requested from Design Services.

The *Specifications* includes the *Notice to Bidders*, revised standard specifications, project details, and special provisions.

The *Specifications*, project plans, and any addenda to these documents may be accessed at Design Services.

The *Standard Specifications* and *Standard Plans* may be purchased at the Publication Distribution Unit.

**2-1.06B Supplemental Project Information**

The Department makes the following supplemental project information available:

**Supplemental Project Information**

Where Available	Description
Included in Project Details	Location Map, Construction Project Informational Signs Staking request form Westlands Water District USA Guidelines Badger Meter and Orion Endpoint data sheets
Available on Design Services webpage	School Pipeline as-built plans, Pothole report, Geotechnical Report

If as-built drawings are available they may not show existing dimensions and conditions. Where new construction dimensions are dependent on existing bridge dimensions, verify the field dimensions and adjust the dimensions of the work to fit the existing conditions.

**2-1.06C–2-1.06D Reserved**

**2-1.07 JOB SITE AND DOCUMENT EXAMINATION**

Examine the job site and bid documents. Notify the Department of apparent errors and patent ambiguities in the plans, specifications, and Bid Item List. Failure to do so may result in rejection of a bid or rescission of an award.

Bid submission is your acknowledgment that you have examined the job site and bid documents and are satisfied with:

1. General and local conditions to be encountered
2. Character, quality, and scope of work to be performed
3. Quantities of materials to be furnished
4. Character, quality, and quantity of surface and subsurface materials or obstacles
5. Requirements of the contract

**2-1.08 RESERVED**

**2-1.09 BID ITEM LIST**

Submit a bid based on the bid item quantities the Department shows on Proposal 2.

**2-1.10 SUBCONTRACTOR LIST**

On the Subcontractor List form, list each subcontractor to perform work in an amount in excess of 1/2 of 1 percent of the total bid or \$10,000, whichever is greater (Pub Cont Code § 4100 et seq.).

For each subcontractor listed, the Subcontractor List form must show:

1. Business name and the location of its place of business.
2. California contractor license number for a non-federal-aid contract.
3. Public works contractor registration number.
4. Portion of work it will perform. Show the portion of the work by:
  - 4.1. Bid item numbers for the subcontracted work
  - 4.2. Percentage of the subcontracted work for each bid item listed
  - 4.3. Description of the subcontracted work if the percentage of the bid item listed is less than 100 percent

### **2-1.11 RESERVED**

### **2-1.12 DISADVANTAGED BUSINESS ENTERPRISES (DBEs)**

#### **2-1.12A General**

Section 2-12 is applicable to this contract.

Under 40 CFR 33:

The contractor 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 40 CFR part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. 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 other legally available remedies.

Include this assurance in each subcontract you sign with a subcontractor.

#### **2-1.12B Good Faith Efforts**

You are required to make and demonstrate the following good faith efforts whenever procuring construction, equipment, services and supplies, even if it has achieved the fair share objective:

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through solicitation, outreach and recruitment activities.
2. Make information on forthcoming opportunities available to DBEs and arrange time frames to establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
3. Consider in the contracting process, whether firms competing for large contracts could subcontract with DBEs. This could include dividing tasks, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
4. Encourage contracting with a consortium of DBEs when a contract is too large for one firm to handle individually.
5. Use the services and assistance of the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

Failure to take the steps outlined above prior to bid opening, and to submit the documents specified in Section 2-1.33, shall cause the bid to be rejected as non-responsive.

#### **2-1.12C Fair Share Objectives**

A fair share objective has been adopted for this project, as required by 40 CFR 33. The objective is not a quota or binding requirement. Meeting the objective will not exempt you from employing and demonstrating the mandatory Good Faith Efforts in Section 2-1.12B for any subcontract, and you will not be penalized or treated as if out of compliance if you do not meet the goal.

### **2-1.13–2-1.30 RESERVED**

### **2-1.31 RESERVED**

### **2-1.32 RESERVED**

### **2-1.33 BID DOCUMENT COMPLETION AND SUBMITTAL**

#### **2-1.33A General**

Complete forms in the *Bid* book.

Submit your bid:

1. Under sealed cover

2. Marked as a bid
3. Identifying the contract number and the bid opening date

Certain bid forms must be submitted with the bid and properly executed.

Certain other forms and information must be submitted either with the bid or within the prescribed period after bid opening as specified elsewhere in these special provisions.

Failure to submit the forms and information as specified results in a nonresponsive bid.

If an agent other than the authorized corporation officer or a partnership member signs the bid, file a Power of Attorney with the Department either before opening bids or with the bid. Otherwise, the bid may be nonresponsive.

### **2-1.33B Bid Item List and Bid Comparison**

Submit a bid based on the bid item quantities the Department shows on Proposal 2. Bids will be evaluated and the low bidder determined as indicated in the *Notice to Bidders*.

Do not submit an unbalanced bid. An unbalanced bid is one in which one or more bid items is/are considered by the Department to have been bid at an amount that is unreasonably high or unreasonably low. A bid may be considered to be non-responsive and may be rejected if it is considered by the Department to be unbalanced.

### **2-1.33C Bid Document Completion**

Proposal sheets are identified by title and by the letter "P" followed by the number assigned to the proposal sheet in question. Proposal sheets are included in the *Bid Book*.

#### **2-1.33C(1) Proposal 1 - Proposal to the Board of Supervisors of Fresno County**

#### **2-1.33C(2) Proposal 2 - Bid Proposal Sheet**

One or more sheet(s) upon which the bidder completes the bid.

Fill out completely including a unit price and total for each unit price-based item and a total for each lump sum item.

Do not make any additions such as "plus tax", "plus freight", or conditions such as "less 2% if paid by 15th".

Use ink or typewriter.

#### **2-1.33C(3) Proposal 3 - Evaluation of Bid Proposal Sheet**

Describes how inconsistencies and irregularities are evaluated and corrected when Design Services reviews the Bid Sheet.

#### **2-1.33C(4) Proposal 4 - Bid Security and Signature**

Submit one of the following forms of bidder's security equal to at least 10 percent of the bid:

- Cash
- Cashier's check
- Certified check
- Signed bidder's bond by an admitted surety insurer

Indicate type of bid security provided.

- Cash – Acceptable but not recommended. Cash is deposited in a clearing account and is returned to bidders by County warrant. This process may take several weeks.

- Cashier's or Certified Checks. This type of security is held until the bid is no longer under consideration. If submitted by a potential awardee, they will be returned when the contract is fully executed by the bidder and bonds and insurance have been approved.
- Bid Bonds - Must be signed by the bidder and by the attorney-in-fact for the bonding company. Provide notarized signature of attorney-in-fact accompanied by bonding company's affidavit authorizing attorney-in-fact to execute bonds. An unsigned bid bond will be cause for rejection.

Provide contractor's license information.

State business name and if business is a:

- Corporation - list officers
- Partnership - list partners
- Joint Venture - list members; if members are corporations or partnerships, list their officers or partners.
- Individual - list Owner's name and firm name style

Signature of Bidder - the following lists types of companies and corresponding authorized signers.

- Corporation - by an officer
- Partnership - by a partner
- Joint Venture - by a member
- Individual - by the Owner

If signature is by a Branch Manager, Estimator, Agent, etc., the bid must be accompanied by a power of attorney authorizing the individual to sign the bid in question or to sign bids more generally, otherwise the bid may be rejected.

Business Address - Firm's Street Address

Mailing Address - P.O. Box or Street Address

Complete, sign, and return with bid.

#### **2-1.33C(5) Proposal 5 - Noncollusion Affidavit**

Must be completed, signed, and returned with bid.

#### **2-1.33C(6) Proposal 6 - Public Contract Code Section 10285.1 Statement**

Check "has" or "has not" in accordance with instructions on form, return with completed for with bid. Note that signing the bid constitutes signing this statement.

#### **2-1.33C(7) Proposal 7 - Public Contract Code Section 10162 Questionnaire And Public Contract Code 10232 Statement**

Check: "yes" or "no" accordance with instructions on form, include explanation if "yes" is checked. Return completed form with bid. Note that signing the bid constitutes signing this questionnaire and statement.

#### **2-1.33C(8) Proposal 8(a) through Proposal 8(d) - Subcontractors**

Sheet(s) upon which bidders list subcontractors. List each subcontractor to perform work in an amount in excess of 1/2 of 1 percent of the total bid or \$10,000, whichever is greater (Pub Cont Code § 4100 et seq.).

The *Subcontractor List* submitted with the bid must show the name, location of business, work portions to be performed, and the contractor's license number for each subcontractor listed.

- Use subcontractor's business name style as registered with the License Board.



- Specify the city in which the subcontractor's business is located and the state if other than California.
- Description of the work to be performed by the subcontractor. Indicate with bid item numbers from the bid sheet and/or work descriptions similar to those on bid sheet.
- List license number and Department of Industrial Relations registration number for each subcontractor.

Upon request from Design Services, provide the following additional information within 24 hours of bid opening if not included on the *Subcontractor List* submitted with the bid:

- Complete physical address for each subcontractor listed.
- Percentage of the total bid or dollar amount associated with each subcontractor listed.

**2-1.33C(9) Proposal 9 - Certification With Regard To The Performance Of Previous Contracts Or Subcontracts Subject To The Equal Opportunity Clause And The Filing Of Required Reports**

For a Federal-aid contract, complete, sign, and return with bid.

**2-1.33C(10) Proposal 10 - Title 40, Code Of Federal Regulations, Part 32 Debarment And Suspension Certification**

For a Federal-aid contract, complete, sign, and return with bid.

**2-1.33C(11) Proposal 11 - Nonlobbying Certification For Federal-Aid Contracts**

For a Federal-aid contract, complete, sign, and return with bid.

**2-1.33C(12) Proposal 12(a) through Proposal 12(b) - Disclosure Of Lobbying Activities**

For a Federal-aid contract, complete, sign, and return with bid.

**2-1.33C(14) Proposal 13(a) through proposal 13(c) - DBE Information — Good Faith Efforts**

For a Federal-aid contract, if you have not met the DBE goal, bidders must complete and submit so that it is received by Design Services no later than 4:00 PM on the fourth business day after the bid opening if not submitted with the bid.

**2-1.33C(15) Proposal 14 - Guidelines for Implementing California State Revolving Funds Disadvantaged Business Enterprise Requirements**

Instructions and forms for compliance with the State of California's Clean Water and Drinking Water State Revolving Fund Programs' requirements and regulations regarding Disadvantaged Business Enterprises. Complete and submit forms in accordance with the guidelines. Adhere to the instructions for the included forms, and ensure that those forms required to be submitted with the bid package are included.

**2-1.33C(16) Proposal 15 - Guaranty**

Does not need to be signed with the bid. Part of the contract which must be signed by the contractor when contract is executed.

**2-1.34 BIDDER'S SECURITY**

Submit one of the following forms of bidder's security equal to at least 10 percent of the bid:

1. Cash
2. Cashier's check
3. Certified check
4. Signed bidder's bond by an admitted surety insurer

Submit cash, cashier's check, certified check, or bidder's bond with your bid.

### **2-1.35–2-1.39 RESERVED**

### **2-1.40 BID WITHDRAWAL**

1. An authorized agent may withdraw a bid before the bid opening date and time by submitting a written bid withdrawal request at the location where the bid was submitted. Withdrawing a bid does not prevent you from submitting a new bid. An authorized agent is an individual authorized to submit a bid.
2. After the bid opening time, you cannot withdraw a bid.

### **2-1.41–2-1.42 RESERVED**

### **2-1.43 BID OPENING**

The Department publicly opens and reads bids at the time and place shown on the *Notice to Bidders*.

### **2-1.44–2-1.45 RESERVED**

### **2-1.46 DEPARTMENT'S DECISION ON BID**

The Department's decision on the bid amount is final.

The Department may reject:

1. All bids
2. A nonresponsive bid

### **2-1.47 BID RELIEF**

The Department may grant bid relief under Pub Cont Code § 5100 et seq. Submit any request for bid relief to Design Services.

### **2-1.48 RESERVED**

### **2-1.49 SUBMITTAL FAILURE HISTORY**

The Department considers a bidder's past failure to submit documents required after bid opening in determining a bidder's responsibility.

### **2-1.50 BID RIGGING**

Section 2-1.50 applies to a federal-aid contract.

The U.S. Environmental Protection Agency (EPA) provides a toll-free "hotline" (Telephone No. 1-888-546-8740) service to report bid rigging activities. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report these activities. The "hotline" is part of the EPA's continuing effort to identify and investigate contract fraud and abuse and is operated under the direction of the EPA Inspector General. All information will be treated confidentially and caller anonymity will be respected. Additional information may be obtained at [https://www.epa.gov/office-inspector-general/epa-oighotline#what\\_to\\_report](https://www.epa.gov/office-inspector-general/epa-oighotline#what_to_report).

### **2-1.51 DISCLOSURE OF SELF-DEALING TRANSACTIONS**

This provision is only applicable if the contractor is operating as a corporation (a for-profit or non-profit corporation) or if during the term of this agreement, the contractor changes its status to operate as a corporation.

Members of the contractor's Board of Directors shall disclose any self-dealing transactions that they are a party to while contractor is providing goods or performing services under this agreement. A self-dealing transaction shall mean a transaction to which the contractor is a party and in which one or more of its directors has a material financial interest. Members of the Board of Directors shall disclose any self-dealing transactions that they are a party to by completing and signing a Self-Dealing Transaction Disclosure Form which is included in *Project Details* of these special provisions.

In the event that the Contractor (to whom the project is awarded) is operating as a corporation or incorporates during the course of the construction contract, and any member of its board of directors is

engaged or intends to become engaged in self-dealing transaction(s), each member of its board of directors who is engaged or intends to become engaged in a self-dealing transaction or transactions must complete and submit to the County a completed Self-Dealing Transaction Disclosure Form (in Project Details) for each such transaction prior to engaging therein or immediately thereafter.

### **3 CONTRACT AWARD AND EXECUTION**

**Replace the headings and paragraphs of Section 3 with:**

#### **3-1.01 GENERAL**

Section 3 includes specifications related to contract award and execution.

#### **3-1.02 CONSIDERATION OF BIDS**

##### **3-1.02A General**

Bids will be compared on the basis listed in the Notice to Bidders.

##### **3-1.02B Tied Bids**

The Department breaks a tied bid with a coin toss:

#### **3-1.03 CONTRACTOR REGISTRATION**

No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

#### **3-1.04 CONTRACT AWARD**

##### **3-1.04A BID PROTEST PROCEDURES**

Any bid protest must be submitted in writing and delivered by the Bidder by either of the following means: (1) via e-mail to [DesignServices@fresnocountyca.gov](mailto:DesignServices@fresnocountyca.gov); or (2) via certified mail, return receipt requested to the following address: Design Division, Department of Public Works and Planning, 2220 Tulare Street, Sixth Floor, Fresno, CA 93721.

**The bid protest must be received no later than 5:00 p.m. of the seventh (7<sup>th</sup>) calendar day following the deadline for submittal of the specific bid document(s) placed at issue by the protest.** Any Bidder filing a protest is encouraged to submit the bid protest via e-mail, because the deadline is based on the Department's receipt of the bid protest. A bid protest accordingly may be rejected as untimely if it is not received by the deadline, regardless of the date on which it was postmarked. The Bidder's compliance with the following additional procedures also is mandatory:

- a. The initial protest document shall contain a complete statement of the grounds for the protest, including a detailed statement of the factual basis and any supporting legal authority.
- b. The protest shall identify and address the specific portion of the document(s) forming the basis for the protest.
- c. The protest shall include the name, address and telephone number of the person representing the protesting party.
- d. The Department will provide a copy of the initial protest document and any attached documentation to all other Bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.
- e. The Board of Supervisors will issue a decision on the protest. If the Board of Supervisors determines that a protest is frivolous, the party originating the protest may be determined to be irresponsible and that party may be determined to be ineligible for future contract awards.

f. The procedure and time limits set forth herein are mandatory and are the Bidder's sole and exclusive remedy in the event of a bid protest. Failure by the Bidder to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including the subsequent filing of a Government Code Claim or legal proceedings.

### **3-1.04B AWARD PERIOD**

If the Department awards the contract, the award is made to the lowest responsible bidder within 90 calendar days after bid opening.

The Department may extend the specified award period if the Bidder agrees.

You may request to extend the award period by faxing a request to Design Services before 4:00 p.m. on or before the last day of the award period. If you do not make this request, after the specified award period:

1. Your bid becomes invalid
2. You are not eligible for the award of the contract

### **3-1.05 CONTRACT BONDS (PUB CONT CODE §§ 10221 AND 10222)**

The successful bidder must furnish 2 bonds conforming to the requirements in the *Agreement* of these special provisions.

### **3-1.06 CONTRACTOR LICENSE**

For a federal-aid contract, the Contractor must be properly licensed as a contractor from contract award through Contract acceptance (Pub Cont Code § 10164).

For a non-federal-aid contract:

1. Contractor must be properly licensed as a contractor from bid opening through Contract acceptance (Bus & Prof Code § 7028.15)
2. Joint venture bidders must obtain a joint venture license before contract award (Bus & Prof Code § 7029.1)

### **3-1.07 INSURANCE POLICIES**

The successful bidder must submit copies of its insurance policies conforming to the requirements in the *Agreement* of these special provisions.

### **3-1.08 –3-1.10 RESERVED**

### **3-1.11 PAYEE DATA RECORD**

Complete and deliver to the Engineer a Payee Data Record form when requested by the Engineer.

### **3-1.12 RESERVED**

### **3-1.13 RESERVED**

### **3-1.14 CONDITIONAL AWARD**

The Owner will first make a “conditional award of contract” to the lowest responsible bidder whose proposal complies with all the requirements prescribed. Such Owner’s “conditional award of contract” is subject to, and conditioned upon, approval of such lowest responsible bidder’s proposal by the California State Water Resources Control Board (“SWRCB”), as evidenced by notice thereof by the SWRCB to the Owner. The Owner has no authority or control over, and the Owner does not assume any responsibility herein for, the SWRCB’s decision-making; the Owner may rely solely upon the SWRCB’s notice thereof to

the Owner as proof of such SWRCB approval, if it is given. Such Owner's "conditional award of contract" is not by itself the award of the contract.

### **3-1.15 AWARD APPROVAL & AWARD NOTIFICATION**

If the SWRCB provides the Owner with the SWRCB's notice of approval of such lowest responsible bidder's proposal, (a) the Owner's receipt thereof satisfies the condition of the Owner's "conditional award of contract" to the lowest responsible bidder whose proposal complies with all the requirements prescribed, and (b) the Director will provide written notice to the Chairman of the Board of Supervisor of the Owner and such lowest responsible bidder, mailed to the address shown on his or her proposal, substantially to the following effect:

- (a) the Owner received the SWRCB's notice that the SWRCB approved such lowest responsible bidder's proposal;
- (b) the Owner's receipt of notice of such approval by the SWRCB satisfies the condition of the Owner's "conditional award of contract" to the lowest responsible bidder whose proposal complies with all the requirements prescribed; and
- (c) that such written notice is given pursuant to this section.

The award of contract, if it is to be made, will be made as follows: the Director will notify the successful bidder by letter, mailed to the address shown on his or her proposal, that (a) his or her bid has been accepted and that he or she has been awarded the contract, and (b) before the Owner executes the written contract, the successful bidder must first comply with Section 03-5.01, below. The Owner shall not be required to enter into the written contract with the successful bidder unless and until the successful bidder shall have complied with Section 3-1.18, below.

The right is reserved by the Owner to reject any or all proposals, to waive technicalities, to advertise for new proposals, or to proceed to do this work otherwise, if in the judgment of the Owner the best interests of the Owner will be promoted thereby.

### **3-1.16 EXTENSION OF TIME**

If the Owner finds that it will be unable to award the contract within ninety (90) calendar days after the opening of proposals, the Director may request any or all bidders to extend all terms of their proposal(s) to a specified date. More than one such extension may be requested, and in all such instances, the provisions of this section shall likewise apply. If a bidder who receives a request for an extension does not elect to extend the terms of his or her proposal beyond the ninety (90) calendar days (or such further extended date) following opening of proposals, or does not respond within seven (7) calendar days to a request for an extension, that bidder's proposal will be deemed as having expired, and that bidder's proposal will not be considered for award of the contract.

### **3-1.17 CANCELLATION OF CONDITIONAL AWARD OR AWARD**

The Owner reserves the right to cancel the conditional award of any contract or the award of any contract at any time before the execution of said contract by all parties without any liability against the Owner.

### **3-1.18 CONTRACT EXECUTION**

The successful bidder must sign the *Agreement*.

Deliver to Design Services:

1. Signed *Agreement*
2. Contract bonds
3. Documents identified in section 3-1.07
4. For a federal-aid contract, *Local Agency Bidder - DBE Information* form

Design Services must receive these documents before the 10th business day after the bidder receives the contract.

The bidder's security may be forfeited for failure to execute the contract within the time specified (Pub Cont Code §§ 10181, 10182, and 10183).

### **3-1.19 BIDDERS' SECURITIES**

The Department keeps the securities of the 1st, 2nd, and 3rd low bidders until the contract has been executed. The other bidders' securities, other than bidders' bonds, are returned upon determination of the 1st, 2nd, and 3rd low bidders, and their bidders' bonds are of no further effect (Pub Cont Code § 10184).

## **4 SCOPE OF WORK**

**Replace Section 4-1.02 with:**

### **4-1.02 INTENT**

The Contract intent is to provide for work completion using the best general practices.

Nothing in the specifications, special provisions, Standard Specifications, or in any other Contract document voids the Contractor's public safety responsibilities.

**Replace the paragraphs of Section 4-1.07C with the following:**

### **4-1.07C Reserved**

**Replace Section 4-1.13 with:**

### **4-1.13 CLEANUP**

Before final inspection, leave the job site neat and presentable and dispose of:

1. Rubbish
2. Excess materials
3. Falsework
4. Temporary structures
5. Equipment

Remove warning, regulatory, and guide signs when directed by the Engineer.

## **5 CONTROL OF WORK**

**Delete the 9<sup>th</sup> Paragraph of Section 5-1.01**

**Add the following before the last sentence in Section 5-1.02**

Caltrans Standard Plans, City of Fresno Standard Drawings, and any other other-agency Standard Drawings included in the "Project Details" section of the book entitled "Specifications" have the same ranking as Standard Plans."

All other drawings in the "Project Details" section of the book entitled "Specifications" have the same ranking as Project Plans.

Tables and other documents in the "Project Details" section of the book entitled "Specifications" have the same ranking as Special Provisions. If a portion of a document in the Project Details section conflicts with the Special Provisions, the Special Provisions shall prevail.

**Replace the headings and paragraphs of section 5-1.09 with:**

**5-1.09 RESERVED**

**Replace Section 5-1.12 with:**

**5-1.12 ASSIGNMENT**

No third-party agreement relieves you or your surety of the responsibility to complete the work. Do not sell, transfer, or otherwise dispose of any Contract part without prior written consent from the Department.

If you assign the right to receive Contract payments, the Engineer accepts the assignment upon the Engineer's receipt of a notice. Assigned payments remain subject to deductions and withholds described in the Contract. The Department may use withheld payments for work completion whether payments are assigned or not.

A pending or disapproved request for assignment does not relieve you of the responsibility to commence and pursue work timely and in strict accordance with contract documents.

**Replace the headings and paragraphs of section 5-1.13C with:**

**5-1.13C RESERVED**

**Replace the headings and paragraphs of section 5-1.13D with:**

**5-1.13D RESERVED**

**Add the following paragraph to the end of section 5-1.16 with:**

**Submit Daily Log records to the Engineer weekly for the entire course of work unless the Engineer requests another interval.**

**Replace the paragraphs of section 5-1.20B(4) with:**

**5-1.20B(4) Contractor–Property Owner Agreement**

Before procuring material from or disposing or stockpiling of material on non-highway property:

1. Provide proof that the property where materials are to be stockpiled or equipment parked/stored is appropriately zoned and/or permitted for the use proposed by the Contractor.
2. Obtain written authorization from each and every owner of the property where materials are to be stockpiled or equipment parked/stored.
3. Provide proof that the signor(s) of the authorization are the owners of the property.
4. Provide an executed release from the property owner(s) absolving the Department from any and all responsibility in connection with the stockpiling of materials or parking/storage of equipment on said property.
5. Obtain written permission from the Engineer to stockpile materials or park/store equipment at the location designated in said authorization.

Before Contract acceptance, submit a document signed by the owner of the material source or disposal site stating that the Contractor has complied with the Contractor-owner agreement.

Failure by the Contractor to provide written authorization shall result in the withholding of all funds due to the Contractor until said authorization is received by the County.

**Replace the paragraph of Section 5-1.20E with:**

County Special District (the local water authority) will allow the Contractor to access water for Construction Projects. The Contractor will be required to install a meter and a backflow preventer prior to connection to the system.

Refer to Section 01 51 36 "WATER AND WATERING" of the Technical Specifications.

**Replace the paragraphs of section 5-1.23A with:**

**5-1.23A General**

Section 5-1.23 includes specifications for action and informational submittals.

Any submittal not specified as an informational submittal is an action submittal.

Submit action and informational submittals to the Engineer. Unless otherwise specified in these Specifications, submittals shall be provided via email in .pdf format.

Each submittal must have a cover sheet that must include:

1. Contract number
2. Project Name
3. Date
4. Submittals (and resubmittals if applicable) must be numbered sequentially
5. Structure number if applicable
6. Contractor
7. Person responsible for submitting the submittal
8. Signature of Contractor's representative sending submittal
9. Section number and/or item submittal is referencing
10. Pages of submittal, excluding cover sheet

The Department rejects a submittal if it has any error or omission.

If the last day for submitting a document falls on a Saturday or holiday, it may be submitted on the next business day with the same effect as if it had been submitted on the day specified.

Documents must be submitted in the English language.

Convert documents to US customary units.

**Replace Section 5-1.26 with:**

#### **5-1.26 CONSTRUCTION SURVEYS**

Refer to Section 01 57 50 of the Technical Specifications.

**Replace Section 5-1.27E with:**

#### **5-1.27E CHANGE ORDER BILLS**

Maintain separate records for change order work costs.

#### **5-1.32 AREAS FOR USE**

Occupy the highway only for purposes necessary to perform the work.

Defend, indemnify, and hold the Department harmless to the same extent as under section 7-1.05.

The Department does not allow temporary residences within the County right-of-way.

## **6 CONTROL OF MATERIALS**

**Replace section 6-1.04 with:**

#### **6-1.04 AMERICAN IRON AND STEEL**

##### **6-1.04A General**

This project is subject to "American Iron and Steel" provisions. Unless a predominantly iron or steel product qualifies for an exemption, as listed by the United States Environmental Protection Agency, all manufactured iron and steel products must be certified as produced within the United States. Attention is directed to the "American Iron and Steel" requirements of P.L. 113-76 (also known as the Continuing Appropriations Act of 2014), and the regulations adopted pursuant thereto. In conformance with the law and regulations, all manufacturing processes for steel and iron materials furnished for incorporation into the work on this project shall occur in the United States. American Iron and Steel compliance



certifications and/or waivers must be provided to the Engineer with the applicable material or equipment submittal, as specified elsewhere in these provisions, for any covered materials. A list of materials covered by this provision, as well as any active state or nationwide waivers, may be obtained for the United States Environmental Protection Agency. The Contractor acknowledges to and for the benefit of the County, the State of California, and the United States, that it understands the goods and services under this Agreement are being funded with monies made available from the DWSRF and Proposition 1 that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contractor for this contract. The Contractor represents and warrants to and for the benefit of the County, the State of California, and the United States, that: the Contractor has reviewed and understands the American Iron and Steel Requirement; all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved; and the Contractor will provide any further verified information, certification or assurance of compliance with this section, or information necessary to support compliance or a waiver of the American Iron and Steel Requirement, as may be requested by the County, the State of California, or the United States. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the County, the State of California, or the United States, to recover damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the County, the State of California, or the United States, resulting from such a failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State of California or any damages owed to the State of California by the County). While the Contractor has no direct contractual privity with the State of California, as a lender to the County for the funding of its project, the County and the Contractor agree that the State of California is a third-party beneficiary and neither this paragraph (nor any other provision of this contract necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State of California.

#### **6-1.04B Iron and Steel Products**

In general, all products made primarily of iron and steel to be incorporated into the project during construction must be produced in the United States, with the exception of:

1. Raw materials, such as ores, limestone and iron and steel scrap
2. Non-iron or steel components of an iron and steel product
3. Mechanical and electrical components and equipment
4. Any item for which a waiver has been approved by the United States Environmental Protection Agency.

Attention is directed to the guidance memorandum provided by the United States Environmental Protection Agency, which has been included in the project details section.

#### **6-1.04C Certification**

Certifications or waivers must be provided for all applicable materials under the American Iron and Steel provisions, which are not covered under a waiver from the United States Environmental Protection Agency. Certifications must indicate that each material has been produced or manufactured in the United States.

**Replace section 6-1.05 with:**

#### **6-1.05 SPECIFIC BRAND OR TRADE NAME AND SUBSTITUTION**

Unless substitution is expressly precluded in the special provisions, a reference to a specific brand or trade name establishes a quality standard and is not intended to limit competition. Unless the Department has made a public interest finding expressly authorizing sole source procurement of a particular item, you may use a product that is equal to or better than the specified brand or trade name if authorized.

Submit a substitution request with a time period that:

1. Follows Contract award
2. Allows 30 days for review

3. Causes no delay

Include substantiating data with the substitution request that proves that substitution:

1. Causes no delay
2. Is of equal or better quality and suitability

If the special provisions disallow substitution of a particular item, provide the specified item and do not propose substitution.

1 inch Badger Model 70 Bronze Disc Series Meters with High Resolution HR-E encoders and Orion Cellular LTE-M Endpoints shall be used for the project, and no substitution therefor shall be allowed.

2 inch Badger Model 170 Bronze Disc Series Meters with High Resolution HR-E encoders and Orion Cellular LTE-M Endpoints shall be used for the project, and no substitution therefor shall be allowed.

3 inch Badger Compound Series Meters with High Resolution HR-E encoders and Orion Cellular LTE-M Endpoints shall be used for the project, and no substitution therefor shall be allowed.

Kupferle Foundry Eclipse No. 88WC Sampling Stations with lockable cast aluminum enclosures shall be used for the project, and no substitution therefor shall be allowed.

## **7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC**

### **Replace the 2<sup>nd</sup> Paragraph of Section 7-1.02K(2) with:**

The general prevailing wage rates and any applicable changes to these wage rates are available:

1. From Design Services
2. From the Department of Industrial Relations' Web site

### **Replace section 7-1.02K(3) with:**

04-22-16

Keep accurate payroll records.

Submit a copy of your certified payroll records, weekly, including those of subcontractors. Include:

1. Each employee's:
  - 1.1. Full name
  - 1.2. Address
  - 1.3. Social security number
  - 1.4. Work classification
  - 1.5. Straight time and overtime hours worked each day and week
  - 1.6. Actual wages paid for each day to each:
    - 1.6.1. Journeyman
    - 1.6.2. Apprentice
    - 1.6.3. Worker
    - 1.6.4. Other employee you employ for the work
  - 1.7. Pay rate
  - 1.8. Itemized deductions made
  - 1.9. Check number issued
  - 1.10. Fringe Benefits
2. Apprentices and the apprentice-to-journeyman ratio

Each certified payroll record must include a Statement of Compliance form signed under penalty of perjury that declares:

1. Information contained in the payroll record is true, correct, and complete
2. Employer has complied with the requirements of sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project
3. Wage rates paid are at least those required by the Contract

Submitted certified payrolls for hauling and delivering ready-mixed concrete must be accompanied by a written time record. The time record must include:

1. Truck driver's full name and address
2. Name and address of the factory or batching plant
3. Time the concrete was loaded at the factory or batching plant
4. Time the truck returned to the factory or batching plant
5. Truck driver's signature certifying under penalty of perjury that the information contained in this written time record is true and correct

Make certified payroll records available for inspection at all reasonable hours at your main office on the following basis:

1. Upon the employee's request or upon request of the employee's authorized representative, make available for inspection a certified copy of the employee's payroll record.
2. Refer the public's requests for certified payroll records to the Department. Upon the public's request, the Department makes available for inspection or furnishes copies of your certified payroll records. Do not give the public access to the records at your main office.

Make all payroll records available for inspection and copying or furnish a copy upon request of a representative of the:

1. Department
2. Division of Labor Standards Enforcement of the Department of Industrial Relations
3. Division of Apprenticeship Standards of the Department of Industrial Relations

Furnish the Department the location of the records. Include the street address, city, and county. Furnish the Department a notification of a location and address change within 5 business days of the change.

Comply with a request for the records within 10 days after you receive a written request. If you do not comply within this period, the Department withholds from progress payments a \$100 penalty for each day or part of a day for each worker until you comply. You are not assessed this penalty for a subcontractor's failure to comply with Labor Code § 1776.

The Department withholds from progress payments for delinquent or inadequate records (Labor Code § 1771.5). If you have not submitted an adequate record by the month's 15th day for the period ending on or before the 1st of that month, the Department withholds up to 10 percent of the monthly progress estimate, exclusive of mobilization. The Department does not withhold more than \$10,000 or less than \$1,000.

#### **7-1.02K(4)i Apprenticeship Requirements for non-Federal Projects**

- A. Pursuant to Sections 1770-1780 of the Labor Code of the State of California, the Director of the Department of Industrial Relations has determined the general prevailing rate of wages in the locality for each craft or type of worker needed to execute the work. Said wage rates pursuant to Section 1773.2 of the Labor Code are on file with the Clerk to the Fresno County Board of Supervisors, and will be made available to any interested person on request. A copy of this wage scale may also be obtained at the following Web Site: [www.dir.ca.gov/dlsr](http://www.dir.ca.gov/dlsr).

- B. Pursuant to Section 1775 of the Labor Code of the State of California, nothing in this Article shall prevent the employment of properly registered apprentices upon public works. Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he/she is employed, and shall be employed only at the work of the craft or trade to which he/she is registered.
- C. Only apprentices, as defined in Section 3077, who are in training under apprenticeship standards and written apprentice agreements under Chapter 4 (commencing at Section 3070), Division 3, of the Labor Code, are eligible to be employed on public works. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he/she is training.
- D. Fresno County is committed to increasing the availability of employment and training opportunities, with particular attention to the plight of those who are most economically disadvantaged. In an effort to advance that purpose, the County will require that the Contractor and each subcontractor employed on this Project shall use their best efforts to ensure that thirty-three percent (33%) of apprentice hours, as determined by California Labor Code Section 1777.5 for each contractor and subcontractor of any tier on this Project, are performed by qualified participants in state approved apprenticeship programs who also are current or former "Welfare-to-Work" participants in the CalWORKs program. Provided, that nothing contained in this Paragraph D shall be interpreted to relieve or in any way diminish the obligation of the Contractor and each subcontractor to comply fully with all applicable apprenticeship laws in accordance with the California Labor Code and the California Code of Regulations; and accordingly such requirements as are contractually imposed by this Paragraph D shall be in addition to such legally mandated requirements, and applicable only to the extent fully consistent therewith.

**7-1.02K(6)(j)(ii) Lead Compliance Plan**

**Add the following at the beginning of this Section**

**Only one lead compliance plan is required for this entire project. Refer to Specification Section 01 22 00 "Explanation of Bid Items"**

**Add between the 9th and 10th paragraphs of section 7-1.03:**

07-15-16

If a height differential of more than 0.04 foot is created by construction activities at a joint transverse to the direction of traffic on the traveled way or a shoulder subject to public traffic, construct a temporary taper at the joint with a slope complying with the requirements shown in the following table:

**Temporary Tapers**

Height differential (foot)	Slope (horizontal:vertical)	
	Taper use of 14 days or less	Taper use of more than 14 days
Greater than 0.08	100:1 or flatter	200:1 or flatter
0.04–0.08	70:1 or flatter	70:1 or flatter

For a taper on existing asphalt concrete or concrete pavement, construct the taper with minor HMA under section 39-2.07.

Grind existing surfaces to accommodate a minimum taper thickness of 0.10 foot under either of the following conditions:

1. HMA material such as rubberized HMA, polymer-modified bonded wearing course, or open-graded friction course is unsuitable for raking to a maximum 0.02 foot thickness at the edge

2. Taper will be in place for more than 14 days

For a taper on a bridge deck or approach slab, construct the taper with polyester concrete under section 60-3.04B.

The completed surface of the taper must be uniform and must not vary more than 0.02 foot from the lower edge of a 12-foot straightedge when placed on its surface parallel and perpendicular to traffic.

If authorized, you may use alternative materials or methods to construct the required taper.

**Replace the headings and paragraphs of Section 7-1.04 with:**

#### **7-1.04 PUBLIC SAFETY**

##### **7-1.04A GENERAL**

You are responsible to provide for public safety.

Do not construct a temporary facility that interferes with the safe passage of traffic.

Control dust resulting from the work, inside and outside the right-of-way.

Move workers, equipment, and materials without endangering traffic.

Whenever your activities create a condition hazardous to the public, furnish, erect and maintain those fences, temporary railing, barricades, lights, signs, and other devices and take any other necessary protective measures to prevent damage or injury to the public.

Any fences, temporary railing, barricades, lights, signs, or other devices furnished, erected and maintained by you are in addition to those for which payment is provided elsewhere in the specifications.

Provide flaggers whenever necessary to ensure that the public is given safe guidance through the work zone. At locations where traffic is being routed through construction under one-way controls, move your equipment in compliance with the one-way controls unless otherwise ordered.

Use of signs, lights, flags, or other protective devices must comply with the *California MUTCD* and any directions of the Engineer. Signs, lights, flags or other protective devices must not obscure the visibility of, nor conflict in intent, meaning, and function of either existing signs, lights and traffic control devices, or any construction area signs.

Keep existing traffic signals and highway lighting in operation. Other forces within the Department will perform routine maintenance of these facilities during the work.

Cover signs that direct traffic to a closed area.

Install temporary illumination in a manner which the illumination and the illumination equipment does not interfere with public safety. The installation of general roadway illumination does not relieve you from furnishing and maintaining any protective devices.

Equipment must enter and leave the highway via existing ramps and crossovers and must move in the direction of traffic. All movements of workmen and construction equipment on or across lanes open to traffic must be performed in a manner that do not endanger the public. Your vehicles or other mobile equipment leaving an open traffic lane to enter the construction area must slow down gradually in advance of the location of the turnoff to give the traffic following an opportunity to slow down. When leaving a work area and entering a roadway carrying traffic, your vehicles and equipment must yield to traffic.

Immediately remove hauling spillage from a roadway lane or shoulder open to traffic. When hauling on roadways, trim loads and remove material from shelf areas to minimize spillage.

Notify the Engineer not less than 5 days before the anticipated start of an activity that will change the vertical or horizontal clearance available to traffic, including shoulders.

Do not store vehicles, material, or equipment in a way that:

1. Creates a hazard to the public
2. Obstructs traffic control devices

Do not install or place temporary facilities used to perform the work which interfere with the free and safe passage of traffic.

Temporary facilities that could be a hazard to public safety if improperly designed must comply with design requirements described in the Contract for those facilities or, if none are described, with standard design criteria or codes appropriate for the facility involved. Submit shop drawings and design calculations for the temporary facilities and show the standard design criteria or codes used. Shop drawings and supplemental calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State.

If you appear to be neglectful or negligent in furnishing warning devices and taking protective measures, the Engineer may direct your attention to the existence of a hazard. You must furnish and install the necessary warning devices. If the Engineer points out the inadequacy of warning devices and protective measures, that action on the part of the Engineer does not relieve you from your responsibility for public safety or abrogate your obligation to furnish and pay for these devices and measures.

Install Type K temporary railing or other authorized protective systems under any of the following conditions:

1. Excavations: Where the near edge of the excavation is within 15 feet from the edge of an open traffic lane
2. Temporarily unprotected permanent obstacles: When the work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and you elect to install the obstacle before installing the protective system; or you, for your convenience and as authorized, remove a portion of an existing protective railing at an obstacle and do not replace such railing completely the same day
3. Storage areas: When material or equipment is stored within 15 feet of the edge of an open traffic lane and the storage is not otherwise prohibited by the Contract
4. Height differentials: When construction operations create a height differential greater than 0.15 feet within 15 feet of the edge of traffic lane

Installation of Type K temporary railing is not required if an excavation within 15 feet from the edge of an open traffic lane is protected by any of the following:

1. Steel plate or concrete covers of adequate thickness to prevent accidental entry by traffic or the public
2. Side slope where the downhill slope is 4:1 (horizontal: vertical) or less unless a naturally occurring condition
3. Barrier or railing

Offset the approach end of Type K temporary railing a minimum of 15 feet from the edge of an open traffic lane. Install the temporary railing on a skew toward the edge of the traffic lane of not more than 1 foot transversely to 10 feet longitudinally with respect to the edge of the traffic lane. If the 15-foot minimum offset cannot be achieved, the temporary railing must be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules must be installed at the approach end of the temporary railing.

Secure Type K temporary railing in place before starting work for which the temporary railing is required.

Where 2 or more lanes in the same direction are adjacent to the area where the work is being performed, including shoulders, the adjacent lane must be closed under any of the following conditions:

1. Work is off the traveled way but within 6 feet of the edge of the traveled way, and the approach speed is greater than 45 miles per hour
2. Work is off the traveled way but within 3 feet of the edge of the traveled way, and the approach speed is less than 45 miles per hour

Closure of the adjacent traffic lane is not required when performing any of the following:

1. Working behind a barrier
2. Paving, grinding, or grooving
3. Installing, maintaining, or removing traffic control devices except Type K temporary railing

Do not reduce an open traffic lane width to less than 10 feet. When traffic cones or delineators are used for temporary edge delineation, the side of the base of the cones or delineators nearest to traffic is considered the edge of the traveled way.

If a traffic lane is closed with channelizers for excavation work, move the devices to the adjacent edge of the traveled way when not excavating. Space the devices as specified for the lane closure.

Do not move or temporarily suspend anything over a traffic lane open to the public unless the public is protected.

#### **7-1.04B WORK ZONE SAFETY AND MOBILITY**

##### **7-1.04B(1) POLICY**

In order to ensure safe and efficient flow of traffic through work zones, the County of Fresno, via its General Plan, Transportation and Circulation Element, Policy TRA-1, has adopted the use of AASHTO Standards as supplemented by Caltrans and County Department of Public Works and Planning Standards.

##### **7-1.04B(2) TRAFFIC MANAGEMENT PLAN**

Perform traffic management shall be in accordance with Section 12, "TEMPORARY TRAFFIC CONTROL," of these special provisions.

##### **7-1.04B(3) TEMPORARY TRAFFIC CONTROL PLAN**

Prepare traffic control plan(s) in accordance with Section 12, "TEMPORARY TRAFFIC CONTROL," of these special provisions.

##### **7-1.04B(4) PUBLIC INFORMATION**

Provide notice to public agencies and others to the extent required, if any, elsewhere in these special provisions. The Engineer provides other noticing not identified to be performed by the Contractor.

**Replace the headings and paragraphs of Section 7-1.06 with:**

#### **7-1.06 INSURANCE**

##### **7-1.06A General**

Nothing in the Contract is intended to establish a standard of care owed to any member of the public or to extend to the public the status of a third-party beneficiary for any of these insurance specifications.

##### **7-1.06B Casualty Insurance**

Obtain and maintain insurance on all of your operations with companies acceptable to the Department as follows:

1. Keep all insurance in full force and effect from the start of the work through Contract acceptance.
2. All insurance must be with an insurance company with a rating from A.M. Best Financial Strength Rating of A or better and a Financial Size Category of VIII or better.

3. Maintain completed operations coverage with a carrier acceptable to the State through the expiration of the patent deficiency in construction statute of repose set forth in Civ Pro Code § 337.1.

#### **7-1.06C Workers' Compensation and Employer's Liability Insurance**

Under Labor Code § 1860, secure the payment of worker's compensation under Labor Code § 3700.

Submit to the Department the following certification before performing the work (Labor Code § 1861):

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.

Contract signing constitutes certification submittal.

Provide Employer's Liability Insurance in amounts not less than:

1. \$1,000,000 for each accident for bodily injury by accident
2. \$1,000,000 policy limit for bodily injury by disease
3. \$1,000,000 for each employee for bodily injury by disease

If there is an exposure of injury to your employees under the U.S. Longshoremen's and Harbor Workers' Compensation Act, the Jones Act, or under laws, regulations, or statutes applicable to maritime employees, coverage must be included for such injuries or claims.

#### **7-1.06D Liability Insurance**

##### **7-1.06D(1) General**

Carry General Liability and Umbrella or Excess Liability Insurance covering all operations by or on behalf of you providing insurance for bodily injury liability and property damage liability for the following limits and including coverage for:

1. Premises, operations and mobile equipment
2. Products and completed operations
3. Broad form property damage (including completed operations)
4. Explosion, collapse, and underground hazards
5. Personal injury
6. Contractual liability

##### **7-1.06D(2) Liability Limits/Additional Insureds**

Refer to the *Agreement* of these special provisions

Additional insured coverage must be provided by a policy provision or by an endorsement providing coverage at least as broad as *Additional Insured* (Form B) endorsement form CG 2010, as published by the Insurance Services Office (ISO), or other form designated by the Department.

##### **7-1.06D(3) Contractor's Insurance Policy is Primary**

The policy must stipulate that the insurance afforded the additional insureds applies as primary insurance. Any other insurance or self-insurance maintained by the State is excess only and must not be called upon to contribute with this insurance.

#### **7-1.06E Automobile Liability Insurance**

Comply with requirements in the *Agreement* of these special provisions

#### **7-1.06F Policy Forms, Endorsements, and Certificates**

Provide your General Liability Insurance under Commercial General Liability policy form no. CG0001 as published by the Insurance Services Office (ISO) or under a policy form at least as broad as policy form no. CG0001.



## **7-1.06G NOT USED**

### **7-1.06H Enforcement**

The Department may assure your compliance with your insurance obligations. Ten days before an insurance policy lapses or is canceled during the Contract period you must submit to the Department evidence of renewal or replacement of the policy.

If you fail to maintain any required insurance coverage, the Department may maintain this coverage and withhold or charge the expense to you or terminate your control of the work.

You are not relieved of your duties and responsibilities to indemnify, defend, and hold harmless the State, its officers, agents, and employees by the Department's acceptance of insurance policies and certificates.

Minimum insurance coverage amounts do not relieve you for liability in excess of such coverage, nor do they preclude the State from taking other actions available to it, including the withholding of funds under this Contract.

### **7-1.06I Self-Insurance**

Comply with the *Agreement* of these special provisions

**Replace the headings and paragraphs of Section 7-1.07 with:**

## **7-1.07 LEGAL ACTIONS AGAINST THE DEPARTMENT**

### **7-1.07A General**

If legal action is brought against the Department over compliance with a State or federal law, rule, or regulation applicable to highway work, then:

1. If the Department in complying with a court order prohibits you from performing work, the resulting delay is a suspension related to your performance, unless the Department terminates the Contract.
2. If a court order other than an order to show cause or the final judgment in the action prohibits the Department from requiring you to perform work, the Department may delete the prohibited work or terminate the Contract.

### **7-1.07B Seal Coat Claims**

RESERVED

### **7-1.07C Claims**

This section applies to non-seal coat projects which involve asphalt concrete paving. Pay for claims for personal property damage caused by your work. Claims are limited to:

1. 10 percent of the total bid

Within 30 days of the last working day placement of hot mix asphalt, do the following:

1. Process and resolve all claims reported or submitted to you by the public as follows:
  - 1.1. Within 3 business days of receipt of a claim, submit to the Department a copy of the claim, a written analysis of the claim, and a statement indicating whether or not you will pay the claim. If you reject a claim, provide the reasons for rejection in writing.
  - 1.2. If the claimant becomes dissatisfied with your handling of the claim, immediately refer the claimant to the local district claims office for assistance in resolving the claim.
2. Submit to the Department evidence of your paid claims.

All claims presented to the Department, (Govt Code § 900 et seq.) are processed and resolved by the Department as follows:

1. The claims are processed as formal government claims subject to all laws and policies and are resolved as the Department determines including referring the claim to you for handling.
2. If the Department approves settlement of a claim or is ordered to pay pursuant to a court order, the claim is paid from funds withheld from you.

3. Within 3 business days of the Department's determination that you are responsible for resolving the claim, the Department sends a copy of the claim to you for resolution or notifies you of the Department's decision to resolve the claim.

The Department withholds an amount not to exceed 5 percent of the total bid to resolve all claims. The amount is held no longer than 60 days following the last working day so that the Department has ample time to resolve any pending claims. After 60 days, any remaining amount withheld is returned to you.

If no withheld funds remain or have been returned, the Department may pay any claims and seek reimbursement from you through an offset or any other legal means. Any reimbursement or offset to be recovered from you, including all other paid claims, is limited to 10 percent of the total bid.

Section 7-1.07C does not limit your obligation to defend and indemnify the Department.

**Add between the 1st and 2nd paragraphs of Section 7-1.11A:**

Comply with 46 CFR 381.7(a)–(b).

**Add to the end of Section 7-1.11B**

Comply with the Davis-Bacon Requirements for DWSRF Projects included in the Project Details section.

**Add the following Section 7-1.11D**

**7-1.11D Procurement Prohibitions from Excluded Parties**

No goods, services, or materials shall be procured from suppliers excluded under the federal System for Award Management, except where the purpose of is to remedy the cause of the violation. Excluded parties may be identified at <http://beta.SAM.gov>. This clause is pursuant to Section 306 of the Clean Air Act and Section 508 of the Clean Water Act, including Executive Order 11738, Administration of the Clean Air Act and Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans; 42 USC 7606; 33 USC 1368.

## **8 PROSECUTION AND PROGRESS**

**Replace the headings and paragraphs in Section 8 with:**

**8-1.01 GENERAL**

Section 8 includes specifications related to prosecuting the Contract and work progress.

**8-1.01A Work Hours**

Perform all work on working days during daytime.

You may request approval to work on a holiday or on a non-working day. If, pursuant to such request, the Engineer authorizes you to work on a holiday or on a non-working day, you pay the actual cost incurred by the Department to perform all inspection, surveying, testing, and all other project-related work by the Department on such holiday or non-working day. Such payment will be deducted from monies due or which may become due to the Contractor.

Plan work so that all construction operations performed each day, including cleanup of the project site, establishment of appropriate traffic control and any other work necessary for the safety of the public shall be completed within the daytime hours.

Do not perform work during nighttime unless approved by the Engineer

Request approval to work during nighttime in writing and include the appropriate traffic control plan(s) and work plan(s) which clearly identify all provisions for illuminating all portions of the work site, including any flagging operations.

If you work fail to complete work during the daytime hours, the Engineer may stop all work upon the onset of nighttime and order you to perform any and all work the Engineer deems necessary to ensure the safety of the public during the nighttime hours.

You are not entitled to any additional compensation or extension of the contract time as a result of the Engineer stopping the work due to the onset of nighttime.

## **8-1.02 SCHEDULE**

### **8-1.02A General**

Upon completion of all work, the Department returns the withholds associated with section 8-1.02 and makes a payment adjustment for work not performed in the same manner as work-character changes.

### **8-1.02B Level 1 Critical Path Method Schedule**

#### **8-1.02B(1) General**

No pay item is provided for Level 1 Critical Path Project Schedule. Payment is considered to be included in the various items of work.

Before or at the preconstruction conference, submit a CPM baseline schedule.

For each schedule, submit:

1. Plotted original, time-scaled network diagram on a sheet at least 8-1/2 by 11 inches with a title block and timeline
2. Read-only compact disc or other Engineer-authorized data-storage device containing the schedule data if software is used to make the schedule. Label the device with:
  - 2.1. Contract number
  - 2.2. CPM schedule number and date produced
  - 2.3. File name

#### **8-1.02B(2) Schedule Format**

On each schedule, show:

1. Planned and actual start and completion dates of each work activity, including applicable:
  - 1.1. Submittal development
  - 1.2. Submittal review and acceptance
  - 1.3. Material procurement
  - 1.4. Contract milestones and constraints
  - 1.5. Equipment and plant setup
  - 1.6. Interfaces with outside entities
  - 1.7. Erection and removal of falsework and shoring
  - 1.8. Test periods
  - 1.9. Major traffic stage change
  - 1.10. Final cleanup
2. Order that you propose to prosecute the work
3. Logical links between the time-scaled work activities
4. All controlling activities
5. Legible description of each activity
6. At least 1 predecessor and 1 successor to each activity except for project start and project end milestones
7. Duration of at least 1 working day for each activity
8. Start milestone date as the Contract approval date

### 8-1.02B(3) Updated Schedule

Submit a monthly updated schedule that includes the status of work completed to date and the work yet to be performed as planned.

You may include changes to updated schedules that do not alter a critical path or extend the scheduled completion date compared to the current schedule. Changes may include:

1. Adding or deleting activities
2. Changing activity constraints
3. Changing durations
4. Changing logic

If any proposed change in planned work would alter the critical path or extend the scheduled completion date, submit a revised schedule within 15 days of the proposed change.

### 8-1.02C–8-1.02F Reserved

### 8-1.03 PRECONSTRUCTION CONFERENCE

Attend a preconstruction conference with key personnel, including your assigned representative, at a time and location determined by the Engineer. Submit documents as required before the preconstruction conference.

Be prepared to discuss the topics and documents shown in the following table:

Topic	Document
Potential claim and dispute resolution	Potential claim forms
Contractor's representation	Assignment of Contractor's representative
DBE	Final utilization reports
Equipment	Equipment list
Labor compliance and equal employment opportunity	Job site posters and benefit and payroll reports
Material inspection	Notice of Materials to be Used form
Materials on hand	Request for Payment for Materials on Hand form
Measurements	--
Partnering	--
Quality control	QC plans
Safety	Injury and Illness Prevention Program and job site posters
Schedule	Baseline schedule and Weekly Statement of Working Days form
Subcontracting	Subcontracting Request form
Surveying	Survey Request form
Traffic control	Traffic contingency plan and traffic control plans
Utility work	--
Weight limitations	--
Water pollution control	SWPPP or WPCP
Work restrictions	PLACs
Action submittals	--

### 8-1.04 START OF JOB SITE ACTIVITIES

#### 8-1.04A General

Provide signed contracts, bonds, and evidence of insurance timely as required.

This section, 8-1.04, "Start of Job Activities," does not modify remedies available to the Department should you fail to provide signed contracts bonds and insurance timely.

Submit a notice 72 hours before starting job site activities. If the project has more than 1 location of work, submit a separate notice for each location.

You may start job site activities before receiving notice of Contract approval if you:

1. Deliver the signed Contract, bonds, and evidence of insurance to the Department
2. Submit 72-hour notice
3. Obtain an encroachment permit from the Department
4. Are authorized by the Department to start
5. Perform work at your own risk
6. Perform work under the Contract

If the Contract is approved, work already performed that complies with the Contract is authorized.

If the Contract is not approved, leave the job site in a neat condition. If a facility has been changed, restore it to its former condition or an equivalent condition. The Department does not pay for the restoration.

**8-1.04B Standard Start**

Be prepared to begin work at the project site no later than the 20th business day after award of the Contract by the Department.

The Engineer may issue a notice to proceed as soon as the Contracts, including bonds and insurance certificates, have been approved.

Start work on the day shown in the notice to proceed, unless an early start has been approved.

The Engineer may issue a notice of commencement of contract time if you fail to provide Contracts, including bonds and insurance certificates or other required documents timely.

A notice of commencement of contract time does not authorize you to start work on the project site, but contract time begins to elapse on the date shown in the notice of commencement of contract time.

**Complete work before the expiration of  
One Hundred and Twenty (120) WORKING DAYS**

from the date shown in said Notice to Proceed, or in the Notice of Commencement of Contract Time, whichever comes first.

Complete all work, including corrective work and punch list work, prior to the expiration of the allotted working days. Working days continue to accrue until corrective work and punch list work is completed and accepted.

In the event that additive bid(s) are awarded, additional working days will be granted in accordance with the following:

<b>Additive Bids Awarded</b>	<b>Number of Additional Working Days</b>
<b>2</b>	<b>Twenty (20)</b>

**Pay to the County of Fresno the sum of  
Four Thousand and Eight Hundred (\$4,800.00)**

per day for each and every calendar day's delay in finishing the work, including corrective work and punch list work, in excess of the total number of working days prescribed above.

The Contractor shall maintain water supply to the system and existing users without interruption other than momentary minor periods for cut-over of lines. Because construction activities / efforts in close proximity

to the existing pipe risk breaking the existing pipe and causing unacceptable service outages, installation of temporary repairs of the existing pipe shall be provided in the various items of work.

The Contractor shall be responsible for course of construction new pipeline or existing pipe line breakages, performing the repair of same, and subjected to monetary assessment for service interruptions. The monetary assessment would be \$100 per hour for extended interruptions of more than six (6) hours.

Transition to the existing Cantua Creek School PVC water main (Bid Item #101) shall be performed on a Saturday and/or Sunday when the school is closed. If system is not on-line by the time school is open, the Contractor will be charged a monetary assessment of \$200 per hour until the system is capable to provide water to the School.

### **8-1.05 TIME**

Contract time starts on the day specified in the notice to proceed or in the notice of commencement of contract time as described in section 8-1.04 or on the day you start job site activities, whichever occurs first.

Complete the work within the Contract time.

Meet each specified interim work completion date.

The Engineer issues a *Weekly Statement of Working Days* by the end of the following week.

The *Weekly Statement of Working Days* shows:

1. Working days and non-working days during the reporting week
2. Time adjustments
3. Work completion date computations, including working days remaining
4. Controlling activities

### **8-1.06 SUSPENSIONS**

The Engineer may suspend work wholly or in part due to conditions unsuitable for work progress. Provide for public safety and a smooth and unobstructed passageway through the work zone during the suspension as specified in sections 7-1.03 and 7-1.04. Providing the passageway is force account work. The Department makes a time adjustment for the suspension due to a critical delay.

The Engineer may suspend work wholly or in part due to your failure to (1) fulfill the Engineer's orders, (2) fulfill a Contract part, or (3) perform weather-dependent work when conditions are favorable so that weather-related unsuitable conditions are avoided or do not occur. The Department may provide for a smooth and unobstructed passageway through the work during the suspension and deduct the cost from payments. The Department does not make a time adjustment for the suspension.

Upon the Engineer's order of suspension, suspend work immediately. Resume work when ordered.

### **8-1.07 DELAYS**

#### **8-1.07A General**

To request a delay-related time or payment adjustment, submit an RFI.

#### **8-1.07B Time Adjustments**

The Department may make a time adjustment for a critical delay. The Engineer uses information from the schedule to evaluate requests for time adjustments.

To request an adjustment, submit a revised schedule showing the delay's effect on the controlling activity. If the delay has:

1. Occurred, submit records of the dates and what work was performed during the delayed activity
2. Not occurred, submit the expected dates or duration of the delayed activity

Update the schedule to the last working day before the start of the delay if ordered.

### **8-1.07C Payment Adjustments**

The Department may make a payment adjustment for an excusable delay that affects your costs.

Only losses for idle equipment, idle workers, and moving or transporting equipment are eligible for delay-related payment adjustments.

The Engineer determines payment for idle time of equipment in the same manner as determinations are made for equipment used in the performance of force account work under section 9-1.04 with the following exceptions:

1. Delay factor in the *Labor Surcharge and Equipment Rental Rates* applies to each equipment rental rate.
2. Daily number of payable hours equals the normal working hours during the delay, not to exceed 8 hours per day.
3. Delay days exclude non-working days.
4. Markups are not added.

The Engineer determines payment adjustment for the idle workers under section 9-1.04B, but does not add markups.

The Engineer includes costs due to necessary extra moving or transporting of equipment.

The Department does not make a payment adjustment for overhead incurred during non-working days of additional construction seasons experienced because of delay.

### **8-1.08–8-1.09 RESERVED**

### **8-1.10 LIQUIDATED DAMAGES**

#### **8-1.10A General**

The Department specifies liquidated damages (Pub Cont Code § 10226). Liquidated damages, if any, accrue starting on the 1st day after the expiration of the working days through the day of Contract acceptance except as specified in sections 8-1.10B and 8-1.10C.

The Department withholds liquidated damages before the accrual date if the anticipated liquidated damages may exceed the value of the remaining work.

Liquidated damages are specified in section 8-1.04.

#### **8-1.10B Failure to Complete Work Parts within Specified Times**

The Department may deduct specified damages from payments for each day needed to complete a work part in excess of the time specified for completing the work part.

Damages for untimely completion of work parts may not be equal to the daily amount specified as liquidated damages for the project as a whole, but the Department does not simultaneously assess damages for untimely completion of work parts and for the whole work.

Damages accrue starting the 1st day after a work part exceeds the specified time through the day the specified work part is complete.

#### **8-1.10C Failure to Complete Work Parts by Specified Dates**

The Department may deduct specified damages from payments for each day needed to complete a work part in excess of the specified completion date for the work part.

Damages for untimely completion of a work part may not be equal to the daily amount specified as liquidated damages for the project as a whole, but the Department does not simultaneously assess damages for untimely completion of a work part and the whole work.

Damages accrue starting the 1st day after an unmet completion date through the day the work part is complete.

#### **8-1.10D RESERVED**

#### **8-1.11–8-1.12 RESERVED**

#### **8-1.13 CONTRACTOR'S CONTROL TERMINATION**

The Department may terminate your control of the work for failure to do any of the following (Pub Cont Code § 10253):

1. Supply an adequate workforce
2. Supply material as described
3. Pay subcontractors (Pub Cont Code §10262)
4. Prosecute the work as described in the Contract

The Department may also terminate your control for failure to maintain insurance coverage.

For a federal-aid project, the Department may terminate your control of the work for failure to include "Required Contract Provisions, Federal-Aid Construction Contracts" in subcontracts.

The Department gives notice to you and your surety at least 5 business days before terminating control. The notice describes the failures and the time allowed to remedy the failures. If failures are not remedied within the time provided, the Department takes control of the work.

The Department may complete the work if the Department terminates the Contractor's control or you abandon the project (Pub Cont Code § 10255). The Department determines the unpaid balance under Pub Cont Code § 10258 and the Contract.

At any time before final payment of all claims, the Department may convert a Contractor's control termination to a Contract termination.

#### **8-1.14 CONTRACT TERMINATION**

##### **8-1.14A General**

The Director may terminate the Contract if it serves the State's best interest. The Department issues you a written notice, implements the termination, and pays you.

##### **8-1.14B Relief from Responsibility for Work**

Upon receiving a termination notice:

1. Stop work
2. Notify subcontractors and suppliers of the Contract termination and stop Contract-related work
3. Perform the Engineer-ordered work to secure the job site for termination
4. Remove equipment
5. Subject to the Engineer's authorization, settle termination-related claims and liabilities involving subcontractors and suppliers; assign to the Department the rights, titles, or interests held by you with respect to these parties

##### **8-1.14C Responsibility for Materials**

Upon receiving a termination notice, protect unused material until:

1. You submit an inventory of materials already produced, purchased, or ordered but not yet used; include the location of the material.
2. The Engineer identifies materials that will be retained by the Department. Submit bills of sales or other records of material title.
3. The Engineer confirms that unused materials paid by progress payment and materials furnished by the State have been delivered and stored as ordered.
4. The titles are transferred for materials purchased by the Department.



Dispose of materials that will not be retained by the Department.

#### **8-1.14D Contract Acceptance after Termination**

The Engineer recommends Contract acceptance after determining the completion of:

1. Work ordered to be completed before termination
2. Other work ordered to secure the project before termination
3. Material delivery and title transfer

The Department pays you under section 9-1.17.

#### **8-1.14E Payment Adjustment for Termination**

If the Department issues a termination notice, the Engineer determines the payment for termination based on the following:

1. Direct cost for the work:
  - 1.1. Including:
    - 1.1.1. Mobilization.
    - 1.1.2. Demobilization.
    - 1.1.3. Securing the job site for termination.
    - 1.1.4. Losses from the sale of materials.
  - 1.2. Not including:
    - 1.2.1. Cost of materials you keep.
    - 1.2.2. Profit realized from the sale of materials.
    - 1.2.3. Cost of material damaged by:
      - 1.2.3.1. Act of God.
      - 1.2.3.2. Act of a public enemy.
      - 1.2.3.3. Fire.
      - 1.2.3.4. Flood.
      - 1.2.3.5. Governor-declared state of emergency.
      - 1.2.3.6. Landslide.
      - 1.2.3.7. Tsunami.
    - 1.2.4. Other credits.
2. Cost of remedial work, as estimated by the Engineer, is not reimbursed.
3. Allowance for profit not to exceed 4 percent of the cost of the work. Prove a likelihood of having made a profit had the Contract not been terminated.
4. Material handling costs for material returned to the vendor or disposed of as ordered.
5. Costs in determining the payment adjustment due to the termination, excluding attorney fees and litigation costs.

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

#### **8-1.15–8-1.16 RESERVED**

## 9 PAYMENT

**Add the following Section 9-1.01A**

### **9-1.01A COMPENSATION**

The bid items shown in the bid proposal sheet represent full compensation for performing all work. Full compensation for any work for which there is no bid item shall be considered to be included in the various items of work.

**Replace the headings and paragraphs of Section 9-1.03 with:**

### **9-1.03 PAYMENT SCOPE**

The Department pays you for furnishing the resources and activities required to complete the work. The Department's payment is full compensation for furnishing the resources and activities, including:

1. Risk, loss, damage repair, or cost of whatever character arising from or relating to the work and performance of the work
2. PLACs and taxes
3. Any royalties and costs arising from patents, trademarks, and copyrights involved in the work

The Department does not pay for your loss, damage, repair, or extra costs of whatever character arising from or relating to the work that is a direct or indirect result of your choice of construction methods, materials, equipment, or manpower, unless specifically mandated by the Contract.

Payment is:

1. Full compensation for all work involved in each bid item shown on the Bid Item List by the unit of measure shown for that bid item
2. For the price bid for each bid item shown on the Bid Item List or as changed by change order with a specified price adjustment

Full compensation for work specified in divisions I, II, and X is included in the payment for the bid items unless:

1. Bid item for the work is shown on the Bid Item List
2. Work is specified as change order work

Work paid for under one bid item is not paid for under any other bid item.

Payment for a bid item includes payment for work in sections referenced by the section set forth by that bid item.

**Notwithstanding anything to the contrary in these special provisions, full compensation for performing all work as shown, as specified, and as directed by the Engineer is considered to be included in the various bid items, and no additional payment will be made, except pursuant to a contract change order to perform work not shown and/or specified.**

**If one or more bid item(s) is/are not included, perform the work as shown and as specified and payment therefor is considered to be included in the various items of work.**

If an alternative is described in the Contract, the Department pays based on the bid items for the details and specifications not described as an alternative unless the bid item is described as an alternative, in which case, the Department pays based on the details and specifications for that alternative.

The Department pays for change order work based on one or a combination of the following:

1. Bid item prices
2. Force account
3. Agreed price

#### 4. Specialist billing

If the Engineer chooses to pay for change order work based on an agreed price, but you and the Engineer cannot agree on the price, the Department pays by force account.

If a portion of extra work is covered by bid items, the Department pays for this work as changed quantities in those items. The Department pays for the remaining portion of the extra work by force account or agreed price.

If the amount of a deduction or withhold exceeds final payment, the Department invoices you for the difference, to be paid upon receipt.

Pay your subcontractors within 10 days of receipt of each progress payment under Pub Cont Code §§ 10262 and 10262.5.

### **9-1.07 PAYMENT ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS**

**Replace Section 9-1.07A with:**

#### **9-1.07A General**

Section 9-1.07 applies to asphalt contained in materials for pavement structures and pavement surface treatments such as HMA, tack coat, asphaltic emulsions, bituminous seals, asphalt binders, and modified asphalt binders placed in the work. Section 9-1.07 does not apply if you opted out of payment adjustments for price index fluctuations at the time of bid.

The Engineer adjusts payment whenever the California statewide crude oil price index for the month the material is placed is more than 5 percent higher or lower than the price index at the time of bid.

The California Department of Transportation determines the California statewide crude oil price index each month on or about the 1st business day of the month using the average of the posted prices in effect for the previous month as posted by Chevron, ExxonMobil, and ConocoPhillips for the Buena Vista 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 the California Department of Transportation Division of Construction Web site.

If the adjustment is a decrease in payment, the Department deducts the amount from the monthly progress payment.

The Department makes payment adjustments due to price index fluctuations for changed quantities under section 9-1.06.

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:

1. 50 percent or more over the price index at bid opening, notify the Engineer.
2. 100 percent or more over the price index at bid opening, do not furnish material containing asphalt until the Engineer authorizes you to proceed with that work. The Department may decrease bid item quantities, eliminate bid items, or terminate the Contract.

Before placing material containing asphalt, submit the current sales and use tax rate in effect in the tax jurisdiction where the material is to be placed.

Submit a public weighmaster's certificate for HMA, tack coat, asphaltic emulsions, and modified asphalt binders, including those materials not paid for by weight. For slurry seals, submit a separate public weighmaster's certificate for the asphaltic emulsion.

**Replace Section 9-1.16F with:**

**9-1.16F Retentions**

The Department, once in each month, shall cause an estimate in writing to be made by the Engineer. The estimate shall include the total amount of work done and acceptable materials furnished, provided the acceptable materials are listed as eligible for partial payment as materials in the special provisions and are furnished and delivered by the Contractor on the ground and not used or are furnished and stored for use on the contract, if the storage is within the State of California and the Contractor furnishes evidence satisfactory to the Engineer that the materials are stored subject to or under the control of the Department, to the time of the estimate, and the value thereof. The estimate shall also include any amounts payable for mobilization. Daily extra work reports furnished by the Contractor less than 5 calendar days, not including Saturdays, Sundays and legal holidays, before the preparation of the monthly progress estimate shall not be eligible for payment until the following month's estimate.

The amount of any material to be considered in making an estimate will in no case exceed the amount thereof which has been reported by the Contractor to the Engineer on State-furnished forms properly filled out and executed, including accompanying documentation as therein required, less the amount of the material incorporated in the work to the time of the estimate. Only materials to be incorporated in the work will be considered. The estimated value of the material established by the Engineer will in no case exceed the contract price for the item of work for which the material is furnished.

The Department shall retain 5 percent of the estimated value of the work done and 5 percent of the value of materials so estimated to have been furnished and delivered and unused or furnished and stored as aforesaid as part security for the fulfillment of the contract by the Contractor. The Department will not hold retention for mobilization or demobilization.

The Department shall pay monthly to the Contractor, while carrying on the work, the balance not retained, as aforesaid, after deducting therefrom all previous payments and all sums to be kept or retained under the provisions of the contract. No monthly estimate or payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the contract.

No monthly estimate or payment shall be construed to be an acceptance of any defective work or improper materials.

Attention is directed to the prohibitions and penalties pertaining to unlicensed contractors as provided in Business and Professions Code Sections 7028.15(a) and 7031.

**Add the following Section 9-1.23:**

**9-1.23 RESOLUTION OF CONTRACT CLAIMS**

Public works contract claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between a Contractor and a local public agency shall be resolved in accordance with the provisions of California Public Contract Code Sections 20104-20104.6, inclusive. In addition, California Public Contract Code Section 9204 requires that the procedure established therein shall apply to all claims (as therein defined) filed by a contractor in connection with a public works project. Accordingly, this contract expressly incorporates all of the terms and conditions of those statutory provisions, which are as follows:

**California Public Contract Code Section 9204**

(a) The Legislature finds and declares that it is in the best interests of the state and its citizens to ensure that all construction business performed on a public works project in the state that is complete and not in dispute is paid in full and in a timely manner.

(b) Notwithstanding any other law, including, but not limited to, Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2, Chapter 10 (commencing with Section 19100) of Part 2, and Article 1.5 (commencing with Section 20104) of Chapter 1 of Part 3, this section shall apply to any claim by a contractor in connection with a public works project.

(c) For purposes of this section:

(1) "Claim" means a separate demand by a contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

(A) A time extension, including, without limitation, for relief from damages or penalties for delay assessed by a public entity under a contract for a public works project.

(B) Payment by the public entity of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for a public works project and payment for which is not otherwise expressly provided or to which the claimant is not otherwise entitled.

(C) Payment of an amount that is disputed by the public entity.

(2) "Contractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code who has entered into a direct contract with a public entity for a public works project.

(3)(A) "Public entity" means, without limitation, except as provided in subparagraph (B), a state agency, department, office, division, bureau, board, or commission, the California State University, the University of California, a city, including a charter city, county, including a charter county, city and county, including a charter city and county, district, special district, public authority, political subdivision, public corporation, or nonprofit transit corporation wholly owned by a public agency and formed to carry out the purposes of the public agency.

(B) "Public entity" shall not include the following:

(i) The Department of Water Resources as to any project under the jurisdiction of that department.

(ii) The Department of Transportation as to any project under the jurisdiction of that department.

(iii) The Department of Parks and Recreation as to any project under the jurisdiction of that department.

(iv) The Department of Corrections and Rehabilitation with respect to any project under its jurisdiction pursuant to Chapter 11 (commencing with Section 7000) of Title 7 of Part 3 of the Penal Code.

(v) The Military Department as to any project under the jurisdiction of that department.

(vi) The Department of General Services as to all other projects.

(vii) The High-Speed Rail Authority.

(4) "Public works project" means the erection, construction, alteration, repair, or improvement of any public structure, building, road, or other public improvement of any kind.

(5) "Subcontractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code who either is in direct contract with a contractor or is a lower tier subcontractor.

(d) (1) (A) Upon receipt of a claim pursuant to this section, the public entity to which the claim applies shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the claimant a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, a public entity and a contractor may, by mutual agreement, extend the time period provided in this subdivision.

(B) The claimant shall furnish reasonable documentation to support the claim.

(C) If the public entity needs approval from its governing body to provide the claimant a written statement identifying the disputed portion and the undisputed portion of the claim, and the governing body 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 public entity shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide the claimant 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 public entity issues its written statement. If the public entity fails to issue a written statement, paragraph (3) shall apply.

(2) (A) If the claimant disputes the public entity's written response, or if the public entity fails to respond to a claim issued pursuant to this section within the time prescribed, the claimant may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the public entity shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(B) 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 public entity shall provide the claimant 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 public entity 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 public entity and the claimant sharing the associated costs equally. The public entity and claimant 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 applicable procedures outside this section.

(C) 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.

(D) Unless otherwise agreed to by the public entity and the contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.

(E) This section does not preclude a public entity from requiring arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program, if mediation under this section does not resolve the parties' dispute.

(3) Failure by the public entity to respond to a claim from a contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim 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.

(4) Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.

(5) 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. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the contractor present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the public entity shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the contractor shall notify the subcontractor in writing as to whether the contractor presented the claim to the public entity and, if the original contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

(e) The text of this section or a summary of it shall be set forth in the plans or specifications for any public works project that may give rise to a claim under this section.

(f) A waiver of the rights granted by this section is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable; and (2) a public entity may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of this section, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in this section.

(g) This section applies to contracts entered into on or after January 1, 2017.

(h) Nothing in this section shall impose liability upon a public entity that makes loans or grants available through a competitive application process, for the failure of an awardee to meet its contractual obligations.

(i) This section shall remain in effect only until January 1, 2027, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2027, deletes or extends that date.

## **California Public Contract Code Sections 20104 – 20104.6**

### **Section 20104**

**(a)(1)** This article applies to all public works claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between a contractor and a local agency.

**(2)** This article shall not apply to any claims resulting from a contract between a contractor and a public agency when the public agency has elected to resolve any disputes pursuant to Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2.

**(b)(1)** "Public work" means "public works contract" as defined in Section 1101 but does not include any work or improvement contracted for by the state or the Regents of the University of California.

**(2)** "Claim" means a separate demand by the contractor for (A) a time extension, (B) payment of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (C) an amount the payment of which is disputed by the local agency.

**(c)** The provisions of this article or a summary thereof shall be set forth in the plans or specifications for any work which may give rise to a claim under this article.

(d) This article applies only to contracts entered into on or after January 1, 1991.

### **Section 20104.2**

For any claim subject to this article, the following requirements apply:

(a) The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

(b) (1) For claims of less than fifty thousand dollars (\$50,000), the local agency shall respond in writing to any written claim within 45 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

(c) (1) For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the local agency shall respond in writing to all written claims within 60 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 30 days after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater.

(d) If the claimant disputes the local agency's written response, or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency, in writing, either within 15 days of receipt of the local agency's response or within 15 days of the local agency's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the local agency shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(e) Following the meet and confer conference, if the claim or any portion remains in dispute, the claimant may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.



(f) This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.

#### **Section 20104.4**

The following procedures are established for all civil actions filed to resolve claims subject to this article:

(a) Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

(b) (1) If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act (Title 4 (commencing with Section 2016.010) of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

(2) Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

(3) In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees of the other party arising out of the trial de novo.

(c) The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process.

#### **Section 20104.6**

(a) No local agency shall fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.

(b) In any suit filed under Section 20104.4, the local agency shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the suit is filed in a court of law.

**Add the following Section 9-1.24:**

#### **9-1.24 SUPPLEMENTAL WORK (PAYMENT ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS)**

This item is provided solely to provide funds necessary for adjustments to the prices of those oil-containing materials expressly specified as eligible for such adjustments in "Payment Adjustments for Price Index Fluctuations," elsewhere in these special provisions.

The amount included for this item is an estimate only, and is a predetermined amount included in the bid proposal sheet(s) for the project.

This item, "Supplemental Work (Payment Adjustments for Price Index Fluctuations)" is purely administrative in nature, is not intended to limit such payment adjustments to the number provided in the bid proposal sheet(s), nor is it intended to modify or supplement the provisions in "Payment Adjustments for Price Index Fluctuations," in any manner whatsoever. Any and all such adjustments shall be made in strict conformance with the requirements in said section.

The provisions in Section 9-1.06, "Changed Quantity Pay Adjustments" of the Standard Specifications shall not apply to the item "Supplemental Work (Payment Adjustments for Price Index Fluctuations)."

### **Add the following Section 9-1.25:**

#### **9-1.25 SUPPLEMENTAL WORK ALLOWANCE**

The Supplemental Work Allowance bid item is provided to compensate the Contractor for new and unforeseen work necessary to construct the project as designed and intended. Supplemental Work is not for design changes. Supplemental Work will be classed as extra work in accordance with the provisions of Section 4-1.05, "Changes and Extra Work," of the Standard Specifications. The dollar amount for supplemental work shown in the Proposal is an estimate only and shall be included in each bidder's proposal.

Supplemental work shall be performed only upon direct written authorization from the Engineer and daily extra work reports shall be submitted to and approved by the Engineer. The contractor shall maintain separate records for extra work performed in accordance with the provisions of Section 5-1.27, "Records," of the Standard Specifications and these special provisions.

Payment will be based on the total amount of authorized Supplemental Work actually performed. The provisions in Section 9-1.06, "Changed Quantity Pay Adjustments" of the Standard Specifications shall not apply to the item "Supplemental Work Allowance."

## **DIVISION II GENERAL CONSTRUCTION**

### **12 TEMPORARY TRAFFIC CONTROL**

**Replace section 12-1.04 with:**

#### **12-1.04 FLAGGING COSTS**

You pay the cost of furnishing all flaggers, including transporting flaggers and furnishing stands and towers for flaggers to provide for the passage of traffic through the work as specified in sections 7-1.03 and 7-1.04.

**Replace section 12-2 with:  
12-2 CONSTRUCTION PROJECT INFORMATION SIGNS**

**12-2.01 GENERAL**

Details for construction project information signs are in *Project Details*.

Keep construction project information signs clean and in good repair at all times.

**12-2.02 MATERIALS**

Provide Construction project information signs, posts, and mounting hardware.

Construction project information signs must be wood post signs complying with section 82-3 of the Standard Specifications. Each sign shall be supported by two 16-foot tall 4x4 smooth wood posts, painted white.

Sign panels for construction project information signs must be 4 feet tall by 8 feet wide and made of 3/4 inch thick exterior grade plywood.

The background on construction project information signs must be painted white.

Text shall be black on a white background.

The size of the text and logos on construction project information signs must be as described in the Project Details. Do not add any additional information unless authorized.

**12-2.03 CONSTRUCTION**

Provide and Install a total of 2 construction project information signs, one at each County Service Area, at the locations designated by the Engineer before starting major work activities visible to highway users.

The Contractor shall construct and maintain signage meeting the guidelines specified in the Project Details insert, DWSRF Sign Requirements. The sign shall be prominently displayed in a location visible to the public.

Upon completion and acceptance of the work, the signs shall be removed and become the property of the Contractor.

**12-2.04 PAYMENT**

The Department pays you for Construction Project Information Signs as follows:

1. 75 percent of the item upon installation of each sign
2. 100 percent of the item upon removal of each sign

**Replace Section 12-3.01C With:**

**12-3.01C Construction**

If channelizing devices are used on the project, perform all layout work necessary to place channelizing devices:

1. On the proper alignment
2. Uniformly at the location and spacing described
3. Straight on a tangent alignment
4. On a true arc in a curved alignment

If temporary traffic control devices are damaged, displaced, or stop operating or functioning as described from any cause during the progress of the work, immediately repair, repaint, or replace the components and restore them to their original locations and positions.

If ordered, furnish and place additional temporary traffic control devices. This work is not change order work if:

1. Required to conform with your traffic control plan
2. Required to conform with the MUTCD
3. Necessary for public safety or convenience as determined by the Engineer
4. Required to perform staged construction shown on the plans

**Replace Section 12-3.03C With:**

**12-3.03C Construction**

If plastic traffic drums are used on project, use 1 type of plastic traffic drum on the project.

Use the same type and brand of retroreflective sheeting for all plastic traffic drums used on the project.

Do not use sandbags or comparable ballast.

Moving plastic traffic drums from location to location if ordered after initial placement is not change order work if:

1. Required to conform with your traffic control plan
2. Required to conform with the MUTCD
3. Necessary for public safety or convenience as determined by the Engineer
4. Required to perform staged construction shown on the plans

**Replace Section 12-3.10C With:**

**12-3.10C Construction**

If barricades are used on the project, place each barricade such that the stripes slope downward in the direction road users are to pass.

Place each sand-filled bag near the ground level on the lower parts of the frame or stays to serve as ballast for the barricades. Do not place ballast on top of barricades or over any retroreflective barricade rail face that is facing traffic.

Do not remove barricades that are shown to be left in place at the time of work completion.

Moving a barricade from location to location is change order work if ordered after initial placement of the barricade unless.

1. Required to conform with your traffic control plan
2. Required to conform with the MUTCD
3. Necessary for public safety or convenience as determined by the Engineer
4. Required to perform staged construction shown on the plans

**Replace Section 12-3.20C(1) With:**

**12-3.20C1 General**

If type K temporary rail is used on the project, before placing Type K temporary railing on the job site, paint the exposed surfaces of the railing with white paint complying with the specifications for acrylic emulsion paint for exterior masonry.

Place Type K temporary railing on a firm, stable foundation. Grade the foundation to provide a uniform bearing surface throughout the entire length of the railing.

Structure excavation and backfill must comply with section 19-3 except compaction of earth fill placed behind Type K temporary railing in a curved layout is not required.

Place and maintain the abutting ends of PC concrete units in alignment without substantial offset from each other.

The drilling of holes and bonding of threaded rods or dowels must comply with the specifications for drilling and bonding dowels in section 51-1.

Install a reflector on the top or face of the rail of each rail unit placed within 10 feet of a traffic lane. Apply adhesive for mounting the reflector under the reflector manufacturer's instructions.

Install a Type P marker panel at each end of railing placed adjacent to a 2-lane, two-way highway and at the end facing traffic for railing installed adjacent to a one-way roadbed. If the railing is placed on a skew, install the marker at the end of the skew nearest the traveled way. Type P marker panels must comply with section 82 except you must furnish the marker panels.

After removing Type K temporary railing:

1. Restore the area to its previous condition or construct it to its planned condition if temporary excavation or embankment was used to accommodate the railing.
2. Remove all threaded rods or dowels to a depth of at least 1 inch below the surface of the concrete. Fill the resulting holes with mortar under section 51-1 except cure the mortar by the water method or by the curing compound method using curing compound no. 6.

If the Engineer orders a lateral move of Type K temporary railing and repositioning is not shown, the lateral move is change order work unless:

1. Required to conform with your traffic control plan
2. Required to conform with the MUTCD
3. Necessary for public safety or convenience as determined by the Engineer
4. Required to perform staged construction shown on the plans

#### **Replace Section 12-3.22C With:**

##### **12-3.22C Construction**

If crash cushion modules are used on the project, use the same type of crash cushion module for a single grouping or array.

Temporary crash cushion arrays must not encroach on the traveled way.

Secure the sand-filled modules in place before starting an activity requiring a temporary crash cushion.

Maintain sand-filled temporary crash cushions in place at each location, including times when work is not actively in progress. You may remove the crash cushions during the work shift for access to the work if the exposed fixed obstacle is 15 feet or more from the nearest lane carrying traffic. Reset the crash cushion before the end of the work shift.

Immediately repair sand-filled temporary crash cushion modules damaged due to your activities. Remove and replace any module damaged beyond repair. Repair and replacement of temporary crash cushion modules damaged by traffic are change order work.

You may place sand-filled temporary crash cushion modules on movable pallets or frames complying with the dimensions shown. The pallets or frames must provide a full-bearing base beneath the modules. Do not move the modules and supporting pallets or frames by sliding or skidding along the pavement or bridge deck.

Attach a Type R or Type P marker panel to the front of the temporary crash cushion if the closest point of the crash cushion array is within 12 feet of the traveled way. Firmly fasten the marker panel to the crash cushion with commercial quality hardware or by other authorized methods. Attach the Type R marker panel such that the top of the panel is 1 inch below the module lid. Attach the Type P marker panel such that the bottom of the panel rests upon the pallet or roadway surface if pallets are not used.

A lateral move of a temporary crash cushion module is change order work if ordered and the repositioning is not shown, unless required for staged construction.

Remove sand-filled temporary crash cushion modules, including sand, pallets or frames, and marker panels, at Contract acceptance. Do not install sand-filled temporary crash cushion modules in the permanent work.

**Replace section 12-3.31C with:**

**12-3.31C Construction**

If portable flashing beacons are used on the project, remove portable flashing beacons from the traveled way at the end of each night's work. You may store the flashing beacon at selected central locations within the highway where designated by the Engineer.

Moving portable flashing beacons from location to location if ordered after initial placement is change order work unless:

1. Required to conform with your traffic control plan
2. Required to conform with the MUTCD
3. Necessary for public safety or convenience as determined by the Engineer
4. Required to perform staged construction shown on the plans

**Replace Section 12-3.35B(6) with:**

**12-3.35B(6) User Interface**

If the project includes an AWIS, the system must have a user interface to control the AWIS PCMS communications. The interface must be (1) software compatible with a Windows environment or (2) a web service accessed by a web browser.

Provide any software on a CD or other Engineer-authorized data-storage device.

The user interface must, at a minimum, provide the user with a list of AWIS PCMSs in the field, location information for each AWIS PCMS, and a real-time on-board display of the message in the field. Control options must, at a minimum, provide the user the ability to change the on-board messages and flash rate.

**Replace the headings and paragraphs of Section 12-4 with:**

**12-4 MAINTAINING TRAFFIC**

**12-4.01 GENERAL**

**12-4.01A General**

Section 12-4.01 includes general specifications for maintaining traffic through construction work zones.

If local authorities regulate traffic, notify them at least 5 business days before the start of job site activities. Cooperate with the local authorities to handle traffic through the work zone and to make arrangements to keep the work zone clear of parked vehicles.

**12-4.01B Materials**

Not Used

**12-4.01C CONSTRUCTION**

Furnishing and operating pilot cars is not change order work.

#### **12-4.01D Payment**

Not Used

### **12-4.02 TRAFFIC CONTROL SYSTEMS**

#### **12-4.02A General**

##### **12-4.02A(1) Summary**

Section 12-4.02 includes specifications for providing a traffic control system to close traffic lanes, shoulders, and roadways.

A traffic control system for a closure includes the temporary traffic control devices described as part of the traffic control system. Temporary traffic control devices must comply with section 12-3.

##### **12-4.02A(2) Definitions**

**designated holidays:** Designated holidays are shown as "holidays" in Section 1-1.07B.

##### **12-4.02A(3) Submittals**

###### **12-4.02A(3)(a) General**

The Contractor shall prepare and submit to the County Construction Engineer for approval, a traffic control system plan indicating the means and methods he will employ to institute and maintain traffic control for all phases of the work within the project. The traffic control system plan shall be submitted to the County Construction Engineer as early as possible, preferably **five (5) working days** prior to pre-construction meeting. The Engineer will require five (5) working days to review the initial submittal of the traffic control system plan and an additional five (5) working days for each successive review.

**No work at the project site whatsoever, including preparatory work such as the installation of construction project funding signs, shall commence until the traffic control system plan has been approved in writing by the Engineer. In the event that the traffic control system plan is not submitted timely, the Engineer may issue a notice of commencement of contract time prior to approval of the traffic control system plan, and working days will begin to accrue against the allotted contract time.**

Late submittal of the traffic control plan or revisions thereafter required, due to the inadequacy of the plan, shall not be accepted as justification for the delay in the start of the working days for the project.

It shall be the Contractor's responsibility to provide, install, maintain, and remove any and all detour signage and traffic control devices and to obtain all permits, including permits from Caltrans, as may be necessary to establish detours as part of the contractor's traffic control plan.

Traffic will not be allowed to be limited to one direction when construction activities are not actively in progress. Providing, installing, maintaining, and removing all traffic control, including portable changeable message signs if required, obtaining and complying with all permits, and providing all traffic control operations shall be the responsibility of the contractor, and no additional compensation will be allowed therefor.

###### **12-4.02A(3)(b) Closure Schedules**

One-way traffic shall be controlled through the project in accordance with the California Manual MUTCD and Caltrans Standard Plans T-11 and T-13 entitled "Traffic Control System for Lane Closure on Multilane Conventional Highways" and "Traffic Control System for Lane Closure on Two Lane Conventional Highways," and these special provisions. Night closure will not be permitted.

When traffic is under one way control on unpaved areas, the cones shown along the centerline on the plan need not be placed.

Every Monday by noon, submit a closure schedule request for planned closures for the next week.

The next week is defined as Sunday at noon through the following Sunday at noon.

Submit a closure schedule request 5 days before the anticipated start of any job site activity that reduces:

1. Horizontal clearances of traveled ways, including shoulders, to 2 lanes or fewer due to activities such as temporary barrier placement and paving
2. Vertical clearances of traveled ways, including shoulders, due to activities such as pavement overlays, overhead sign installation, or falsework girder erection

Submit closure schedule changes, including additional closures, by noon at least 3 business days before a planned closure.

Cancel closure requests at least 48 hours before the start time of the closure.

The Department notifies you of unauthorized closures or closures that require coordination with other parties as a condition for authorization.

#### **12-4.02A(3)(c) Contingency Plans for Closures**

Submit a contingency plan for an activity that could affect a closure if a contingency plan is specified in the special provisions or if a contingency plan is requested.

If a contingency plan is requested, submit the contingency plan within 1 business day of the request.

The contingency plan must identify the activities, equipment, processes, and materials that may cause a delay in the opening of a closure to traffic. The plan must include:

1. List of additional or alternate equipment, materials, or workers necessary to ensure continuing activities and on-time opening of closures if a problem occurs. If the additional or alternate equipment, materials, or workers are not on the job site, specify their location, the method for mobilizing these items, and the required time to complete mobilization.
2. General time-scaled logic diagram displaying the major activities and sequence of the planned activities. For each activity, identify the critical event that will activate the contingency plan.

Submit revisions to a contingency plan at least 3 business days before starting the activity requiring the contingency plan. Allow 2 business days for review.

#### **12-4.02A(4) Quality Assurance**

Reserved

#### **12-4.02B Materials**

Not Used

#### **12-4.02C Construction**

##### **12-4.02C(1) General**

Traffic will be controlled by flagmen by eyesight, radio (walkie talkie) or baton. In the event these methods do not work satisfactorily, as determined by the Engineer, a pilot car will be required.

The Engineer may require a pilot car to be used during earthwork operations in preparation of the grading plane or other operations when the Contractor's operations cover an area beyond the line of sight, or beyond the range of radios or when the baton method does not function satisfactorily.

Work that interferes with traffic is limited to the hours when closures are allowed.

Additional advance flaggers are required.

For traffic under 1-way control on unpaved areas, the cones along the centerline need not be placed.

You may use a pilot car to control traffic. If a pilot car is used for traffic control, the cones along the centerline need not be placed. The pilot car must have radio contact with personnel in the work area. Operate the pilot car through the traffic control zone at a speed not greater than 25 miles per hour.



### **12-4.02C(3) Closure Requirements and Charts**

#### **12-4.02C(3)(a) General**

Where 2 or more lanes in the same direction, including the shoulders, are adjacent to the area where the work is being performed, close the adjacent lane under any of the following conditions:

1. Work is off the traveled way but within 6 feet of the edge of the traveled way, and the approach speed is greater than 45 mph
2. Work is off the traveled way but within 3 feet of the edge of the traveled way, and the approach speed is less than 45 mph

Closure of the adjacent traffic lane is not required during any of the following activities:

1. Work behind a barrier
2. Paving, grinding, or grooving
3. Installation, maintenance, or removal of traffic control devices except for temporary railing

#### **12-4.02C(3)(b) - 12-4.02C(3)(n)**

Reserved

#### **12-4.02C(3)(o) Closure of Conventional County Roads**

The type and location of signs, lights, flags, flagmen, and other traffic control and safety devices shall be in accordance with the current edition of the California Manual on Uniform Traffic Control Devices (MUTCD) issued by the State of California, Department of Transportation (Caltrans).

Public traffic shall be permitted to pass through construction at all times unless otherwise specified herein.

Provide access to properties abutting the project site at all times.

Whenever possible, the Contractor will be required to maintain one paved traffic lane, not less than 10 feet wide in each direction at all time. Only locations where roads are not wide enough, one lane traffic will be allowed as per these specifications.

When directed by the Engineer, traffic shall be routed through the work under one-way control.

Under one-way reversing traffic control operations, public traffic may be stopped in one direction for periods not to exceed 10 minutes.

Lane closure is defined as the closure of a traffic lane or lanes within a single traffic control system.

The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

Driveways and access roads shall remain accessible at all times.

Valley gutters shall be constructed in one-half widths and the remaining one-half width shall be kept free from obstructions to allow local traffic and through traffic to pass.

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders including sections closed to public traffic.

When work vehicles or equipment are parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed as shown on standard plan T-10.

The Contractor's equipment and materials shall not remain in a lane except when such lane is closed to traffic and the lane is being used for contract operations.

**12-4.02C(3)(o)–12-4.02C(3)(s) Reserved**

**12-4.02C(4)–12-4.02C(6) Reserved**

**12-4.02C(7) Traffic Control System Requirements**

**12-4.02C(7)(a) General**

Control traffic using stationary closures.

If components of the traffic control system are displaced or cease to operate or function as specified, immediately repair them to their original condition or replace them and place them back in their original locations.

Vehicles equipped with attenuators must comply with section 12-3.23.

Each vehicle used to place, maintain, and remove components of a traffic control system on a multilane highway must have a Type II flashing arrow sign that must operate whenever the vehicle is used for placing, maintaining, or removing the components. For a stationary closure, vehicles with a Type II flashing arrow sign not involved in placing, maintaining, or removing the components must display only the caution display mode. If a flashing arrow sign is required for a closure, activate the sign before the closure is in place.

**12-4.02C(7)(b) Stationary Closures**

Except for channelizing devices placed along open trenches or excavations adjacent to the traveled way, remove the components of the traffic control system for a stationary closure from the traveled way and shoulders at the end of each work period. You may store the components at authorized locations within the limits of the highway.

If a traffic lane is closed with channelizing devices for excavation work, move the devices to the adjacent edge of the traveled way when not excavating. Space the devices as shown for the lane closure.

**12-4.02C(7)(c) Moving Closures**

For a moving closure, use a PCMS that complies with section 12-3.32 except the sign must be truck mounted. The full operational height to the bottom of the sign may be less than 7 feet above the ground but must be as high as practicable.

If you use a flashing arrow sign in a moving closure, the sign must be truck mounted. Operate the flashing arrow sign in the caution display mode if it is being used on a 2-lane, two-way highway.

**12-4.02C(8) Traffic Control System Signs**

**12-4.02C(8)(a) General**

Traffic control system signs must comply with section 12-3.11.

**12-4.02C(8)(b) Connector and Ramp Closure Signs**

Inform motorists of a temporary closing of a (1) connector or a (2) freeway or expressway entrance or exit ramp using:

1. SC6-3(CA) (Ramp Closed) sign for closures of 1 day or less
2. SC6-4(CA) (Ramp Closed) sign for closures of more than 1 day

SC6-3(CA) and SC6-4(CA) signs must be stationary mounted at the locations shown and must remain in place and visible to motorists during the connector or ramp closure.

Notify the Engineer at least 2 business days before installing the sign and install the sign from 7 to 15 days before the closure.

#### **12-4.02C(10)–12-4.02C(11) Reserved**

#### **12-4.02C(12) Failure to Provide Traffic Control.**

If you do not provide the traffic control and it becomes necessary for the Engineer to notify you of your duties according to the Standard Specifications and these special provisions, you will pay \$200 per 15-minute period or portion thereof to the County for all the time required to acquire the traffic control, including pilot car.

Such payment shall commence at the time notice of the improper traffic control condition is given to you or your authorized representative by the Engineer and shall terminate when the condition is corrected. Such payment will be deducted from your payment.

In addition thereto, when it is necessary for the Engineer to perform the work, you will pay the actual cost for the performance thereof. Such amount will be deducted from the your payment. This will be in addition to any penalties imposed in these special provisions.

The provisions in this section will not relieve you from your responsibility to provide such additional devices or take such measures as may be necessary to comply with the provisions in Section 7-1.04, "Public Safety," of the Standard Specifications.

#### **12-4.02D Payment**

The Department pays for change order work for a traffic control system by force account for increased traffic control and uses a force account analysis for decreased traffic control.

Traffic control system for lane closure is paid for as traffic control system. Flagging costs are paid for as specified in section 12-1.04.

The requirements in section 4-1.05 for payment adjustment do not apply to traffic control system. Adjustments in compensation for traffic control system will be made for an increase or decrease in traffic control work if ordered and will be made on the basis of the cost of the necessary increased or decreased traffic control. The adjustment will be made on a force account basis for increased work and estimated on the same basis in the case of decreased work.

A traffic control system required by change order work is paid for as a part of the change order work.

Full compensation for furnishing and operating the pilot car, (including driver, radios, and any other equipment and labor required) shall be considered as included in the contract lump sum price paid for traffic control system and no further payment will be made.

#### **12-4.03 FALSEWORK OPENINGS**

Reserved

#### **12-4.04 PEDESTRIAN FACILITIES**

##### **12-4.04A General**

Section 12-4.04 includes specifications for providing temporary pedestrian facilities.

Temporary pedestrian facilities must comply with section 16-2.02.

##### **12-4.04B Materials**

Not Used

##### **12-4.04C Construction**

If pedestrian traffic is allowed to pass through work areas, provide a temporary pedestrian facility through the construction areas within the highway. Include a protective overhead covering as necessary to ensure protection from falling objects and drippings from overhead structures.

If an activity requires a closure of a walkway, provide another walkway nearby, off of the traveled way.

Where pedestrian openings through falsework are required, provide a temporary pedestrian facility with a protective overhead covering during all bridge construction activities.

#### **12-4.04D Payment**

Not Used

#### **12-4.06–12-4.10 RESERVED**

## **13 WATER POLLUTION CONTROL**

### **Add to Section 13-1.01:**

#### **STATE WATER RESOURCES CONTROL BOARD (SWRCB) NOTICE OF INTENT FILING (NOI) FEE**

Complete the NOI filing process started by the County on the SWRCB website using information available in the contract, field and website. The Engineer will link your plan to the project on the SWRCB website.

The SWRCB NOI bid item is specifically provided to reimburse Contractor for payment of NOI filing fee charged by the SWRCB and paid by the Contractor after the Contractor has completed the NOI filing process started by the County.

The amount paid will be the amount of the fee only. No payment will be made for overhead or processing costs. Full compensation for any overhead and processing costs will be considered to be included in the various items of work, and no separate compensation will be made therefor.

The provisions of section 9-1.06 for increased or decreased quantities shall not apply to the "State Water Resources Control Board - Notice of Intent" bid item.

The SWRCB website can be found at:

**<https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.xhtml>**

The dollar amount shown in the Proposal is an estimate only and shall be included in each bidder's proposal.

### **Replace 13-1.01A with:**

#### **13-1.01A Summary**

Section 13-1 includes general specifications for preventing, controlling, and abating water pollution within waters of the State.

Information on forms, reports, and other documents is in the following Caltrans manuals:

1. Field Guide to Construction Site Dewatering
2. Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual
3. Construction Site Best Management Practices (BMPs) Manual
4. Construction Site Monitoring Program Guidance Manual

You may view these manuals at the Stormwater and Water Pollution Control Information link at the Caltrans Division of Construction website or purchase them at the Caltrans Publication Distribution Unit.

A WPCP and a SWPPP must comply with the Caltrans Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual and must be prepared using the latest template posted on the Construction stormwater website.

**Replace Section 13-1.01D92) with**

**13-1.01D(2) Regulatory Requirements**

Comply with the discharge requirements in the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities; Order No. 2009-000 9-DWQ, CAS000002 (Construction General Permit) and any amendments thereto issued by the SWRCB. The Construction General Permit may be found at:

[http://www.waterboards.ca.gov/water\\_issues/programs/stormwater/constpermits.shtml](http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml)

Discharges from manufacturing facilities, such as batch plants and crushing plants, must comply with the discharge requirements in the NPDES General Permit for Storm Water Discharges Associated with Industrial Activities; Order No. 2014-0057-DWQ, CAS000001 (Industrial General Permit), issued by the SWRCB. For the Industrial General Permit, go to the SWRCB website.

For a batch plant and crushing plant outside a job site or within a job site that serves one or more contracts, obtain coverage under the Industrial General Permit before operating a batch plant to manufacture concrete, HMA, or other material or a crushing plant to produce rock or aggregate.

This Project disturbs 1.2 acres of soil.

**Replace Section 13-1.01D(4)(b) with:**

**13-1.01D(4)(b) Qualifications**

The WPC manager must:

1. Comply with the requirements provided in the Construction General Permit for:
  - 1.1. QSP if the project requires a WPCP
  - 1.2. QSD if the project requires a SWPPP
2. Complete the stormwater management training described at the Stormwater and Water Pollution Control Information link at the Caltrans Division of Construction website

**Add to section 13-3.01A:**

This project's risk level is 1.

**Add between the 4th and 5th paragraphs of section 13-3.01C(2)(a):**

The Central Valley Regional Water Quality Control Board will review the authorized SWPPP.

**Replace Section 13-3.01C(5) with:**

**13-3.01C(5) Annual Certification**

Submit an annual certification of compliance as described in the Caltrans *Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual* before July 15th of each year.

**Replace Section 13-4.03G with:**

**13-4.03G Dewatering**

Dewatering consists of discharging accumulated stormwater, groundwater, or surface water from excavations or temporary containment facilities.

If dewatering is required, perform dewatering work as specified for the work items involved, such as a temporary ATS or dewatering and discharge.

If dewatering and discharging activities are not specified for a work item and you perform dewatering activities:

1. Conduct dewatering activities under the Caltrans *Field Guide for Construction Site Dewatering*.
2. Ensure any dewatering discharge does not cause erosion, scour, or sedimentary deposits that could impact natural bedding materials.
3. Discharge the water within the project limits. Dispose of the water if it cannot be discharged within project limits due to site constraints or contamination.
4. Do not discharge stormwater or non-stormwater that has an odor, discoloration other than sediment, an oily sheen, or foam on the surface. Immediately notify the Engineer upon discovering any such condition.

**Replace Section 13-5.04 with:**

#### **13-5.04 PAYMENT**

The payment quantity for temporary soil stabilization bid items paid for by the area is the area measured parallel with the ground surface not including the additional quantity used for overlaps.

If there is no bid item for temporary soil stabilization measures, payment therefor is considered to be included in the bid item for prepare water pollution control program or in the bid item for prepare and implement stormwater pollution prevention plan, as applicable.

**Replace Section 13-6.04 with:**

#### **13-6.04 PAYMENT**

The payment quantity for temporary sediment control bid items paid for by the length is the length measured along the centerline of the installed material.

The payment quantity, if any, for temporary fiber roll does not include the additional quantity used for overlaps.

The Department does not pay for the relocation of temporary drainage inlet protection during work progress.

If there are no bid items for installing or maintaining temporary sediment control measures, payment therefor is considered to be included in the bid item for prepare water pollution control program or in the bid item for prepare and implement stormwater pollution prevention plan, as applicable.

**Replace Section 13-7.03D with:**

#### **13-7.03D Payment**

The Department does not pay for the relocation of temporary construction entrances or roadways during work progress.

If there are no bid items for installing or maintaining temporary construction entrances or roadways, payment therefor is considered to be included in the bid item for prepare water pollution control program or in the bid item for prepare and implement stormwater pollution prevention plan, as applicable.

#### **13-8 RESERVED**

## **14 ENVIRONMENTAL STEWARDSHIP (WILL BE REPLACED)**

**Add Section 14-12.04:**

#### **14-12.04 RELATIONS WITH SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT (SJVAPCD)**

You are responsible for compliance with all applicable SJVAPCD regulations and requirements. This section is provided for your information, and nothing herein or elsewhere within these special provisions shall be construed as limiting your responsibility for complying with all applicable rules and regulations.

In accordance with SJVAPCD Regulation VIII – Fugitive PM10 Prohibitions: Rule 8021, an SJVAPCD-approved dust control plan is NOT required for this project. However, you are required to notify the SJVAPCD prior to commencing construction operations, and you are responsible for compliance with all applicable rules and regulations of the SJVAPCD and the requirements listed in Section 01 57 27 Dust Control of the technical specifications.

**Replace Section 14-12.04–14.12.08 With:**

**14-12.05–14.12.08 RESERVED**

## **16 TEMPORARY FACILITIES**

**Replace section 16-1.02 with:**

### **16-1.02 Materials**

Where concrete driveway modifications are required, a temporary access ramp shall be constructed using excavated earthy material to allow access to the properties.

## **DIVISION III EARTHWORK AND LANDSCAPE**

### **17 GENERAL**

**Replace the 4th paragraph in section 17-2.03A with:**

Clear and grub vegetation only within the immediate limits required for the installations of the contract facilities.

**Replace the 1<sup>st</sup> sentence in the 2<sup>nd</sup> paragraph in section 17-2.03A with:**

Cut tree branches that extend over the roadway and hang within 20 feet of finished grade and as directed by the engineer.

**Add to end of 17-2.03C:**

Any trees with a trunk diameter greater than or equal to 4" will constitute as a "tree removal" and will have separate bid item. Any tree or shrub less than 4" shall be considered in the bid item for "clearing and grubbing".

## DIVISION V SURFACINGS AND PAVEMENTS

Replace the headings and paragraphs of Section 36-3 with:

### 36-3 PAVEMENT SMOOTHNESS

#### 36-3.01 GENERAL

##### 36-3.01A Summary

Section 36-3 includes specifications for measuring the smoothness of pavement surfaces.

##### 36-3.01B Definitions

Reserved

##### 36-3.01C Submittals

###### 36-3.01C(1) General

Reserved

###### 36-3.01C(2) Reserved

###### 36-3.01C(3) Reserved

###### 36-3.01C(4) Straightedge Measurements

Within 2 business days of measuring smoothness with a straightedge, submit a list of the areas requiring smoothness correction. Identify the areas by:

1. Location number
2. District-County-Route
3. Beginning station or post mile to the nearest 0.01 mile
4. For correction areas within a traffic lane:
  - 4.1. Lane direction, *NB*, *SB*, *EB*, or *WB*
  - 4.2. Lane number from left to right in the direction of travel
  - 4.3. Wheel path, *L* for left, *R* for right, or *B* for both
5. For correction areas not within a traffic lane:
  - 5.1. Identify the pavement area, such as shoulder, weigh station, or turnout
  - 5.2. Direction and distance from the centerline, *L* for left or *R* for right
6. Estimated size of correction area

##### 36-3.01D Quality Assurance

###### 36-3.01D(1) General

Reserved

###### 36-3.01D(2) Reserved

###### 36-3.01D(3) Quality Control

###### 36-3.01D(3)(a) General

Reserved

###### 36-3.01D(3)(b) Smoothness

###### 36-3.01D(3)(b)(i) General

Test pavement smoothness using a 12-foot straightedge for the pavement at:

1. Traffic lanes less than 1,000 feet in length, including ramps, turn lanes, and acceleration and deceleration lanes
2. Areas within 15 feet of manholes
3. Shoulders
4. Weigh-in-motion areas
5. Miscellaneous areas such as medians, gore areas, turnouts, and maintenance pullouts



6. Any other areas selected by the Engineer.

**36-3.01D(3)(b)(ii) Reserved**

**36-3.01D(3)(b)(iii) Reserved**

**36-3.01D(4) Department Acceptance**

The Department accepts pavement surfaces for smoothness based on compliance with the smoothness specifications for the type of pavement surface specified.

For areas that require pavement smoothness determined using a 12-foot straightedge, the pavement surface must not vary from the lower edge of the straightedge by more than:

1. 0.01 foot when the straightedge is laid parallel with the centerline
2. 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

**36-3.02 MATERIALS**

Not Used

**36-3.03 CONSTRUCTION**

Perform pavement smoothness testing in areas selected by the Engineer in the presence of the Engineer.

**36-3.04 PAYMENT**

Not Used

**Replace Section 39 with:**

**39 ASPHALT CONCRETE**

**39-1 GENERAL**

**39-1.01 GENERAL**

Section 39 includes specifications for performing asphalt concrete work.

**39-1.02 MATERIALS**

Not Used

**39-1.03 CONSTRUCTION**

Not Used

**39-1.04 PAYMENT**

Not Used

**39-2 HOT MIX ASPHALT**

**39-2.01 GENERAL**

**39-2.01A General**

**39-2.01A(1) Summary**

Section 39-2.01 includes general specifications for producing and placing hot mix asphalt.

HMA includes one or more of the following types:

1. Type A HMA
2. RHMA-G
3. OGFC

4. BWC
5. Minor HMA

WMA technologies must be on the Authorized Material List for WMA authorized technologies.

For HMA that uses asphalt binder containing crumb rubber modifier, submit a Crumb Rubber Usage Report form monthly and at the end of the project.

Wherever reference is made to the following test methods, the year of publication for these test methods is as shown in the following table:

Test method	Year of publication
AASHTO M 17	2011 (2015)
AASHTO M 323	2013
AASHTO R 30	2002 (2015)
AASHTO R 35	2014
AASHTO T 27	2014
AASHTO T 49	2014
AASHTO T 59	2013
AASHTO T 96	2002 (2010)
AASHTO T 164	2014
AASHTO T 176	2008
AASHTO T 209	2012
AASHTO T 269	2014
AASHTO T 275	2007 (2012)
AASHTO T 283	2014
AASHTO T 304	2011
AASHTO T 305	2014
AASHTO T 308	2010
AASHTO T 312	2014
AASHTO T 324	2014
AASHTO T 329	2013
AASHTO T 335	2009
ASTM D36/D36M	2014 <sup>ε1</sup>
ASTM D92	2012b
ASTM D217	2010
ASTM D297	2013
ASTM D445	2014
ASTM D2007	2011
ASTM D2074	2007 (Reapproved 2013)
ASTM D2995	1999 (Reapproved 2009)
ASTM D4791	2010
ASTM D5329	2009
ASTM D7741/D7741M	2011 <sup>ε1</sup>
Asphalt Institute MS-2	7th edition (2015)

### 39-2.01A(2) Definitions

**binder replacement:** Binder from RAP expressed as a percent of the total binder in the mix.

**coarse aggregate:** Aggregate retained on a no. 4 sieve.

**fine aggregate:** Aggregate passing a no. 4 sieve.

**leveling course:** Thin layer of HMA used to correct minor variations in the longitudinal and transverse profile of the pavement before placement of other pavement layers.

**miscellaneous areas:** Areas outside the traveled way and shoulders such as:

1. Median areas not including inside shoulders
2. Island areas
3. Sidewalks
4. Gutters
5. Ditches
6. Overside drains
7. Aprons at ends of drainage structures
8. Driveways and driveway approaches

**processed RAP:** RAP that has been fractionated.

**supplemental fine aggregate:** Mineral filler consisting of rock dust, slag dust, hydrated lime, hydraulic cement, or any combination of these and complying with AASHTO M 17.

### **39-2.01A(3) Submittals**

#### **39-2.01A(3)(a) General**

Reserved

#### **39-2.01A(3)(b) Job Mix Formula**

##### **39-2.01A(3)(b)(i) General**

Except for the HMA to be used in miscellaneous areas and dikes, submit your proposed JMF for each type of HMA to be used. The JMF must be submitted on the Contractor Job Mix Formula Proposal form along with:

1. Mix design documentation on Contractor Hot Mix Asphalt Design Data form dated within 12 months of submittal
2. JMF verification on a Caltrans Hot Mix Asphalt Verification form, if applicable
3. JMF renewal on a Caltrans Job Mix Formula Renewal form, if applicable
4. SDS for:
  - 4.1. Asphalt binder
  - 4.2. Supplemental fine aggregate except fines from dust collectors
  - 4.3. Antistrip additives

The Contractor Hot Mix Asphalt Design Data form must show documentation on aggregate quality.

If you cannot submit a Department-verified JMF on a Caltrans Hot Mix Asphalt Verification form dated within 12 months before HMA production, the Engineer verifies the JMF.

Submit a new JMF if you change any of the following:

1. Target asphalt binder percentage greater than  $\pm 0.2$  percent
2. Asphalt binder supplier
3. Combined aggregate gradation
4. Aggregate sources
5. Liquid antistrip producer or dosage
6. Average binder content in a new processed RAP stockpile by more than  $\pm 2.00$  percent from the average RAP binder content reported on page 4 of your Contractor Hot Mix Asphalt Design Data form
7. Average maximum specific gravity in a new processed RAP stockpile by more than  $\pm 0.060$  from the average maximum specific gravity value reported on page 4 of your Contractor Hot Mix Asphalt Design Data form
8. Any material in the JMF, except lime supplier and source

Allow the Engineer 5 business days from a complete JMF submittal for document review of the aggregate qualities, mix design, and JMF. The Engineer notifies you if the proposed JMF submittal is accepted.

If your JMF fails verification testing, submit an adjusted JMF based on your testing. The adjusted JMF must include a new Contractor Job Mix Formula Proposal form, Contractor Hot Mix Asphalt Design Data form, and the results of the failed verification testing.

You may submit an adjusted aggregate gradation TV on a Contractor Job Mix Formula Proposal form before verification testing. Aggregate gradation TV must be within the TV limits specified.

### **39-2.01A(3)(b)(ii) Job Mix Formula Renewal**

You may request a JMF renewal by submitting:

1. Proposed JMF on a Contractor Job Mix Formula Proposal form
2. Previously verified JMF documented on a Caltrans Hot Mix Asphalt Verification form dated within 12 months
3. Mix design documentation on a Contractor Hot Mix Asphalt Design Data form used for the previously verified JMF

### **39-2.01A(3)(b)(iii) Job Mix Formula Modification**

For an authorized JMF, submit a modified JMF if you change any of the following:

1. Asphalt binder supplier
2. Liquid antistrip producer
3. Liquid antistrip dosage

You may change any of the above items only once during the Contract.

Submit your modified JMF request at least 15 days before production. Each modified JMF submittal must include:

1. Proposed modified JMF on Contractor Job Mix Formula Proposal form, marked *Modified*.
2. Mix design records on Contractor Hot Mix Asphalt Design Data form for the authorized JMF to be modified.
3. JMF verification on Hot Mix Asphalt Verification form for the authorized JMF to be modified.
4. Test results for the modified JMF in compliance with the mix design specifications. Perform tests at the mix design OBC as shown on the Contractor Asphalt Mix Design Data form.

With an accepted modified JMF submittal, the Engineer verifies each modified JMF within 10 days of receiving all verification samples.

### **39-2.01A(3)(c) Quality Control Plan**

With your proposed JMF submittal, submit a QC plan for HMA.

The QC plan must describe the organization and procedures for:

1. Controlling HMA quality characteristics
2. Taking samples, including sampling locations
3. Establishing, implementing, and maintaining QC
4. Determining when corrective actions are needed
5. Implementing corrective actions
6. Using methods and materials for backfilling core locations

The QC plan must address the elements affecting HMA quality, including:

1. Aggregates
2. Asphalt binder
3. Additives

4. Production
5. Paving

The QC plan must include aggregate QC sampling and testing during lime treatment.

The QC Plan must include action and suspension limits and details of corrective action to be taken if any process is outside of those limits. Suspension limits must not exceed specified acceptance criteria.

The QC plan must describe how test results will be submitted including times for sampling and testing for each quality characteristic.

Allow 5 business days for review of the QC plan.

If you change QC procedures, personnel, or sample testing locations, submit a QC plan supplement before implementing the proposed change. Allow 3 business days for review of the QC plan supplement.

#### **39-2.01A(3)(d) Test Results**

For mix design, JMF verification, production start-up, and each 10,000 tons, submit AASHTO T 283 and AASHTO T 324 (Modified) test results to the Engineer.

Submit all QC test results, except AASHTO T 283 and AASHTO T 324 (Modified), within 3 business days of a request. Submit AASHTO T 283 QC tests within 15 days of sampling.

For tests performed under AASHTO T 324 (Modified), submit test data and 1 tested sample set within 5 business days of sampling.

If coarse and fine durability index tests are required, submit test results within 2 business days of sampling.

If a tapered notched wedge is used, submit compaction test result values within 24 hours of testing.

#### **39-2.01A(3)(e) Reserved**

#### **39-2.01A(3)(f) Liquid Antistrip Treatment**

If liquid antistrip treatment is used, submit the following with your proposed JMF submittal:

1. One 1 pt sample
2. Infrared analysis, including copy of absorption spectra
3. Certified copy of test results
4. Certificate of compliance for each liquid antistrip shipment. On each certificate of compliance, include:
  - 4.1. Your signature and printed name
  - 4.2. Shipment number
  - 4.3. Material type
  - 4.4. Material specific gravity
  - 4.5. Refinery
  - 4.6. Consignee
  - 4.7. Destination
  - 4.8. Quantity
  - 4.9. Contact or purchase order number
  - 4.10. Shipment date
5. Proposed proportions for the liquid antistrip

For each delivery of liquid antistrip to the HMA production plant, submit a 1 pt sample to the Engineer. Submit shipping documents. Label each liquid antistrip sampling container with:

1. Liquid antistrip type
2. Application rate
3. Sample date
4. Contract number

At the end of each day's production shift, submit production data in electronic media. Present data on electronic media in a tab delimited format. Use line feed carriage return with 1 separate record per line for each production data set. Allow enough fields for the specified data. Include data titles at least once per report. For each HMA mixing plant type, submit the following information in the order specified:

1. For batch plant mixing:
  - 1.1. Production date
  - 1.2. Time of batch completion
  - 1.3. Mix size and type
  - 1.4. Each ingredient's weight
  - 1.5. Asphalt binder content as a percentage of the total weight of mix
  - 1.6. Liquid antistriper content as a percentage of the asphalt binder weight
2. For continuous mixing plant:
  - 2.1. Production date
  - 2.2. Data capture time
  - 2.3. Mix size and type
  - 2.4. Flow rate of wet aggregate collected directly from the aggregate weigh belt
  - 2.5. Aggregate moisture content as a percentage of the dry aggregate weight
  - 2.6. Flow rate of asphalt binder collected from the asphalt binder meter
  - 2.7. Flow rate of liquid antistriper collected from the liquid antistriper meter
  - 2.8. Asphalt binder content as a percentage of the total weight of mix calculated from:
    - 2.8.1. Aggregate weigh belt output
    - 2.8.2. Aggregate moisture input
    - 2.8.3. Asphalt binder meter output
  - 2.9. Liquid antistriper content as a percentage of the asphalt binder weight calculated from:
    - 2.9.1. Asphalt binder meter output
    - 2.9.2. Liquid antistriper meter output

### **39-2.01A(3)(g) Lime Treatment**

If aggregate lime treatment is used, submit the following with your proposed JMF submittal and each time you produce lime-treated aggregate:

1. Exact lime proportions for fine and coarse virgin aggregates
2. If marination is required, the averaged aggregate quality test results within 24 hours of sampling
3. For dry lime aggregate treatment, a treatment data log from the dry lime and aggregate proportioning device in the following order:
  - 3.1. Treatment date
  - 3.2. Time of day the data is captured
  - 3.3. Aggregate size being treated
  - 3.4. HMA type and mix aggregate size
  - 3.5. Wet aggregate flow rate collected directly from the aggregate weigh belt
  - 3.6. Aggregate moisture content, expressed as a percentage of the dry aggregate weight
  - 3.7. Flow rate of dry aggregate calculated from the flow rate of wet aggregate
  - 3.8. Dry lime flow rate
  - 3.9. Lime ratio from the authorized JMF for each aggregate size being treated
  - 3.10. Lime ratio from the authorized JMF for the combined aggregates
  - 3.11. Actual lime ratio calculated from the aggregate weigh belt output, aggregate moisture input, and dry lime meter output, expressed as a percentage of the dry aggregate weight
  - 3.12. Calculated difference between the authorized lime ratio and the actual lime ratio
4. For lime slurry aggregate treatment, a treatment data log from the slurry proportioning device in the following order:
  - 4.1. Treatment date
  - 4.2. Time of day the data is captured
  - 4.3. Aggregate size being treated
  - 4.4. Wet aggregate flow rate collected directly from the aggregate weigh belt

- 4.5. Moisture content of the aggregate just before treatment, expressed as a percentage of the dry aggregate weight
- 4.6. Dry aggregate flow rate calculated from the wet aggregate flow rate
- 4.7. Lime slurry flow rate measured by the slurry meter
- 4.8. Dry lime flow rate calculated from the slurry meter output
- 4.9. Authorized lime ratio for each aggregate size being treated
- 4.10. Actual lime ratio calculated from the aggregate weigh belt and slurry meter output, expressed as a percentage of the dry aggregate weight
- 4.11. Calculated difference between the authorized lime ratio and actual lime ratio
- 4.12. Dry lime and water proportions at the slurry treatment time

Each day during lime treatment, submit the treatment data log on electronic media in tab delimited format. Each continuous treatment data set must be a separate record using a line feed carriage return to present the specified data on 1 line. The reported data must include data titles at least once per report.

### **39-2.01A(3)(h) Warm Mix Asphalt Technology**

If a WMA technology is used, submit the following with your proposed JMF submittal:

1. SDS for the WMA technology
2. For water injection foam technology:
  - 2.1. Name of technology
  - 2.2. Proposed foaming water content
  - 2.3. Proposed HMA production temperature range
  - 2.4. Certification from binder supplier stating no antifoaming agent is used
3. For additive technology:
  - 3.1. Name of technology
  - 3.2. Percent admixture by weight of binder and percent admixture by total weight of HMA as recommended by the manufacturer
  - 3.3. Methodology for inclusion of admixture in laboratory-produced HMA
  - 3.4. Proposed HMA production temperature range

Collect and hold data for the duration of the Contract and submit the electronic media daily. The snapshot of production data must include the following:

1. Production date
2. Production location
3. Time of day the data is captured
4. HMA mix type being produced and target binder rate
5. HMA additive type, brand, and target rate
6. Temperature of the binder and HMA mixture
7. For a continuous mixing plant, the rate of flow of the dry aggregate calculated from the wet aggregate flow rate as determined by the conveyor scale
8. For a continuous mixing plant, the rate of flow of the asphalt meter
9. For a continuous mixing plant, the rate of flow of HMA additive meter
10. For batch plant mixing, actual batch weights of all ingredients
11. Dry aggregate to binder ratio calculated from metered ingredient output
12. Dry aggregate to HMA additive ratio calculated from metered output

At the end of each day's production shift, submit electronic media from the HMA plant process controller. Present data on electronic media in comma-separated values or tab-separated values format. The captured data for the ingredients represented by the production snapshot must have allowances for sufficient fields to satisfy the amount of data required by these specifications and include data titles at least once per report.

### **39-2.01A(3)(i) Reserved**

**39-2.01A(3)(m)–39-2.01A(3)(o) Reserved**

**39-2.01A(4) Quality Assurance**

**39-2.01A(4)(a) General**

AASHTO T 324 (Modified) is AASHTO T 324 with the following parameters:

1. Target air voids must equal  $7.0 \pm 1.0$  percent
2. Specimen height must be  $60 \pm 1$  mm
3. Number of test specimens must be 4 to run 2 tests
4. Do not average the 2 test results
5. Test specimen must be a 150 mm gyratory compacted specimen
6. Test temperature must be set at:
  - 6.1.  $113 \pm 2$  degrees F for PG 58
  - 6.2.  $122 \pm 2$  degrees F for PG 64
  - 6.3.  $131 \pm 2$  degrees F for PG 70 and above
7. Measurements for impression must be taken at every 100 passes along the total length of the sample
8. Inflection point is the number of wheel passes at the intersection of the creep slope and the stripping slope at maximum rut depth
9. Testing shut off must be set at 25,000 passes
10. Submersion time for samples must not exceed 4 hours

Take samples under California Test 125.

If a WMA technology is used, a technical representative for the WMA technology must attend the preconstruction meeting.

**39-2.01A(4)(b) Job Mix Formula Verification**

The Engineer verifies the JMF from samples taken from HMA produced by the plant to be used. The production set point at the plant must be within  $\pm 0.2$  from the asphalt binder percentage TV shown in your Contractor Job Mix Formula Proposal form. Notify the Engineer at least 2 business days before sampling materials. Samples may be taken from a different project including a non-Department project if you make arrangements for the Engineer to be present during sampling.

In the Engineer's presence and from the same production run, take samples of:

1. Aggregates. Coarse, fine, and supplemental fine aggregates must be taken from the combined cold-feed belt or the hot bins. If lime treatment is required, samples must be taken from individual stockpiles before lime treatment. Samples must be at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each type of supplemental fine aggregate. For hot-bin samples, the Department combines these aggregate samples to verify the TV submitted on a Contractor Job Mix Formula Proposal form.
2. Asphalt binder. Take at least four 1 qt samples. Each sample must be in a cylindrical-shaped can with an open top and friction lid. If the asphalt binder is modified or rubberized, the asphalt binder must be sampled with the components blended in the proportions to be used.
3. RAP. Samples must be at least 50 lb from each fractionated stockpile used or 100 lb from the belt.
4. Plant-produced HMA. The HMA samples must be at least 250 lb.

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers.

Submit 3 parts and keep 1 part.

After acceptance of the JMF submittal, the Engineer verifies each proposed JMF within 20 days of receiving all verification samples.

For JMF verification, the Engineer tests the following for compliance with the specifications:

1. Aggregate quality
2. Aggregate gradation
3. Voids in mineral aggregate on laboratory-produced HMA



#### 4. HMA quality characteristics for Department acceptance

To verify the HMA for air voids, voids in mineral aggregate, and dust proportion, the Engineer uses an average of 3 briquettes. The Engineer tests plant-produced material.

If the Engineer verifies the JMF, the Engineer furnishes you a Hot Mix Asphalt Verification form.

If the Engineer's test results on plant-produced samples do not show compliance with the specifications, the Engineer notifies you. Adjust your JMF based on your testing unless the Engineer authorizes reverification without adjustments. JMF adjustments may include a change in:

1. Asphalt binder content TV up to  $\pm 0.20$  percent from the OBC value submitted on the Contractor Hot Mix Asphalt Design Data form
2. Aggregate gradation TV within the TV limits specified in the aggregate gradation table

You may adjust the JMF only once due to a failed verification test.

For each HMA type and aggregate size specified, the Engineer verifies up to 2 proposed JMF submittals including a JMF adjusted after verification failure. If you submit more than 2 JMFs for each type of HMA and aggregate size, the Engineer deducts \$3,000 from payments for each verification exceeding this limit. This deduction does not apply to verifications initiated by the Engineer or if a JMF expires while HMA production is stopped longer than 30 days.

A verified JMF is valid for 12 months.

#### **39-2.01A(4)(c) Job Mix Formula Authorization**

You may start HMA production if:

1. Engineer's review of the JMF shows compliance with the specifications
2. Department has verified the JMF within 12 months before HMA production
3. Engineer authorizes the verified JMF

#### **39-2.01A(4)(d) Job Mix Formula Renewal**

For a JMF renewal and upon request, in the Engineer's presence and from the same production run, take samples of:

1. Aggregates. Coarse, fine, and supplemental fine aggregates must be taken from the combined cold-feed belt or the hot bins. If lime treatment is required, samples must be taken from individual stockpiles before lime treatment. Samples must be at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each type of supplemental fines. For hot-bin samples, the Department combines these aggregate samples to verify the TV submitted on a Contractor Job Mix Formula Proposal form.
2. Asphalt binder. Take at least four 1 qt samples. Each sample must be in a cylindrical-shaped can with an open top and friction lid. If the asphalt binder is modified or rubberized, the asphalt binder must be sampled with the components blended in the proportions to be used.
3. RAP. Samples must be at least 50 lb from each fractionated stockpile.
4. Plant-produced HMA. The HMA samples must be at least 250 lb.

Notify the Engineer at least 2 business days before sampling materials. For aggregate, RAP, and HMA, split samples into at least 4 parts. Submit 3 parts and use 1 part for your testing.

Allow the Engineer 5 business days from a complete JMF reverification submittal for document review of the aggregate qualities, mix design, and JMF.

The most recent aggregate quality test results within the past 12 months may be used for verification of JMF renewal or upon request, the Engineer may perform aggregate quality tests for verification of JMF renewal.

The Engineer verifies the JMF for renewal under section 39-2.01A(4)(b) except:

1. Engineer keeps the samples until you provide test results for your part on a Contractor Job Mix Formula Renewal form.
2. Department tests samples of materials obtained from the HMA production unit after you submit test results that comply with the mix design specifications.
3. After completion of the JMF verification renewal document review, the Engineer verifies each proposed JMF within 20 days of receiving the verification renewal samples and the complete Contractor Job Mix Formula Renewal form.
4. You may not adjust the JMF due to a failed verification.
5. For each HMA type and aggregate gradation specified, the Engineer verifies at no cost to you 1 proposed JMF renewal within a 12-month period.

If the Engineer verifies the JMF renewal, the Engineer furnishes you a Hot Mix Asphalt Verification form. The Hot Mix Asphalt Verification form is valid for 12 months.

#### **39-2.01A(4)(e) Job Mix Formula Modification**

The Engineer verifies the modified JMF after the modified JMF HMA is placed and verification samples are taken within the first 750 tons. The Engineer tests verification samples for compliance with:

1. Hamburg wheel track mix design specifications
2. Air void content
3. Voids in mineral aggregate on plant-produced HMA mix design specifications
4. Dust proportion mix design specifications

The Engineer may test for moisture susceptibility for compliance with the mix design specifications.

If the modified JMF is verified, the Engineer revises your Hot Mix Asphalt Verification form to include the new asphalt binder source, new liquid antistriper producer, or new liquid antistriper dosage. Your revised form will have the same expiration date as the original form.

If a modified JMF is not verified, stop production and any HMA placed using the modified JMF is rejected.

The Engineer deducts \$2,000 from payments for each JMF modification.

#### **39-2.01A(4)(f) Certifications**

##### **39-2.01A(4)(f)(i) General**

Laboratories testing aggregate and HMA qualities used to prepare the mix design and JMF must be qualified under AASHTO Re:Source program and the Caltrans Independent Assurance Program.

##### **39-2.01A(4)(f)(ii) Hot Mix Asphalt Plants**

Before production, the HMA plant must have a current qualification under the Caltrans Material Plant Quality Program.

##### **39-2.01A(4)(f)(iii)–39-2.01A(4)(f)(v) Reserved**

##### **39-2.01A(4)(g) Reserved**

##### **39-2.01A(4)(h) Quality Control**

##### **39-2.01A(4)(h)(i) General**

QC test results must comply with the specifications for Department acceptance.

Prepare 3 briquettes for air voids content and voids in mineral aggregate determination. Report the average of 3 tests.

Except for smoothness, if 2 consecutive QC test results or any 3 QC test results for 1 day's production do not comply with the materials specifications:

1. Stop HMA production
2. Notify the Engineer
3. Take corrective action

4. Demonstrate compliance with the specifications before resuming production and placement

For QC tests performed under AASHTO T 27, results are considered 1 QC test regardless of number of sieves out of compliance.

Do not resume production and placement until the Engineer authorizes your corrective action proposal.

You are not entitled to compensation for the suspension of work resulting from noncompliance with quality control requirements, including those identified in the QC Plan.

**39-2.01A(4)(h)(ii) Reserved**

**39-2.01A(4)(h)(iii) Aggregates**

**39-2.01A(4)(h)(iii)(A) General**

Reserved

**39-2.01A(4)(h)(iii)(B) Aggregate Lime Treatments**

If lime treatment is required, sample coarse and fine aggregates from individual stockpiles before lime treatment. Combine aggregate in the JMF proportions. Test the aggregates under the test methods and frequencies shown in the following table:

**Aggregate Quality Control During Lime Treatment**

Quality characteristic	Test method	Minimum sampling and testing frequency
Sand equivalent <sup>a, b</sup>	AASHTO T 176	1 per 750 tons of untreated aggregate
Percent of crushed particles	AASHTO T 335	1 per 10,000 tons or 2 per project whichever is greater
Los Angeles Rattler	AASHTO T 96	
Fine aggregate angularity	AASHTO T 304, Method A	
Flat and elongated particles	ASTM D4791	
Fine durability index	AASHTO T 210	

<sup>a</sup>Report test results as the average of 3 tests from a single sample.

<sup>b</sup>Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," 8.4.2, "Manual Shaker Method, and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde.

For lime slurry aggregate treatment, determine the aggregate moisture content at least once every 2 hours of treatment. Calculate moisture content under AASHTO T 255 and report it as a percent of dry aggregate weight. Use the moisture content calculations as a set point for the proportioning process controller.

The device controlling lime and aggregate proportioning must produce a treatment data log. The log must consist of a series of data sets captured at 10-minute intervals throughout daily treatment. The data must be a treatment activity register and not a summation. The material represented by a data set is the quantity produced 5 minutes before and 5 minutes after the capture time. Collected data must be stored by the controller for the duration of the Contract.

If 3 consecutive sets of recorded treatment data indicate a deviation of more than 0.2 percent above or below the lime ratio in the authorized JMF, stop treatment and take corrective action.

If a set of recorded treatment data indicates a deviation of more than 0.4 percent above or below the lime ratio in the authorized JMF, stop treatment and do not use the material represented by that set of data in HMA.

If 20 percent or more of the total daily treatment indicates a deviation of more than 0.2 percent above or below the lime ratio in the authorized JMF, stop treatment and do not use that day's treated aggregate in HMA.

The Engineer may order you to stop aggregate treatment activities for any of following:

1. You fail to submit treatment data log.
2. You fail to submit aggregate QC data for marinated aggregate.
3. You submit incomplete, untimely, or incorrectly formatted data.
4. You do not take corrective actions.
5. You take late or unsuccessful corrective actions.
6. You do not stop treatment when proportioning tolerances are exceeded.
7. You use malfunctioning or failed proportioning devices.

If you stop treatment for noncompliance, notify the Engineer of any corrective actions taken and conduct a successful 20-minute test run before resuming treatment.

#### **39-2.01A(4)(h)(iv) Liquid Antistrip Treatment**

For continuous mixing or batch-plant mixing, sample asphalt binder before adding liquid antistrip. For continuous mixing, sample the combined asphalt binder and liquid antistrip after the static mixer.

#### **39-2.01A(4)(h)(v) Production Start-up Evaluation**

You and the Engineer evaluate HMA production and placement at production start-up.

Within the first 750 tons produced on the 1st day of HMA production, in the Engineer's presence, and from the same production run, take samples of:

1. Aggregates. Samples must be at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each type of supplemental fines. For hot-bin samples, the Department combines these aggregate samples.
2. Asphalt binder. Take at least four 1 qt samples. Each sample must be in a cylindrical-shaped can with an open top and friction lid. If the asphalt binder is modified or rubberized, the asphalt binder must be sampled with the components blended in the proportions to be used.
3. RAP. Samples must be at least 50 lb..
4. HMA. The HMA samples must be at least 250 lb.

Sample aggregates from the combined cold-feed belt or hot bin. Take RAP samples from the RAP system.

For aggregates, RAP, and HMA, split the samples into at least 4 parts and label their containers. Submit 3 parts and keep 1 part.

You and the Engineer must test the samples and report test results, except for AASHTO T 324 (Modified) and AASHTO T 283 test results, within 5 business days of sampling. For AASHTO T 324 (Modified) and AASHTO T 283 test results, report test results within 15 days of sampling. If you proceed before receipt of the test results, the Engineer may consider the HMA placed to be represented by these test results.

#### **39-2.01A(4)(h)(vi) RESERVED**

#### **39-2.01A(4)(h)(vii) RESERVED**

### **39-2.01A(4)(h)(viii) Density Cores**

Except for HMA pavement placed using method compaction, take 4- or 6-inch diameter density cores at least once every 5 business days. Take 1 density core for every 250 tons of HMA from random locations the Engineer selects. Take density cores in the Engineer's presence, and backfill and compact holes with authorized material. Before submitting a density core, mark it with the density core's location and place it in a protective container.

If a density core is damaged, replace it with a density core taken within 1 foot longitudinally from the original density core location. Relocate any density core located within 1 foot of a rumble strip to 1 foot transversely away from the rumble strip.

For a tapered notched wedge joint, take 4- or 6-inch diameter density cores 6 inches from the upper vertical notch of the completed longitudinal joint for every 3,000 feet at locations selected by the Engineer. Take cores after the adjacent lane is placed and before opening the pavement to traffic. Take cores in the presence of the Engineer, and backfill and compact holes with authorized material. Before submitting a density core, mark it with the core's location, and place it in a protective container.

### **39-2.01A(4)(h)(ix) Pavement Smoothness**

For HMA pavement within 3 feet from and parallel to the construction joint formed between curbs, gutters, or existing pavement, test pavement smoothness using a 12-foot straightedge.

### **39-2.01A(4)(h)(x) Reserved**

#### **39-2.01A(4)(i) Department Acceptance**

##### **39-2.01A(4)(i)(i) General**

The Department tests treated aggregate for acceptance before lime treatment except for gradation.

The Engineer takes HMA samples for AASHTO T 283 and AASHTO T 324 (Modified) from any of the following locations:

1. Plant
2. Truck
3. Windrow

The Engineer takes HMA samples for all other tests from any of the following locations:

1. Plant
2. Truck
3. Windrow
4. Mat behind the paver

To obtain workability of the HMA sample for splitting, the Engineer reheats each sample of HMA mixture not more than 2 cycles. Each reheat cycle is performed by placing the loose mixture in a mechanical forced-draft oven for 2 hours or less after the sample reaches 140 degrees F.

The Engineer splits samples and provides you with a part if you request this.

No single aggregate or HMA test result may represent more than 750 tons or one day's production, whichever is less, except AASHTO T 283 and AASHTO T 324 (Modified).

Except for smoothness, if 2 consecutive Department acceptance test results or any 3 Department acceptance test results for 1 day's production do not comply with the specifications:

1. Stop HMA production
2. Take corrective action
3. Demonstrate compliance with the specifications before resuming production and placement

For Department acceptance tests performed under AASHTO T 27, results are considered 1 Department acceptance test regardless of the number of sieves out of compliance.

The Engineer accepts HMA based on:

1. Authorized JMF
2. Authorized QC plan
3. Asphalt binder compliance
4. Asphalt emulsion compliance
5. Visual inspection
6. Pavement smoothness

**39-2.01A(4)(i)(ii) In-Place Density**

Except for HMA pavement placed using method compaction, the Engineer tests the density core you take from each 250 tons of HMA. The Engineer determines the percent of theoretical maximum density for each density core by determining the density core's density and dividing by the theoretical maximum density.

Density cores must be taken from the final layer, cored through the entire pavement thickness shown. Where OGFC is required, take the density cores before placing OGFC.

If the percent of theoretical maximum density does not comply with the specifications, the Engineer may accept the HMA and take a payment deduction as shown in the following table:

**Reduced Payment Factors for Percent of Maximum Theoretical Density**

HMA percent of maximum theoretical density	Reduced payment factor	HMA percent of maximum theoretical density	Reduced payment factor
91.0	0.0000	97.0	0.0000
90.9	0.0125	97.1	0.0125
90.8	0.0250	97.2	0.0250
90.7	0.0375	97.3	0.0375
90.6	0.0500	97.4	0.0500
90.5	0.0625	97.5	0.0625
90.4	0.0750	97.6	0.0750
90.3	0.0875	97.7	0.0875
90.2	0.1000	97.8	0.1000
90.1	0.1125	97.9	0.1125
90.0	0.1250	98.0	0.1250
89.9	0.1375	98.1	0.1375
89.8	0.1500	98.2	0.1500
89.7	0.1625	98.3	0.1625
89.6	0.1750	98.4	0.1750
89.5	0.1875	98.5	0.1875
89.4	0.2000	98.6	0.2000
89.3	0.2125	98.7	0.2125
89.2	0.2250	98.8	0.2250
89.1	0.2375	98.9	0.2375
89.0	0.2500	99.0	0.2500
<89.0	Remove and replace	>99.0	Remove and replace

For acceptance of a completed tapered notched wedge joint, the Engineer determines density from cores you take every 3,000 feet.

**39-2.01A(4)(i)(iii) Pavement Smoothness**

RESERVED

### **39-2.01A(4)(i)(iv) Dispute Resolution**

You and the Engineer must work together to avoid potential conflicts and to resolve disputes regarding test result discrepancies. Notify the Engineer within 5 business days of receiving a test result if you dispute the test result.

If you or the Engineer dispute the other's test results, submit your test results and copies of paperwork including worksheets used to determine the disputed test results. An independent third party performs referee testing. Before the third party participates in a dispute resolution, it must be qualified under AASHTO Materials Reference Laboratory program, and the Caltrans' Independent Assurance Program. The independent third party must have no prior direct involvement with this Contract. By mutual agreement, the independent third party is chosen from:

1. Caltrans laboratory in a district or region not in the district or region the project is located
2. Transportation Laboratory
3. Laboratory not currently employed by you or your HMA producer

If the Department's portion of the split QC samples or acceptance samples are not available, the independent third party uses any available material representing the disputed HMA for evaluation.

For a dispute involving JMF verification, the independent third party performs referee testing as specified in the 5th paragraph of section 39-2.01A(4)(b).

If the independent third party determines the Department's test results are valid, the Engineer deducts the independent third party's testing costs from payments. If the independent third party determines your test results are valid, the Department pays the independent third party's testing costs.

### **39-2.01B Materials**

#### **39-2.01B(1) General**

Reserved

#### **39-2.01B(2) Mix Design**

##### **39-2.01B(2)(a) General**

The HMA mix design must comply with the Superpave HMA mix design as described in MS-2 Asphalt Mix Design Methods by the Asphalt Institute.

The Contractor Hot Mix Asphalt Design Data form must show documentation on aggregate quality.

##### **39-2.01B(2)(b) Hot Mix Asphalt Treatments**

If the proposed JMF indicates that the aggregate is being treated with dry lime or lime slurry with marination, or the HMA with liquid antistripping, then testing the untreated aggregate under AASHTO T 283 and AASHTO T 324 is not required.

If HMA treatment is required or being used by the Contractor, determine the plasticity index of the aggregate blend under California Test 204.

Do not use an aggregate blend with a plasticity index greater than 10.

If the plasticity index is from 4 to 10, treat the aggregate blend with dry lime with marination or lime slurry with marination.

If the plasticity index is less than 4, treat the aggregate blend with dry lime or lime slurry with marination, or treat the HMA with liquid antistripping.

##### **39-2.01B(2)(c) Warm Mix Asphalt Technology**

For HMA with WMA additive technology, produce HMA mix samples for your mix design using your methodology for inclusion of WMA admixture in laboratory-produced HMA. Cure the samples in a forced-air draft oven at 275 degrees F for 4 hours ± 10 minutes.

For WMA water injection foam technology, the use of foamed asphalt for mix design is not required.

### **39-2.01B(3) Asphalt Binder**

Asphalt binder must comply with section 92.

For a leveling course, the grade of asphalt binder for the HMA must be PG 64-10 or PG 64-16.

### **39-2.01B(4) Aggregates**

#### **39-2.01B(4)(a) General**

Aggregates must be clean and free from deleterious substances.

The aggregates for a leveling course must comply with the grading specifications for Type A HMA in section 39-2.02B(4)(b).

#### **39-2.01B(4)(b) Aggregate Gradations**

Aggregate gradation must be determined before the addition of asphalt binder and must include supplemental fine aggregates. Test for aggregate gradation under AASHTO T 27. Do not wash the coarse aggregate. Wash the fine aggregate only. Use a mechanical sieve shaker. Aggregate shaking time must not exceed 10 minutes for each coarse and fine aggregate portion.

Choose a TV within the TV limits shown in the tables titles "Aggregate Gradation for Type A HMA (Percentage Passing)".

Gradations are based on nominal maximum aggregate size.

#### **39-2.01B(4)(c) Aggregate Lime Treatments**

##### **39-2.01B(4)(c)(i) General**

If aggregate lime treatment is required as specified in section 39-2.01B(2)(b), the virgin aggregate must comply with the aggregate quality specifications.

Lime for treating aggregate must comply with section 24-2.02.

Water for lime treatment of aggregate with lime slurry must comply with section 24-1.02B.

Notify the Engineer at least 24 hours before the start of aggregate treatment.

Do not treat RAP.

The lime ratio is the pounds of dry lime per 100 lb of dry virgin aggregate expressed as a percentage. Water content of slurry or untreated aggregate must not affect the lime ratio.

Coarse and fine aggregate fractions must have the lime ratio ranges shown in the following table:

Aggregate fractions	Lime ratio percent
Coarse	0.4–1.0
Fine	1.5–2.0
Combined	0.8–1.5

The lime ratio for fine and coarse aggregate must be within  $\pm 0.2$  percent of the lime ratio in the accepted JMF. The lime ratio must be within  $\pm 0.2$  percent of the authorized lime ratio when you combine the individual aggregate sizes in the JMF proportions. The lime ratio must be determined before the addition of RAP.

If marination is required, marinate treated aggregate in stockpiles from 24 hours to 60 days before using in HMA. Do not use aggregate marinated longer than 60 days.

Treated aggregate must not have lime balls or clods.



### **39-2.01B(4)(c)(ii) Dry Lime**

If marination is required:

1. Treat and marinate coarse and fine aggregates separately
2. Treat the aggregate and stockpile for marination only once
3. Treat the aggregate separately from HMA production

Proportion dry lime by weight with an automatic continuous proportioning system.

If you use a batch-type proportioning system for HMA production, control proportioning in compliance with the specifications for continuous mixing plants. Use a separate dry lime aggregate treatment system for HMA batch mixing including:

1. Pugmill mixer
2. Controller
3. Weigh belt for the lime
4. Weigh belt for the aggregate

If a continuous mixing plant for HMA production without lime-marinated aggregates is used, use a controller that measures the blended aggregate weight after any additional water is added to the mixture. The controller must determine the quantity of lime added to the aggregate from the aggregate weigh belt input in connection with the manually input total aggregate moisture, the manually input target lime content, and the lime proportioning system output. Use a continuous aggregate weigh belt and pugmill mixer for lime treatment in addition to the weigh belt for the aggregate proportioning to asphalt binder in the HMA plant. If you use a water meter for moisture control for lime treatment, the meter must comply with Caltrans' *MPQP* manual.

When mixing dry lime with aggregate, the aggregate moisture content must ensure complete lime coating. The aggregate moisture content must not cause aggregate to be lost between the point of weighing the combined aggregate continuous stream and the dryer. Add water to the aggregate for mixing and coating before dry lime addition. Immediately before mixing lime with aggregate, water must not visibly separate from the aggregate.

Mix aggregate, water, and dry lime with a continuous pugmill mixer with twin shafts. Immediately before mixing lime with aggregate, water must not visibly separate from the aggregate. Store dry lime in a uniform and free-flowing condition. Introduce dry lime to the pugmill in a continuous process. The introduction must occur after the aggregate cold feed and before the point of proportioning across a weigh belt and the aggregate dryer. Prevent loss of dry lime.

The pugmill must be equipped with paddles arranged to provide sufficient mixing action and mixture movement. The pugmill must produce a homogeneous mixture of uniformly coated aggregates at mixer discharge.

If the aggregate treatment process is stopped longer than 1 hour, clean the equipment of partially treated aggregate and lime.

Aggregate must be completely treated before introduction into the mixing drum.

### **39-2.01B(4)(c)(iii) Lime Slurry**

For lime slurry aggregate treatment, treat aggregate separate from HMA production. Stockpile and marinate the aggregate.

Proportion lime and water with a continuous or batch mixing system.

Add lime to the aggregate as slurry consisting of mixed dry lime and water at a ratio of 1 part lime to from 2 to 3 parts water by weight. The slurry must completely coat the aggregate.

Immediately before mixing lime slurry with the aggregate, water must not visibly separate from the aggregate.

Proportion lime slurry and aggregate by weight in a continuous process.

**39-2.01B(5) Liquid Antistrip Treatment**

Liquid antistrip must be from 0.25 to 1.0 percent by weight of asphalt binder. Do not use liquid antistrip as a substitute for asphalt binder.

Liquid antistrip total amine value must be 325 minimum when tested under ASTM D2074.

Use only 1 liquid antistrip type or brand at a time. Do not mix liquid antistrip types or brands.

Store and mix liquid antistrip under the manufacturer's instructions.

**39-2.01B(6)–39-2.01B(7) Reserved**

**39-2.01B(8) Hot Mix Asphalt Production**

**39-2.01B(8)(a) General**

Do not start HMA production before verification and authorization of JMF.

The HMA plant must have a current qualification under Caltrans' Material Plant Quality Program.

Weighing and metering devices used for the production of HMA modified with additives must comply with Caltrans' *MPQP*. If a loss-in-weight meter is used for dry HMA additive, the meter must have an automatic and integral material delivery control system for the refill cycle.

Calibrate the loss-in-weight meter by:

1. Including at least 1 complete system refill cycle during each calibration test run
2. Operating the device in a normal run mode for 10 minutes immediately before starting the calibration process
3. Isolating the scale system within the loss-in-weight feeder from surrounding vibration
4. Checking the scale system within the loss-in-weight feeder for accuracy before and after the calibration process and daily during mix production
5. Using a minimum 15 minute or minimum 250 lb test run size for a dry ingredient delivery rate of less than 1 ton per hour.
6. Complying with the limits of Table B, "Conveyor Scale Testing Extremes," in Caltrans' *MPQP*

Proportion aggregate by hot or cold-feed control.

Aggregate temperature must not be more than 375 degrees F when mixed with the asphalt binder.

Asphalt binder temperature must be from 275 to 375 degrees F when mixed with aggregate.

Mix HMA ingredients into a homogeneous mixture of coated aggregates.

HMA must be produced at the temperatures shown in the following table:

<b>HMA Production Temperatures</b>	
HMA compaction	Temperature (°F)
HMA	
Density based	≤ 325
Method	305–325
HMA with WMA technology	
Density based	240–325
Method	260–325

If you stop production for longer than 30 days, a production start-up evaluation is required.

**39-2.01B(8)(b) Liquid Antistrip**

If 3 consecutive sets of recorded production data show that the actual delivered liquid antistrip weight is more than ±1 percent of the authorized mix design liquid antistrip weight, stop production and take corrective action.

If a set of recorded production data shows that the actual delivered liquid antistriper weight is more than  $\pm 2$  percent of the authorized mix design liquid antistriper weight, stop production. If the liquid antistriper weight exceeds 1.2 percent of the asphalt binder weight, do not use the HMA represented by that data.

The continuous mixing plant controller proportioning the HMA must produce a production data log. The log must consist of a series of data sets captured at 10-minute intervals throughout daily production. The data must be a production activity register and not a summation. The material represented by the data is the quantity produced 5 minutes before and 5 minutes after the capture time. For the duration of the Contract, the collected data must be stored by the plant controller or a computer's memory at the plant.

The Engineer orders proportioning activities stopped for any of the following reasons:

1. You fail to submit data
2. You submit incomplete, untimely, or incorrectly formatted data
3. You fail to take corrective actions
4. You take late or unsuccessful corrective actions
5. You fail to stop production when proportioning tolerances are exceeded
6. You use malfunctioning or failed proportioning devices

If you stop production, notify the Engineer of any corrective actions taken before resuming.

### **39-2.01B(8)(c) Warm Mix Asphalt Technology**

Proportion all ingredients by weight. The HMA plant process controller must be the sole source of ingredient proportioning control and be fully interfaced with all scales and meters used in the production process. The addition of the HMA additive must be controlled by the plant process controller.

Liquid ingredient additive, including a normally dry ingredient made liquid, must be proportioned with a mass flow meter at continuous mixing plants. Use a mass flow meter or a container scale to proportion liquid additives at batch mixing plants.

Continuous mixing plants using HMA additives must comply with the following:

1. Dry ingredient additives for continuous production must be proportioned with a conveyor scale or a loss-in-weight meter.
2. HMA plant process controller and ingredient measuring systems must be capable of varying all ingredient-feed rates proportionate with the dry aggregate delivery at all production rates and rate changes.
3. Liquid HMA additive must enter the production stream with the binder. Dry HMA additive must enter the production stream at or before the mixing area.
4. If dry HMA additives are used at continuous mixing HMA plants, bag-house dust systems must return all captured material to the mix. This requirement is waived for lime-treated aggregates.
5. HMA additive must be proportioned to within  $\pm 0.3$  percent of the target additive rate.

Batch mixing plants using HMA additives must comply with the following:

1. Metered HMA additive must be placed in an intermediate holding vessel before being added to the stream of asphalt binder as it enters the pugmill.
2. If a container scale is used, weigh additive before combining with asphalt binder. Keep the container scale separate from other ingredient proportioning. The container scale capacity must be no more than twice the volume of the maximum additive batch size. The container scale's graduations must be smaller than the proportioning tolerance or 0.001 times the container scale capacity.
3. Dry HMA additive proportioning devices must be separate from metering devices for the aggregates and asphalt binder. Proportion dry HMA additive directly into the pugmill, or place in an intermediate holding vessel to be added to the pugmill at the appropriate time in the batch cycle. Dry ingredients for batch production must be proportioned with a hopper scale.
4. Zero tolerance for the HMA additive batch scale is  $\pm 0.5$  percent of the target additive weight. The indicated HMA additive batch scale weight may vary from the preselected weight setting by up to  $\pm 1.0$  percent of the target additive weight.

### 39-2.01B(9) Geosynthetic Pavement Interlayer

Geosynthetic pavement interlayer must comply with the specifications for pavement fabric, paving mat, paving grid, paving geocomposite grid, or geocomposite strip membrane as shown.

The asphalt binder for geosynthetic pavement interlayer must be PG 64-10, PG 64-16, or PG 70-10.

### 39-2.01B(10) Tack Coat

Tack coat must comply with the specifications for asphaltic emulsion or asphalt binder. Choose the type and grade of emulsion or binder.

### 39-2.01B(11) Miscellaneous Areas and Dikes

For miscellaneous areas and dikes:

1. Choose the aggregate gradation from:
  - 1.1. 3/8-inch Type A HMA aggregate gradation
  - 1.2. 1/2-inch Type A HMA aggregate gradation
  - 1.3. dike mix aggregate gradation
2. Choose asphalt binder Grade PG 64-10, PG 64-16 or PG 70-10.
3. Minimum asphalt binder content must be:
  - 3.1. 6.40 percent for 3/8-inch Type A HMA aggregate gradation
  - 3.2. 5.70 percent for 1/2-inch Type A HMA aggregate gradation
  - 3.3. 6.00 percent for dike mix aggregate gradation

If you request and the Engineer authorizes, you may reduce the minimum asphalt binder content.

Aggregate gradation for dike mix must be within the TV limits for the specified sieve size shown in the following table:

**Dike Mix Aggregate Gradation  
(Percentage Passing)**

Sieve size	Target value limit	Allowable tolerance
1/2"	100	--
3/8"	---	95 - 100
No. 4	73-77	TV ± 10
No. 8	58-63	TV ± 10
No. 30	29-34	TV ± 10
No. 200		0 - 14

For HMA used in miscellaneous areas and dikes, sections 39-2.01A(3), 39-2.01A(4), 39-2.01B(2), 39-2.01B(4)(c), and 39-2.01B(5)-(10) do not apply.

### 39-2.01C Construction

#### 39-2.01C(1) General

Do not place HMA on wet pavement or frozen surface.

You may deposit HMA in a windrow and load it in the paver if:

1. Paver is equipped with a hopper that automatically feeds the screed
2. Loading equipment can pick up the windrowed material and deposit it in the paver hopper without damaging base material
3. Activities for depositing, pickup, loading, and paving are continuous
4. For method compaction:
  - 4.1. The temperature of the HMA and the HMA produced with WMA water injection technology in the windrow does not fall below 260 degrees F

- 4.2. The temperature of the HMA produced using WMA additive technology in the windrow does not fall below 250 degrees F

HMA placed in a windrow on the roadway surface must not extend more than 250 feet in front of the loading equipment or material transfer vehicle.

You may place HMA in 1 or more layers on areas less than 5 feet wide and outside the traveled way, including shoulders. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture.

HMA handled, spread, or windrowed must not stain the finished surface of any improvement, including pavement.

Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, or compactors.

HMA must be free of:

1. Segregation
2. Coarse or fine aggregate pockets
3. Hardened lumps
4. Marks
5. Tearing
6. Irregular Texture

Complete finish rolling activities before the pavement surface temperature is:

1. Below 150 degrees F for HMA with unmodified binder
2. Below 140 degrees F for HMA with modified binder

### **39-2.01C(2) Spreading and Compacting Equipment**

#### **39-2.01C(2)(a) General**

Paving equipment for spreading must be:

1. Self-propelled
2. Mechanical
3. Equipped with a screed or strike-off assembly that can distribute HMA the full width of a traffic lane
4. Equipped with a full-width compacting device
5. Equipped with automatic screed controls and sensing devices that control the thickness, longitudinal grade, and transverse screed slope

Install and maintain grade and slope references.

The screed must be heated and produce a uniform HMA surface texture without tearing, shoving, or gouging.

The paver must not leave marks such as ridges and indentations unless you can eliminate them by rolling.

Rollers must be equipped with a system that prevents HMA from sticking to the wheels. You may use a parting agent that does not damage the HMA or impede the bonding of layers.

In areas inaccessible to spreading and compacting equipment:

1. Spread the HMA by any means to obtain the specified lines, grades, and cross sections
2. Use a pneumatic tamper, plate compactor, or equivalent to achieve thorough compaction

### **39-2.01C(2)(b) Material Transfer Vehicle**

If a material transfer vehicle is specified, the material transfer vehicle must have sufficient capacity to prevent stopping the paver and must be capable of:

1. Either receiving HMA directly from trucks or using a windrow pickup head to load it from a windrow deposited on the roadway surface
2. Remixing the HMA with augers before transferring into the paver's receiving hopper or feed system
3. Transferring HMA directly into the paver's receiving hopper or feed system

### **39-2.01C(2)(c) Method Compaction Equipment**

For method compaction, each paver spreading HMA must be followed by at least one of each of the following 3 types of rollers:

1. Breakdown roller must be a vibratory roller specifically designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons.
2. Intermediate roller must be an oscillating-type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi.
3. Finishing roller must be a steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons.

Each roller must have a separate operator. Rollers must be self-propelled and reversible.

### **39-2.01C(2)(d)–39-2.01C(2)(f) Reserved**

### **39-2.01C(3) Surface Preparation**

#### **39-2.01C(3)(a) General**

Before placing HMA, remove loose paving particles, dirt, and other extraneous material by any means including flushing and sweeping.

#### **39-2.01C(3)(b) Subgrade**

Prepare subgrade to receive HMA under the sections for the material involved. Subgrade must be free of loose and extraneous material.

#### **39-2.01C(3)(c) Reserved**

#### **39-2.01C(3)(d) Reserved**

#### **39-2.01C(3)(e) Reserved**

#### **39-2.01C(3)(f) Tack Coat**

Apply a tack coat:

1. To existing pavement including planed surfaces
2. Between HMA layers
3. To vertical surfaces of:
  - 3.1. Curbs
  - 3.2. Gutters
  - 3.3. Construction joints

Equipment for the application of tack coat must comply with section 37-1.03B.

Before placing HMA, apply a tack coat in 1 application at the minimum residual rate shown in the following table for the condition of the underlying surface:

**Tack Coat Application Rates for HMA**

HMA over:	Minimum residual rates (gal/sq yd)		
	CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h asphaltic emulsion	CRS1/CRS2, RS1/RS2 and QS1/CQS1 asphaltic emulsion	Asphalt binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h asphaltic emulsion
New HMA (between layers)	0.02	0.03	0.02
Concrete pavement and existing asphalt concrete surfacing	0.03	0.04	0.03
Planed pavement	0.05	0.06	0.04

If a stress absorbing membrane interlayer as specified in section 37-2.05 is applied, the tack coat application rates for new HMA apply.

Notify the Engineer if you dilute asphaltic emulsion with water. The weight ratio of added water to asphaltic emulsion must not exceed 1 to 1.

Measure added water either by weight or volume under section 9-1.02 or use water meters from water districts, cities, or counties. If you measure water by volume, apply a conversion factor to determine the correct weight.

With each dilution, submit:

1. Weight ratio of water to bituminous material in the original asphaltic emulsion
2. Weight of asphaltic emulsion before diluting
3. Weight of added water
4. Final dilution weight ratio of water to asphaltic emulsion

Apply a tack coat to vertical surfaces with a residual rate that will thoroughly coat the vertical face without running off.

If authorized, you may:

1. Change tack coat rates
2. Omit tack coat between layers of new HMA during the same work shift if:
  - 2.1. No dust, dirt, or extraneous material is present
  - 2.2. Surface is at least 140 degrees F

Immediately in advance of placing HMA, apply additional tack coat to damaged areas or where loose or extraneous material is removed.

Close areas receiving tack coat to traffic. Do not allow the tracking of tack coat onto pavement surfaces beyond the job site.

If you use an asphalt binder for tack coat, the asphalt binder temperature must be from 285 to 350 degrees F when applied.

**39-2.01C(3)(g) Geosynthetic Pavement Interlayer**

Where shown, place geosynthetic pavement interlayer over a coat of asphalt binder and in compliance with the manufacturer's instructions. Do not place the interlayer on a wet or frozen surface. If the interlayer, in compliance with the manufacturer's instructions, does not require asphalt binder, do not apply asphalt binder before placing the interlayer.

Before placing the interlayer or asphalt binder:

1. Repair cracks 1/4 inch and wider, spalls, and holes in the pavement. This repair is change order work.
2. Clean the pavement of loose and extraneous material.

If the interlayer requires asphalt binder, immediately before placing the interlayer, apply asphalt binder at a rate specified by the interlayer manufacturer; at  $0.25 \pm 0.03$  gal per square yard of interlayer; or at a rate that just saturates the interlayer; whichever is greater. Apply asphalt binder the width of the interlayer plus 3 inches on each side. At an interlayer overlap, apply asphalt binder on the lower interlayer the same overlap distance as the upper interlayer.

If asphalt binder tracked onto the interlayer or brought to the surface by construction equipment causes interlayer displacement, cover it with a small quantity of HMA.

If the interlayer placement does not require asphalt binder, apply tack coat prior to placing HMA at the application rates specified under section 39-2.01C(3)(f) based on the condition of the underlying surface on which the interlayer was placed.

Align and place the interlayer with no overlapping wrinkles, except a wrinkle that overlaps may remain if it is less than 1/2 inch thick. If the overlapping wrinkle is more than 1/2 inch thick, cut the wrinkle out and overlap the interlayer no more than 2 inches.

Overlap the interlayer borders between 2 to 4 inches. In the direction of paving, overlap the following roll with the preceding roll at any break.

You may use rolling equipment to correct distortions or wrinkles in the interlayer.

Before placing HMA on the interlayer, do not expose the interlayer to:

1. Traffic, except for crossings under traffic control and only after you place a small HMA quantity
2. Sharp turns from construction equipment
3. Damaging elements

Pave HMA on the interlayer during the same work shift. The minimum HMA thickness over the interlayer must be 0.12 foot including at conform tapers.

### **39-2.01C(4) Longitudinal Joints**

#### **39-2.01C(4)(a) General**

Longitudinal joints in the top layer must match lane lines. Alternate the longitudinal joint offsets in the lower layers at least 0.5 foot from each side of the lane line. Other longitudinal joint placement patterns are allowed if authorized.

A vertical longitudinal joint of more than 0.15 foot is not allowed at any time between adjacent lanes open to traffic.

For an HMA thickness of 0.15 foot or less, the distance between the ends of the adjacent surfaced lanes at the end of each day's work must not be greater than can be completed in the following day of normal paving.

For an HMA thickness greater than 0.15 foot, you must place HMA on adjacent traveled way lanes or shoulder such that at the end of each work shift the distance between the ends of HMA layers on adjacent lanes is from 5 to 10 feet. Place additional HMA along the transverse edge at each lane's end and along the exposed longitudinal edges between adjacent lanes. Hand rake and compact the additional HMA to form temporary conforms. You may place kraft paper or other authorized release agent under the conform tapers to facilitate the taper removal when paving activities resume.

If placing HMA against the edge of existing pavement, saw cut or grind the pavement straight and vertical along the joint and remove extraneous material.



### **39-2.01C(4)(b) Tapered Notched Wedge**

For divided highways with an HMA lift thickness greater than 0.15 foot, you may construct a 1-foot wide tapered notched wedge joint as a longitudinal joint between adjacent lanes open to traffic. A vertical notch of 0.75 inch maximum must be placed at the top and bottom of the tapered wedge.

The tapered notched wedge must keep its shape while exposed to traffic. Pave the adjacent lane within 1 day.

Construct the tapered portion of the tapered notched wedge with an authorized strike-off device. The strike-off device must provide a uniform slope and must not restrict the main screed of the paver.

You may use a device attached to the screed to construct longitudinal joints that will form a tapered notched wedge in a single pass. The tapered notched wedge must be compacted to a minimum of 91 percent compaction.

### **39-2.01C(5) Pavement Edge Treatments**

Construct edge treatment on the HMA pavement as shown.

Where a tapered edge is required, use the same type of HMA used for the adjacent lane or shoulder.

The edge of roadway where the tapered edge is to be placed must have a solid base, free of debris such as loose material, grass, weeds, or mud. Grade the areas to receive the tapered edge as required.

The tapered edge must be placed monolithic with the adjacent lane or shoulder and must be shaped and compacted with a device attached to the paver.

The device must be capable of shaping and compacting HMA to the required cross section as shown. Compaction must be accomplished by constraining the HMA to reduce the cross sectional area by 10 to 15 percent. The device must produce a uniform surface texture without tearing, shoving, or gouging and must not leave marks such as ridges and indentations. The device must be capable of transitioning to cross roads, driveways, and obstructions.

For the tapered edge, the angle of the slope must not deviate by more than  $\pm 5$  degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

If paving is done in multiple lifts, the tapered edge must be placed with each lift.

Short sections of hand work are allowed to construct tapered edge transitions.

The test section:

1. Must not be less than 0.1 mile in length.
2. Must have a width equal to the width of the pavement and tapered edge to be paved in one pass during production.
3. Locations shall be proposed by the Contractor and approved by the Engineer.

The test section must be constructed with asphalt paver fitted with one of the following FHWA-approved tapered edge devices:

1. **“Shoulder Wedge Maker”** manufactured by Transtech Systems, Inc., 1594 State Street, Schenectady, NY 12304, Telephone 1-800-724-6306 or 518-370-5558
2. **“Advant-Edger”** manufactured by Advant-Edge Paving Equipment LLC, 33 Old Niskayuna Road, Loudonville, NY 12211, Telephone 814-422-3343
3. **“Ramp Champ”** manufactured by Advant-Edge Paving Equipment LLC, 33 Old Niskayuna Road, Loudonville, NY 12211, Telephone 814-422-3343
4. **“SafeTSlope”** manufactured by Troxler Electronic Laboratories, Inc., 3008 E. Cornwallis Rd. Research Triangle Park, NC 27709, Telephone 877-876-9537

Comply with manufacturer's instructions for attaching the device(s) to the paver. The Engineer accepts the use of selected tapered edge device when edge shape and compaction of the test section are in compliance with plans and specifications. No further paving operations which include the construction of the tapered edge shall commence unless means and methods for constructing the tapered edge are approved by the Engineer.

### **39-2.01C(6) Widening Existing Pavement**

If widening existing pavement, construct new pavement structure to match the elevation of the existing pavement's edge before placing HMA over the existing pavement.

### **39-2.01C(7) Shoulders, Medians, and Other Road Connections**

Until the adjoining through lane's top layer has been paved, do not pave the top layer of:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets

If the number of lanes changes, pave each through lane's top layer before paving a tapering lane's top layer. Simultaneous to paving a through lane's top layer, you may pave an adjoining area's top layer, including shoulders. Do not operate spreading equipment on any area's top layer until completing final compaction.

If shoulders or median borders are shown, pave shoulders and median borders adjacent to the lane before opening a lane to traffic.

If shoulder conform tapers are shown, place conform tapers concurrently with the adjacent lane's paving.

If a driveway or a road connection is shown, place additional HMA along the pavement's edge to conform to road connections and driveways. Hand rake, if necessary, and compact the additional HMA to form a smooth conform taper.

### **39-2.01C(8) Leveling**

Section 39-2.01C(8) applies if a bid item for hot mix asphalt (leveling) is shown on the Bid Item List.

Fill and level irregularities and ruts with HMA before spreading HMA over the base, existing surfaces, or bridge decks. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture. HMA used to change an existing surface's cross slope or profile is not paid for as hot mix asphalt (leveling).

### **39-2.01C(9) Miscellaneous Areas and Dikes**

Prepare the area to receive HMA for miscellaneous areas and dikes, including excavation and backfill as needed.

Spread the HMA in miscellaneous areas in 1 layer and compact to the specified lines and grades.

In median areas adjacent to slotted median drains, each layer of HMA must not exceed 0.20 foot maximum compacted thickness.

The finished surface must be:

1. Textured uniformly

2. Compacted firmly
3. Without depressions, humps, and irregularities

**39-2.01C(10)–39-2.01C(14) Reserved**

**39-2.01C(15) Compaction**

**39-2.01C(15)(a) General**

Rolling must leave the completed surface compacted and smooth without tearing, cracking, or shoving.

If a vibratory roller is used as a finish roller, turn the vibrator off.

Do not open new HMA pavement to traffic until its mid depth temperature is below 160 degrees F.

If the surface to be paved is both in sunlight and shade, pavement surface temperatures are taken in the shade.

**39-2.01C(15)(b) Method Compaction**

Use method compaction for all conditions.

HMA compaction coverage is the number of passes needed to cover the paving width. A pass is 1 roller's movement parallel to the paving in either direction. Overlapping passes are part of the coverage being made and are not a subsequent coverage. Do not start a coverage until completing the prior coverage.

Method compaction must consist of performing:

1. Breakdown compaction of each layer with 3 coverages using a vibratory roller. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the HMA layer thickness is less than 0.08 foot, turn the vibrator off.
2. Intermediate compaction of each layer of HMA with 3 coverages using a pneumatic-tired roller at a speed not to exceed 5 mph.
3. Finish compaction of HMA with 1 coverage using a steel-tired roller.

Start rolling at the lower edge and progress toward the highest part.

The Engineer may order fewer coverages if the layer thickness of HMA is less than 0.15 foot.

The compacted lift thickness must not exceed 0.25 foot.

**39-2.01C(15)(c)–39-2.01C(15)(e) Reserved**

**39-2.01C(16) Smoothness Corrections**

If the pavement surface does not comply with section 39-2.01A(4)(i)(iii), grind the pavement to within specified tolerances, remove and replace the pavement, or place an overlay of HMA. Do not start corrective work until your method is authorized.

Do not use equipment with carbide cutting teeth to grind the pavement unless authorized.

Smoothness corrections must leave at least 75 percent of the specified HMA thickness. If ordered, core the pavement at the locations selected by the Engineer. Coring, including traffic control, is change order work. Remove and replace deficient pavement areas where the overlay thickness is less than 75 percent of the thickness specified.

Corrected HMA pavement areas must be uniform rectangles, half the lane width, with edges:

1. Parallel to and along the nearest HMA pavement edge or lane line
2. Perpendicular to the pavement centerline

On ground areas not to be overlaid with OGFC, apply a fog seal under section 37-4.02.

Where corrections are made within areas requiring testing with inertial profiler, reprofile the entire lane length with the inertial profiler.

Where corrections are made within areas requiring testing with a 12-foot straightedge, retest the corrected area with the straightedge.

### **39-2.01C(17) Data Cores**

Section 39-2.01C(17) applies if a bid item for data core is shown on the Bid Item List.

Take data cores of the completed HMA pavement, underlying base, and subbase material. Notify the Engineer 3 business days before coring.

Protect data cores and surrounding pavement from damage.

Take 4-inch or 6-inch diameter data cores:

1. At the beginning, end, and every 1/2 mile within the paving limits of each route on the project
2. After all paving is complete
3. From the center of the specified lane

On a 2-lane roadway, take data cores from either lane. On a 4-lane roadway, take data cores from the outermost lane in each direction. On a roadway with more than 4 lanes, take data cores from the innermost lane and the outermost lane in each direction.

Each core must include the stabilized materials encountered. You may choose not to recover unstabilized material but you must identify the material. Unstabilized material includes any of the following:

1. Granular material
2. Crumbled or cracked stabilized material
3. Sandy or clayey soil

Where data core samples are taken, backfill and compact the holes with an authorized material.

After data core summary and photograph submittal, dispose of cores.

### **39-2.01D Payment**

The payment quantity for geosynthetic pavement interlayer is the area measured from the actual pavement covered.

Except for tack coat used in minor HMA, payment for tack coat is not included in the payment for hot mix asphalt.

The Department does not adjust the unit price for an increase or decrease in the tack coat quantity.

The payment quantity for HMA of the type shown on the Bid Item List is measured based on the combined mixture weight. If recorded batch weights are printed automatically, the bid item for HMA is measured by using the printed batch weights, provided:

1. Total aggregate and supplemental fine aggregate weight per batch is printed. If supplemental fine aggregate is weighed cumulatively with the aggregate, the total aggregate batch weight must include the supplemental fine aggregate weight.
2. Total virgin asphalt binder weight per batch is printed.
3. Each truckload's zero tolerance weight is printed before weighing the first batch and after weighing the last batch.
4. Time, date, mix number, load number and truck identification is correlated with a load slip.
5. Copy of the recorded batch weights is certified by a licensed weigh master and submitted.

The payment quantity for place hot mix asphalt dike of the type shown on the Bid Item List is the length measured from end to end. Payment for the HMA used to construct the dike is not included in the payment for place hot mix asphalt dike.

The payment quantity for place hot mix asphalt (miscellaneous areas) is the area measured for the in-place compacted area. Payment for the HMA used for miscellaneous areas is not included in the payment for place hot mix asphalt (miscellaneous areas).

The Engineer does not adjust the unit price for an increase or decrease in the prepaving grinding day quantity.

### **39-2.02 TYPE A HOT MIX ASPHALT**

#### **39-2.02A General**

##### **39-2.02A(1) Summary**

Section 39-2.02 includes specifications for producing and placing Type A hot mix asphalt.

You may produce Type A HMA using an authorized WMA technology.

##### **39-2.02A(2) Definitions**

Reserved

##### **39-2.02A(3) Submittals**

###### **39-2.02A(3)(a) General**

Reserved

###### **39-2.02A(3)(b) Job Mix Formula**

The JMF must be based on the superpave HMA mix design as described in *MS-2 Asphalt Mix Design Methods* by the Asphalt Institute.

###### **39-2.02A(3)(c) Reclaimed Asphalt Pavement**

Submit QC test results for RAP gradation with the combined aggregate gradation within 2 business days of taking RAP samples during Type A HMA production.

###### **39-2.02A(3)(d)–39-2.02A(3)(f) Reserved**

##### **39-2.02A(4) Quality Assurance**

###### **39-2.02A(4)(a) General**

Reserved

###### **39-2.02A(4)(b) Quality Control**

###### **39-2.02A(4)(b)(i) General**

Reserved

###### **39-2.02A(4)(b)(ii) Aggregates**

Test the quality characteristics of aggregates under the test methods and frequencies shown in the following table:

### Aggregate Testing Frequencies

Quality characteristic	Test method	Minimum testing frequency
Gradation <sup>a</sup>	AASHTO T 27	1 per 750 tons and any remaining part
Sand equivalent <sup>b, c</sup>	AASHTO T 176	
Moisture content <sup>d</sup>	AASHTO T 255	
Crushed particles	AASHTO T 335	1 per 10,000 tons or 2 per project whichever is greater
Los Angeles Rattler	AASHTO T 96	
Flat and elongated particles	ASTM D4791	
Fine aggregate angularity	AASHTO T 304 Method A	
Coarse durability index	AASHTO T 210	1 per 3,000 or 1 per paving day, whichever is greater
Fine durability index	AASHTO T 210	

<sup>a</sup>If RAP is used, test the combined aggregate gradation under California Test 384.

<sup>b</sup>Reported value must be the average of 3 tests from a single sample.

<sup>c</sup>Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde.

<sup>d</sup>Test at continuous mixing plants only. If RAP is used, test the RAP moisture content at continuous mixing plant and batch mixing plant.

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during HMA production.

#### **39-2.02A(4)(b)(iii) Reclaimed Asphalt Pavement**

Sample and test processed RAP at a minimum frequency of 1 sample per 1,000 tons with a minimum of 6 samples per fractionated stockpile. If the fractionated stockpile has not been augmented, the 3 RAP samples taken and tested for mix design can be part of this minimum sample requirement. If a processed RAP stockpile is augmented, sample and test processed RAP quality characteristics at a minimum frequency of 1 sample per 500 tons of augmented RAP.

The combined RAP sample when tested under AASHTO T 164 must be within  $\pm 2.00$  percent of the average asphalt binder content reported on page 4 of your Contractor Hot Mix Asphalt Design Data form. If a new processed RAP stockpile is required, the average binder content of the new processed RAP stockpile must be within  $\pm 2.00$  percent of the average binder reported on page 4 of your Contractor Hot Mix Asphalt Design Data form.

The combined RAP sample when tested under AASHTO T 209 must be within  $\pm 0.06$  of the average maximum specific gravity reported on page 4 of your Contractor Hot Mix Asphalt Design Data form.

During Type A HMA production, sample RAP twice daily and perform QC testing for:

1. Aggregate gradation at least once a day under California Test 384
2. Moisture content at least twice a day

#### **39-2.02A(4)(b)(iv)–39-2.02A(4)(b)(viii) Reserved**

#### **39-2.02A(4)(b)(ix) Type A Hot Mix Asphalt Production**

Test the quality characteristics of Type A HMA under the test methods and frequencies shown in the following table:

**Type A HMA Production Testing Frequencies**

Quality characteristic	Test method	Minimum testing frequency
Asphalt binder content	AASHTO T 308, Method A	1 per 750 tons and any remaining part
HMA moisture content	AASHTO T 329	1 per 2,500 tons but not less than 1 per paving day
Air voids content	AASHTO T 269	1 per 4,000 tons or 2 every 5 paving days, whichever is greater
Voids in mineral aggregate	MS-2MS-2 Asphalt Mixture Volumetrics	1 per 10,000 tons or 2 per project whichever is greater
Dust proportion	MS-2MS-2 Asphalt Mixture Volumetrics	
Density of core	California Test 375	2 per paving day
Nuclear gauge density	California Test 375	3 per 250 tons or 3 per paving day, whichever is greater
Hamburg wheel track	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project, whichever is greater
Moisture susceptibility	AASHTO T 283	

**39-2.02A(4)(c)–39-2.02A(4)(d) Reserved**

**39-2.02A(4)(e) Department Acceptance**

The Department accepts Type A HMA based on compliance with:

1. Aggregate quality requirements shown in the following table:

**Aggregate Quality**

Quality characteristic	Test method	Requirement	
Aggregate gradation <sup>a</sup>	AASHTO T 27	JMF ± Tolerance	
Percent of crushed particles	AASHTO T 335		
Coarse aggregate (min, %)			
One-fractured face			95
Two-fractured faces			90
Fine aggregate (min, %) (Passing No. 4 sieve and retained on No. 8 sieve.)			
One-fractured face		70	
Los Angeles Rattler (max, %)	AASHTO T 96		
Loss at 100 Rev.			12
Loss at 500 Rev.			40
Sand equivalent (min.) <sup>b, c</sup>	AASHTO T 176	47	
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	10	
Fine aggregate angularity (min, %) <sup>d</sup>	AASHTO T 304, Method A	45	
Coarse durability index (D <sub>c</sub> , min)	AASHTO T 210	65	
Fine durability index (D <sub>f</sub> , min)	AASHTO T 210	50	

<sup>a</sup>The Engineer determines combined aggregate gradations containing RAP under California Test 384.

<sup>b</sup>Reported value must be the average of 3 tests from a single sample.

<sup>c</sup>Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde.

<sup>d</sup>The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

2. If RAP is used, RAP quality requirements shown in the following table:

**Reclaimed Asphalt Pavement Quality**

Quality characteristic	Test method	Requirement
Binder content (% within the average value reported)	AASHTO T 164	±2.00
Specific gravity (within the average value reported)	AASHTO T 209	±0.06

3. In place Type A HMA quality requirements shown in the following table:



**Type A HMA Acceptance In Place**

Quality characteristic	Test method	Requirement
Asphalt binder content (%)	AASHTO T 308 Method A	JMF -0.30, +0.50
HMA moisture content (max, %)	AASHTO T 329	1.00
Air voids content at N <sub>design</sub> (%) <sup>a, b</sup>	AASHTO T 269	4.0 ± 1.5 (5.0 ± 1.5 for 1-inch aggregate)
Voids in mineral aggregate on laboratory-produced HMA (min, %) <sup>d</sup> Gradation: No. 4 3/8-inch 1/2-inch 3/4-inch 1-inch with NMAS = 1-inch with NMAS = 3/4-inch	MS-2MS-2 Asphalt Mixture Volumetrics	16.5–19.5 15.5–18.5 14.5–17.5 13.5–16.5  13.5–16.5 14.5–17.5
Voids in mineral aggregate on plant-produced HMA (min, %) <sup>a</sup> Gradation: No. 4 3/8-inch 1/2-inch 3/4-inch 1-inch with NMAS = 1-inch with NMAS = 3/4-inch	MS-2MS-2 Asphalt Mixture Volumetrics <sup>c</sup>	15.5–18.5 14.5–17.5 13.5–16.5 12.5–15.5  12.5–15.5 13.5–16.5
Dust proportion	MS-2MS-2 Asphalt Mixture Volumetrics	0.6–1.3 <sup>g</sup>
Density of core (% of max theoretical density) <sup>e, f</sup>	California Test 375	91.0–97.0
Hamburg wheel track (min number of passes at 0.5-inch rut depth) Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	AASHTO T 324 (Modified)	10,000 15,000 20,000 25,000
Hamburg wheel track (min number of passes at inflection point) Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	AASHTO T 324 (Modified)	10,000 10,000 12,500 15,000
Moisture susceptibility (min, psi, dry strength)	AASHTO T 283	100
Moisture susceptibility (min, psi, wet strength)	AASHTO T 283	70

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<sup>a</sup>Prepare 3 briquettes. Report the average of 3 tests.

<sup>b</sup>The Engineer determines the bulk specific gravity of each lab-compacted briquette under AASHTO T 275, Method A, and theoretical maximum specific gravity under AASHTO T 209, Method A.

<sup>c</sup>Determine bulk specific gravity under AASHTO T 275, Method A.

<sup>d</sup>The Engineer determines the laboratory-prepared Type A HMA value for only mix design verification.

<sup>e</sup>The Engineer determines percent of theoretical maximum density under California Test 375 except the Engineer uses:

1. AASHTO T 275 to determine in-place density of each density core
2. AASHTO T 209, Method A to determine theoretical maximum density instead of calculating test maximum density

<sup>f</sup>The Engineer determines theoretical maximum density under AASHTO T 209, Method A, at the frequency specified in California Test 375, part 5, section D.

<sup>g</sup>For lime-treated aggregates, the dust proportion requirement is 0.6–1.5.

### **39-2.02B Materials**

#### **39-2.02B(1) General**

Reserved

### 39-2.02B(2) Type A Hot Mix Asphalt Mix Design

The mix design for Type A HMA must comply with the requirements shown in the following table:

**Type A HMA Mix Design Requirements**

Quality characteristic	Test method	Requirement
Air voids content (%)	AASHTO T 269 <sup>a</sup>	$N_{\text{initial}} > 8.0$ $N_{\text{design}} = 4.0$ ( $N_{\text{design}} = 5.0$ for 1-inch aggregate) $N_{\text{max}} > 2.0$
Gyrations compaction (no. of gyrations)	AASHTO T 312	$N_{\text{initial}} = 8$ $N_{\text{design}} = 85.0$ $N_{\text{max}} = 130$
Voids in mineral aggregate (min, %) <sup>b</sup> Gradation: No. 4 3/8-inch 1/2-inch 3/4-inch 1-inch with NMAS = 1-inch with NMAS = 3/4-inch	MS-2 Asphalt Mixture Volumetrics	16.5–19.5 15.5–18.5 14.5–17.5 13.5–16.5  13.5–16.5 14.5–17.5
Dust proportion	MS-2 Asphalt Mixture Volumetrics	0.6–1.3
Hamburg wheel track (min number of passes at 0.5-inch rut depth) Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	AASHTO T 324 (Modified) <sup>c</sup>	10,000 15,000 20,000 25,000
Hamburg wheel track (min number of passes at the inflection point) Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	AASHTO T 324 (Modified) <sup>c</sup>	10,000 10,000 12,500 15,000
Moisture susceptibility, dry strength (min, psi)	AASHTO T 283 <sup>c</sup>	100
Moisture susceptibility, wet strength (min, psi)	AASHTO T 283 <sup>c, d</sup>	70

<sup>a</sup>Calculate the air voids content of each specimen using AASHTO T 275, Method A, to determine bulk specific gravity. Use AASHTO T 209, Method A, to determine theoretical maximum specific gravity. Use a digital manometer and pycnometer when performing AASHTO T 209.

<sup>b</sup>Measure bulk specific gravity using AASHTO T 275, Method A.

<sup>c</sup>Test plant-produced Type A HMA.

<sup>d</sup>Freeze thaw required.

For Type A HMA mixtures using RAP, the maximum allowed binder replacement is 15.0 percent.

### 39-2.02B(3) Asphalt Binder

The grade of asphalt binder for Type A HMA must be PG 64-10.

### 39-2.02B(4) Aggregates

#### 39-2.02B(4)(a) General

Before the addition of asphalt binder and lime treatment, the aggregates must comply with the requirements shown in the following table:

<b>Aggregate Quality</b>		
Quality characteristic	Test method	Requirement
Percent of crushed particles: Coarse aggregate (min, %) One-fractured face Two-fractured faces Fine aggregate (min, %) (Passing No. 4 sieve and retained on No. 8 sieve.) One-fractured face	AASHTO T 335	95 90 70
Los Angeles Rattler (max, %) Loss at 100 Rev. Loss at 500 Rev.	AASHTO T 96	12 40
Sand equivalent (min) <sup>a</sup>	AASHTO T 176	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	10
Fine aggregate angularity (min, %) <sup>b</sup>	AASHTO T 304, Method A	45

<sup>a</sup>The reported value must be the average of 3 tests from a single sample. Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, "Manual Shaker," 7.1.2, "Alternate Method No. 2," and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde.

<sup>b</sup>The Engineer waives this specification if the Type A HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate, except if your JMF fails verification. Manufactured sand is fine aggregate produced by crushing rock or gravel.

#### 39-2.02B(4)(b) Aggregate Gradations

The aggregate gradations for Type A HMA must comply with the requirements shown in the following table:

<b>Aggregate Gradation Requirements</b>	
Type A HMA pavement thickness shown	Gradation
0.10 foot	3/8 inch
Greater than 0.10 to less than 0.20 foot	1/2 inch
0.20 to less than 0.25 foot	3/4 inch
0.25 foot or greater	3/4 inch or 1 inch

Aggregate gradation must be within the TV limits for the specified sieve size shown in the following tables:

**Aggregate Gradations for Type A HMA  
(Percentage Passing)**

**1 inch**

Sieve size	Target value limit	Allowable tolerance
1"	100	--
3/4"	88–93	TV ± 5
1/2"	72–85	TV ± 6
3/8"	55–70	TV ± 6
No. 4	35–52	TV ± 7
No. 8	22–40	TV ± 5
No. 30	8–24	TV ± 4
No. 50	5–18	TV ± 4
No. 200	3.0–7.0	TV ± 2.0

**3/4 inch**

Sieve size	Target value limit	Allowable tolerance
1"	100	--
3/4"	90–98	TV ± 5
1/2"	70–90	TV ± 6
No. 4	42–58	TV ± 5
No. 8	29–43	TV ± 5
No. 30	10–23	TV ± 4
No. 200	2.0–7.0	TV ± 2.0

**1/2 inch**

Sieve size	Target value limit	Allowable tolerance
3/4"	100	--
1/2"	95–98	TV ± 5
3/8"	72–95	TV ± 5
No. 4	52–69	TV ± 5
No. 8	35–55	TV ± 5
No. 30	15–30	TV ± 4
No. 200	2.0–8.0	TV ± 2.0

**3/8 inch**

Sieve size	Target value limit	Allowable tolerance
1/2"	100	--
3/8"	95–98	TV ± 5
No. 4	55–75	TV ± 5
No. 8	30–50	TV ± 5
No. 30	15–35	TV ± 5
No. 200	2.0–9.0	TV ± 2.0

**No. 4**

Sieve size	Target value limit	Allowable tolerance
3/8"	100	--
No. 4	95–98	TV ± 5
No. 8	70–80	TV ± 6
No. 30	34–45	TV ± 5
No. 200	2.0–12.0	TV ± 4.0

**39-2.02B(5) Reclaimed Asphalt Pavement**

You may substitute RAP for part of the virgin aggregate in a quantity up to 15 percent of the aggregate blend.

Provide enough space at your plant for complying with all RAP handling requirements. Provide a clean, graded base, well drained area for stockpiles.

Isolate the processed RAP stockpiles from other materials. Store processed RAP in conical or longitudinal stockpiles. Processed RAP must not be agglomerated or be allowed to congeal in large stockpiles.

**39-2.02B(6)–39-2.02B(10) Reserved**

**39-2.02B(11) Type A Hot Mix Asphalt Production**

If RAP is used, the asphalt plant must automatically adjust the virgin asphalt binder to account for RAP percentage and RAP binder.

During production, you may adjust hot- or cold-feed proportion controls for virgin aggregate and RAP. RAP must be within ±3 of RAP percentage described in your Contractor Job Mix Formula Proposal form without exceeding 15 percent.

**39-2.02C Construction**

Where the pavement thickness shown is greater than 0.30 foot, you may place Type A HMA in multiple lifts not less than 0.15 foot each. If placing Type A HMA in multiple lifts:

1. Aggregate gradation must comply with the requirements shown in the following table:

**Aggregate Gradation Requirements**

Type A HMA lift thickness	Gradation
0.15 to less than 0.20 foot	1/2 inch
0.20 foot to less than 0.25 foot	3/4 inch
0.25 foot or greater	3/4 inch or 1 inch

2. Apply a tack coat before placing a subsequent lift
3. The Engineer evaluates each HMA lift individually for compliance

If the ambient air temperature is below 60 degrees F, cover the loads in trucks with tarpaulins. If the time for HMA discharge to truck at the HMA plant until transfer to paver's hopper is 90 minutes or greater and if the ambient air temperature is below 70 degrees F, cover the loads in trucks with tarpaulins, unless the time from discharging to the truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or the pavement surface.

Spread Type A HMA at the ambient air and surface temperatures shown in the following table:

**Minimum Ambient Air and Surface Temperatures**

Lift thickness (feet)	Ambient air (°F)		Surface (°F)	
	Unmodified asphalt binder	Modified asphalt binder	Unmodified asphalt binder	Modified asphalt binder
Type A HMA and Type A HMA produced with WMA water injection technology				
<0.15	55	50	60	55
≥0.15	45	45	50	50
Type A HMA produced with WMA additive technology				
<0.15	45	45	50	45
≥0.15	40	40	40	40

For Type A HMA and Type A HMA produced with WMA water injection technology placed under method compaction, if the asphalt binder is:

1. Unmodified, complete:
  - 1.1. 1st coverage of breakdown compaction before the surface temperature drops below 250 degrees F
  - 1.2. Breakdown and intermediate compaction before the surface temperature drops below 190 degrees F
  - 1.3. Finish compaction before the surface temperature drops below 150 degrees F
2. Modified, complete:
  - 2.1. 1st coverage of breakdown compaction before the surface temperature drops below 240 degrees F
  - 2.2. Breakdown and intermediate compaction before the surface temperature drops below 180 degrees F
  - 2.3. Finish compaction before the surface temperature drops below 140 degrees F

For Type A HMA produced with WMA additive technology placed under method compaction, if the asphalt binder is:

1. Unmodified, complete:
  - 1.1. 1st coverage of breakdown compaction before the surface temperature drops below 240 degrees F
  - 1.2. Breakdown and intermediate compaction before the surface temperature drops below 190 degrees F
  - 1.3. Finish compaction before the surface temperature drops below 140 degrees F
  - 1.4. You may continue static rolling below 140 degrees F to remove roller marks.
2. Modified, complete:
  - 2.1. 1st coverage of breakdown compaction before the surface temperature drops below 230 degrees F
  - 2.2. Breakdown and intermediate compaction before the surface temperature drops below 170 degrees F
  - 2.3. Finish compaction before the surface temperature drops below 130 degrees F
  - 2.4. You may continue static rolling below 130 degrees F to remove roller marks.

You may cool Type A HMA with water when rolling activities are complete if authorized.

### **39-2.02D Payment**

Not Used

## **39-2.07 MINOR HOT MIX ASPHALT**

### **39-2.07A General**

#### **39-2.07A(1) Summary**

Section 39-2.07 includes specifications for producing and placing minor hot mix asphalt.

Minor HMA must comply with section 39-2.02 except as specified in this section 39-2.07.

The inertial profiler requirements in section 36-3 do not apply.

#### **39-2.07A(2) Definitions**

Reserved

#### **39-2.07A(3) Submittals**

The QC plan and test results in sections 39-2.01A(3)(c) and 39-2.01A(3)(d) do not apply.

### **39-2.07A(4) Quality Assurance**

#### **39-2.07A(4)(a) General**

The JMF renewal requirements in section 39-2.01A(4)(d) do not apply.

Test pavement smoothness with a 12 foot straightedge.

#### **39-2.07A(4)(b) Quality Control**

Testing for compliance with the following quality characteristics is not required:

1. Flat and elongated particles
2. Fine aggregate angularity
3. Hamburg wheel track
4. Moisture susceptibility

#### **39-2.07A(4)(c) Department Acceptance**

The Department accepts minor HMA under section 39-2.02A(4)(e) except for compliance with requirements for the following quality characteristics:

1. Flat and elongated particles
2. Fine aggregate angularity
3. Hamburg wheel track
4. Moisture susceptibility

### **39-2.07B Materials**

#### **39-2.07B(1) General**

Reserved

#### **39-2.07B(2) Minor Hot Mix Asphalt Mix Design**

The Hamburg wheel track and moisture susceptibility requirements do not apply to the mix design for minor HMA.

#### **39-2.07B(3) Asphalt Binder**

The grade of asphalt binder for minor HMA must be PG-64-10 or PG-64-16.

#### **39-2.07B(4) Liquid Antistrip Treatment**

Treat minor HMA with liquid antistrip unless you submit AASHTO T 283 and AASHTO T 324 (Modified) test results showing compliance with section 39-2.02B and dated within 12 months of the submittal.

#### **39-2.07C Construction**

Not Used

#### **39-2.07D Payment**

Not Used

### **39-2.08–39-2.10 RESERVED**

## **39-3 EXISTING ASPHALT CONCRETE**

### **39-3.01 GENERAL**

#### **39-3.01A General**

Section 39-3.01 includes general specifications for performing work on existing asphalt concrete facilities.

Work performed on existing asphalt concrete facilities must comply with section 15.

#### **39-3.01B Materials**

Not Used



### **39-3.01C Construction**

Before removing a portion of an asphalt concrete facility, make a 2-inch deep saw cut to a true line along the limits of the removal area.

### **39-3.01D Payment**

Not Used

## **39-3.02 REPLACE ASPHALT CONCRETE SURFACING**

### **39-3.02A General**

Section 39-3.02 includes specifications for replacing asphalt concrete surfacing.

### **39-3.02B Materials**

HMA to be used for replacing asphalt concrete surfacing must comply with Type A HMA as specified in section 39-2.02.

The grade of asphalt binder must be PG 64-10 or PG 64-16.

Tack coat must comply with section 39-2.01B(10).

### **39-3.02C Construction**

Where replace asphalt concrete surfacing is shown, remove the full depth of the existing asphalt concrete surfacing and replace with HMA. The Engineer determines the exact limits of asphalt concrete surfacing to be replaced.

Replace asphalt concrete in a lane before the lane is specified to be opened to traffic.

Before removing asphalt concrete, outline the replacement area and cut neat lines with a saw or grind to full depth of the existing asphalt concrete. Do not damage asphalt concrete and base remaining in place.

If you excavate the base beyond the specified plane, replace it with HMA.

Do not use a material transfer vehicle for replacing asphalt concrete surfacing.

Before placing HMA, apply a tack coat as specified in section 39-2.01C(3)(f).

Place HMA using method compaction as specified in section 39-2.01C(2)(c).

### **39-3.02D Payment**

The payment quantity for replace asphalt concrete surfacing is the volume determined from the dimensions shown.

## **39-3.03 REMOVE ASPHALT CONCRETE DIKES**

### **39-3.03A General**

Section 39-3.03 applies to removing asphalt concrete dikes outside the limits of excavation.

### **39-3.03B Materials**

Not Used

### **39-3.03C Construction**

Reserved

### **39-3.03D Payment**

Not Used

## **39-3.04 COLD PLANING ASPHALT CONCRETE PAVEMENT**

### **39-3.04A General**

Section 39-3.04 includes specifications for cold planing asphalt concrete pavement.

Cold planing asphalt concrete pavement includes the removal of pavement markers, traffic stripes, and pavement markings within the area of cold planing.

Schedule cold planing activities such that the pavement is cold planed, the HMA is placed, and the area is opened to traffic during the same work shift.

#### **39-3.04B Materials**

HMA for temporary tapers must be of the same quality that is used for the HMA overlay or comply with the specifications for minor HMA in section 39-2.07.

#### **39-3.04C Construction**

##### **39-3.04C(1) General**

Do not use a heating device to soften the pavement.

The cold planing machine must be:

1. Equipped with a cutter head width that matches the planing width unless a wider cutter head is authorized.
2. Equipped with automatic controls for the longitudinal grade and transverse slope of the cutter head and:
  - 2.1. If a ski device is used, it must be at least 30 feet long, rigid, and a 1-piece unit. The entire length must be used in activating the sensor.
  - 2.2. If referencing from existing pavement, the cold planing machine must be controlled by a self-contained grade reference system. The system must be used at or near the centerline of the roadway. On the adjacent pass with the cold planing machine, a joint-matching shoe may be used.
3. Equipped to effectively control dust generated by the planing operation
4. Operated such that no fumes or smoke is produced.

Replace broken, missing, or worn machine teeth.

If you do not complete placing the HMA surfacing before opening the area to traffic, you must:

1. Construct a temporary HMA taper to the level of the existing pavement.
2. Place HMA during the next work shift.
3. Submit a corrective action plan that shows you will complete cold planing and placement of HMA in the same work shift. Do not restart cold planing activities until the corrective action plan is authorized.

##### **39-3.04C(2) Grade Control and Surface Smoothness**

Install and maintain grade and transverse slope references.

The final cut must result in a neat and uniform surface.

The completed surface of the planed pavement must not vary more than 0.02 foot when measured with a 12-foot straightedge parallel with the centerline. With the straightedge at right angles to the centerline, the transverse slope of the planed surface must not vary more than 0.03 foot.

Where lanes are open to traffic, the drop-off of between adjacent lanes must not be more than 0.15 foot.

##### **39-3.04C(3) Planed Material**

Remove cold planed material concurrently with planing activities such that the removal does not lag more than 50 feet behind the planer.

##### **39-3.04C(4) Temporary HMA Tapers**

If a drop-off between the existing pavement and the planed area at transverse joints cannot be avoided before opening to traffic, construct a temporary HMA taper.

Compact by any method that will produce a smooth riding surface

Completely remove temporary tapers before placing permanent surfacing.

**39-3.04D Payment**

Not Used

**39-3.05–39-3.08 RESERVED**

## **DIVISION IX TRAFFIC CONTROL DEVICES**

### **82 SIGNS AND MARKERS**

**Replace Section 82-1.01A with:**

**82-1.01A Summary**

Section 82-1 includes general specifications for fabricating and installing sign panels and markers and constructing roadside signs.

Signs and markers must comply with the *California MUTCD*, *California Sign Specifications*, and the FHWA publication *Standard Highway Signs and Markings*. For the *California Sign Specifications*, go to the Caltrans Traffic Operations website.

**Replace Item 1 of the 2nd paragraph of section 82-2.02A with:**

1. Phrase *Property of The County of Fresno*

**Add to section 82-2.02B:**

Signs must be 0.080 inch thick aluminum alloy and street name signs must be 0.125 inch thick alloy faced on both sides.

**Add to section 82-2.02C:**

Reflective sheeting on all signs shall be 3M Diamond Grade DG3 Series 4000 or equal, and must meet ASTM Type XI specifications.

**Add to section 82-2.02D:**

All signs must have the 3M 1160 graffiti resistant clear overlay film or equal.

**Replace Section 82-2.04 with:**

**82-2.04 PAYMENT**

Not Used

**Add to section 82-3.02A:**

All new roadside signs must be square post 14 gauge steel.

**Add to section 82-3.02B:**

All post for traffic signs must be 2"X2"X10' square by 14 gauge steel, with 7/16 inch holes punched one inch on center on all four sides for the entire length of the post.

Welded Anchor (2 ¼"X2 ¼"X30") and sleeve (2 ½"X2 ½"X18") shall be used as a base to anchor post in the ground. Hole size and placement must be the same as the metal post.

All mounting hardware shall be either galvanized or stainless steel. Banding shall be 3/4 inch wide stainless steel with flare leg sign brackets. Hose clamps are not permitted. All signs shall be mounted using 3/8" aluminum drive rivets. Nuts and bolts are not permitted.

**Replace Section 82-3.02D with:**

**82-3.02D Laminated Wood Box Posts**

Furnish a laminated wood box post with an attached metal cap at the top of each post.

**Replace the last line of section 82-3.04 with:**

Full compensation for furnishing sign panels is included in the bid item price per each Roadside Sign - One Post and Roadside Sign - Two Post. One or more sign panels furnished and installed on a single post will be counted as (1) one Roadside Sign - One Post. One or more sign panels furnished and installed on two posts will be counted as (1) one Roadside Sign - Two Post.

## **DIVISION XI MATERIALS**

### **90 CONCRETE**

**Replace Section 90-1.01D(3) with:**

**90-1.01D(3) Shrinkage**

If shrinkage limitations are specified, test the concrete under AASHTO T 160, modified as follows:

1. Prepare specimens that have a 4 by 4-inch cross section.
2. Remove each specimen from the mold  $23 \pm 1$  hours after mixing the concrete and place the specimen in lime water at  $73 \pm 3$  degrees F until 7 days age.
3. Take a comparator reading at 7 days age and record it as the initial reading.
4. Store the specimens in a humidity-controlled room maintained at  $73 \pm 3$  degrees F and  $50 \pm 4$  percent relative humidity for the remainder of the test.
5. Take subsequent readings at 7, 14, 21, and 28 days drying.

Perform AASHTO T 160 testing at a laboratory that is accredited to perform AASHTO T 160 or that maintains a current rating of 3 or better for the Cement and Concrete Reference Laboratory concrete proficiency sample program.

Shrinkage test data authorized by Caltrans no more than 3 years before the 1st day of the Contract is authorized for the entire Contract. The test data must be for concrete with similar proportions and using the same materials and material sources to be used on the Contract. Concrete is considered to have similar proportions if no more than 2 mix design elements are varied and the variation is within the tolerances shown in the following table:

Mix design element	Tolerance (±)
Water to cementitious material ratio	0.03
Total water content (%)	5
Coarse aggregate content (%)	10
Fine aggregate content (%)	10
SCM content (%)	5
Admixture as originally dosed <sup>a</sup> (%)	25

<sup>a</sup>Admixtures must be the same brand.

**Replace Section 90-2.02E With:**

**90-2.02E Production**

Sections 90-1.02F, 90-1.02G(1), 90-1.02G(2), 90-1.02G(3), and 90-1.02G(4) do not apply to minor concrete.

Store, proportion, mix, transport, and discharge the cementitious material, water, aggregate, and admixtures in compliance with recognized standards of good practice that result in thoroughly and uniformly mixed concrete suitable for the intended use. Recognized standards of good practice are outlined in various industry publications, such as those issued by ACI, AASHTO, or by Caltrans.

Use a quantity of water that produces concrete with a consistency that complies with section 90-1.02G(6). Do not add water during hauling or after arrival at the delivery point unless allowed by the Engineer.

Discharge ready-mixed concrete from the transport vehicle while the concrete is still plastic and before stiffening occurs. Take whatever action is necessary to eliminate quick stiffening, except do not add water.

Conditions contributing to quick stiffening are:

1. Elapsed time of 1.5 hours in agitating hauling equipment or 1 hour in nonagitating hauling equipment
2. More than 250 revolutions of the drum or blades after introduction of the cementitious material to the aggregates
3. Concrete temperature over 90 degrees F

The mixing time in a stationary mixer must be at least 50 seconds and no more than 5 minutes.

The minimum required revolutions at mixing speed for transit-mixed concrete must be at least that recommended by the mixer manufacturer and must be increased as needed to produce thoroughly and uniformly mixed concrete.

If you add a high-range water-reducing admixture to the concrete at the job site, the total revolutions must not exceed 300.

**Replace Section 90-4.02 With:**

**90-4.02 MATERIALS**

You may use Type III portland cement in PC concrete.

The specifications for SCM content in section 90-1.02B(3) do not apply to PC concrete.

For PC concrete, the SCM content must comply with one of the following:

1. Any combination of portland cement and SCM satisfying the following equation:

Equation 1:

$$[(25 \times UF) + (12 \times FA) + (10 \times FB) + (6 \times SL)]/TC \geq X$$

where:

UF = silica fume, metakaolin, or UFFA, including the quantity in blended cement, lb/cu yd

*FA* = natural pozzolan or fly ash complying with AASHTO M 295, Class F or N, with a CaO content of up to 10 percent, including the quantity in blended cement, lb/cu yd

*FB* = natural pozzolan or fly ash complying with AASHTO M 295, Class F or N, with a CaO content of greater than 10 percent and up to 15 percent, including the quantity in blended cement, lb/cu yd

*SL* = GGBFS, including the quantity in blended cement, lb/cu yd

*TC* = total quantity of cementitious material, lb/cu yd

*X* = 0.0 for innocuous aggregate, 3.0 for all other aggregate

2. 15 percent Class F fly ash with at least 48 oz of LiNO<sub>3</sub> solution added per 100 lb of portland cement. The CaO content of the fly ash must not exceed 15 percent.
3. Any combination of SCM and portland cement for which the expansion of cementitious material and aggregate does not exceed 0.10 percent when tested under ASTM C1567. Submit test data with each mix design. Test data authorized by Caltrans no more than 3 years before the 1st day of the Contract is authorized for the entire Contract. The test data must be for the same concrete mix and must use the same materials and material sources to be used on the Contract.

If municipally supplied potable water is used for PC concrete, the testing specified in section 90-1.02D is waived unless requested.

Portland cement based repair material must be on the Authorized Material List for precast Portland cement based repair material.

## **92 ASPHALT BINDERS**

**Replace 92-1.01D(2) With:**

### **92-1.01D(2) Certification**

Asphalt binder suppliers must comply with the Caltrans Certification Program for Suppliers of Asphalt. For a copy of the certification program, go to the METS website.

**Replace Section 92-1.02B With**

### **92-1.02B Performance Grade Asphalt Binders**

PG asphalt binder must comply with the requirements shown in the following table:

**PG Asphalt Binders**

Quality characteristic	Test method	Requirement				
		PG 58-22 <sup>a</sup>	PG 64-10	PG 64-16	PG 64-28	PG 70-10
Original Binder						
Flash point (min, °C)	AASHTO T 48	230	230	230	230	230
Solubility <sup>b</sup> (min, %)	AASHTO T 44	99	99	99	99	99
Viscosity at 135 °C <sup>c</sup> (max, Pa•s)	AASHTO T 316	3.0	3.0	3.0	3.0	3.0
Dynamic shear Test temperature at 10 rad/s (°C) G*/sin(delta) (min, kPa) G*/sin(delta) (max, kPa)	AASHTO T 315	58 1.00 2.00	64 1.00 2.00	64 1.00 2.00	64 1.00 2.00	70 1.00 2.00
RTFO <sup>f</sup> test <sup>e</sup> mass loss (max, %)	AASHTO T 240	1.00	1.00	1.00	1.00	1.00
RTFO <sup>f</sup> Test Aged Binder						
Dynamic shear Test temperature at 10 rad/s (°C) G*/sin(delta) (min, kPa)	AASHTO T 315	58 2.20	64 2.20	64 2.20	64 2.20	70 2.20
Ductility at 25 °C (min, cm)	AASHTO T 51	75	75	75	75	75
PAV <sup>g</sup> Test temperature (°C)	AASHTO R 28	100	100	100	100	110
RTFO <sup>f</sup> Test and PAV <sup>g</sup> Aged Binder						
Dynamic shear, Test temperature at 10 rad/s (°C) G*/sin(delta) (max, kPa)	AASHTO T 315	22 <sup>d</sup> 5000	31 <sup>d</sup> 5000	28 <sup>d</sup> 5000	22 <sup>d</sup> 5000	34 <sup>d</sup> 5000
Creep stiffness, Test temperature, °C S-value (max, MPa) M-value (min)	AASHTO T 313	-12 300 0.300	0 300 0.300	-6 300 0.300	-18 300 0.300	0 300 0.300

<sup>a</sup>Use as asphalt rubber base stock for high mountain and high desert area.

<sup>b</sup>The Engineer waives solubility requirements if the supplier is an authorized material source as defined by the Caltrans *Certification Program for Suppliers of Asphalt*.

<sup>c</sup>The Engineer waives this specification if the supplier provides written certification the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.

<sup>d</sup>Test the sample at 3 °C higher if it fails at the specified test temperature. G\*/sin(delta) remains 5000 kPa maximum.

<sup>e</sup>The residue from mass change determination may be used for other tests.

<sup>f</sup>RTFO means rolling thin film oven.

<sup>g</sup>PAV means Pressure Aging Vessel.

PG modified asphalt binder must comply with the requirements shown in the following table:

**PG Modified Asphalt Binders**

Quality characteristic	Test method	Requirement		
		PG 58-34 M	PG 64-28 M	PG 76-22 M
Original Binder				
Flash point (min, °C)	AASHTO T 48	230	230	230
Solubility (min, %)	AASHTO T 44 <sup>a</sup>	97.5	97.5	97.5 <sup>b</sup>
Viscosity at 135 °C <sup>c</sup> (max, Pa*s)	AASHTO T 316	3.0	3.0	3.0
Dynamic shear, Test temperature at 10 rad/s (°C) G*/sin(delta) (min, kPa)	AASHTO T 315	58 1.00	64 1.00	76 1.00
RTFO <sup>g</sup> test <sup>d</sup> , Mass loss (max, %)	AASHTO T 240	1.00	1.00	1.00
RTFO <sup>g</sup> Test Aged Binder				
Dynamic shear, Test temperature at 10 rad/s (°C) G*/sin(delta) (min, kPa)	AASHTO T 315	58 2.20	64 2.20	76 2.20
Dynamic shear, Test temperature at 10 rad/s, °C Delta (max, degree)	AASHTO T 315	80 <sup>e</sup>	80 <sup>e</sup>	80 <sup>e</sup>
Elastic recovery <sup>f</sup> , Test temperature (°C) Recovery (min, %)	AASHTO T 301	25 75	25 75	25 65
PAV <sup>h</sup> , Temperature (°C)	AASHTO R 28	100	100	110
RTFO <sup>g</sup> Test and PAV <sup>h</sup> Aged Binder				
Dynamic shear, Test temperature at 10 rad/s (°C) G*/sin(delta) (max, kPa)	AASHTO T 315	16 5000	22 5000	31 5000
Creep stiffness, Test temperature (°C) S-value (max, Mpa) M-value (min)	AASHTO T 313	-24 300 0.300	-18 300 0.300	-12 300 0.300

<sup>a</sup>The Department allows ASTM D5546 or ASTM D7553 instead of AASHTO T 44. Particles recovered from ASTM D5546 or ASTM D7553 or AASHTO T 44 must be less than 250 µm.

<sup>b</sup>Report only for spray application.

<sup>c</sup>The Engineer waives the viscosity requirements if the supplier provides written certification the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.

<sup>d</sup>The residue from mass change determination may be used for other tests.

<sup>e</sup>Test temperature is the temperature at which G\*/sin(delta) is 2.2 kPa. A graph of log G\*/sin(delta) plotted against temperature may be used to determine the test temperature when G\*/sin(delta) is 2.2 kPa. A graph of (delta) versus temperature may be used to determine delta at the temperature when G\*/sin(delta) is 2.2 kPa. The graph must have at least 2 points that envelope G\*/sin(delta) of 2.2 kPa, and the test temperature must not be more than 6 degree C apart. The Engineer also accepts direct measurement of delta at the temperature when G\*/sin(delta) is 2.2 kPa.

<sup>f</sup>Tests without a force ductility clamp may be performed.

<sup>g</sup>RTFO means rolling thin film oven.

<sup>h</sup>PAV means Pressure Aging Vessel.



Do not modify PG modified asphalt binder using polyphosphoric acid.

Crumb rubber must be from automobile and truck tires and must be free from contaminants including fabric, metal, minerals, and other nonrubber substances.

PG modified asphalt binder modified with crumb rubber must be homogeneous and must not contain visible particles of crumb rubber.

The supplier of PG modified asphalt binder modified with crumb rubber must:

1. Report the quantity of crumb rubber by weight of asphalt binder
2. Certify a minimum of 10 percent of crumb rubber by weight of asphalt binder

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## SECTION 01 00 05

### SPECIFICATIONS

#### PART 1 GENERAL

##### 1.1 GENERAL

- A. The Contractor shall keep on the job a copy of the Plans and Specifications and shall at all times give the Owner and Engineer access thereto.
- B. Anything mentioned in the Specifications and not shown on the Plans or shown on the Plans and not mentioned in the Specifications shall be of like effect as if shown or mentioned in both.
- C. The Contractor shall not take advantage of any errors, discrepancies or omissions which may exist in the Plans and Specifications but shall immediately call them to the attention of the Engineer whose interpretation or correction thereof shall be conclusive.
- D. In case of conflict between portions of the Contract Documents, the order of precedence of Contract Documents shall be:
  - First: Permits from other agencies as may be required by law.
  - Second: Addenda
  - Third: Special Provisions Section 1 through 9
  - Fourth: Technical Specifications, Divisions 2, 3, 9, 31, 32, 33, and 40
  - Fifth: Special Provisions Section 10 through 92
  - Sixth: Plans
  - Seventh: General Requirements, Division 1
  - Eighth: Revised Standard Specifications
  - Ninth: State Standard Specifications
  - Tenth: Reference Documents
- E. Change Orders, supplemental agreements and approved revisions to Plans and Specifications will take precedence over documents listed above. Detailed Plans shall have precedence over general Plans.
- F. Whenever any conflict appears in any portions of the Contract Documents, it shall be resolved by application of the order of precedence.

##### 1.2 GENERAL REQUIREMENTS AND TECHNICAL SPECIFICATIONS

- A. For definitions of the Specifications categorized as General Requirements (Division 1) and Technical Specifications (Divisions 2, 3, 5, 9, 31, 32, 33, and 40) refer to Section 01 42 13 – Definitions and Abbreviations.

### 1.3 REFERENCE DOCUMENTS

- A. For a definition of Reference Documents and State Standard Specifications refer to Section 01 42 13 – Definitions and Abbreviations.
- B. Throughout the following Specification sections, references are made to various widely published, standard and commercial specifications, manuals, or codes of technical societies, organizations, or associations. These specifications are intended to amplify the descriptions of materials, equipment, and construction systems. The Contractor shall caution each of his Subcontractors to become familiar with the contents of the pertinent portions of these Reference Documents. The following Reference Documents are the most widely used, and are cited or referred to in each of the following sections of these Specifications:
  - 1. American Society of Testing Materials (ASTM)
  - 2. American National Standards Institute (ANSI)
  - 3. American Standards Associations (ASA)
  - 4. American Concrete Institute (ACI)
  - 5. Federal Specifications, as applicable.
  - 6. California Building Code
  - 7. California Plumbing Code
  - 8. National Electric Code
  - 9. Construction Safety Orders of the Division of Industrial Relations latest edition.
- C. Each citation of a Reference Document shall be construed to refer to the latest published revision of such specification as of the date of the invitation for bids and to such portions of it that relate and apply directly to the material or installation called for on this job. The Engineer will give no consideration to any claimed ignorance as to what a cited Reference Document contains, since such Subcontractor on a project of this scope is deemed to be experienced and familiar with his own trade to be experienced and familiar with his own trade's generally accepted, published standards of quality.
- D. Whenever references are made to any of the above-mentioned Reference Documents or testing methods in the governing Building Codes, the requirements of those Reference Documents shall govern, insofar as they are not in contravention with maxima or minima prescribed by documents designated in the Building Code.

1.4 LIST OF DRAWINGS

A. The Work shall conform to the following Drawings:

TITLE	SHEET NUMBERS	DRAWING NUMBERS
Cover Sheet	1	G1
Sheet Index & General Notes	2	G2
Civil Legend	3	G3
El Porvenir Index Sheet	4	G4
Cantua Creek Index Sheet 1	5	G5
Cantua Creek Index Sheet 2	6	G6
Horizontal Control Plan	7	G7
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W El Progreso Ave Sta 20+000 to End	9	C1-2
W Hidalgo Ave Sta 30+00 to End	10	C1-3
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W Latta Ave Sta 60+00 to 64+40	12	C2-1
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S Chappo Ave Sta 90+00 to End	16	C2-5
S Santa Clara Ave Sta 94+00 to End	17	C2-6
W Clarkson Ave Sta 100+00 to 107+50	18	C2-7
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CSA 32 Clarkson Avenue Water Main Abandonment	33	CD-10

1.5 STATE STANDARD SPECIFICATIONS

A. For the purpose of this contract, the following terms or pronouns in place of them, used throughout the State Standard Specifications and defined in Section 1, Definition of Terms, of the State Standard Specifications, shall be as follows:

<u>TERMS</u>	<u>INTERPRETATION</u>

State	California Department of Water Resources
Owner	County of Fresno
Department	County of Fresno
Director	County of Fresno
Engineer	County of Fresno, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted them.
Department of Transportation	County of Fresno
Contractor	The person or persons, co-partnership or corporation, private or municipal, who have entered into a contract with the Agency as party or parties of the second part, or his or her legal representative.

**1.6 OCCUPATIONAL SAFETY AND HEALTH ACT**

- A. The applicable standards of the American National Standards Institute and the National Fire Protection Association that have been adopted are hereby made a part of these Specifications as a whole and as mentioned in the various sections.
- B. Any errors, ambiguities, or inconsistencies of these standards with either the local codes, the Specifications, or the Drawings shall be brought to the attention of the Engineer.

**1.7 COMPLIANCE WITH ALL LAWS AND CODES**

- A. Contractor shall conform to and abide by all local city, county, state and federal laws, rules, regulations, including industrial safety laws. Such laws shall be considered as essential parts of these Specifications and, in the absence of definite requirements herein, the provisions of such rules and regulations shall be observed by the Contractor. If the Drawings and/or Specifications are at variance therewith, Contractor shall so notify Engineer promptly. Should the Contractor perform any work contrary to such laws, ordinances, rules and regulations he shall bear all costs arising therefrom.
- B. Where these Specifications, however, call for or describe materials workmanship or construction of a better quality, higher standard, or larger size than is required by said rules and regulations, the provisions of these Specifications shall take precedence over said rules and regulations. Contractor shall furnish, without any

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extra charge, all additional labor or materials, or both, when required for compliance with these rules and regulations.

**END OF SECTION**

Specifications  
01 00 05-5



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## SECTION 01 11 00

### DESCRIPTION OF WORK AND SCHEDULE CONSTRAINTS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. The Work consists of furnishing all labor, materials and equipment necessary for the installation of a new water distribution system with service lines within the service limits of County of Fresno County Service Areas (CSA) 30 and 32, the Cantua Elementary School and nearby properties. The work includes, but is not limited to, installation of water mains, water services, fire hydrants, appurtenances, water system tie-ins to the existing tank sites, disinfecting, testing, trench resurfacing, striping, and abandonment of the existing water distribution system.
- B. The construction sites are located in the County of Fresno, California, in the communities of Three Rocks and Cantua Creek.
- C. The primary components are generally described as follows:
  - 1. Installation of new 4", 6", and 8" water mains.
  - 2. Installation of new water service laterals, meters and meter boxes (from water main to edge of right of way).
  - 3. Installation of water service piping (on private property) from house to meter in right of way, including new grounding rods as required by the County Building Department. This work will be included if Add Alternate No. 1 is awarded.
  - 4. Installation of new Fire Hydrants.
  - 5. Installation of Combination Air Valves
  - 6. Installation of Blow Offs
  - 7. Installation of Bacteriological Sampling Stations
  - 8. Pavement replacement.
  - 9. Removal of Asbestos Cement Pipe (as necessary)
  - 10. Abandonment of existing water distribution systems (i.e. - water mains, appurtenances, and services).
- D. This project is jointly funded through the Department of Water Resources and the State Water Resources Control Board. Bid items have been segregated based on funding source.

## 1.2 TIME CONSTRAINTS

- A. Contractor shall supervise, inspect, and direct the Work competently and apply such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the specific means, methods, techniques, sequence, or procedure of construction required to complete the project as specified by the Contract Documents. Contractor shall be responsible to see that the completed Work complies accurately with the Contract Documents.

## 1.3 ORDER OF WORK

- A. The order of work shall be executed as described below. The Contractor shall submit a phased work plan and schedule to the Engineer for review and approval prior to the start of construction activities. Any proposed deviations to the execution of work, as described below, are subject to approval by the County and Engineer in advance of construction. Construction will be divided into the three major phases of work as described below.
- B. The Contractor shall complete all three (3) phases of work within the time limits specified in Section 8-1.04A of the Special Provisions.
- C. Phase No. 1 – Water System Improvements
  1. The Engineer has made a diligent effort to accurately show existing water services on the Plans, however, the Contractor is responsible for verifying the location of all existing buried utilities, including existing water services, as a first order of work. Existing water services are shown on the plans based on information available to the Engineer. The Contractor shall submit a marked up set of plans detailing the location of utilities that deviate from the plans, including water service locations and actual depth of utilities potholed for review by the Engineer prior to proceeding with construction.
  2. New water service laterals shall be located offset of existing water services as detailed on the Plans. Coordinate with County of Fresno Resources Division. Notice shall be sent to the public before water service lateral installation.
    - a. If Add Alternate No. 1 is awarded, the Contractor is responsible for identifying a preferred alignment for the new water service piping on private property from the meter at the edge of the right of way to the point of connection at each house. It is the intent that new piping will follow the same alignment as existing pipe but in some instances the locations may need to be modified due to conflicts with existing improvements.
      - 1) The Contractor shall prepare and submit schematic plot plans for each property showing the proposed alignment for approval by the County. Plot plans shall identify any proposed changes to water service locations shown on the Plans inside the right of way (from new water main to edge of right of way) due to re-pathing of onsite pipes.

- 2) If necessary, Contractor will be available to meet with County staff on site to confirm onsite pipe alignments.
3. The Engineer will provide one initial set of construction stakes for the new meter boxes at the proposed locations shown on the Plans. Modifications may be required to water service alignments due to deviations in actual existing water service locations or onsite re-pathing as described above. The Contractor shall re-mark proposed water service locations that change upon approval by the Engineer.
4. The Contractor shall obtain all permits required for the project. The Contractor shall obtain the following permits from the County:
  - a. Building Permit – for all work on private property for onsite water service pipe work (Add Alternate No. 1). The cost for each permit is \$130.

The Contractor shall submit all required documentation necessary to secure a permit, pay all fees and satisfy all permit requirements. The County will obtain waivers from property owners to grant permission to access private property.

5. The Contractor shall notify Westlands Water District before commencing work within their easement and in the vicinity of their irrigation pipelines and shall comply with all requirements of Westlands Water District.
6. Install water mains, water service laterals, fire hydrants, blow-offs, combination air valves, bacteriological sampling stations, and all appurtenant facilities, as shown on the plans. If Add Alternate No. 1 is awarded, the Contractor shall install onsite water service piping concurrently with construction of water system improvements in road right of way.
7. The new water main will be installed at the same depth as abandoned water main and active water main at many locations. The Contractor shall remove existing asbestos cement pipe as needed to install new water main. Contractor shall abide by federal and state regulations for removal and disposal of pipe and provide proper worker protection for all asbestos pipe removal. At locations where conflicts with active water mains exist, Contractor shall install temporary re-connections as detailed on the plans.
8. If a portion of existing water services are temporarily removed, Contractor shall reconnect water services to existing main to maintain service until new water mains and services are active. Similarly, at locations where conflicts exist between new water main and existing water services, Contractor shall re-route existing water service around new water main to maintain connection to existing active water main.
9. Contractor shall purchase and install meters, as specified in these Specifications. The Contractor shall record serial numbers of meters installed at each address and shall furnish a list to the Owner for use by the County of Fresno to develop a billing list.

10. Disinfect and test water system improvements in conformance with the requirements of these Specifications. The water system improvements must be accepted in writing by the County after successful completion of testing (and by DDW for Bacteriological tests). No connections shall be made to the County's water system (or existing customer hookups) until the improvements have been accepted.
  - a. Temporary connections with backflow preventors will be allowed to fill water main for testing (see detail on Plans).
11. Connect to existing water supply system at respective tank sites (see Sheets C1-4 and C2-11 of the Plans). Coordinate with the Supervising Operator of CSA 30 and 32 water systems before connecting to tank sites.
12. Contractor shall coordinate connection to the existing water main in Clarkson Avenue, adjacent to the school, with the County, school district and other affected customers. Temporary interruption to water service for the school, school housing and mobile home park will need to be scheduled.
13. Phase No. 2 shall not be started until Phase No. 1 is complete and accepted by County. The Contractor may be allowed to proceed with Phase No. 2 prior to completing "replacement of existing improvements" work described below, if approved by the County.
14. Replacement of existing improvements:
  - a. Any existing improvements, in County road right of way or on private property, damaged shall be replaced "in kind" and restored to its original condition.
  - b. For concrete improvements requiring removal and replacement (including sidewalk, valley gutter, and curb and gutter), it is the intent to remove and replace between expansion joints. Limits of replacement shall be approved by the County in the field. Replacement shall be paid at the unit price bid. Replacement work shall be completed in accordance with details on the Plans.
  - c. The Contractor shall remove and replace existing sidewalk at locations where meters, fire hydrants, combination air valves, bacteriological sampling stations or other proposed facilitates are located within existing sidewalk area.
  - d. The Contractor shall remove and replace existing valley gutter at locations identified on the Plans.
  - e. The Contractor has an option to trench or bore new services into place. Regardless of method selected, the Contractor shall pass water service underneath existing curb and gutter and protect curb and gutter in place. The Contractor shall backfill under curb and gutter with cement slurry. The same requirements apply to pipe installation for

combination air valves and bacteriological sampling stations. Cost associated with protecting concrete curb and gutter and placing slurry shall be included in the unit bid items for water services, combination air valves and bacteriological sampling stations, respectively. If concrete curb and gutter is damaged, the contractor shall replace or repair, as approved by the County, at no additional cost.

- f. Removal and replacement of concrete curb and gutter is identified on the Plans at locations where fire hydrant or water mains cross curb and gutter. Replacement shall be paid at the unit price bid for concrete curb and gutter.

D. Phase No. 2 – Water Service Connection

1. Disconnect each customer from old water service and connect to new water service.
2. The Contractor shall notify residents in conformance with the notification requirements as stated below:
  - a. During temporary water system shutdown, the Contractor shall notify each resident on a daily basis that their water service will be disrupted for a period of time. No single water service shall be disrupted for more than 4 hours, and each notification shall be as follows:
  - b. Notice shall read: "Due to the current water system improvements project, water will be shut down between the hours \_\_\_\_ to \_\_\_\_ (time). Contact \_\_\_\_\_ (Contractor's name and phone number) and the County of Fresno (County contact name and phone number to be verified by the Contractor) for further questions and concerns."
3. If Add Alternate No. 1 is not awarded, the existing water service lead lines shall be cut between the old meter boxes and the right of way lines. The existing service lines from the old meter boxes shall be capped and the existing service lead lines to the houses will be connected to the new meters and water services with Schedule 80 PVC pipe and fittings.
4. If Add Alternative 1 is awarded, the following will be performed at all residences where the County acquires waivers from the property owners:
  - a. The existing water service lead lines shall be cut approximately 5 feet outside of the existing house perimeter and the existing house service lead lines will be connected to the new house water services at those locations. The existing water service lead lines from the street shall be capped as shown on the details on the plans.
  - b. If the house does not have an existing working shut-off valve outside the house perimeter, a new one will be installed at the new service connection in accordance with the details on the Plans.

- c. If an inspection reveals that the existing electrical house service grounding system does not meet current codes, new electrical ground rods will be installed to comply with current building code requirements.
  5. All pipe and fittings shall be thoroughly disinfected before reconnecting the existing lead lines to the new water service lines.
  6. Phase No. 3 shall not be started until Phase No. 2 is complete and accepted by County.
- E. Phase No. 3 – Water System Abandonment
  - a. The Contractor shall abandon the existing water system in conformance with the requirements of these Specifications and the Plans.
- F. Final Walk-through and written acceptance of the project will take place after all work is complete.

**END OF SECTION**

## SECTION 01 11 05

### ENGINEER'S STATUS DURING CONSTRUCTION

#### PART 1 GENERAL

##### 1.1 VISITS TO SITE

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, will determine, in general, if the Work is proceeding in accordance with the Contract Documents.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Section 1.4, below. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.
- C. Review of the Work by the Engineer shall not relieve the Contractor of the obligation to fulfill all conditions of the Contract.
- D. No oral or telephonic agreement or conversation with any officer, agent or employee of the Owner or the Engineer, or with the Engineer, either before or after execution of the Contract, shall affect or modify any of the terms or obligations contained in any of the Contract Documents.
- E. Engineer has the authority to stop work if unsafe working conditions develop.

##### 1.2 AUTHORIZED VARIATIONS IN WORK

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

##### 1.3 REJECTING DEFECTIVE WORK

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed. Neither this authority



nor the Engineer's good faith judgment to reject or not reject any work shall subject the Engineer to any liability or cause of action by the Contractor, subcontractors, or any other suppliers or persons performing work on the Contract.

**1.4 LIMITATIONS ON ENGINEER'S AUTHORITY AND RESPONSIBILITIES**

- A. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- B. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- C. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

**END OF SECTION**

**SECTION 01 11 10**  
**COORDINATION OF WORK**

**PART 1 GENERAL**

*1.1 RESPONSIBILITY OF CONTRACTOR*

- A. If any part of the Work depends for proper execution or results upon the work of others, the Contractor shall inspect and promptly report to the Engineer any apparent discrepancies or defects in such work of others that render it unsuitable for such proper execution and results. Failure of the Contractor to so inspect and report shall constitute an acceptance of the work of others as fit and proper except as to defects which may develop in the work of others after execution of the Work by the Contractor.

*1.2 WORK INVOLVED WITH EXISTING SYSTEM*

- A. Existing materials and equipment removed not designated to be salvaged for Owner in the execution of the Work shall become the property of the Contractor and shall be removed from, and disposed of, off the site by the Contractor in an acceptable and lawful manner.

*1.3 COORDINATION OF WORK*

- A. The Contractor shall maintain overall coordination for the execution of the Work. Based on the Construction Schedule prepared in accordance with these Specifications, he shall obtain from each of his subcontractors a similar schedule and shall be responsible for all parties maintaining these schedules or for coordinating required modifications.
- B. The existing system is operational and shall remain operational at all times. Water to customer shall be delivered at all times. Water shall be shut off for a period no greater than 4 hours for the conditions stated in section 01 11 00.

**END OF SECTION**

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## SECTION 01 20 00

### MEASUREMENT & PAYMENT

#### PART 1 GENERAL

##### 1.1 MEASUREMENT

- A. Unless otherwise specified in the Contract Documents, quantities of work shall be determined from measurements or dimensions in a horizontal plane. All measurements shall be made in accordance with United States Standard Measures and shall be measured on the basis of "in-place" quantities.
- B. After the work has been completed, the Engineer will make field measurements of unit price items in order to determine the quantities of the various items as a basis for payment. On all unit price items, the contractor will be paid for the actual amount of the work performed in accordance with the contract documents, as computed from field measurements.
- C. Work or quantities not listed in the description of bid items are considered incidental to other construction and will not be measured. Compensation for such incidental work is considered to be included in the various items of work bid.

##### 1.2 PARTIAL PAYMENT

- A. Attention is directed to Section 9-1.06 of the State Standard Specifications which, except as modified herein, shall apply in its entirety.
  - 1. The Department shall retain 5 percent of the estimated value of the work done and 5 percent of the value of materials so estimated to have been furnished and delivered and unused or furnished and stored as aforesaid as part security for the fulfillment of the contract by the Contractor. The Department will not hold retention for mobilization or demobilization..
  - 2. Partial payments for materials on hand shall be based upon the value of material delivered on site, properly stored in a secured fenced area subject to, or under the control of, the owner and local agency, and unused. Contractor shall submit copies of invoices of materials to support values. Materials stored shall be installed within 60 days of delivery for payment eligibility.
- B. Payment shall not relieve the Contractor from its obligations under the Contract; nor shall such payment be construed as acceptance of any of the Work. Payment shall not be construed as transfer of ownership of any equipment or materials to the Owner. Responsibility of ownership shall remain with the Contractor who shall be obligated to protect any fully or partially completed work or structure for which payment has been made; or replace any materials or equipment to be provided under the Contract which may be damaged, lost, stolen or otherwise degraded in any way prior to acceptance of the Work, except as provided in Section 7-1.15 of the State Standard Specifications.

County of Fresno  
County Service Areas 30 and 32  
Water System Improvements

1.3 *FINAL PAYMENT*

- A. Notice of Completion will be filed by Engineer for acceptance of the project.

**END OF SECTION**

Measurement & Payment  
01 20 00-2

## SECTION 01 22 00

### EXPLANATION OF BID ITEMS

#### 1.1 GENERAL

The Contract payment for the specified items of work as set forth in the Bid Schedule shall be full compensation for furnishing all labor, materials, methods or processes, implements, tools, equipment and incidentals and for doing all work involved as required by the provisions of the Contract Documents for a complete in place and operational system.

Unless otherwise specified in the Specifications, quantities of work shall be determined per each, or from measurements or dimensions in a horizontal plane. All materials shall be measured on the basis of "in place" quantities and paid for using the units listed in the bid schedule.

Except as noted, the Engineer will make field measurements of unit price items in order to determine the quantities of the various items as a basis for payment. On all unit price items, the contractor will be paid for the actual amount of the work performed in accordance with the contract documents, as computed from field measurements.

Work or quantities not listed in the description of bid items are considered incidental to other construction and will not be separately measured or paid for. Compensation for such work and/or material shall be included in the prices paid for other items of work.

#### 1.2 CSA 30 - BASE BID ITEMS (A)

##### **Bid Item No. 1 - Mobilization, Bonds, and Insurance**

This item is a lump sum bid for mobilization, all necessary bonds, insurance, permits, licenses required during the performance of the work, and demobilization and shall conform to the provisions of these Specifications. Bid Item No. 1 and Bid Item No. 33 are intended to cover all of the base "Mobilization" costs for CSA 30. The costs of mobilization for CSA 30 shall be proportioned between these two bid items. This is required for funding purposes.

This item shall consist of covering the Contractors cost for Contract Documents and for the moving of personnel, equipment, supplies and incidentals to the CSA 30 project site. This item shall include obtaining all permits required for the CSA 30 project; except any permits specifically included under a separate bid item. Permit fees and all other permit preparation costs shall be included in this bid item. This item includes any construction staking that is not provided by the Owner. This item also includes demobilization, including removal of all equipment supplies, personnel, and incidentals from the CSA 30 project site at the end of construction.

All costs associated with this item shall be included in the lump sum price and no additional payment will be made. This bid item shall be paid as specified in Section 9 Payment and Sub-Section 9-1.16 D Mobilization of the State Standard Specifications.

**Bid Item No. 2 - Construction Project Information Sign**

This item is a per each bid for constructing, erecting, maintaining and removing construction project information signs in conformance with the provisions of Section 12-2 of the Special Provisions and the Project Details.

Before any major physical construction work which is readily visible to highway users is started on this contract, the Contractor shall furnish and erect construction project information signs at the locations designated by the Engineer. The signs shall conform to the requirements in the State Standard Specifications, these special provisions, and as directed by the Engineer.

This reconstruction project will require 2 signs, one at each County Service Area. The Contractor's attention is directed to the "Project Details" of these specifications.

The Contractor shall construct and maintain signage meeting the guidelines specified in the Project Details insert, DWSRF Sign Requirements. The signs shall be prominently displayed in a location visible to the public.

During the course of construction work, the signs shall be kept clean and in good repair by the Contractor. Signs destroyed or damaged by the Contractor's operations shall be replaced at the Contractor's expense.

Upon completion and acceptance of the work, the signs shall remain in place until approved for removal by the Engineer. The Contractor shall be responsible for removing and disposing of the signs after acceptance of the work.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in constructing, maintaining, repairing, and removing construction project information signs shall be included in the unit price bid for Construction Project Information Sign, and no additional payment will be made therefor.

**Bid Item No. 3 - Job Site Management**

This bid item is a lump sum bid item for the cost of all work involved with CSA 30 job site management and includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in spill prevention and control, material management, waste management, non-stormwater management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste resulting from your activities, as specified in the Standard Specifications and these Special Provisions, and as ordered by the Engineer.

Bid Item No. 3 and Bid Item No. 34 are intended to cover all of the base "Job Site Management" costs for CSA 30. The costs of job site management for CSA 30 shall be proportioned between these two bid items. This is required for funding purposes.

The contractor shall abide by all federal and state regulations regarding removal and disposal of Asbestos Cement pipe.

This item also includes providing worker protection from trench failures and other hazards that may occur during construction. The Contractor shall comply with the provisions of the Construction Safety Orders, Tunnel Safety Orders, and General Safety Orders issued by the State of California Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations, as they pertain to the protection of workers from the hazard of caving ground.

The Contractor shall obtain a permit from the Division of Industrial Safety of the State of California prior to commencement of construction. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 30 contract work completed.

#### **Bid Item No. 4 - Traffic Control**

This bid item is a lump sum bid for all materials, labor and appurtenances required to maintain traffic control measures within the CSA 30 project limits in accordance with the Standard Specifications and Special Provisions and as directed by the Engineer. The Contractor shall submit a traffic control plan for review and approval by the County. Traffic control provisions shall conform but not limited to the following requirements:

1. The California Manual on Uniform Traffic Control Devices (MUTCD), latest edition, is hereby referred to and incorporated herein as though set forth in full. The Contractor shall be responsible for providing all necessary traffic control facilities, 24 hours per day, 7 days per week for the entire duration of the project.
2. The Contractor shall maintain pedestrian crossings with adequate visibility for approaching traffic.
3. The Contractor shall notify County Fire and Sheriff Departments, and County Road Maintenance and Operations Division at least forty-eight (48) hours in advance of any proposed lane closure. Any lane closures must have prior approval of the County of Fresno and have pre-notification warning signs in place seven (7) calendar days prior to said closure.
4. The Contractor shall obtain an encroachment permit and approval of a traffic control plan conforming to the requirements specified herein and the Caltrans encroachment permit requirements for any work encroaching in Caltrans right-of-way or affecting traffic flow in Caltrans right-of-way.
5. The Contractor shall submit a traffic control plan to the County of Fresno (and Caltrans if required) for review and approval. A copy of the approved traffic control plan shall be provided to the Engineer prior to the start of construction activities.
6. The Contractor shall strictly comply with, and will be solely responsible for, all required traffic control and devices as per approved plan and any revisions thereof. The Contractor shall inspect the traffic control setup at two-hour intervals, at a minimum, and correct all problems immediately.
7. The Contractor shall provide safe access for the County, County's representatives, and Caltrans (if applicable) inspection staff.
8. Specific traffic control measures associated with the work of this Contract are as follows:
  - a. Existing striping and road stencil work which conflicts with detour layout shall be removed. Conflicting signs shall be covered.



- b. Where traffic is moved out of its normal position, traffic lanes must be a minimum of ten (10) feet wide. One (1) lane of traffic in each direction shall be maintained, at all times, unless approved otherwise by the County (and Caltrans).
- c. Lane closures shall be limited between the hours of 9 AM to 4 PM to minimize disruptions to commuter traffic. All lane closures must be approved by the County (and Caltrans) in advance. The road shall be returned to two-way traffic outside of the hours specified above.
- d. The Contractor may use trench plates to re-open the road to two-way traffic overnight, however, temporary trench resurfacing shall be placed after each road crossing is complete. Temporary trench resurfacing shall be maintained until permanent trench resurfacing is placed. Permanent trench resurfacing shall be scheduled and placed immediately following acceptance of water main, services and appurtenances installed.
- e. Access to all local streets, businesses and residences shall be maintained at all times, except as noted below. Where the Contractor's operations block access to driveways, the Contractor shall provide a minimum of forty-eight (48) hour written notice to the residents and minimize the duration of interruptions to driveway access.

Full compensation for furnishing all labor (including flagging), materials, tools, equipment, and incidentals, and for doing all work involved for the sole convenience, direction and safety of public traffic and pedestrians shall be included in this bid item. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 30 contract work completed.

#### **Bid Item No. 5 - Lead Compliance Plan**

This bid item is a lump sum bid for all labor, equipment, and incidentals and for doing all the work involved in preparing a Lead Compliance Plan in accordance with Section 7-1.02K(6)(j)(ii) of the Standard Specifications and with these special provisions.

The County will require only one Lead Compliance Plan for this project, however the cost of preparing it shall be divided proportionally among each bid section of the job where removal of existing pavement is included as part of the work. This is required for funding purposes.

#### **Bid Item No. 6 - Prepare and Implement Storm Water Pollution Prevention Plan**

This bid item is a lump sum bid for prepare and implement a Storm Water Pollution Prevention Plan ("SWPPP"), and includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in preparing, implementing, maintaining, inspecting, and removing water pollution control practices in accordance with the approved SWPPP as specified in the Standard Specifications and these special provisions, and as directed by the Engineer..

This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of contract work completed.

The County will require only one SWPPP and application to the State Water Resources Control Board for the entire project, however the cost of preparing and implementing it shall be divided

proportionally among each applicable bid section of the work. This is required for funding purposes.

**Bid Item No. 7 - State Water Resources Control Board – Notice of Intent**

This bid item is specifically provided to reimburse the Contractor for payment of the NOI filing fee charged by the SWRCB and paid by the Contractor after the Contractor has completed the NOI filing process started by the County. The amount paid for this bid item will be the fee only. No payment will be made for overhead or processing costs. Full compensation for any overhead and processing costs will be considered to be included in the various items of work, and no separate compensation will be made therefor.

The dollar amount shown in the Proposal is an estimate only and shall be included in each bidder's proposal. Payment for this bid item will be adjusted based on the actual fee paid. The provisions of Section 9-1.06 for increased or decreased quantities shall not apply to the "State Water Resources Control Board – Notice of Intent" bid item.

Only one SWRCB NOI will be required for the entire project, however the cost of the NOI filing fee shall be divided proportionally among each applicable bid section of the work. This is required for funding purposes.

**Bid Item No. 8 - Dust Control**

This bid item includes all materials, labor and appurtenances required to perform dust control measures for the CSA 30 project limits in accordance with conditions of these specifications. The contractor shall file a no fee construction notification form with the SJVAPCD pursuant to section 6.4 of SJVAPCD District Rule 8021-Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities (a Dust Control Plan is not required).

This bid item will be paid for by Lump Sum, prorated, based on percentage of CSA 30 contract work completed.

**Bid Item No. 9 - Supplemental Work Allowance**

This item is provided to account for supplemental work which may be required due to differing job site conditions not provided for on the Plans or in these Specifications and other unforeseen work which the Engineer determines is necessary to allow for the work required by the Contract Documents to proceed as intended without interruption. This item will be used only for this purpose. The dollar amount listed on the Bid Proposal Form is an estimated allowance set aside by the Owner and shall be included on each Bidder's Bid Proposal sheets.

Supplemental work shall be performed only upon direct written authorization from the Engineer and daily extra work reports shall be submitted to and approved by the Engineer. The Contractor shall maintain separate records for extra work performed in accordance with the provisions of Section 5-1.27, "Records," of the Standard Specifications and the special provisions.

The Contractor will be paid only for the value of completed supplemental work which has been authorized in writing by the Engineer.

The value of work, which the Owner may authorize under this item, may be less than the amount shown on the Bid Proposal sheet, and it could be that no supplemental work will be authorized at all. Accordingly, payments to the Contractor for supplemental work will likely differ substantially from the estimated Allowance which is included in the Bid Proposal. If no supplemental work is authorized or if no authorized supplemental work is performed, then no payments will be made to the Contractor under this Bid item and the Contract Price will be reduced by the full amount of the item included in the Bid Proposal for supplemental work. The provisions in Section 9-1.06, "Changed Quantity Pay Adjustments" of the Standard Specifications shall not apply to the item "Supplemental Work Allowance."

The value of supplemental work cannot exceed the amount shown on the bid proposal sheet. Additional work that requires compensation exceeding this allowance shall be subject to approval by the contract change order procedures of this Contract.

The Contractor shall have no claim for anticipated overhead or profit should the County fail to authorize any supplemental work or should the value of authorized supplemental work be less than anticipated by the Contractor.

#### **Bid Item No. 10 - Supplemental Work (Payment Adjustments for Price Index Fluctuations)**

This item is provided solely to provide funds necessary for adjustments to the prices of those oil-containing materials expressly specified as eligible for such adjustments in Section 9-1.07 "Payment Adjustments for Price Index Fluctuations," in the special provisions. This item does not apply if you opted out of payment adjustments for price index fluctuations at the time of bid.

The dollar amount shown in the Proposal for this bid item is an estimate only and shall be included in each bidder's proposal. The actual payment may be an increase or decrease depending on the changes in the price index. The provisions in Section 9-1.06 "Changed Quantity Pay Adjustments" of the Standard Specifications shall not apply to this bid item.

#### **Bid Item No. 11 - Clearing and Grubbing**

This bid item is a lump sum bid for the cost of all work involved in clearing and grubbing the CSA 30 project site. Clear and grub vegetation only within the immediate limits required for the installations of the contract facilities. Said areas shall be stripped of surface vegetation, including clearing and grubbing of all shrubs, bushes, vines, stumps, roots, removing and replacing fencing for site access, debris and unsuitable material, within the CSA 30 project site area including fill slopes, temporarily stockpiling unsuitable material per Standard Specifications and these Specifications during construction and related work. This bid item shall be paid at the lump sum price bid.

This bid items includes removal of any other concrete, asphalt or other improvements not included in other items of work.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 30 contract work completed.

### **Bid Item No. 12 - Utility Potholing**

This bid item includes the cost of potholing and locating all existing utilities including all existing water service locations within the CSA 30 project limits. Note that the Plans may not include all existing utilities within the project limits. All existing utilities and water service locations must be marked prior to start of construction. The bid item unit price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This is a lump sum bid item and will be paid at the lump sum price bid. Payment will be prorated based on the percentage of work completed under this bid item.

### **Bid Item No. 13 - 6" DI, TR Xtreme Water Main**

This bid item includes the unit bid price for furnishing and installing 6" DI, TR Xtreme pipeline, fittings, and appurtenances as shown on Plans to the lines and grades shown on the plans, except where specifically included in another bid item, including but not limited to, pavement removal, the performing excavation and over excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, furnishing and installing 6" DI TR Xtreme water main and fittings, polyethylene encasement, restrained joints, tracer wire, caution tape, import sand for pipe zone, backfill and compaction, placing cement slurry where required, restoration of unpaved surfaces, flushing, disinfection, pressure testing, acquisition and disposal of water used during testing.

If a portion of existing active water services are temporarily removed for installation of new water main or due to a conflict between new water main and service elevation, the Contractor shall furnish, install, and disinfect new piping to restore water service connection to existing water main. All work for reconnecting water services will be included in the unit price bid for this item of work and no separate payment will be made therefor.

It is anticipated that existing concrete curb and gutter will be removed and replaced in order to accommodate the installation of the water main at those locations where the water main crosses existing curb and gutter. The cost for removal and replacement of concrete curb and gutter for water main installation is included in **Bid Item 26-Sawcut, Remove and Replace Concrete Curb and Gutter**. If the existing curb and gutter is not removed during the pipe installation, backfill with cement slurry under existing curb and gutter shall be included in this bid item.

It is anticipated that existing concrete valley gutter will be removed and replaced in order to accommodate the installation of the water main at those locations where the water main crosses existing valley gutter. The cost for removal and replacement of concrete valley gutter for water main installation is included in **Bid Item 27-Sawcut, Remove and Replace Concrete Valley Gutter**.

The bid item lineal foot price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per lineal foot of pipe installed.

### **Bid Item No. 14 - 4" DI, TR Flex Water Main**

This bid item includes the unit bid price for furnishing and installing 4" DI TR Flex pipeline, fittings,

and appurtenances as shown on Plans to the lines and grades shown on the plans, except where specifically included in another bid item, including but not limited to, pavement removal, the removal and replacement of existing privately owned improvements, performing excavation and over excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, furnishing and installing 4" DI TR Flex water main and fittings, polyethylene encasement, restrained joints, tracer wire, caution tape, import sand for pipe zone, backfill and compaction, placing cement slurry where required, restoration of unpaved surfaces, flushing, disinfection, pressure testing, acquisition and disposal of water used during testing.

If a portion of existing active water services are temporarily removed for installation of new water main or due to a conflict between new water main and service elevation, the Contractor shall furnish, install, and disinfect new piping to restore water service connection to existing water main. All work for reconnecting water services will be included in the unit price bid for this item of work and no separate payment will be made therefor.

The bid item lineal foot price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per lineal foot of pipe installed.

#### **Bid Item No. 15 - 6" Gate Valve Assembly**

This bid item is a unit bid price includes furnishing and installing 6" gate valves at the locations shown on the plans except where specifically included in another bid item, including but not limited to the installation of the valve, valve box, concrete collar, riser, restrained joints, and adjusting valve boxes and covers to finished grade.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the Plans and Specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each 6" valve and valve box installed. Valving associated with hydrants, laterals, services, and other appurtenances are included in other bid items.

#### **Bid Item No. 16 - 4" Gate Valve Assembly**

This bid item is a unit price bid, per each, for furnishing and installing 4" gate valves at the locations shown on the plans except where specifically included in another bid item, including but not limited to the installation of the valve, valve box, concrete collar, riser, restrained joints, and adjusting valve boxes and covers to finished grade.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each 4" valve and valve box installed.

**Bid Item No. 17 - 1-Inch Combination Air Valve Assembly**

This bid item is a unit price bid, per each, for furnishing and installing 1-inch combination air valve assemblies at the locations shown on the Plans, including but not limited to pavement removal, excavation, stockpiling and disposal of unacceptable backfill material, furnishing and installing combination valve assembly, pipe, valves and fittings, corporation stop, restrained joints, enclosure and concrete slab, backfill and compaction, backfill with cement slurry under curb and gutter, temporary flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water used during testing.

It is not anticipated that concrete curb and gutter will be removed for air valve Installation. If contractor chooses to open cut for air valve installation, cost for curb and gutter removal and replacement shall be included in this bid item and not paid in Bid Item 26.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each combination air valve installed.

**Bid Item No. 18 - Permanent Blow Off Assembly**

This bid item is a unit price bid, per each, for furnishing and installing permanent blow-off assemblies at the locations shown on the plans in conformance with the detail shown on the plans, including but not limited to all pavement removal, excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, furnishing and installing all pipe and fittings, valves, backfill and compaction, the installation of the blow-off assembly, traffic rated vault, adjusting the vault cover to finish grade, flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water used during testing.

It is anticipated that existing concrete curb and gutter will be removed and replaced to accommodate the installation of the blow-off piping. Concrete curb and gutter removal and replacement associated with blow off assembly installations shall be paid under Bid Item No. 26. If the existing curb and gutter is not removed during the pipe installation, backfill with cement slurry under existing curb and gutter shall be included in this bid item.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each permanent blow-off assembly installed.

**Bid Item No. 19 - Bacteriological Sampling Station**

This bid item is a unit bid item, per each, that includes furnishing and installing bacteriological water sampling stations at the locations shown on the plans except where specifically included in another bid item, including but not limited to all pavement removal, excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, backfill with cement slurry under curb and gutter, furnishing and installing all pipe and fittings, enclosure and concrete slab,

flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water used during testing.

It is not anticipated that concrete curb and gutter will be removed for bacteriological sampling station Installation. If contractor chooses to open cut for bacteriological sampling station installation, cost for curb and gutter removal and replacement shall be included in this bid item, and not paid in Bid Item 26.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, replacement of any concrete curb, driveway approach or other concrete improvements removed during construction along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each for bacteriological water sampling station installed.

### **Bid Item No. 20 - Fire Hydrant Assembly and Lateral**

This bid item is a unit price bid, per each, for furnishing and installing fire hydrant assembly at the locations shown on the Plans, including but not limited to excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, furnishing and installing fire hydrant assembly, pipe, fittings, restrained joints, gate valve, valve box and polyethylene encasement, backfill and compaction, installation of blue pavement marker, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water used during testing and restoration of unpaved surfaces.

It is anticipated that existing concrete curb and gutter will be removed and replaced to accommodate the installation of the hydrant lateral piping. Concrete curb and gutter removal and replacement associated with fire hydrant assembly and lateral installations shall be paid under Bid Item No. 26. If the existing curb and gutter is not removed during the pipe installation, backfill with cement slurry under existing curb and gutter shall be included in this bid item.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each hydrant installed.

### **Bid Item No. 21 - Type A 1-Inch Water Service Lateral Replacement**

This bid item is a unit bid item, per each, that includes furnishing and installing a 1-inch water service, for each parcel shown on the plans in the base bid, including but not limited to, public notices, all pavement removal, excavation, stockpiling, and disposal of unacceptable backfill material, placing of pipe bedding, placing cement slurry backfill under existing curb and gutter, furnishing and installing all pipe and fittings, valves, flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water using during testing.

The Contractor has the option to install services by open cutting or by boring method. It is not anticipated that concrete curb and gutter will be removed for water service Installation. If contractor chooses to open cut for water service installation, cost for curb and gutter removal and

replacement shall be included in this bid item and not paid in Bid Item 26.

All costs associated with protecting existing utilities and improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item.

The bid price item shall include full compensation for furnishing all labor, tools, equipment, and materials, along with all associated appurtenances required to complete the installation, construction, and testing of the described improvements in fully functional order, in conformance with these Plans and Specifications, and as directed by the Engineer. This is a unit bid item and will be paid per each water service installed.

### **Bid Item No. 22 - Type A 3-Inch Water Service Lateral Replacement (Hidalgo Avenue)**

This bid item is a unit bid item, per each, that includes furnishing and installing a 3-inch water service, for each location shown on the plans in the base bid, including but not limited to, public notices, all pavement removal, excavation, stockpiling, and disposal of unacceptable backfill material, placing of pipe bedding, placing cement slurry backfill under existing curb and gutter, furnishing and installing all pipe and fittings, valves, flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water used during testing.

The Contractor has the option to install services by open cutting or by boring method. It is not anticipated that concrete curb and gutter will be removed for water service installation. If contractor chooses to open cut for water service installation, cost for curb and gutter removal and replacement shall be included in this bid item and not paid in Bid Item 26.

All costs associated with protecting existing utilities and improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item.

The bid price item shall include full compensation for furnishing all labor, tools, equipment, and materials, along with all associated appurtenances required to complete the installation, construction, and testing of the described improvements in fully functional order, in conformance with these Plans and Specifications, and as directed by the Engineer. This is a unit bid item and will be paid per each water service installed.

### **Bid Item No. 23 - Temporary Trench Resurfacing (Mains & FH Laterals)**

This bid item is a unit price bid, per lineal foot, for all work associated with the placement, temporary compaction, maintenance, and removal (prior to the installation of permanent trench resurfacing) of an estimated quantity of temporary trench resurfacing for water mains noted on the plans and as designated by the Engineer. All trenching in roadway must be patched each day prior to end of shift. All temporary trench resurfacing within County of Fresno road right of way shall consist of 4 inches of cut-back or "cold-mix" resurfacing in conformance with the County of Fresno Encroachment Permit and Improvement Standards. Temporary trench resurfacing shall be maintained by the Contractor during and after normal working hours and on weekends and holidays. The Contractor shall inspect the condition of the temporary surfacing at sufficient intervals and make repairs as necessary.



This bid item includes trench resurfacing for water mains and hydrant laterals only. Trench resurfacing for service lateral lines and for other water system appurtenances such as blow-offs, air valve assemblies, and test stations are included in separate bid item.

This bid item shall be paid at the unit price bid per lineal foot for an estimated quantity of trench resurfacing. The estimated quantity for temporary trench resurfacing as shown in the bid schedule shall be the **“final pay quantity”** and no additional allowance will be made therefor unless the scope of the work changes.

#### **Bid Item No. 24 - Temporary Trench Resurfacing (Services and Appurtenances)**

This bid item is a unit price bid, per each, for all work associated with the placement, temporary compaction, maintenance, and removal (prior to the installation of permanent trench resurfacing) of an estimated quantity of temporary trench resurfacing for all water services and appurtenances noted on the plans and as designated by the Engineer. All trenching in roadway must be patched each day prior to end of shift. All temporary trench resurfacing within County of Fresno road right of way shall consist of 4 inches of cut-back or “cold-mix” resurfacing in conformance with the County of Fresno Encroachment Permit and Improvement Standards. Temporary trench resurfacing shall be maintained by the Contractor during and after normal working hours and on weekends and holidays. The Contractor shall inspect the condition of the temporary surfacing at sufficient intervals and make repairs as necessary.

This bid item includes trench resurfacing for all 1” water service, 3” water service, permanent blow off assembly installation, bacteriological sampling station installation and combination air relief valve installation.

This bid item shall be paid at the unit price bid per each for an estimated quantity of trench resurfacing. The estimated quantity for temporary trench resurfacing (Services and Appurtenances) as shown in the bid schedule shall be the **“final pay quantity”** and no additional allowance will be made therefor unless the scope of the work changes.

#### **Bid Item No. 25 - Permanent Trench Resurfacing (Mains, Services and Appurtenances)**

This bid item is a unit price bid, per ton, for all work associated with furnishing and installing permanent trench resurfacing and compaction for the length of the water main, services and appurtenances. All Permanent Trench Resurfacing shall be in accordance with County of Fresno Standards and the plans and specifications. This item also includes the replacement of all destroyed traffic markings.

This bid item shall also include replacement of any disturbed warning markers, signs, striping, cross bars, and stop bars.

Reference is made to County of Fresno Standard Specifications and these plans and specifications. The Contractor shall use a self-propelled paving machine in accordance with the standards stated above to resurface all areas in which pavement was removed associated with the work of this Contract for trenches greater than three (3) feet in width. The Contractor shall use a roller that has a width equal to or less than the width of the trench for all trenches greater than three (3) feet in width.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and

materials, saw cutting trench edges, grinding pavement for overlays and all other associated and/or incidental work along with all associated work required to complete permanent trench resurfacing in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per ton, and may be substantially increased or decreased depending on the actual amount of asphalt pavement that needs to be used for resurfacing and no other adjustment to unit price will be allowed therefor.

**Bid Item No. 26 - Sawcut, Remove and Replace Concrete Curb and Gutter**

This bid item is a unit price bid, per linear feet, for all work associated with saw cutting, removal and replacement of concrete curb and gutter at the locations designated on the plans including compensation for all labor, materials, tools, equipment, and incidentals required to construct concrete curb and gutter to the lines and grades shown and specified. This bid item includes pavement and concrete removal, excavation, preparation and compaction of Subgrade, furnishing, grading and compacting the granular base material, forming, furnishing and placing the Portland cement concrete, finishing and all other work required to result in a complete curb and gutter.

An estimated quantity of curb and gutter is specified. It is the intent of the County to remove and replace curb and gutter between existing expansion joints where practical. This bid item will be paid for Per Lineal Foot of curb and gutter removed and replaced.

If contractor anticipates removal and replacement of concrete curb and gutter segments other than where specifically depicted on the plans, the cost of removal and replacement shall be included in the bid item for which the work will result in removal and replacement of curb and gutter.

**Bid Item No. 27 - Sawcut, Remove and Replace Concrete Valley Gutter**

This bid item is a unit price bid, per square feet, for all work associated with saw cutting, removal and replacement of concrete valley gutter at the locations designated on the plans including compensation for all labor, materials, tools, equipment, and incidentals required to construct concrete valley gutter to the lines and grades shown and specified. This bid item includes pavement and concrete removal, excavation, preparation and compaction of Subgrade, furnishing, grading and compacting the granular base material, forming, furnishing and placing reinforcing bars, furnishing and placing the Portland cement concrete, finishing and all other work required to result in a complete valley gutter. This bid item will be paid for Per Square Foot.

**Bid Item No. 28 - Remove Existing Valve Boxes**

This bid item is a unit price bid, per each, for removing all existing valve boxes that are located within the pavement at the locations shown on the plans including but not limited to the removal of the concrete valve box and lid, concrete collar, and top portions of the riser. The remaining portion of the riser will be backfilled with cement slurry, and the excavated area shall be backfilled, compacted, and repaved as shown on the details in the plans.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the removal of the described improvements, including backfilling and repaving, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per

each valve box removed.

**Bid Item No. 29 - Remove Existing Fire Hydrants**

This bid item is a unit price bid, per each, for removing all existing fire hydrants at the locations shown on the plans including but not limited to the removal of the fire hydrant assembly, cutting existing riser pipe and installing a water tight cap at or above the existing elbow, and backfilling and compacting as shown on the plans.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the removal of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each fire hydrant removed.

**Bid Item No. 30 - Remove and Dispose of Existing Asbestos Cement Pipe**

This bid item is a unit price bid per each for the cost of all work involved in removing all existing asbestos cement pipe at the locations shown on the plans including but not limited to abiding by all federal and state standards for removal of asbestos cement pipe and proper disposal of pipe.

Abandoned asbestos cement pipe shall be removed at all locations where there is a conflict with the new water main. Existing pipe shall be properly removed and plugged at each exposed end of the abandoned water main.

The quantity shown in the Proposal shall be included in each Bidder's proposal. This item may be increased, decreased or deleted entirely by Owner, if the Engineer determines that it is unnecessary. If the item is deleted, no compensation will be made therefor. No costs shall be incurred pertaining to this item unless directed by the Engineer. This item is excluded from the adjustment of changed quantities as specified in Standard Specifications Section 9-1.06 "Changed Quantity Payment Adjustments."

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the removal of the described improvements, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each location.

**Bid Item No. 31 - CSA 30 Tank Site Connection**

This bid item is a unit bid item, per each, for all work related to connecting the new distribution system to the existing HDPE pipeline at the location shown on the plans, for the CSA 30 Tank Site Connection. This includes trenching, bedding, shading and compaction, backfill and compaction, tracer wire, furnishing and installing tapping tee and valve and appurtenances, disinfection, testing, and inspection to complete the CSA 30 Tank Site Connection as shown on the Plans. Completed item shall provide a complete and fully operational connection to the existing water system.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the tie-in to the existing water system, in conformance with the Plans and Specifications, and as directed by the Engineer.

This bid item shall be paid at the unit price bid per each CSA 30 Tank Site Connection.

### **Bid Item No. 32 - Water System Abandonment**

This item includes furnishing all labor, equipment, tools, material and incidentals for the abandonment of the existing water distribution system in CSA 30 in conformance with the details shown on the plans, including but not limited to cutting and capping existing water main pipes at the tank site, capping and abandoning existing services, removal of existing water meters and meter boxes, and backfilling and compacting as noted on the Plans. This bid item will be paid for by Lump Sum. Payment will be prorated based on the percentage of work completed under this bid item.

### **1.3 CSA 30 – BASE BID ITEMS (B)**

### **Bid Item No. 33 - Mobilization, Bonds, and Insurance**

This item is a lump sum bid for mobilization, all necessary bonds, insurance, permits, licenses required during the performance of the work, and demobilization and shall conform to the provisions of these Specifications. Bid Item No. 1 and Bid Item No. 33 are intended to cover all of the base “Mobilization” costs for CSA 30, The costs of mobilization for CSA 30 shall be proportioned between these two bid items. This is required for funding purposes.

This item shall consist of covering the Contractors cost for Contract Documents and for the moving of personnel, equipment, supplies and incidentals to the CSA 30 project site. This item shall include obtaining all permits required for the CSA 30 project; except any permits specifically included under a separate bid item. Permit fees and all other permit preparation costs shall be included in this bid item. This item includes any construction staking that is not provided by the Owner. This item also includes demobilization, including removal of all equipment supplies, personnel, and incidentals from the CSA 30 project site at the end of construction.

All costs associated with this item shall be included in the lump sum price and no additional payment will be made. This bid item shall be paid as specified in Section 9 Payment and Sub-Section 9-1.16 D Mobilization of the State Standard Specifications.

### **Bid Item No. 34 - Job Site Management**

This bid item is a lump sum bid item for the cost of all work involved with CSA 30 job site management and includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in spill prevention and control, material management, waste management, non-stormwater management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste resulting from your activities, as specified in the Standard Specifications and these Special Provisions, and as ordered by the Engineer.

Bid Item No. 3 and Bid Item No. 34 are intended to cover all of the base “Job Site Management” costs for CSA 30. The costs of job site management for CSA 30 shall be proportioned between these two bid items. This is required for funding purposes.

The contractor shall abide by all federal and state regulations regarding removal and disposal of Asbestos Cement pipe.

This item also includes providing worker protection from trench failures and other hazards that may occur during construction. The Contractor shall comply with the provisions of the Construction Safety Orders, Tunnel Safety Orders, and General Safety Orders issued by the State of California Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations, as they pertain to the protection of workers from the hazard of caving ground.

The Contractor shall obtain a permit from the Division of Industrial Safety of the State of California prior to commencement of construction. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 30 contract work completed.

### **Bid Item No. 35 - 1" Water Meter and Meter Box**

This bid item includes furnishing and installing a water meter box, 1" water service meter and transceiver at the locations shown on the Plans including but not limited to, public notices, excavation, disposal of material, furnishing and installing traffic rated meter box and lid, connections to new water service and existing service lead lines, flushing, disinfection, and acquisition and disposal of water used during testing and restoration of surrounding area.

The Contractor shall furnish and install the County of Fresno standard meter and meter box as specified in these Plans and Specifications and no substitutions will be allowed.

All costs associated with protecting existing improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item. Contractor shall be required to obtain and pay all costs associated with Fresno County permits. The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each 1" water meter, meter box and transceiver installed.

### **Bid Item No. 36 - 2" Water Meter and Meter Box**

This bid item includes furnishing and installing a water meter box, 2" water service meter and transceiver at the locations shown on the Plans including but not limited to, public notices, excavation, disposal of material, furnishing and installing traffic rated meter box and lid, connections to new water service and existing service lead lines, flushing, disinfection, and acquisition and disposal of water used during testing and restoration of surrounding area. The Contractor shall furnish and install the County of Fresno standard meter and meter box as specified in these Plans and Specifications and no substitutions will be allowed.

All costs associated with protecting existing improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item. Contractor shall be required to obtain and pay all costs associated with Fresno County permits. The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item

and will be paid per each 2" water meter, meter box and transceiver installed.

#### **1.4 CSA 32 BASE BID ITEMS (A)**

##### **Bid Item No. 37 - Mobilization, Bonds, and Insurance**

This item is a lump sum bid for mobilization, all necessary bonds, insurance, insurance, permits, and licenses required during the performance of the work, and demobilization and shall conform to the provisions of these Specifications. Bid Item No. 37 and Bid Item No. 73 are intended to cover all of the base "Mobilization" costs for CSA 32. The costs of mobilization for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

This item shall consist of covering the Contractors cost for Contract Documents and for the moving of personnel, equipment, supplies and incidentals to the CSA 32 project site. This item shall include obtaining all permits required for the CSA 32 project; except any permits specifically included under a separate bid item. Permit fees and all other permit preparation costs shall be included in this bid item. This item includes any construction staking that is not provided by the Owner. This item also includes demobilization, including removal of all equipment supplies, personnel, and incidentals from the CSA 32 project site at the end of construction.

All costs associated with this item shall be included in the lump sum price and no additional payment will be made. This bid item shall be paid as specified in Section 9 Payment and Sub-Section 9-1.16 D Mobilization of the State Standard Specifications.

##### **Bid Item No. 38 - Construction Project Information Sign**

This item is a per each bid for constructing, erecting, maintaining and removing construction project information signs in conformance with the provisions of Section 12-2 of the Special Provisions and the Project Details.

Before any major physical construction work which is readily visible to highway users is started on this contract, the Contractor shall furnish and erect construction project information signs at the locations designated by the Engineer. The signs shall conform to the requirements in the State Standard Specifications, these special provisions, and as directed by the Engineer.

This reconstruction project will require 2 signs, one at each County Service Area. The Contractor's attention is directed to the "Project Details" of these specifications.

The Contractor shall construct and maintain signage meeting the guidelines specified in the Project Details insert, DWSRF Sign Requirements. The signs shall be prominently displayed in a location visible to the public.

During the course of construction work, the signs shall be kept clean and in good repair by the Contractor. Signs destroyed or damaged by the Contractor's operations shall be replaced at the Contractor's expense.

Upon completion and acceptance of the work, the signs shall remain in place until approved for removal by the Engineer. The Contractor shall be responsible for removing and disposing of the signs after acceptance of the work.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in constructing, maintaining, repairing, and removing construction project information signs shall be included in the unit price bid for Construction Project Information Sign, and no additional payment will be made therefor.

### **Bid Item No. 39 - Job Site Management**

This bid item is a lump sum bid item for the cost of all work involved with CSA 32 job site management and includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in spill prevention and control, material management, waste management, non-stormwater management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste resulting from your activities, as specified in the Standard Specifications and these Special Provisions, and as ordered by the Engineer.

Bid Item No. 39 and Bid Item No. 74 are intended to cover all of the base "Job Site Management" costs for CSA 32. The costs of job site management for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

The contractor shall abide by all federal and state regulations regarding removal and disposal of Asbestos Cement pipe.

This item also includes providing worker protection from trench failures and other hazards that may occur during construction. The Contractor shall comply with the provisions of the Construction Safety Orders, Tunnel Safety Orders, and General Safety Orders issued by the State of California Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations, as they pertain to the protection of workers from the hazard of caving ground.

The Contractor shall obtain a permit from the Division of Industrial Safety of the State of California prior to commencement of construction. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 32 contract work completed.

### **Bid Item No. 40 - Traffic Control**

This bid item is a lump sum bid for all materials, labor and appurtenances required to maintain traffic control measures within the CSA 32 project limits and as directed by the Engineer. Bid Item No. 40 and Bid Item No. 75 are intended to cover all of the "Traffic Control" costs for CSA 32. The total costs of traffic control for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

The Contractor shall submit a traffic control plan for review and approval by the County. Traffic control provisions shall conform but not limited to the following requirements:

1. The California Manual on Uniform Traffic Control Devices (MUTCD), latest edition, is hereby referred to and incorporated herein as though set forth in full. The Contractor shall be responsible for providing all necessary traffic control facilities, 24 hours per day, 7 days per week for the entire duration of the project.

2. The Contractor shall maintain pedestrian crossings with adequate visibility for approaching traffic.
3. The Contractor shall notify County Fire and Sheriff Departments, and County Transportation Department and Traffic Division at least forty-eight (48) hours in advance of any proposed lane closure. Any lane closures must have prior approval of the County of Fresno and have pre-notification warning signs in place seven (7) calendar days prior to said closure.
4. The Contractor shall submit a traffic control plan to the County of Fresno for review and approval. A copy of the approved traffic control plan shall be provided to the Engineer prior to the start of construction activities.
5. The Contractor shall strictly comply with, and will be solely responsible for, all required traffic control and devices as per approved plan and any revisions thereof. The Contractor shall inspect the traffic control setup at two-hour intervals, at a minimum, and correct all problems immediately.
6. The Contractor shall provide safe access for the County and County's representatives inspection staff.
7. Specific traffic control measures associated with the work of this Contract are as follows:
  - a. Existing striping and road stencil work which conflicts with detour layout shall be removed. Conflicting signs shall be covered.
  - b. Where traffic is moved out of its normal position, traffic lanes must be a minimum of twelve (12) feet wide. One (1) lane of traffic in each direction shall be maintained, at all times, unless approved otherwise by the County (and Caltrans).
  - c. Lane closures shall be limited between the hours of 9 AM to 4 PM to minimize disruptions to commuter traffic. All lane closures must be approved by the County (and Caltrans) in advance. The road shall be returned to two-way traffic outside of the hours specified above.
  - d. The Contractor may use trench plates to re-open the road to two-way traffic overnight, however, temporary trench resurfacing shall be placed after each road crossing is complete. Temporary trench resurfacing shall be maintained until permanent trench resurfacing is placed. Permanent trench resurfacing shall be scheduled and placed immediately following acceptance of water main, services and appurtenances installed.
  - e. Access to all local streets, businesses and residences shall be maintained at all times, except as noted below. Where the Contractor's operations block access to driveways, the Contractor shall provide a minimum of forty-eight (48) hour written notice to the residents and minimize the duration of interruptions to driveway access.

Full compensation for furnishing all labor (including flagging), materials, tools, equipment and incidentals, and for doing all work involved for the sole convenience, direction and safety of public traffic and pedestrians shall be included in this bid item. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 32 contract work completed.

#### **Bid Item No. 41 - Lead Compliance Plan**

This bid item is a lump sum bid for all labor, equipment, and incidentals and for doing all the work



involved in preparing a Lead Compliance Plan in accordance with Section 7-1.02K(6)(j)(ii) of the Standard Specifications and with these special provisions.

The County will require only one Lead Compliance Plan for this project, however the cost of preparing it shall be divided proportionally among each bid section of the job where removal of existing pavement is included as part of the work. This is required for funding purposes.

**Bid Item No. 42 - Prepare and Implement Storm Water Pollution Prevention Plan**

This bid item is a lump sum bid for prepare and implement a Storm Water Pollution Prevention Plan ("SWPPP"), and includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in preparing, implementing, maintaining, inspecting, and removing water pollution control practices in accordance with the approved SWPPP as specified in the Standard Specifications and these special provisions, and as directed by the Engineer..

This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of contract work completed.

The County will require only one SWPPP and application to the State Water Resources Control Board for the entire project, however the cost of preparing and implementing it shall be divided proportionally among each applicable bid section of the work. This is required for funding purposes.

**Bid Item No. 43 - State Water Resources Control Board – Notice of Intent**

This bid item is specifically provided to reimburse the Contractor for payment of the NOI filing fee charged by the SWRCB and paid by the Contractor after the Contractor has completed the NOI filing process started by the County. The amount paid for this bid item will be the fee only. No payment will be made for overhead or processing costs. Full compensation for any overhead and processing costs will be considered to be included in the various items of work, and no separate compensation will be made therefor.

The dollar amount shown in the Proposal is an estimate only and shall be included in each bidder's proposal. Payment for this bid item will be adjusted based on the actual fee paid. The provisions of Section 9-1.06 for increased or decreased quantities shall not apply to the "State Water Resources Control Board – Notice of Intent" bid item.

Only one SWRCB NOI will be required for the entire project, however the cost of the NOI filing fee shall be divided proportionally among each applicable bid section of the work. This is required for funding purposes.

**Bid Item No. 44 - Dust Control**

This bid item includes all materials, labor and appurtenances required to perform dust control measures for the CSA 32 project limits in accordance with conditions of these specifications. Bid Item No. 44 and Bid Item No. 79 are intended to cover all of the "Dust Control" costs for CSA 32. The costs of providing dust control for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

The contractor shall file a no fee construction notification form with the SJVAPCD pursuant to section 6.4 of SJVAPCD District Rule 8021-Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities (a Dust Control Plan is not required).

This bid item will be paid for by Lump Sum, prorated, based on percentage of CSA 32 contract work completed.

**Bid Item No. 45 - Supplemental Work Allowance**

This item is provided to account for supplemental work which may be required due to differing job site conditions not provided for on the Plans or in these Specifications and other unforeseen work which the Engineer determines is necessary to allow for the work required by the Contract Documents to proceed as intended without interruption. This item will be used only for this purpose. The dollar amount listed on the Bid Proposal Form is an estimated allowance set aside by the County and shall be included on each Bidder's Bid Proposal sheets.

Supplemental work shall be performed only upon direct written authorization from the Engineer and daily extra work reports shall be submitted to and approved by the Engineer. The Contractor shall maintain separate records for extra work performed in accordance with the provisions of Section 5-1.27, "Records," of the Standard Specifications and the special provisions..

The Contractor will be paid only for the value of completed supplemental work which has been authorized in writing by the County.

The value of work, which the Owner may authorize under this item, may be less than the amount shown on the Bid Proposal sheet, and it could be that no supplemental work will be authorized at all. Accordingly, payments to the Contractor for supplemental work will likely differ substantially from the estimated Allowance which is included in the Bid Proposal. If no supplemental work is authorized or if no authorized supplemental work is performed, then no payments will be made to the Contractor under this Bid item and the Contract Price will be reduced by the full amount of the item included in the Bid Proposal for supplemental work. The provisions in Section 9-1.06, "Changed Quantity Pay Adjustments" of the Standard Specifications shall not apply to the item "Supplemental Work Allowance."

The value of supplemental work cannot exceed the amount shown on the bid proposal sheet. Additional work that requires compensation exceeding this allowance shall be subject to approval by the contract change order procedures of this Contract.

The Contractor shall have no claim for anticipated overhead or profit should the County fail to authorize any supplemental work or should the value of authorized supplemental work be less than anticipated by the Contractor.

**Bid Item No. 46 - Supplemental Work (Payment Adjustments for Price Index Fluctuations)**

This item is provided solely to provide funds necessary for adjustments to the prices of those oil-containing materials expressly specified as eligible for such adjustments in Section 9-1.07 "Payment Adjustments for Price Index Fluctuations," in the special provisions. This item does not apply if you opted out of payment adjustments for price index fluctuations at the time of bid.

The dollar amount shown in the Proposal for this bid item is an estimate only and shall be included in each bidder's proposal. The actual payment may be an increase or decrease depending on the changes in the price index. The provisions in Section 9-1.06 "Changed Quantity Pay Adjustments" of the Standard Specifications shall not apply to this bid item.

### **Bid Item No. 47 – Clearing and Grubbing**

This bid item is a lump sum bid for the cost of all work involved in clearing and grubbing the CSA 32 project site. Bid Item No. 47 and Bid Item No. 81 are intended to cover all of the "Clearing and Grubbing" costs for CSA 32. The costs of providing clearing and grubbing for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

Clear and grub vegetation only within the immediate limits required for the installations of the contract facilities. Said areas shall be stripped of surface vegetation, including clearing and grubbing of all shrubs, bushes, vines, stumps, roots, removing and replacing fencing for site access, debris and unsuitable material, within the project site area including fill slopes, temporarily stockpiling unsuitable material per Standard Specifications and these Specifications during construction and related work. This bid item shall be paid at the lump sum price bid.

This bid item includes removal of any other concrete, asphalt or other improvements not included in other items of work.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 32 contract work completed.

### **Bid Item No. 48 - Utility Potholing**

This bid item includes the cost of potholing and locating all existing utilities including all existing water service locations within the CSA 32 project limits. Note that the Plans may not include all existing utilities within the project limits. All existing utilities and water service locations must be marked prior to start of construction.

Bid Item No. 48 and Bid Item No. 82 are intended to cover all of the "Utility Potholing" costs for CSA 32. The costs of providing utility potholing for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

The bid item unit price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This is a lump sum bid item and will be paid at the lump sum price bid. Payment will be prorated based on the percentage of work completed under this bid item.

### **Bid Item No. 49 - 8" PVC, C900, DR-14 Water Main**

This bid item is a unit price bid, per lineal foot, for furnishing and installing 8" diameter C900 DR-14 PVC water pipe to the lines and grades shown on the Plans including but not limited to, pavement removal, trenching, placing pipe bedding, furnishing and installing 8" diameter C900

DR-14 PVC pipe and fittings, polyethylene encasement, restrained joints, tracer wire, caution tape, appurtenances, thrust blocks, backfill and compaction, restoration of unpaved surfaces, disposal of excess and any unsuitable backfill material, backfill with cement slurry where required per plans, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water used during testing.

If a portion of existing active water services are temporarily removed for installation of new water main or due to a conflict between new water main and service elevation, the Contractor shall furnish, install, and disinfect new piping to restore water service connection to existing water main. All work for reconnecting water services will be included in the unit price bid for this item of work and no separate payment will be made therefor.

It is anticipated that existing concrete valley gutter will be removed and replaced to accommodate the installation of the water main at those locations where the water main crosses existing valley gutter. The cost for removal of concrete valley gutter for water main is included in **Bid Item 64-Sawcut, Remove and Replace Concrete Valley Gutter**.

The bid item lineal foot price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per lineal foot.

#### **Bid Item No. 50 - 6" PVC, C900, DR-14 Water Main**

This bid item is a unit price bid, per lineal foot, for furnishing and installing 6" diameter C900 DR-14 PVC water pipe to the lines and grades shown on the Plans including but not limited to, pavement removal, trenching, placing pipe bedding, furnishing and installing 6" diameter C900 DR-14 PVC pipe and fittings, polyethylene encasement, restrained joints, tracer wire, caution tape, appurtenances, thrust blocks, backfill and compaction, restoration of unpaved surfaces, disposal of excess and any unsuitable backfill material, backfill with cement slurry where required per plans, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water used during testing.

If a portion of existing active water services are temporarily removed for installation of new water main or due to a conflict between new water main and service elevation, the Contractor shall furnish, install, and disinfect new piping to restore water service connection to existing water main. All work for reconnecting water services will be included in the unit price bid for this item of work and no separate payment will be made therefor.

It is anticipated that existing concrete valley gutter will be removed and replaced to accommodate the installation of the water main at those locations where the water main crosses existing valley gutter. The cost for removal and replacement of concrete valley gutter for water main installation is included in **Bid Item 64-Sawcut, Remove and Replace Concrete Valley Gutter**.

The bid item lineal foot price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per lineal foot.

**Bid Item No. 51 - 6" DIP, Class 52 Water Main**

This bid item includes the unit bid price for furnishing and installing 6" DIP, Class 52 Water Main, fittings, and appurtenances as shown on Plans to the lines and grades shown on the plans, except where specifically included in another bid item, including but not limited to, pavement removal, the performing excavation and over excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, furnishing and installing 6" DIP Class 52 water main and fittings, polyethylene encasement, restrained joints, tracer wire, caution tape, import sand for pipe zone, backfill and compaction, placing cement slurry where required, restoration of unpaved surfaces, flushing, disinfection, pressure testing, acquisition and disposal of water used during testing.

If a portion of existing active water services are temporarily removed for installation of new water main or due to a conflict between new water main and service elevation, the Contractor shall furnish, install, and disinfect new piping to restore water service connection to existing water main. All work for reconnecting water services will be included in the unit price bid for this item of work and no separate payment will be made therefor.

The cost for removal and replacement of concrete valley gutter for water main installation is included in **Bid Item 64-Sawcut, Remove and Replace Concrete Valley Gutter**.

The bid item lineal foot price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per lineal foot of pipe installed.

**Bid Item No. 52 - 8" Gate Valve Assembly**

This bid item is a unit price bid, per each, for furnishing and installing 8" gate valves at the locations shown on the plans except where specifically included in another bid item, including but not limited to the installation of the valve, thrust block if needed, valve box, concrete collar, riser, restrained joints, and adjusting valve boxes and covers to finished grade.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each 8" valve and valve box installed.

**Bid Item No. 53 - 6" Gate Valve Assembly**

This bid item is a unit price bid, per each, for furnishing and installing 6" gate valves at the locations shown on the plans except where specifically included in another bid item, including but not limited to the installation of the valve, thrust block if needed, valve box, concrete collar, riser, restrained joints, and adjusting valve boxes and covers to finished grade.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item

and will be paid per each 6" valve and valve box installed.

**Bid Item No. 54 - 1-Inch Combination Air Valve Assembly**

This bid item is a unit price bid, per each, for furnishing and installing 1-inch combination air valves assemblies at the locations shown on the Plans, including but not limited to pavement and concrete removal, excavation, stockpiling and disposal of unacceptable backfill material, furnishing and installing combination valve assembly, pipe, valves and fittings, restrained joints, enclosure and concrete slab, backfill and compaction, backfill with cement slurry under curb and gutter, temporary flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water used during testing.

It is not anticipated that concrete curb and gutter will be removed for air valve Installation. If contractor chooses to open cut for air valve installation, cost for curb and gutter removal and replacement shall be included in this bid item and not paid in Bid Item 63.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each combination air valve installed.

**Bid Item No. 55 - Permanent Blow off Assembly**

This bid item is a unit price bid, per each, for furnishing and installing permanent blow-off assemblies at the locations shown on the plans in conformance with the detail shown on the plans, including but not limited to all pavement and concrete removal, excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, furnishing and installing all pipe and fittings, valves, backfill and compaction, the installation of the blow-off assembly, traffic rated vault, adjusting the vault cover to finish grade, flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water used during testing.

It is anticipated that existing concrete curb and gutter will be removed and replaced to accommodate the installation of the blow-off piping. Concrete curb and gutter removal and replacement associated with blow off assembly installations shall be paid under Bid Item No. 63. If the existing curb and gutter is not removed during the pipe installation, backfill with cement slurry under existing curb and gutter shall be included in this bid item.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each permanent blow-off assembly installed.

**Bid Item No. 56 - Bacteriological Sampling Station**

This bid item is a unit bid item, per each, that includes furnishing and installing bacteriological water sampling stations at the locations shown on the plans except where specifically included in another bid item, including but not limited to all pavement removal, excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, backfill with cement slurry under

curb and gutter, furnishing and installing all pipe and fittings, enclosure and concrete slab, flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water used during testing.

It is not anticipated that concrete curb and gutter will be removed for bacteriological sampling station Installation. If contractor chooses to open cut for bacteriological sampling station installation, cost for curb and gutter removal and replacement shall be included in this bid item and not paid in Bid Item 63.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, replacement of any concrete curb, driveway approach or other concrete improvements removed during construction along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each bacteriological water sampling station installed.

### **Bid Item No. 57 - Fire Hydrant Assembly and Lateral**

This bid item is a unit price bid, per each, for furnishing and installing fire hydrant assembly at the locations shown on the Plans, including but not limited to excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, furnishing and installing fire hydrant assembly, pipe, fittings, restrained joints, gate valve, valve box and concrete collar, polyethylene encasement, backfill and compaction, installation of blue pavement marker, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water used during testing and restoration of unpaved surfaces.

It is anticipated that existing concrete curb and gutter will be removed and replaced in order to accommodate the installation of the hydrant lateral piping. Concrete curb and gutter removal and replacement associated with fire hydrant assembly and lateral installations shall be paid under Bid Item No. 63.

It is anticipated that existing concrete sidewalk will be removed and replaced to accommodate the installation of some of the hydrant lateral piping and hydrants. Concrete sidewalk removal and replacement associated with fire hydrant assembly and lateral installations shall be paid under Bid Item No. 65.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each hydrant installed.

### **Bid Item No. 58 - Install Bollards for Fire Hydrant**

This bid item is a unit price bid, per each, for furnishing and installing bollards for fire hydrants as shown on the Plans. Bollards shall be installed to protect fire hydrants that are installed behind rolled curb and gutter.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials required to complete the installation, construction and testing of the described

improvements in fully functional order, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each bollard installed.

**Bid Item No. 59 - Type A and B 1-Inch Water Service Lateral Replacement**

This bid item is a unit bid item, per each, that includes furnishing and installing a 1-inch water service, for each parcel shown on the plans in the base bid, including but not limited to, public notices, all pavement removal, excavation, stockpiling, and disposal of unacceptable backfill material, placing of pipe bedding, backfill with cement slurry under curb and gutter, furnishing and installing all pipe and fittings, valves, flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water using during testing.

Concrete sidewalk removal and replacement associated with Type B water service lateral replacements shall be paid under Bid Item No. 65.

The Contractor has the option to install services by open cutting or by boring method. It is not anticipated that concrete curb and gutter will be removed for water service installation. If contractor chooses to open cut for water service installation, cost for curb and gutter removal and replacement shall be included in this bid item and not paid in Bid Item 63.

All costs associated with protecting existing utilities and improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item.

The bid price item shall include full compensation for furnishing all labor, tools, equipment, and materials, along with all associated appurtenances required to complete the installation, construction, and testing of the described improvements in fully functional order, in conformance with these Plans and Specifications, and as directed by the Engineer. This is a unit bid item and will be paid per each water service installed.

**Bid Item No. 60 - Temporary Trench Resurfacing (Mains & FH Laterals)**

This bid item is a unit price bid, per lineal foot, for all work associated with the placement, temporary compaction, maintenance, and removal (prior to the installation of permanent trench resurfacing) of an estimated quantity of temporary trench resurfacing for water mains noted on the plans and as designated by the Engineer. All trenching in roadway must be patched each day prior to end of shift. All temporary trench resurfacing within County of Fresno road right of way shall consist of 4 inches of cut-back or "cold-mix" resurfacing in conformance with the County of Fresno Encroachment Permit and Improvement Standards. Temporary trench resurfacing shall be maintained by the Contractor during and after normal working hours and on weekends and holidays. The Contractor shall inspect the condition of the temporary surfacing at sufficient intervals and make repairs as necessary.

This bid item includes trench resurfacing for water mains and hydrant laterals only. Trench resurfacing for service lateral lines and for other water system appurtenances such as blow-offs, air valve assemblies, and test stations are included in separate bid item.

This bid item shall be paid at the unit price bid per lineal foot for an estimated quantity of trench resurfacing. The estimated quantity for temporary trench resurfacing as shown in the bid schedule shall be the "**final pay quantity**" and no additional allowance will be made therefor



unless the scope of the work changes.

### **Bid Item No. 61 - Temporary Trench Resurfacing (Services and Appurtenances)**

This bid item is a unit price bid, per each, for all work associated with the placement, temporary compaction, maintenance, and removal (prior to the installation of permanent trench resurfacing) of an estimated quantity of temporary trench resurfacing for all water services and appurtenances noted on the plans and as designated by the Engineer. All trenching in roadway must be patched each day prior to end of shift. All temporary trench resurfacing within County of Fresno road right of way shall consist of 4 inches of cut-back or "cold-mix" resurfacing in conformance with the County of Fresno Encroachment Permit and Improvement Standards. Temporary trench resurfacing shall be maintained by the Contractor during and after normal working hours and on weekends and holidays. The Contractor shall inspect the condition of the temporary surfacing at sufficient intervals and make repairs as necessary. Temporary trench resurfacing will be paid for only once at any given location.

This bid item includes trench resurfacing for and 1" water service, 3" water service, fire hydrant installation, permanent blow off assembly installation, bacteriological sampling station installation and combination air relief valve installation.

This bid item shall be paid at the unit price bid per each for an estimated quantity of trench resurfacing. The estimated quantity for temporary trench resurfacing (Services and Appurtenances) as shown in the bid schedule shall be the "**final pay quantity**" and no additional allowance will be made therefor unless the scope of the work changes.

### **Bid Item No. 62 - Permanent Trench Resurfacing (Mains, Services and Appurtenances)**

This bid item is a unit price bid, per ton, for all work associated with furnishing and installing permanent trench resurfacing and compaction for the length of the water main, services and appurtenances. All Permanent Trench Resurfacing shall be in accordance with County of Fresno Standards and the plans and specifications. This item also includes the replacement of all destroyed traffic markings.

This bid item shall also include replacement of any disturbed warning markers, signs, striping, cross bars, and stop bars.

Reference is made County of Fresno Standard Specifications and these plans and specifications. The Contractor shall use a self-propelled paving machine in accordance with the standards stated above to resurface all areas in which pavement was removed associated with the work of this Contract for trenches greater than three (3) feet in width. The Contractor shall use a roller that has a width equal to or less than the width of the trench for all trenches greater than three (3) feet in width.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, saw cutting trench edges, grinding pavement for overlays and all other associated and/or incidental work along with all associated work required to complete permanent trench resurfacing in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per ton for an estimated quantity of permanent trench resurfacing. This bid item shall be paid at the unit price bid per ton, and may be substantially increased or decreased depending on the actual amount of asphalt pavement that

needs to be used for resurfacing and no other adjustment to unit price will be allowed therefor.

**Bid Item No. 63 - Sawcut, Remove and Replace Concrete Curb and Gutter**

This bid item is a unit price bid, per lineal foot, for all work associated with saw cutting, removal and replacement of concrete curb and gutter at the locations designated on the plans including compensation for all labor, materials, tools, equipment, and incidentals required to construct concrete curb and gutter to the lines and grades shown and specified. This bid item includes pavement removal, excavation, preparation and compaction of Subgrade, furnishing, grading and compacting the granular base material, forming, furnishing and placing the Portland cement concrete, finishing and all other work required to result in a complete curb and gutter.

An estimated quantity of curb and gutter is specified. It is the intent of the County to remove and replace curb and gutter between existing expansion joints where practical. This bid item will be paid for Per Lineal Foot of curb and gutter removed and replaced.

If contractor anticipates removal and replacement of concrete curb and gutter segments other than where specifically depicted on the plans, the cost of removal and replacement shall be included in the bid item for which the work will result in removal and replacement of curb and gutter.

**Bid Item No. 64 - Sawcut, Remove and Replace Concrete Valley Gutter**

This bid item is a unit price bid, per square feet, for all work associated with saw cutting, removal and replacement of concrete valley gutter at the locations designated on the plans including compensation for all labor, materials, tools, equipment, and incidentals required to construct concrete valley gutter to the lines and grades shown and specified. This bid item includes pavement removal, excavation, preparation and compaction of Subgrade, furnishing, grading and compacting the granular base material, forming, furnishing and placing reinforcing bars, furnishing and placing the Portland cement concrete, finishing and all other work required to result in a complete valley gutter. This bid item will be paid for Per Square Foot.

**Bid Item No. 65 - Sawcut, Remove and Replace Concrete Sidewalk**

This bid item is a unit price bid, per square foot, for all work associated with saw cutting, removal and replacement of concrete sidewalk for water main installation, fire hydrant removals and installations, water meter box removals, and "Type B" water service and meter installations, including compensation for all labor, materials, tools, equipment, and incidentals required to construct concrete sidewalk to the lines and grades shown and specified. This bid item includes concrete sidewalk removal, excavation, preparation and compaction of Subgrade, furnishing, grading and compacting the granular base material, forming, furnishing and placing the Portland cement concrete, finishing and all other work required to result in a complete sidewalk. This bid item will be paid for Per Square Foot.

**Bid Item No. 66 - Remove Existing Valve Boxes**

This bid item is a unit price bid, per each, for removing all existing valves boxes that are located within the pavement at the locations shown on the plans including but not limited to the removal of the concrete valve box and lid, concrete collar, and top portions of the riser. The remaining portion of the riser will be backfilled with cement slurry, and the excavated area shall be backfilled,

compacted, and repaved as shown on the details in the plans.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the removal of the described improvements, including backfilling and repaving, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each valve box removed.

### **Bid Item No. 67 - Remove Existing Fire Hydrants**

This bid item is a unit price bid, per each, for removing all existing fire hydrants at the locations shown on the plans including but not limited to the removal of the fire hydrant assembly, cutting existing riser pipe and installing a water tight cap at or above the existing elbow, removal of existing bollards, and backfilling and compacting as shown on the plans.

Removing and replacing of concrete sidewalk associated with the removal of existing fire hydrants shall be paid under Bid Item No. 65. Removal and replacement of concrete rolled curb and gutter associated with the removal of existing fire hydrants shall be paid under Bid Item No. 63.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the removal of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each fire hydrant removed.

### **Bid Item No. 68 - Remove and Dispose of Existing Asbestos Cement Pipe**

This bid item is a unit price bid per each for the cost of all work involved in removing all existing asbestos cement pipe at the locations shown on the plans including but not limited to abiding by all federal and state standards for removal of asbestos cement pipe and proper disposal of pipe.

Existing asbestos cement pipe shall be removed at all locations where there is a conflict with the new water main. Existing pipe shall be properly removed and a temporary re-connection will be installed as shown in the details on the plans. Temporary re-connections will be paid under Bid Item No. 70.

The quantity shown in the Proposal shall be included in each Bidder's proposal. This item may be increased, decreased or deleted entirely by Owner, if the Engineer determines that it is unnecessary. If the item is deleted, no compensation will be made therefor. No costs shall be incurred pertaining to this item unless directed by the Engineer. This item is excluded from the adjustment of changed quantities as specified in Standard Specifications Section 9-1.06 "Changed Quantity Payment Adjustments."

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the removal of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each location.

**Bid Item No. 69 - Remove and Replace Sewer House Branches with 4" PVC SDR 35**

This bid item is a unit price bid, per each, for the cost of all work involved in removing and re-installing existing sewer house branches as necessary with 4" diameter PVC SDR 35 pipe as indicated in the details on the plans including but not limited to, trenching, placing pipe bedding, furnishing and installing 4" diameter PVC SDR 35 pipe and fittings and backfill and compaction. This bid item shall be paid at the unit price bid per each.

The quantity shown in the Proposal shall be included in each Bidder's proposal. This item may be increased, decreased or deleted entirely by Owner, if the Engineer determines that it is unnecessary. If the item is deleted, no compensation will be made therefor. No costs shall be incurred pertaining to this item unless directed by the Engineer. This item is excluded from the adjustment of changed quantities as specified in Standard Specifications Section 9-1.06 "Changed Quantity Payment Adjustments."

**Bid Item No. 70 - Temporary By-Pass Connection of Existing Water Main**

This bid item is a unit price bid, per each, for the cost of all work involved in installing 6" PVC C900 Pipe and temporarily connecting to existing AC pipe as necessary at the locations shown on the plans including but not limited to, furnishing and installing 6" diameter C900 DR-14 PVC pipe and fittings, restrained joints, appurtenances, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water used during testing. This bid item shall be paid at the unit price bid per each.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each.

The quantity shown in the Proposal shall be included in each Bidder's proposal. This item may be increased, decreased or deleted entirely by Owner, if the Engineer determines that it is unnecessary. If the item is deleted, no compensation will be made therefor. No costs shall be incurred pertaining to this item unless directed by the Engineer. This item is excluded from the adjustment of changed quantities as specified in Standard Specifications Section 9-1.06 "Changed Quantity Payment Adjustments."

**Bid Item No. 71 - CSA 32 Tank Site Connection**

This bid item is a unit bid item, per each, for all work related to connecting the new water main to the existing pump discharge pipeline at the location shown on the plans, for the CSA 32 Tank Site Connection. This includes trenching, bedding, backfill and compaction, tracer wire, Tapping tee and valve and appurtenances, disinfection, testing, and inspection to complete the CSA 32 Tank Site Connection as shown on the Plans. Completed item shall provide a complete and fully operational connection to the existing water system.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the tie-in to the existing water system, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each CSA 32 Tank Site Connection to the

system.

### **Bid Item No. 72 - Water System Abandonment**

This item includes furnishing all labor, equipment, tools, material and incidentals for the abandonment of the existing water distribution system in CSA 32 in conformance with the details shown on the plans, including but not limited to cutting and capping existing water main pipe at the tank site, capping and abandoning existing services, removal of existing meters and meter boxes, and backfilling and compacting as noted on the Plans. This bid item will be paid for by Lump Sum. Payment will be prorated based on the percentage of work completed under this bid item.

## **1.5 CSA 32 BASE BID ITEMS (B)**

### **Bid Item No. 73 - Mobilization, Bonds, and Insurance**

This item is a lump sum bid for mobilization, all necessary bonds, insurance, insurance, permits, and licenses required during the performance of the work, and demobilization and shall conform to the provisions of these Specifications. Bid Item No. 37 and Bid Item No. 73 are intended to cover all of the base "Mobilization" costs for CSA 32. The costs of mobilization for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

This item shall consist of covering the Contractors cost for Contract Documents and for the moving of personnel, equipment, supplies and incidentals to the CSA 32 project site. This item shall include obtaining all permits required for the CSA 32 project; except any permits specifically included under a separate bid item. Permit fees and all other permit preparation costs shall be included in this bid item. This item includes any construction staking that is not provided by the Owner. This item also includes demobilization, including removal of all equipment supplies, personnel, and incidentals from the CSA 32 project site at the end of construction.

All costs associated with this item shall be included in the lump sum price and no additional payment will be made. This bid item shall be paid as specified in Section 9 Payment and Sub-Section 9-1.16 D Mobilization of the State Standard Specifications.

### **Bid Item No. 74 - Job Site Management**

This bid item is a lump sum bid item for the cost of all work involved with CSA 32 job site management and includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in spill prevention and control, material management, waste management, non-stormwater management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste resulting from your activities, as specified in the Standard Specifications and these Special Provisions, and as ordered by the Engineer.

Bid Item No. 39 and Bid Item No. 74 are intended to cover all of the base "Job Site Management" costs for CSA 32. The costs of job site management for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

The contractor shall abide by all federal and state regulations regarding removal and disposal of Asbestos Cement pipe.

This item also includes providing worker protection from trench failures and other hazards that may occur during construction. The Contractor shall comply with the provisions of the Construction Safety Orders, Tunnel Safety Orders, and General Safety Orders issued by the State of California Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations, as they pertain to the protection of workers from the hazard of caving ground.

The Contractor shall obtain a permit from the Division of Industrial Safety of the State of California prior to commencement of construction. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 32 contract work completed.

### **Bid Item No. 75 - Traffic Control**

This bid item is a lump sum bid for all materials, labor and appurtenances required to maintain traffic control measures within the CSA 32 project limits and as directed by the Engineer. Bid Item No. 40 and Bid Item No. 75 are intended to cover all of the "Traffic Control" costs for CSA 32. The total costs of traffic control for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

The Contractor shall submit a traffic control plan for review and approval by the County. Traffic control provisions shall conform but not limited to the following requirements:

1. The California Manual on Uniform Traffic Control Devices (MUTCD), latest edition, is hereby referred to and incorporated herein as though set forth in full. The Contractor shall be responsible for providing all necessary traffic control facilities, 24 hours per day, 7 days per week for the entire duration of the project.
2. The Contractor shall maintain pedestrian crossings with adequate visibility for approaching traffic.
3. The Contractor shall notify County Fire and Sheriff Departments, and County Transportation Department and Traffic Division at least forty-eight (48) hours in advance of any proposed lane closure. Any lane closures must have prior approval of the County of Fresno and have pre-notification warning signs in place seven (7) calendar days prior to said closure.
4. The Contractor shall submit a traffic control plan to the County of Fresno for review and approval. A copy of the approved traffic control plan shall be provided to the Engineer prior to the start of construction activities.
5. The Contractor shall strictly comply with, and will be solely responsible for, all required traffic control and devices as per approved plan and any revisions thereof. The Contractor shall inspect the traffic control setup at two-hour intervals, at a minimum, and correct all problems immediately.
6. The Contractor shall provide safe access for the County and County's representatives inspection staff.
7. Specific traffic control measures associated with the work of this Contract are as follows:
  - a. Existing striping and road stencil work which conflicts with detour layout shall be removed. Conflicting signs shall be covered.
  - b. Where traffic is moved out of its normal position, traffic lanes must be a minimum of

twelve (12) feet wide. One (1) lane of traffic in each direction shall be maintained, at all times, unless approved otherwise by the County (and Caltrans).

- c. Lane closures shall be limited between the hours of 9 AM to 4 PM to minimize disruptions to commuter traffic. All lane closures must be approved by the County (and Caltrans) in advance. The road shall be returned to two-way traffic outside of the hours specified above.
- d. The Contractor may use trench plates to re-open the road to two-way traffic overnight, however, temporary trench resurfacing shall be placed after each road crossing is complete. Temporary trench resurfacing shall be maintained until permanent trench resurfacing is placed. Permanent trench resurfacing shall be scheduled and placed immediately following acceptance of water main, services and appurtenances installed.
- e. Access to all local streets, businesses and residences shall be maintained at all times, except as noted below. Where the Contractor's operations block access to driveways, the Contractor shall provide a minimum of forty-eight (48) hour written notice to the residents and minimize the duration of interruptions to driveway access.

Full compensation for furnishing all labor (including flagging), materials, tools, equipment and incidentals, and for doing all work involved for the sole convenience, direction and safety of public traffic and pedestrians shall be included in this bid item. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 32 contract work completed.

#### **Bid Item No. 76 - Lead Compliance Plan**

This bid item is a lump sum bid for all labor, equipment, and incidentals and for doing all the work involved in preparing a Lead Compliance Plan in accordance with Section 7-1.02K(6)(j)(ii) of the Standard Specifications and with these special provisions.

The County will require only one Lead Compliance Plan for this project, however the cost of preparing it shall be divided proportionally among each bid section of the job where removal of existing pavement is included as part of the work. This is required for funding purposes.

#### **Bid Item No. 77 - Prepare and Implement Storm Water Pollution Prevention Plan**

This bid item is a lump sum bid for prepare and implement a Storm Water Pollution Prevention Plan ("SWPPP"), and includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in preparing, implementing, maintaining, inspecting, and removing water pollution control practices in accordance with the approved SWPPP as specified in the Standard Specifications and these special provisions, and as directed by the Engineer..

This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of contract work completed.

The County will require only one SWPPP and application to the State Water Resources Control Board for the entire project, however the cost of preparing and implementing it shall be divided proportionally among each applicable bid section of the work. This is required for funding

purposes.

**Bid Item No. 78 - State Water Resources Control Board – Notice of Intent**

This bid item is specifically provided to reimburse the Contractor for payment of the NOI filing fee charged by the SWRCB and paid by the Contractor after the Contractor has completed the NOI filing process started by the County. The amount paid for this bid item will be the fee only. No payment will be made for overhead or processing costs. Full compensation for any overhead and processing costs will be considered to be included in the various items of work, and no separate compensation will be made therefor.

The dollar amount shown in the Proposal is an estimate only and shall be included in each bidder's proposal. Payment for this bid item will be adjusted based on the actual fee paid. The provisions of Section 9-1.06 for increased or decreased quantities shall not apply to the "State Water Resources Control Board – Notice of Intent" bid item.

Only one SWRCB NOI will be required for the entire project, however the cost of the NOI filing fee shall be divided proportionally among each applicable bid section of the work. This is required for funding purposes.

**Bid Item No. 79 - Dust Control**

This bid item includes all materials, labor and appurtenances required to perform dust control measures for the CSA 32 project limits in accordance with conditions of these specifications. Bid Item No. 44 and Bid Item No. 79 are intended to cover all of the "Dust Control" costs for CSA 32. The costs of providing dust control for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

The contractor shall file a no fee construction notification form with the SJVAPCD pursuant to section 6.4 of SJVAPCD District Rule 8021-Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities (a Dust Control Plan is not required).

This bid item will be paid for by Lump Sum, prorated, based on percentage of CSA 32 contract work completed.

**Bid Item No. 80 - Supplemental Work (Payment Adjustments for Price Index Fluctuations)**

This item is provided solely to provide funds necessary for adjustments to the prices of those oil-containing materials expressly specified as eligible for such adjustments in Section 9-1.07 "Payment Adjustments for Price Index Fluctuations," in the special provisions. This item does not apply if you opted out of payment adjustments for price index fluctuations at the time of bid.

The dollar amount shown in the Proposal for this bid item is an estimate only and shall be included in each bidder's proposal. The actual payment may be an increase or decrease depending on the changes in the price index. The provisions in Section 9-1.06 "Changed Quantity Pay Adjustments" of the Standard Specifications shall not apply to this bid item.

**Bid Item No. 81 – Clearing and Grubbing**



This bid item is a lump sum bid for the cost of all work involved in clearing and grubbing the CSA 32 project site. Bid Item No. 47 and Bid Item No. 81 are intended to cover all of the "Clearing and Grubbing" costs for CSA 32. The costs of providing clearing and grubbing for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

Clear and grub vegetation only within the immediate limits required for the installations of the contract facilities. Said areas shall be stripped of surface vegetation, including clearing and grubbing of all shrubs, bushes, vines, stumps, roots, removing and replacing fencing for site access, debris and unsuitable material, within the project site area including fill slopes, temporarily stockpiling unsuitable material per Standard Specifications and these Specifications during construction and related work. This bid item shall be paid at the lump sum price bid.

This bid item includes removal of any other concrete, asphalt or other improvements not included in other items of work.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of CSA 32 contract work completed.

#### **Bid Item No. 82 - Utility Potholing**

This bid item includes the cost of potholing and locating all existing utilities including all existing water service locations within the CSA 32 project limits. Note that the Plans may not include all existing utilities within the project limits. All existing utilities and water service locations must be marked prior to start of construction.

Bid Item No. 48 and Bid Item No. 82 are intended to cover all of the "Utility Potholing" costs for CSA 32. The costs of providing utility potholing for CSA 32 shall be proportioned between these two bid items. This is required for funding purposes.

The bid item unit price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This is a lump sum bid item and will be paid at the lump sum price bid. Payment will be prorated based on the percentage of work completed under this bid item.

#### **Bid Item No. 83 - 8" PVC, C900, DR-14 Water Main (East of Santa Clara Avenue)**

This bid item is a unit price bid, per lineal foot, for furnishing and installing 8" diameter C900 DR-14 PVC water pipe to the lines and grades shown on the Plans within Clarkson Avenue, including but not limited to, trenching, placing pipe bedding, furnishing and installing 8" diameter C900 DR-14 PVC pipe and fittings, restrained joints, tracer wire, caution tape, appurtenances, thrust blocks, backfill and compaction, backfill with cement slurry where required per plans, restoration of unpaved surfaces, disposal of excess and any unsuitable backfill material, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water used during testing.

If a portion of existing active water services are temporarily removed for installation of new water

main or due to a conflict between new water main and service elevation, the Contractor shall furnish, install, and disinfect new piping to restore water service connection to existing water main. All work for reconnecting water services will be included in the unit price bid for this item of work and no separate payment will be made therefor.

The bid item lineal foot price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per lineal foot.

#### **Bid Item No. 84 - 4" PVC, C900, DR-14 Water Main**

This bid item is a unit price bid, per lineal foot, for furnishing and installing 4" diameter C900 DR-14 PVC water pipe to the lines and grades shown on the Plans within Clarkson Avenue, including but not limited to, trenching, placing pipe bedding, furnishing and installing 4" diameter C900 DR-14 PVC pipe and fittings, restrained joints, tracer wire, caution tape, appurtenances, thrust blocks, backfill and compaction, backfill with cement slurry where required per plans, restoration of unpaved surfaces, disposal of excess and any unsuitable backfill material, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water used during testing.

If a portion of existing active water services are temporarily removed for installation of new water main or due to a conflict between new water main and service elevation, the Contractor shall furnish, install, and disinfect new piping to restore water service connection to existing water main. All work for reconnecting water services will be included in the unit price bid for this item of work and no separate payment will be made therefor.

The bid item lineal foot price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per lineal foot.

#### **Bid Item No. 85 - 8" Gate Valve Assembly**

This bid item is a unit price bid, per each, for furnishing and installing 8" gate valves at the locations shown on the plans except where specifically included in another bid item, including but not limited to the installation of the valve, thrust block if needed, valve box, concrete collar, riser, restrained joints, and adjusting valve boxes and covers to finished grade.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each 8" valve and valve box installed.

#### **Bid Item No. 86 - 4" Gate Valve Assembly**

This bid item is a unit price bid, per each, for furnishing and installing 4" gate valves at the locations shown on the plans except where specifically included in another bid item, including but not limited to the installation of the valve, thrust block if needed, valve box, concrete collar, riser, restrained joints, and adjusting valve boxes and covers to finished grade.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each 4" valve and valve box installed.

**Bid Item No. 87 - 1-Inch Combination Air Valve Assembly**

This bid item is a unit price bid, per each, for furnishing and installing 1-inch combination air valve assemblies at the locations shown on the Plans, including but not limited to pavement and concrete removal, excavation, stockpiling and disposal of unacceptable backfill material, furnishing and installing combination valve assembly, pipe, valves and fittings, restrained joints, enclosure and concrete slab, backfill and compaction, temporary flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water used during testing.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each combination air valve installed.

**Bid Item No. 88 - Permanent Blow Off Assembly**

This bid item is a unit price bid, per each, for furnishing and installing permanent blow-off assemblies at the locations shown on the plans in conformance with the detail shown on the plans, including but not limited to all pavement and concrete removal, excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, furnishing and installing all pipe and fittings, valves, backfill and compaction, the installation of the blow-off assembly, traffic rated vault, adjusting the vault cover to finish grade, flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water used during testing.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each permanent blow-off assembly installed.

**Bid Item No. 89 - Fire Hydrant Assembly and Lateral**

This bid item is a unit price bid, per each, for furnishing and installing fire hydrant assembly at the locations shown on the Plans, including but not limited to excavation, stockpiling and disposal of unacceptable backfill material, placing pipe bedding, furnishing and installing fire hydrant assembly, pipe, fittings, restrained joints, gate valve, valve box and concrete collar, polyethylene encasement, backfill and compaction, installation of blue pavement marker, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water used during testing and restoration of unpaved surfaces.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation,

construction and testing of the described improvements in fully functional order, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each hydrant installed.

**Bid Item No. 90 - Install Bollards for Fire Hydrant and Air Valves**

This bid item is a unit price bid, per each, for furnishing and installing bollards for fire hydrants, and air release valves including the bollard footing and excavation, as shown on the Plans. Bollards will be installed to protect fire hydrants and air valve assemblies where no curbs exist between the road and the proposed facilities.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each bollard installed.

**Bid Item No. 91 - Type A 1-Inch Water Service Lateral Replacement (Clarkson Avenue)**

This bid item is a unit bid item, per each, that includes furnishing and installing a 1-inch water service, for each parcel shown on the plans in the base bid, including but not limited to, public notices, excavation, stockpiling, and disposal of unacceptable backfill material, placing of pipe bedding, furnishing and installing all pipe and fittings, valves, flushing, disinfection, pressure and bacteriological testing and acquisition and disposal of water using during testing.

The Contractor has the option to install services by open cutting or by boring method. All costs associated with protecting existing utilities and improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item. Contractor shall be required to obtain and pay all costs associated with County of Fresno permits.

The bid price item shall include full compensation for furnishing all labor, tools, equipment, and materials, along with all associated appurtenances required to complete the installation, construction, and testing of the described improvements in fully functional order, in conformance with these Plans and Specifications, and as directed by the Engineer. This is a unit bid item and will be paid per each water service installed.

**Bid Item No. 92 - Type A 4-Inch Water Service Lateral (Mobile Home Park)**

This bid item is a unit bid item, per each, that includes furnishing and installing a 4-inch water service for the mobile home park, including but not limited to, public notices, excavation, stockpiling, and disposal of unacceptable backfill material, placing of pipe bedding, furnishing and installing all pipe and fittings, valves, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water using during testing and restoration of unpaved surfaces.

The Contractor has the option to install services by open cutting or by boring method. All costs associated with protecting existing utilities and improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item. Contractor shall be required to obtain and pay all costs associated with County of Fresno permits.

The bid price item shall include full compensation for furnishing all labor, tools, equipment, and materials, along with all associated appurtenances required to complete the installation, construction, and testing of the described improvements in fully functional order, in conformance with these Plans and Specifications, and as directed by the Engineer. This is a unit bid item and will be paid per each water service installed.

**Bid Item No. 93 - Type A 3-Inch Water Service Lateral (Cantua Creek Vineyards IV)**

This bid item is a unit bid item, per each, that includes furnishing and installing a 3-inch water service, for each location shown on the plans in the base bid, including but not limited to, public notices, excavation, stockpiling, and disposal of unacceptable backfill material, placing of pipe bedding, furnishing and installing all pipe and fittings, valves, flushing, disinfection, pressure and bacteriological testing, acquisition and disposal of water used during testing and restoration of unpaved surfaces.

The Contractor has the option install services by open cutting or by boring method. All costs associated with protecting existing utilities and improvements and replacing any damaged improvements “in kind” shall be included in this bid item unless specifically included in another bid item. Contractor shall be required to obtain and pay all costs associated with County of Fresno permits.

The bid price item shall include full compensation for furnishing all labor, tools, equipment, and materials, along with all associated appurtenances required to complete the installation, construction, and testing of the described improvements in fully functional order, in conformance with these Plans and Specifications, and as directed by the Engineer. This is a unit bid item and will be paid per each water service installed.

**Bid Item No. 94 - 1” Type A & B Water Meter and Meter Box**

This bid item includes furnishing and installing a water meter box, water service meter and transceiver at the locations shown on the Plans including but not limited to, public notices, excavation, disposal of material, furnishing and installing all pipe and fittings to make connections to new water service lateral and existing house service lead line, meter box (traffic-rated where specified), flushing, disinfection, and acquisition and disposal of water used during testing and restoration of surrounding area, including concrete repair.

All costs associated with protecting existing improvements and replacing any damaged improvements “in kind” shall be included in this bid item unless specifically included in another bid item. Contractor shall be required to obtain and pay all costs associated with Fresno County permits. The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each installed.

**Bid Item No. 95 - 2” Water Meter and Meter Box (Mobile Home Park)**

This bid item includes furnishing and installing a water meter box, 2” water service meter and transceiver at the mobile home park as shown on the Plans including but not limited to, public notices, excavation, disposal of material, and furnishing and installing all pipe and fittings to make

connection to new water service lateral, meter box (traffic-rated where specified), installing new 4" service line and connecting to existing service line, flushing, disinfection, and acquisition and disposal of water used during testing and restoration of surrounding area, including concrete repair.

All costs associated with protecting existing improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item. Contractor shall be required to obtain and pay all costs associated with Fresno County permits. The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each installed.

**Bid Item No. 96 - 2" Water Meter and Meter Box (School)**

This bid item includes removing and replacing existing 2" water meters and meter boxes located near the east end of the Cantua Elementary School property, The existing meter and meter box shall be removed. The bid item includes furnishing and installing a new water meter box, 2" water service meter and transceiver at the school as shown on the plans, including but not limited to, public notices, excavation, concrete saw cutting, disposal of material, and furnishing and installing all pipe and fittings to make connections to the existing service pipelines, meter box (traffic-rated where specified), flushing, disinfection, and acquisition and disposal of water used during testing and restoration of surrounding area, including concrete repair.

All costs associated with protecting existing improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item. Contractor shall be required to obtain and pay all costs associated with Fresno County permits. The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item and will be paid per each installed.

**Bid Item No. 97 - 3" Water Meter and Meter Box (Cantua Creek Vineyards IV)**

This bid item includes furnishing and installing a water meter box, 3" water service meter and transceiver at the locations shown on the Plans including but not limited to, public notices, excavation, disposal of material, and furnishing and installing all pipe and fittings to make connection to new water service lateral, meter box (traffic-rated where specified), flushing, disinfection, and acquisition and disposal of water used during testing and restoration of surrounding area, including concrete repair.

All costs associated with protecting existing improvements and replacing any damaged improvements "in kind" shall be included in this bid item unless specifically included in another bid item. Contractor shall be required to obtain and pay all costs associated with Fresno County permits. The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the installation, construction and testing of the described improvements in fully functional order, in conformance with the plans and specifications, and as directed by the Engineer. This is a unit price bid item

and will be paid per each installed.

**Bid Item No. 98 - Abandon Existing 4" Water Main (Clarkson Avenue):**

This item includes furnishing all labor, equipment, tools, material and incidentals for the abandonment of existing 4" water main along Clarkson Avenue in conformance with the details shown on the plans, including but not limited to cutting and capping the 4" pipeline. This bid item will be paid for by Lump Sum. Payment will be prorated based on the percentage of work completed under this bid item.

**Bid Item No. 99 - Temporary Trench Resurfacing (Mains)**

This bid item is a unit price bid, per lineal foot, for all work associated with the placement, temporary compaction, maintenance, and removal (prior to the installation of permanent trench resurfacing) of an estimated quantity of temporary trench resurfacing for water mains noted on the plans and as designated by the Engineer. All trenching in roadway must be patched each day prior to end of shift. All temporary trench resurfacing within County of Fresno road right of way shall consist of 4 inches of cut-back or "cold-mix" resurfacing in conformance with the County of Fresno Encroachment Permit and Improvement Standards. Temporary trench resurfacing shall be maintained by the Contractor during and after normal working hours and on weekends and holidays. The Contractor shall inspect the condition of the temporary surfacing at sufficient intervals and make repairs as necessary.

This bid item includes trench resurfacing for water mains only. Trench resurfacing for service lateral lines and for other water system appurtenances such as blow-offs, air valve assemblies, and test stations are included in separate bid item.

This bid item shall be paid at the unit price bid per lineal foot for an estimated quantity of trench resurfacing. The estimated quantity for temporary trench resurfacing as shown in the bid schedule shall be the "**final pay quantity**" and no additional allowance will be made therefor unless the scope of the work changes.

**Bid Item No. 100 - Permanent Trench Resurfacing (Mains, Services and Appurtenances)**

This bid item is a unit price bid, per ton, for all work associated with furnishing and installing permanent trench resurfacing and compaction for the length of the water main, services and appurtenances. All Permanent Trench Resurfacing shall be in accordance with County of Fresno Standards and the plans and specifications. This item also includes the replacement of all destroyed traffic markings.

This bid item shall also include replacement of any disturbed warning markers, signs, striping, cross bars, and stop bars.

Reference is made County of Fresno Standard Specifications and these plans and specifications. The Contractor shall use a self-propelled paving machine in accordance with the standards stated above to resurface all areas in which pavement was removed associated with the work of this Contract for trenches greater than three (3) feet in width. The Contractor shall use a roller that has a width equal to or less than the width of the trench for all trenches greater than three (3) feet in width.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, saw cutting trench edges, grinding pavement for overlays and all other associated and/or incidental work along with all associated work required to complete permanent trench resurfacing in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per ton.

**Bid Item No. 101 - Connection to Existing Water Main**

This bid item is a unit bid item, per each, for all work related to connecting the new water mains to the existing Cantua Elementary School 8-inch PVC water main along Clarkson Avenue at the locations shown on the plans. This includes trenching, bedding, backfill and compaction, tracer wire, valves and appurtenances, testing, and inspection to complete the Connections to the existing water main as shown on the Plans. Completed item shall provide a complete and fully operational connection to the existing water main.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the tie-in to the existing water main, in conformance with the Plans and Specifications, and as directed by the Engineer. This bid item shall be paid at the unit price bid per each connection to the existing water main.

**1.6 CSA 30 ADDITIVE ALTERNATE NO. 1 BID ITEMS**

**Bid Item No. 102 - Mobilization, Bonds, and Insurance**

This item is a lump sum bid for mobilization, all necessary bonds, insurance, insurance, permits, and licenses required during the performance of the work, and demobilization and shall conform to the provisions of these Specifications. This bid item is intended to cover any additional mobilization costs that might be required for CSA 30 (in excess of the base mobilization costs included in Bid Item No. 1 and Bid Item No. 33) specifically if Additive Alternate No. 1 is awarded.

This item shall consist of covering the Contractors cost for Contract Documents and for the moving of additional personnel, equipment, supplies and incidentals to the CSA 30 project site. This item shall include obtaining all permits required for Additive Alternate No. 1; except any permits specifically included under a separate bid item. Permit fees and all other permit preparation costs shall be included in this bid item. This item includes any construction staking that is not provided by the Owner. This item also includes demobilization, including removal of all additional equipment supplies, personnel, and incidentals from the CSA 30 project site at the end of construction.

All costs associated with this item shall be included in the lump sum price and no additional payment will be made. This bid item shall be paid as specified in Section 9 Payment and Sub-Section 9-1.16 D Mobilization of the State Standard Specifications.

**Bid Item No. 103 - Job Site Management**

This bid item is a lump sum bid item for the cost of any additional work involved with CSA 30 job site management (in excess of the base job site management costs included in Bid Item No. 3 and Bid Item No. 34) specifically if Additive Alternate No. 1 is awarded.



This bid item includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in spill prevention and control, material management, waste management, non-stormwater management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste resulting from your activities, as specified in the Standard Specifications and these Special Provisions, and as ordered by the Engineer.

The contractor shall abide by all federal and state regulations regarding removal and disposal of Asbestos Cement pipe.

This item also includes providing worker protection from trench failures and other hazards that may occur during construction. The Contractor shall comply with the provisions of the Construction Safety Orders, Tunnel Safety Orders, and General Safety Orders issued by the State of California Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations, as they pertain to the protection of workers from the hazard of caving ground.

The Contractor shall obtain a permit from the Division of Industrial Safety of the State of California prior to commencement of construction. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of Additive Alternate No. 1 contract work completed.

#### **Bid Item No. 104 - County of Fresno Plumbing and Electrical Permits**

This item shall be bid per each and shall include only the actual fees paid for the County of Fresno Electrical and Plumbing Permits. The Contractor shall be responsible for obtaining the permits and fulfilling all requirements as set forth in said permits. Any overhead and administrative costs associated with obtaining the permits shall be considered to be included in the bid prices for the various items of work, and no additional payments will be made therefor.

The County of Fresno Electrical and Plumbing Permits amount listed on the Bid Proposal is for bidding purposes only and the Contractor will be reimbursed the actual amount paid to the County of Fresno.

#### **Bid Item No. 105 - Update Grounding System**

This item shall be bid per each and shall conform to the provisions of California Electrical Code (CEC) 2010, these Specifications and as directed by the Engineer.

At each location required by the Engineer or Building Official, the Contractor will be required to update the residential electrical grounding system. Prior to updating the grounding system, the contractor will be required to obtain an electrical permit from the governing Building Official. The fee paid required for the electrical permit shall be covered by **Bid Item 104 – County of Fresno Plumbing and Electrical Permits**.

This item shall consist of furnishing and installing any or all of the items listed below in order to update the residential grounding system.

1. 8-Foot grounding rod
2. Bonding wire and all necessary connection clamps, connecting the grounding rod to the existing ground/Neutral Buss in electrical service panel

3. Bonding wire and all necessary connection clamps, connecting the residential cold water metal pipe system to the ground rod or to the existing ground/Neutral Buss in electrical service panel as required by the electrical permit

Full compensation for furnishing all labor, materials, tools, equipment, permits and incidentals and for doing all work involved in updating the residential grounding system, complete in place, shall be included in the per each price bid.

The final pay quantity will be based upon actual number of updated residential grounding systems installed, as determined by the Engineer.

### **Bid Item No. 106 - Clearing and Grubbing**

This bid item is a lump sum bid for the cost of any additional work involved in clearing and grubbing the project site, specifically if Additive Alternate No. 1 is awarded.

Clear and grub vegetation only within the immediate limits required for the installations of the contract facilities. Said areas shall be stripped of surface vegetation, including clearing and grubbing of all shrubs, bushes, vines, stumps, roots, removing and replacing fencing for site access, debris and unsuitable material, within the project site area including fill slopes, temporarily stockpiling unsuitable material per Standard Specifications and these Specifications during construction and related work. This bid item shall be paid at the lump sum price bid.

This bid item includes removal of any other concrete, asphalt or other improvements not included in other items of work.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of Additive Alternate No. 1 contract work completed.

### **Bid Item No. 107 - 1" House Service Line:**

This is a unit price bid, per lineal foot, for all work associated with furnishing and installing 1" house service lines on private property. Payment under this item shall be considered full compensation for all labor, materials, tools, equipment and incidentals required to furnish and install 1" diameter schedule 80 PVC house service line from the new meter box location to the lead line connection point identified on the plans. This item shall include making connections to new meter and onsite plumbing connection to the existing lead line. The unit price shall include payment for all pipe, excavation, trench preparation, taping any buried galvanized pipe, backfill, compaction, flushing line, and other work required to make the system complete and operable.

This bid item also includes removal and replacement of any on-site private concrete, asphalt, and landscaping features that are in the way of the proposed house service line alignments. All damaged existing facilities shall be replaced in kind.

This bid item will be paid for Per Lineal Foot of house service line installed.

## **1.7 CSA 32 ADDITIVE ALTERNATE NO. 2 BID ITEMS**

### **Bid Item No. 108 - Mobilization, Bonds, and Insurance**

This item is a lump sum bid for mobilization, all necessary bonds, insurance, insurance, permits, and licenses required during the performance of the work, and demobilization and shall conform to the provisions of these Specifications. This bid item is intended to cover any additional mobilization costs that might be required for CSA 32 (in excess of the base mobilization costs included in Bid Item Nos. 37 and 73) specifically if Additive Alternate No. 2 is awarded.

This item shall consist of covering the Contractors cost for Contract Documents and for the moving of additional personnel, equipment, supplies and incidentals to the CSA 32 project site. This item shall include obtaining all permits required for Additive Alternate No. 2; except any permits specifically included under a separate bid item. Permit fees and all other permit preparation costs shall be included in this bid item. This item includes any construction staking that is not provided by the Owner. This item also includes demobilization, including removal of any additional equipment supplies, personnel, and incidentals from the CSA 32 project site at the end of construction.

All costs associated with this item shall be included in the lump sum price and no additional payment will be made. This bid item shall be paid as specified in Section 9 Payment and Sub-Section 9-1.16 D Mobilization of the State Standard Specifications.

### **Bid Item No. 109 - Job Site Management**

This bid item is a lump sum bid item for the cost of all additional work involved with CSA 32 job site management (in excess of the base job site management costs included in Bid Item No. 39 and Bid Item No. 74) specifically if Additive Alternate No. 2 is awarded.

This bid item includes full compensation for furnishing any additional labor, materials, tools, equipment, and incidentals and for doing any additional work involved in spill prevention and control, material management, waste management, non-stormwater management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste resulting from your activities, as specified in the Standard Specifications and these Special Provisions, and as ordered by the Engineer.

The contractor shall abide by all federal and state regulations regarding removal and disposal of Asbestos Cement pipe.

This item also includes providing worker protection from trench failures and other hazards that may occur during construction. The Contractor shall comply with the provisions of the Construction Safety Orders, Tunnel Safety Orders, and General Safety Orders issued by the State of California Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations, as they pertain to the protection of workers from the hazard of caving ground.

The Contractor shall obtain a permit from the Division of Industrial Safety of the State of California prior to commencement of construction. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of Additive Alternate No. 2 contract work completed.

**Bid Item No. 110 - County of Fresno Plumbing and Electrical Permits**

This item shall be bid per each and shall include only the actual fees paid for the County of Fresno Electrical and Plumbing Permits. The Contractor shall be responsible for obtaining the permits and fulfilling all requirements as set forth in said permits. Any overhead and administrative costs associated with obtaining the permits shall be considered to be included in the bid prices for the various items of work, and no additional payments will be made therefor.

The County of Fresno Electrical and Plumbing Permits amount listed on the Bid Proposal is for bidding purposes only and the Contractor will be reimbursed the actual amount paid to the County of Fresno.

**Bid Item No. 111 - Update Grounding System**

This item shall be bid per each and shall conform to the provisions of California Electrical Code (CEC) 2010, these Specifications and as directed by the Engineer.

At each location required by the Engineer or Building Official, the Contractor will be required to update the residential electrical grounding system. Prior to updating the grounding system, the contractor will be required to obtain an electrical permit from the governing Building Official. The cost of obtaining the electrical permit shall be covered by **Bid Item 110 – County of Fresno Plumbing and Electrical Permits**.

This item shall consist of furnishing and installing any or all of the items listed below in order to update the residential grounding system.

4. 8-Foot grounding rod
5. Bonding wire and all necessary connection clamps, connecting the grounding rod to the existing ground/Neutral Buss in electrical service panel
6. Bonding wire and all necessary connection clamps, connecting the residential cold water metal pipe system to the ground rod or to the existing ground/Neutral Buss in electrical service panel as required by the electrical permit

Full compensation for furnishing all labor, materials, tools, equipment, permits and incidentals and for doing all work involved in updating the residential grounding system, complete in place, shall be included in the per each price bid for Bid Item No. 104 – Update Grounding System.

The final pay quantity will be based upon actual number of updated residential grounding systems installed, as determined by the Engineer.

**Bid Item No. 112 - Clearing and Grubbing**

This bid item is a lump sum bid for the cost of any additional work involved in clearing and grubbing the project site, specifically if Additive Alternate No. 2 is awarded.

Clear and grub vegetation only within the immediate limits required for the installations of the contract facilities. Said areas shall be stripped of surface vegetation, including clearing and grubbing of all shrubs, bushes, vines, stumps, roots, removing and replacing fencing for site access, debris and unsuitable material, within the project site area including fill slopes, temporarily

stockpiling unsuitable material per Standard Specifications and these Specifications during construction and related work. This bid item shall be paid at the lump sum price bid.

This bid item includes removal of any other concrete, asphalt or other improvements not included in other items of work.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, along with all associated appurtenances required to complete the work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of Additive Alternate No. 2 contract work completed.

**Bid Item No. 113 - 1" House Service Line:**

This is a unit price bid, per lineal foot, for all work associated with furnishing and installing 1" house serve lines on private property. Payment under this item shall be considered full compensation for all labor, materials, tools, equipment and incidentals required to furnish and install 1" diameter schedule 80 PVC house service line from the new meter box location to the lead line connection point identified on the plans. This item shall include making connections to new meter and onsite plumbing connection to the existing lead line. The unit price shall include payment for all pipe, excavation, trench preparation, taping any buried galvanized pipe, backfill, compaction, flushing line, and other work required to make the system complete and operable.

This bid item also includes removal and replacement of any on-site private concrete, asphalt, and landscaping features that are in the way of the proposed house service line alignments. All damaged existing facilities shall be replaced in kind.

This bid item will be paid for Per Lineal Foot of house service line installed.

**END OF SECTION**

## SECTION 01 26 13

### REQUEST FOR INTERPRETATION

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for handling and processing Requests for Interpretation (RFI).
- B. Requests for Interpretation are intended for requesting clarification and interpretation of Contract Documents due to apparent inconsistencies, errors or omissions in the Contract Documents, and due to unanticipated existing conditions.
- C. An RFI which fails to comply with the requirements of this section will be returned to the Contractor for correction without the benefit of the Engineer's response.
- D. No extension of Contract Time will be granted due to the Contractor's failure to transmit an RFI to the Engineer sufficiently in advance of the Work to permit processing.
- E. The Owner reserves the right to assess the Contractor for the costs of the Engineer's response to an RFI which the Owner deems as being frivolous or unnecessary.
- F. The RFI form is provided at the end of this section.

##### 1.2 PROCEDURE

- A. Only after the Contractor has thoroughly reviewed all Contract Documents and other data available to the Contractor, shall the Contractor submit an RFI to the Engineer.
- B. All RFI's shall utilize the provided RFI form noted above and shall indicate which drawings, details, and specifications need clarification. The RFI should be explicit in what interpretation or information is required. Each submitted RFI shall only address a single subject or issue; and shall be numbered in sequence of submittal.
- C. RFI's shall be submitted to the Engineer at least 10 calendar days before a response is needed.
- D. The Engineer will log each received RFI along with the date of receipt and name of the individual submitting.
- E. The Engineer will provide written responses to RFI's within 5 regular working days.

#### PART 2 PRODUCTS

NOT USED

County of Fresno  
County Service Areas 30 and 32  
Water System Improvements

**PART 3 EXECUTION**

NOT USED

**END OF SECTION**

Request for Interpretation  
01 26 13-2

## REQUEST FOR INFORMATION / INTERPRETATION

Project: \_\_\_\_\_ RFI Number: \_\_\_\_\_

From: \_\_\_\_\_

To: Provost & Pritchard Engineering Group Date: \_\_\_\_\_

Request: \_\_\_\_\_

Requested Date/Time for Response:

Signed by: \_\_\_\_\_

Response: \_\_\_\_\_

Attachments

Response From: \_\_\_\_\_ To: \_\_\_\_\_ Date Received: \_\_\_\_\_ Date Returned: \_\_\_\_\_

Signed by: \_\_\_\_\_

Copies:  Owner  Consultants  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  File

Request for Interpretation  
01 26 13-3



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## **SECTION 01 31 19**

### **PROJECT MEETINGS**

#### **PART 1 GENERAL**

##### **1.1 PRECONSTRUCTION CONFERENCE**

- A. Upon receipt of the Notice to Proceed, or at an earlier time if mutually agreeable, the Owner will arrange a preconstruction conference to be attended by the Contractor, Contractor's superintendent, the Owner, the Engineer or his representative, and representatives of utilities, major subcontractors and others involved in the execution of the Work.
- B. The purpose of this conference shall be to establish a working understanding between the parties and to discuss the Construction Schedule, Critical Path Method format required, shop drawing submittals and processing, applications for payment and their processing, and such other subjects as may be pertinent for the execution of the Work.

##### **1.2 PROGRESS MEETINGS**

- A. The Engineer shall arrange and conduct progress meetings. These meetings shall be conducted weekly, unless designated otherwise and shall be attended by the Engineer or his representative, Contractor, Contractor's superintendent and representatives of all subcontractors, utilities, and others, that are active in the execution of the Work. The purpose of these meetings shall be to expedite the work of any subcontractor or other organization that is not up to schedule, resolve conflicts, and in general, coordinate and expedite the execution of the Work.
- B. The agenda of progress meetings shall include review of progress and schedule, of payment request, of the latest Construction Schedule update, and of the record documents.

##### **1.3 PROGRESS AND SCHEDULE REVIEW**

- A. The progress of the Work and the Construction Schedule shall be reviewed to verify:
  - 1. Actual start and finish dates of completed activities since the last progress meeting.
  - 2. Durations and progress of all activities not completed.
  - 3. Reason, time, and cost data for Change Order work that is to be incorporated into the Construction Schedule or payment request form.
  - 4. Payment due to the Contractor based on percentage complete of items in the submitted payment request.

5. Reasons for, and duration of, required revisions in the Construction Schedule.
6. After each monthly update, the Contractor shall submit to the Engineer three (3) prints of the last accepted Construction Schedule, revised in accordance with the monthly review.

**1.4 REVIEW OF PAYMENT REQUEST**

- A. The Contractor shall have his copy of the payment request and all other data required by the Contract Documents completed prior to the progress meeting. The Engineer will process Contractor's payment request after satisfactory review of the schedule update.

**PART 2 PRODUCTS**

NOT USED

**PART 3 EXECUTION**

NOT USED

**END OF SECTION**

## **SECTION 01 33 00**

### **SUBMITTAL PROCEDURES**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. The work described in this section includes general requirements and procedures related to the preparation and transmission of submittals to include Shop Drawings, Samples, Manuals, and Record Drawings

##### **1.2 RELATED WORK**

- A. General Conditions
- B. Individual equipment specifications

##### **1.3 GENERAL**

- A. Before submitting a Shop Drawing or Sample, Contractor shall have:
  - 1. Reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
  - 2. Determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - 3. Determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
  - 4. Determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
- B. Submit each submittal document under separate cover or transmittal. Transmittal shall include the following identification data, as applicable:
  - 1. Contract number
  - 2. Project name and location
  - 3. Submittal number and revision
  - 4. Product identification

5. Applicable contract drawing number, specification section, and paragraph number
  6. Stamp Space: Blank space of approximately 2-1/2 inches high by 4 inches wide adjacent to the identification data to receive Engineer's status stamp.
  7. Contractor's certification statement as described below
- C. To each submittal affix the following signed Certification Statement.
1. "Certification Statement: By this submittal, we hereby represent that we have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and pertinent data and we have checked and coordinated each item with other applicable approved drawings and all Contract requirements."
- D. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.
- E. Furnish neat, legible, and sufficiently explicit detail to enable proper review for Contract compliance.
- F. Contractor assumes all risks of error and omission.
- G. Work performed before approval, or not conforming to approved submittals, shall be at Contractor's risk.
- H. Submittal requirements contained in this specification are in addition to specific submittal requirements contained in individual equipment specification sections.

#### 1.4 APPROVAL PROCESS

- A. Engineer will provide timely review of Submittal, Shop Drawings and Samples in accordance with Section 5-1.23B of the Standard Specifications. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
- B. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
- C. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

- D. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has given Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the Contract Documents and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
- E. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
- F. Submittals will be returned, marked with one of the following classifications:
  - 1. NO EXCEPTION TAKEN: Requires no corrections, no marks.
  - 2. APPROVED AS NOTED: Requires minor corrections. Items may be fabricated as marked without further resubmission. Resubmit 2 corrected copies to the Engineer.
  - 3. RESUBMIT: Requires corrections. Resubmit entire submittal following original submission with corrections noted. Allow time for checking and Engineer's appropriate action.
  - 4. REJECTED: Requires major corrections or is otherwise not following Contract Documents. No items shall be fabricated. Resubmit entire submittal following original submission with corrections noted.
  - 5. INFORMATION ONLY: Items specified by Contract Documents.

## **PART 2 SUBMITTAL DOCUMENTS**

### **2.1 SHOP DRAWINGS**

- A. Unless otherwise noted in the individual specification sections, submit five (5) sets of shop drawings.
- B. All catalog and specification sheets shall be clearly marked to indicate the specific model number and configuration to be used. Items not applicable to the project shall be crossed out.
- C. Show complete and detailed fabrication; assembly and installation details; wiring and control diagrams; catalog data; pamphlets; descriptive literature; and performance and test data.
- D. Include calculations or other information sufficient to show comprehensive description of structure, equipment, or system provided and its intended manner of use.

- E. Include Manufacturer's installation recommendations.

## 2.2 SAMPLES

- A. Unless otherwise noted in the individual specification sections, submit three (3) samples of each item.
- B. Samples shall be representative of the actual material proposed for use in the project and of sufficient size to demonstrate design, color, texture, and finish.
- C. Permanently attach to each sample
  - 1. The contract number
  - 2. Project name and location
  - 3. Product identification
  - 4. Applicable contract drawing and specification section number
  - 5. Subcontractor's, vendor's and/or manufacturer's name, address, and telephone number.
- D. Certain samples may be tested for specific requirements by the Owner and/or Engineer prior to approval. Failure of sample to pass tests will be sufficient cause for refusal to consider further samples of the same brand and make.
- E. Rejected samples will be returned upon request, and resubmittals shall consist of new samples.

## 2.3 RECORD DRAWINGS

- A. Maintain 1 record copy of Contract Documents at site in good order and annotated to show revisions made during construction. Keep annotations current for possible inspection.
  - 1. Make record drawings available to Engineer at all times during life of Contract.
  - 2. Drawings: Made part of record drawings and to include:
    - a. Contract Drawings: Annotate or redraft, as required, to show revisions, substitutions, variations, omissions, and discrepancies made or discovered during construction concerning location and depth of utilities, piping, ductbanks, conduits, manholes, pumps, valves, vaults, and other equipment. Make revisions and show on all drawing views with actual dimensions established to permanent points.
    - b. Working/Layout Drawings: When required as submittals, record actual layouts of conduit runs between various items of electrical equipment for power, control, and instrumentation; wire sizes, numbers, and

functions; configuration of conduits; piping layouts; and duct layouts.  
Add sections

3. Before preliminary inspection, furnish reproducible of record drawings. At completion of Contract and before final payment is made, furnish Engineer 1 set of reproducibles of finally approved record drawings reflecting revisions herein described.

## 2.4 OPERATION AND MAINTENANCE MANUALS

A. Furnish Operation and Maintenance Manuals for various types of equipment and systems, as required by Contract Documents. Operation and Maintenance Manuals shall be provided for all mechanical and electrical equipment. Unless otherwise indicated, furnish separate manual for each piece of equipment and system. If manual contains other items or equipment, indicate where specified items are located in manual. Include in manual complete information necessary to operate, maintain, and repair specific equipment and system furnished under this Contract, and include the following specific requirements;

1. Contents.
  - a. Table of Contents and Index.
  - b. Brief description of equipment/system and principal components.
  - c. Starting and stopping procedures, both normal and emergency.
  - d. Installation, maintenance, and overhaul instructions including detailed assembly drawings with parts list and numbers, and recommended spare parts list with recommended quantity, manufacturer's price, supplier's address, and telephone number.
  - e. Recommended schedule for servicing, including technical data sheets that indicate weights and types of oil, grease, or other lubricants recommended for use and their application procedures.
  - f. One copy of each component wiring diagram and system wiring diagram showing wire size and identification.
  - g. One approved copy of each submittal with changes made during construction properly noted, including test certificates, characteristic curves, factory and field test results.
  - h. For electrical systems, include dimensioned installation drawings, single line diagrams, control diagrams, wiring and connection diagrams, list of material for contractors, relays and controls, outline drawings showing relays, meters, controls and indication equipment mounted on equipment or inside cubicles, control and protective schematics, and recommended relay settings.



2. Material:
  - a. Covers: Oil, moisture, and wear resistant 9 inches by 11-1/2 inches size.
  - b. Pages: 60 pound paper 8-1/2 inches by 11 inches size with minimum of 2 punched holes 8-1/2 inches apart reinforced with plastic, cloth, or metal.
  - c. Fasteners: Metal screw post or Acco metal strap type.
  - d. Diagrams and Illustrations: Attach foldouts, as required.
- B. Copies:
  1. Submit five (5) preliminary copies of manuals for review and approval no later than date of shipment of equipment. Installation shall not begin until manuals are accepted by Engineer. Include in preliminary copies all items required under "Contents" above. Three copies will be marked and returned to Contractor.
  2. Deliver seven (7) copies of finally approved manuals to Engineer before startup.

### **PART 3 EXECUTION**

*NOT USED*

**END OF SECTION**

## SECTION 01 35 00

### MATERIAL SUBSTITUTION PROCEDURES

#### PART 1 GENERAL

##### 1.1 GENERAL

- A. The materials furnished and used shall be new, except as may be provided elsewhere in these Specifications, or on the Plans.
- B. All materials required to complete the work under this contract shall be furnished by the Contractor, unless otherwise stated.
- C. It shall be the duty of the Contractor to call the Engineer's attention to apparent errors or omissions and request instruction before proceeding with the Work. The Engineer may, by appropriate instructions, correct said apparent errors and omissions, which instructions shall be as binding upon the Contractor as though contained in the original Contract Documents.

##### 1.2 DEFINITIONS

- A. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor.
- B. Revisions: Changes to Contract Documents requested by Owner or Engineer.
- C. Options: Specified options of products and construction methods included in Contract Documents.

##### 1.3 TRADE NAMES AND ALTERNATIVES

- A. Wherever an article, or any class of materials, is specified by the trade name or by the name of any particular patentee, manufacturer or dealer, or by reference to the catalog of any such manufacturer or dealer, it shall be taken as intending to mean and specify the article or material described or any other equal thereto in quality, finish and durability, and equally as serviceable for the purpose for which it is or they are intended. The intent of the Plans and Specifications is to specify highest grade standard equipment, and it is not the intent of these Plans and Specifications to exclude or omit the products of any responsible manufacturer, if such products are equal in every practical respect to those mentioned herein, as determined by the Engineer.

##### 1.4 SAMPLES

- A. At the option of the Engineer, the source of supply of materials for the Work shall be subject to tests and inspection before the delivery is started and before such materials are used in the Work. Samples representative of the character and

quality of materials shall be submitted by the Contractor. Samples shall be of sufficient quantities or amounts for testing or examination.

- B. All tests of materials furnished by the Contractor shall be made in accordance with the commonly recognized standards of national technical organizations, and such special methods and tests as are prescribed in the Contract Documents.
- C. The Contractor shall furnish such samples of materials as are requested by the Engineer, without charge. No material shall be used until the Engineer has had the opportunity to test or examine such materials. Samples will be secured and tested whenever necessary to determine the quality of the material. Samples and test specimens prepared at the jobsite, such as concrete test cylinders, shall be taken or prepared by the Engineer, or his designated representative, in the presence and with the assistance of the Contractor.

#### 1.5 *SUBMITTALS*

- A. Material Submittals shall be made in accordance with Section 01 33 00 – Submittals.

#### 1.6 *INSPECTION OF MATERIALS BY THE CONTRACTOR*

- A. Contractor shall make a close inspection of all materials as delivered, and shall promptly return all defective materials without waiting for their rejection by the Engineer.

#### 1.7 *CERTIFICATES OF COMPLIANCE*

- A. A Certificate of Compliance may be required for certain materials and equipment that become final products of the completed Work. Certificates of Compliance shall be furnished prior to the use of any materials for which these Specifications require that such a certificate be furnished. In addition, when so authorized in these Specifications, the Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance.
- B. The Certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the Specifications.
- C. A Certificate of Compliance shall be furnished with each lot of material delivered to the Work and the lot so certified shall be clearly identified in the certificate.
- D. All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the Work which conforms to the requirements of the Plans and Specifications and any such material not conforming to such requirements will be subject to rejection whether in place or not.

- E. The County of Fresno reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.
  - 1. The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer.

#### 1.8 MANUFACTURER TESTING

- A. At the option of the Engineer, materials and equipment to be supplied under this Contract will be tested and inspected either at their place of origin or at the site of the Work. The Contractor shall give the Engineer written notification well in advance of actual readiness of materials and equipment to be tested and inspected at point of origin.
  - 1. Satisfactory tests and inspections at the point of origin shall not be construed as a final acceptance of the materials and equipment nor shall such tests and inspections preclude retesting or re-inspection at the site of the Work.
  - 2. Materials and equipment which will require testing and inspection at the place of origin shall not be shipped prior to such testing and inspection.

#### 1.9 MANUFACTURERS' RECOMMENDATIONS

- A. All equipment specified and used in the project shall be installed in accordance with the approved manufacturer's current written recommendations.
- B. All such equipment, material, etc., shall be of the manufacturer's latest system or line.

#### 1.10 SUBSTITUTIONS

- A. Conditions: Contractor's substitutions shall be considered when one or more conditions are satisfied, as determined by the Engineer. (The Contractor's submittal and Engineer's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.)
  - 1. Extensive revisions to Contract Documents are not required.
  - 2. Proposed changes are in keeping with the general intent of the Contract Documents.
  - 3. Request is timely, fully documented and properly submitted.
  - 4. Request is directly related to an "or equal" clause or similar language in the Contract Documents.
  - 5. The specified product or method of construction cannot be provided within the Contract Time. The request shall not be considered if the product or

method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

6. The specified product or method of construction cannot receive necessary approval by governing authority, and the requested substitution can.
7. Substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear.
  - a. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
  - b. Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.
8. Specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
9. Specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
10. Specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.

#### **1.11 SUBSTITUTION REQUEST FORM**

- A. Use Substitution Request Form in on page 01 35 00-5.
- B. Submit one form (4 copies) for each request.

**END OF SECTION**

## SUBSTITUTION REQUEST FORM

Page 1 of 2

**TO:** \_\_\_\_\_

**PROJECT:** \_\_\_\_\_

We hereby submit for your consideration the following product instead of the specified item for the above project:

SECTION:	PARAGRAPH:	SPECIFIED ITEM:

Proposed Substitution: \_\_\_\_\_  
\_\_\_\_\_

- Attach: 1) Complete technical data, including laboratory tests, if applicable.  
2) Complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation.

A. Does the substitution affect dimensions on Drawings?  
\_\_\_\_\_  
\_\_\_\_\_

B. Will the undersigned pay for changes to the project design, including engineering and detailing costs caused by the requested substitution?  
\_\_\_\_\_  
\_\_\_\_\_

C. What affect does substitution have on other trades?  
\_\_\_\_\_  
\_\_\_\_\_

D. Differences between proposed substitution and specified item?  
\_\_\_\_\_  
\_\_\_\_\_

E. Manufacturer's guarantees of the proposed and specified items are:  
    \_\_\_ Same      \_\_\_ Different (explain on attached sheet)

## SUBSTITUTION REQUEST FORM

Page 2 of 2

The undersigned states that the function, appearance and quality are equivalent or superior to the specified item.

Submitted By:

Signature \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

Date \_\_\_\_\_

Telephone \_\_\_\_\_

For Use by Design Consultant
Accepted Accepted as Noted Not Accepted Received Late By _____
Date _____
Remarks

## SECTION 01 35 43

### ENVIRONMENTAL PROCEDURES

#### PART 1 GENERAL

##### 1.1 GENERAL

- A. The Contractor shall implement the environmental mitigation measures described in the following sections, excepting those measures specifically identified to be completed by the Owner.

##### 1.2 RELATED WORK

- A. Not used.

##### 1.3 CULTURAL RESOURCES

- A. If archaeological features or materials are unearthed during any phase of project activities, activities within fifty (50) feet of the find shall cease until Contractor has contacted the California State Historic Preservation Office (SHPO), and the significance of the resource has been evaluated. Any mitigation measures that may be deemed necessary must have the approval of SHPO, and shall be implemented, pursuant to the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation, 48 CFR 44716, by a "qualified" archaeologist representing the Contractor prior to the resumption of construction activities.
- B. If human remains are exposed by activity related to the project, the Contractor shall comply with California State Health and Safety Code, Section 7050.5, which states that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to California Public Resources Code, Section 5097.98.

##### 1.4 BIOLOGICAL RESOURCES

- A. No evidence of threatened or endangered species has been found on the project site; however, several threatened or endangered species are known to reside in the general area surrounding the project site. If any evidence of threatened and endangered species is observed during the course of construction, the Contractor shall notify the Owner immediately.

##### 1.5 AIR QUALITY

- A. Contractor shall abide to all applicable state, federal, and local codes and regulations for fugitive dust management and control. Refer to Section 01 57 27 – Dust Control for Air Quality mitigation measure requirements.



**1.6 HYDROLOGY AND WATER QUALITY**

- A. Contractor shall abide to all applicable state, federal, and local codes and regulations for storm water management and control. Refer to Section 13 of the County of Fresno Specifications – Water Pollution Control mitigation measurement requirements.

**END OF SECTION**

## SECTION 01 42 13

### DEFINITIONS AND ABBREVIATIONS

#### PART 1 GENERAL

1.1 *DEFINITIONS AND TERMS* – IN THE EVENT THAT THESE DEFINITIONS CONFLICT WITH THE DEFINITIONS IN SECTION 1-1.07, THE DEFINITIONS IN SECTION 1-1.07 SHALL PREVAIL.

A. Whenever in these Specifications, or in other Contract Documents, the following terms are used, the intent and meaning shall be interpreted as follows:

1. Board: Board of Directors, Fresno County.
2. Calendar Day: Every day shown on the calendar.
3. Contractor: The word “Contractor” means the person, firm or corporation to whom the award is made. Subcontractors as such will not be recognized.
4. Contract Price: The total amount of money for which the Contract is awarded.
5. Contract Unit Price: The Contractor’s original bid for a single unit of an item of work in the Proposal.
6. Contract Time: The number of calendar days for completion of the Work, including authorized time extensions. In the event a calendar date is specified for Project completion in lieu of a number of calendar days, the Work shall be completed by that calendar date. The Contract Time shall be computed by excluding the first and including the last day; and if the last day be Sunday or a legal holiday, that shall be excluded.
7. Engineer: County of Fresno Director of Public Works and Planning, and/or his designee.
8. Equipment: (Construction) - All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of work. (Installed) - All material or articles used in equipping a facility as furnishings or apparatus to fulfill a functional design.
9. General Conditions: As specified in Section 00 72 00 – General Conditions.
10. General Requirements: All specifications contained in Division 1 of the Caltrans Standard Specifications.
11. Notice: Any notice allowed or required to be given by the Owner may be given by the Engineer.
12. Owner: Fresno County

13. Person: Any individual, association, partnership, corporation, trust, joint venture or other legal entity.
14. Plans: The drawings, profiles, cross-sections, working drawings and supplemental drawings, or reproduction thereof, approved by the Engineer, which show the location, character, dimensions or details of the work.
15. Proposal: The offer of a Bidder when submitted on the Proposal form; properly signed and guaranteed.
16. Reference Documents: Bulletins, Rules, Methods of Analysis or Test, Codes, Standards, and Specifications of public or private agencies, Engineer Societies, or Industrial Associations. Reference shall be to the latest edition thereof, including Amendments, which are in effect and published at the time the Request for Bids is issued, unless a specific edition is identified, in which case reference shall be to such specific edition. Reference Documents are intended to amplify the descriptions of materials, equipment, and construction systems and are to be considered a part of the Contract Documents insofar as the various sections thereof are referred to hereinafter. Examples of Reference Documents are Federal Specifications, State Standard Specifications, and those of American Society of Testing Materials (ASTM), American National Standards Institute (ANSI), American Standards Associations (ASA), and American Concrete Institute (ACI).
17. Salvage: The protection storage, and/or removal of specified existing equipment, parts or materials during the work for retention and later use by the Owner.
18. Sanitary Sewer: Any conduit and appurtenances intended for the reception and transfer of sewage.
19. Specifications: Any or all of the specifications defined in this section and any addendums thereof. They are divided into four general categories: Special Provisions, General Requirements (Division 1), Technical Specifications (Division 2 through Division 46), and Reference Documents.
20. State: The State of California.
21. State Standard Plans: State of California, Business and Transportation Agency, Department of Transportation, Caltrans, Standard Plans, latest revision.
22. State Standard Specifications: Standard Specifications for the project are those entitled "Standard Specifications, State of California, Business and Transportation Agency, Department of Transportation", 2015 edition, and any subsequent revisions through September 2, 2016. hereinafter referred to as the State Standard Specifications. These Specifications are to be considered a part of the Contract Documents insofar as they are not superseded by the Special Provisions and other provisions contained in Divisions 01, 02, 03, 05, 09, 31, 32, 33 and 40 of these Specifications.

23. Storm Sewer: Any conduit and appurtenances intended for the reception and transfer of storm water.
24. Street: Any public road, highway, parkway, freeway, alley, walk or right-of-way.
25. Surety: Any individual, firm or corporation bound with and for the Contractor for the acceptable performance, execution and completion of the Work, and for the satisfaction of all obligations incurred.
26. Utility: Tracks, overhead or underground wires, pipelines, conduits, ducts or structures, sewers of storm drains owned, operated or maintained in or across a public right-of-way or private easement.
27. Water Main: Any conduit and appurtenances intended for the distribution of water.
28. Working Day: Any weekday (Monday through Friday), not a designated national holiday, during which weather allows the Contractor to work four or more hours consecutively, starting no later than 10:00 AM.

## 1.2 REFERENCED STANDARDS

- A. The standards referred to, except as modified, shall have full force and effect as though printed in this Specification, and shall be the latest edition or revision thereof in effect on the bid opening date, unless a particular edition or issue is indicated. Copies of these standards are not available from the Owner. The Engineer will furnish, upon request, information as to how copies may be obtained.

## 1.3 LIST OF ABBREVIATIONS

- A. Abbreviations and terms, or pronouns in place of them, shall be interpreted as follows:

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ABMA	American Boiler Manufacturers Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
ADC	Air Diffusion Council
AEIC	Association of Edison Illuminating Companies
AFBMA	Antifriction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction

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AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ARI	American Refrigeration Institute
ASA	(now U.S.A.S.I., USA Standards Institute) Association & its Standard Specifications
ASAHC	American Society of Architectural Hardware Consultants
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gage
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America (formerly SCPI)
CAL/OSHA	California Occupational Safety and Health Administration
CALTRANS	California Department of Transportation
CBC	California Building Code
CCR	California Codes of Regulations
CDA	Copper Development Association
CEC	California Electrical Code
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CISPI	Cast Iron Soil Pipe Institute
CMAA	Crane Manufacturers Association of America
CMC	California Mechanical Code
CPC	California Plumbing Code
CRA	California Redwood Association
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard (U.S. Department of Commerce)
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
EI	Edison Electric Institute
EJCDC	Engineers' Joint Contract Documents Committee
EPA	Environmental Protection Agency
FED SPEC	Federal Specification
FCI	Fluid Controls Institute
FGMA	Flat Glass Marketing Association
FIA	Factory Insurance Association
FM	Factory Mutual
FSA	Fluid Sealing Association
FTI	Facing Tile Institute
HEI	Heat Exchange Institute

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HMI	Hoist Manufacturers Institute
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
ICBO	International Conference of Building Officials
I-B-R	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IFI	Industrial Fasteners Institute
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
JIC	Joint International Conference (Hydraulic Institute)
MHI	Materials Handling Institute
MIL	Military Specification
MMA	Monorail Manufacturers Association
MSS	Manufacturers' Standardization Society
NAAMM	National Association of Architectural Metals Manufacturers
NACE	National Association of Corrosion Engineers.
MBBPVI	National Board of Boiler and Pressure Vessel Inspectors
NBHA	National Builders Hardware Association
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NEMI	National Elevator Manufacturing Industry
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
NLA	National Lime Association
NPC	National Plumbing Code
NPT	National Pipe Thread
NRCA	National Roofing Contractors' Association
NRMCA	National Ready Mixed Concrete Association
NSC	National Safety Council
NSF	National Sanitation Foundation
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
PFI	Pipe Fabrication Institute
PS	Product Standard
RTI	Resilient Tile Institute (formerly AVATI)
SAE	Society of Automotive Engineers
SCPRF	Structural Clay Products Research Foundation
SI	International Systems of Units (Metric)
SIGMA	Sealed Insulating Glass Manufacturers Association
SFPA	Southern Forest Products Association

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SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPFA	Steel Plate Fabricators Association
SPI	Society of the Plastics Industry
SPTA	Southern Pressure Treaters Association
SSI	Scaffolding and Shoring Institute
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction (Greenbook)
UL	Underwriters' Laboratories
UPC	Uniform Plumbing Code
USBR	U.S. Bureau of Reclamation
USGS	United States Geological Survey
WCLA	West Coast Lumbermen's Association (Std. Grading and Dressing Rule)
WCLIB	West Coast Lumber Inspection Bureau
WIC	Woodwork Institute of California
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

**END OF SECTION**

## **SECTION 01 43 00**

### **QUALITY CONTROL AND TESTING**

#### **PART 1 GENERAL**

##### *1.1 NOTICE OF DEFECTS*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- B. All defective Work may be rejected, corrected, or accepted, at the discretion of the Owner and Engineer.

##### *1.2 ACCESS TO WORK*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests shall have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith.

##### *1.3 MATERIALS AND EQUIPMENT*

- A. Materials and equipment shall be subject to the requirements of Section 01 35 00 – Material Substitution.

##### *1.4 PROJECT SITE TESTING*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. All routine tests of materials such as concrete, asphalt and soil compaction is done by County Materials at no cost to the Contractor. Bact-T Testing shall be by an independent certified laboratory, paid by the owner and approved by the Engineer. All retests shall be Borne by the contractor.
- C. All material suitability tests shall be at the expense of the Contractor. Testing shall be by an independent certified laboratory approved by the Engineer.
- D. If test(s) indicate that work does not meet specified requirements, remove work, replace and re-test. The cost of the first retest for acceptance testing will be borne by the owner, but the cost for each additional retest will be deducted from monies paid to the Contractor at a value of \$250 per retest.



**1.5 TEST STANDARDS**

- A. All sampling, specimen preparation, and testing of materials shall be in accordance with the standards of nationally recognized technical organizations.
- B. The physical characteristics of all materials not particularly specified shall conform to the latest standards published by the ASTM, where applicable.

**1.6 UNCOVERING WORK**

- A. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without concurrence of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and recovered at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be re-observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
  - 1. If it is found that the uncovered Work is defective, Contractor shall promptly correct said defects, including all work involved in uncovering and recovering the work, at no cost to the Owner.
  - 2. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction.

**1.7 CORRECTION OR REMOVAL OF DEFECTIVE OR REJECTED WORK**

- A. Upon receipt of notice, Contractor shall correct all defective or rejected Work and replace it with Work that is not defective, at no cost to the Owner.

**1.8 ACCEPTANCE OF DEFECTIVE WORK**

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so.
  - 1. If any such acceptance occurs, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted.
  - 2. Engineer shall determine the reasonableness of the diminished value of Work so accepted and Contractor shall pay all costs involved in making such determination.

**END OF SECTION**

**SECTION 01 50 00**  
**TEMPORARY FACILITIES**

**PART 1 GENERAL**

**1.1 GENERAL**

- A. The Contractor shall provide all temporary facilities and utilities required for completion of the Work as well as safety precautions and programs. No attempt is made to set out in detail the Contractor's means or methods necessary to accomplish the tasks involved.

**1.2 REFERENCES**

- A. State Standard Specifications Section 16.

**1.3 TEMPORARY UTILITIES**

**A. Water**

- 1. The Contractor may make arrangements with the Owner to use municipal water where appropriate during construction. See Section 01 51 36 -- Watering of these specifications for details.
- 2. Water used for human consumption shall be kept free from contamination and shall conform to the requirements of the State and local authorities for potable water.

**B. Sanitary Facilities**

- 1. The Contractor shall provide suitable and adequate sanitary conveniences for the use his staff at the site of the Work. Such conveniences shall include chemical toilets or water closets and shall be located at appropriate locations at the site of the Work. All sanitary conveniences shall conform to the regulations of the public authority having jurisdiction over such matters. At the completion of the Work, all such sanitary conveniences shall be removed and the site left in a sanitary condition.
- 2. With respect to sanitation facilities, the Contractor shall cooperate with and follow directions of representatives of the Public Health Service and the State. State and County Public Health Service representatives shall have access to the Work, whether it is in preparation or progress, and the Contractor shall provide facilities for such access and inspection.

**1.4 TEMPORARY CONSTRUCTION FACILITIES**

- A. Construction hoists, shoring, and similar temporary facilities shall be of ample size and capacity to adequately support and move the loads to which they will be

subjected. Railings, enclosures, safety devices, and controls required by law or for adequate protection of life and property shall be provided.

- B. Temporary supports shall be designed with an adequate safety factor to assure adequate load bearing capability. The Contractor shall submit design calculations prepared by a professional registered engineer for staging and shoring prior to application of loads.
- C. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to warn all pedestrian and vehicular traffic of such excavations from one hour before sunset each day to one hour after sunrise of the next day until such excavation is entirely refilled, compacted, and paved. All excavations shall be barricaded in such a manner as to prevent person from falling, walking, or otherwise entering any excavation in any street, roadway, parking lot, treatment plant, or any other area, public or private.
- D. The Contractor shall adequately identify and guard all hazardous areas and conditions by visual warning devices and, where necessary, physical barriers. Such devices shall, as a minimum, conform to the requirements of Cal/OSHA.
- E. At such time or times any temporary construction facilities and utilities are no longer required for the work, the Contractor shall notify the Engineer of his intent and schedule for removal of the temporary facilities and utilities, and obtain the Engineer's approval before removing the same. As approved, the Contractor shall remove the temporary facilities and utilities from the site as his property and leave the site in such condition as specified, as directed by the Engineer, and/or as indicated on the Plans.

#### 1.5 ACCESS ROADS AND STAGING AREA

- A. Adequately access shall be maintained to all storage areas and other areas to which frequent access is required. The Contractor shall limit the location of his storage of equipment and materials outside of the project site. The Contractor shall make his own arrangements for space that may be required and bear all associated costs. The Contractor shall provide any temporary storage required for the protection of equipment and materials as recommended by manufacturers of such materials.
- B. Storage and protection:
  - 1. Materials and equipment shall be stored in accordance with supplier's written instructions, with seals and labels intact and legible. Exposed metal surfaces of valves, fittings and similar materials shall be coated with accordance with manufacturer's recommendations to prevent corrosion.
  - 2. Storage shall be arranged to provide access for inspection. The Contractor shall periodically inspect to assure materials and equipment are undamaged and are maintained under required conditions.

**END OF SECTION**

**SECTION 01 51 36**  
**WATER AND WATERING**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. The work of this section consists of furnishing, hauling, and applying water required for compaction of embankments, backfills, subgrade, and base course, and other construction operations.
- B. Obtaining and furnishing potable water for filling, disinfecting, and flushing the distribution system.

*1.2 RELATED WORK*

- A. Section 01 50 00 – Temporary Facilities
- B. Section 01 57 27 – Dust Control
- C. Section 33 13 00 – Disinfection of Water Distribution System

*1.3 REFERENCES*

- A. Section 10-6 - Watering, State Standard Specifications

**PART 2 PRODUCTS**

*2.1 WATER*

- A. Non-potable: Free of debris, organic matter, and other objectionable substances.
- B. Potable: Conforming with the State of California drinking water standards.

**PART 3 EXECUTION**

*3.1 WATER TRUCK (DUST CONTROL)*

- A. At least 1,000-gallon capacity.
- B. Keep at least one water truck on site at all times, unless Engineer approves removal of the truck from the site before final completion.

*3.2 APPLICATION*

- A. Use pressure type distributors or a pipeline equipped with sprinkler system. Provide approved meter devices near points of discharge.

- B. Ensure a uniform application of water for optimum moisture content. Avoid excessive runoff and minimize water waste.
- C. The Contractor may water excavation areas before excavating. Drill full depth of excavation to make moisture determinations.
- D. If over watering occurs, de-water at no additional expense to the Owner.

### 3.3 SPECIAL CONTROLS

The Contractor shall take all reasonable means to minimize inconvenience and injury to the public by dust, noise, diversion of storm water, or other agencies under his control.

#### A. Dust Control

- 1. As specified in Section 01 57 27 – Dust Control

#### B. Water Sources

- 1. The Owner will furnish potable water, from the existing CSA 30 and CSA 32 water distribution systems via fire hydrants. The Contractor shall be responsible for furnishing and installing a connection to each fire hydrant, flow meter with totalizer, pump, portable tank, and all necessary piping and appurtenances necessary for water pipeline flushing, filling, testing and disinfection procedures only. Contractor is hereby made aware of the Districts' limitation to provide potable water at certain times of the day and up to a certain amount. It is expected that the Districts will be able to provide water to fill and flush the pipelines equivalent to 2 pipe volumes of up to 1000 lineal feet of pipeline (approximately 5,000 gallons at the time) before the storage tank must be replenished for the next flushing cycle. The Contractor shall anticipate performing the disinfection and flushing procedures only during off-peak hours, demand times potentially from the hours of 11:00 AM to 3:00 PM, or as directed by the County's Operator. If the Contractor elects to utilize distribution system water, the Contractor will be charged \$400 per acre-foot of water. The Contractor's bid proposal shall include all costs associated with purchase of water for the project. The Contractor shall coordinate with the County Operator for obtaining water during the allowed off-peak hours. It shall be the responsibility of the Contractor to furnish and install all required equipment necessary to deliver water from the Owner's source.
- 2. At the Contractor's option, Contractor may use a Certified Water Hauler to supply potable water for initial filling, flushing, and testing of the new water distribution system. The Contractor is responsible for securing disinfected water that meets drinking water standards and shall construct all facilities necessary to furnish water for his or her use during construction.
- 3. Water used for human consumption shall be kept free from contamination and shall conform to the requirements of the State and local authorities for potable water.

4. Water necessary for construction operations such as dust control and backfill compaction may be available from the existing Districts' distribution systems, depending on the time needed and the amount necessary. Nevertheless, the Contractor shall make arrangements to obtain potable or non-potable construction water from another approved source to complete these operations. Contractor shall provide written proof to Owner that an alternate source of water has been secured and is available for his or her use. All arrangements, costs, and equipment required for securing the use of the alternate water source and to convey water to the project site will be the responsibility of the Contractor. The Contractor may utilize both distribution system water and the alternative approved water source to complete construction operations.
5. Full compensation for furnishing all labor, materials, tools and equipment and for doing all work involved in furnishing and applying water, including the costs of purchasing water, as required by the Contract Documents and Specifications and the State Standard Specifications, shall be considered as included in the contract unit prices paid for other items of work and no additional allowance will be made therefore.

**END OF SECTION**

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## **SECTION 01 57 27**

### **DUST CONTROL**

#### **PART 1 GENERAL**

##### *1.1 WORK INCLUDED*

- A. The work of this section consists of implementing measures to prevent air pollution during construction activities. A Dust Control Plan (DCP) is not required for this project.

##### *1.2 RELATED WORK*

- A. Section 01 51 36 – Water and Watering

##### *1.3 QUALITY ASSURANCE*

- A. Arrange demolition activities to minimize dust to the maximum practical extent. Clearing, excavation, and grading shall be limited to those areas of the Project site necessary for construction. Minimize the area exposed and unprotected.

#### **PART 2 EXECUTION**

##### *2.1 GENERAL DESCRIPTION*

- A. The contractor shall comply with all requirements of the San Joaquin Air Pollution Control District (SJVAPCD) Regulation VIII, including notification to the SJVAPCD, implementation of dust control measures, and record keeping.
- B. Furnish, install, maintain, and operate dust control measures, including but not limited to water application, manual street sweeping and wheel washers.

##### *2.2 DUST CONTROL MEASURES*

- A. Water may be used for dust suppression. Contractor is responsible to provide water, as may be needed for dust control, in accordance with Section 01 51 36 – Water and Watering.

##### *2.3 MAINTENANCE OF TEMPORARY FACILITIES*

- A. Inspect dust control facilities and remove sediment from paved surfaces prior to end of business each day.

##### *2.4 REMOVAL OF TEMPORARY DUST CONTROL MEASURES*

- A. Temporary control measures shall be removed once grading or excavation is completed, and soils have stabilized.



County of Fresno  
County Service Areas 30 and 32  
Water System Improvements

**END OF SECTION**

Dust Control  
01 57 27-2

## **SECTION 01 57 50**

### **CONSTRUCTION STAKES, LINES, AND GRADES**

#### **PART 1 GENERAL**

##### **1.1 LINES AND GRADE**

- A. The Work shall be executed in accordance with the lines and grades indicated in the Contract Documents. Distances and measurements, except elevations and structural dimensions, shall be made on horizontal planes.

##### **1.2 OWNER'S SURVEY SERVICES**

- A. Construction surveying and staking for construction will be done by the Engineer or Engineer's representative at the Owner's expense. The Engineer will provide one set of stakes for the following:
  - 1. Horizontal alignment of water mains at 100-foot intervals and at horizontal angle points or change in direction. Water main shall be installed at the minimum depth specified on the Plans. Minimal cut depths at key grade changes.
  - 2. Water service locations will be staked based on the location shown on the Plans. One (1) stake will be provided for each service. The Contractor is responsible for staking any services that change in location from that shown on the original Plans.
  - 3. Two (2) stakes will be provided for each water facility appurtenances, such as hydrants, blow-offs, air valves, etc.
- B. Additional detail staking layout will be the responsibility of the Contractor.
- C. The Contractor shall be responsible for preserving construction survey stakes, permanent survey monuments and bench marks for the duration of their usefulness. If any construction survey stakes permanent survey monuments or benchmarks are lost or disturbed and need to be replaced, such replacement shall be made by the Engineer at the expense of the Contractor. Cost will be deducted from monies paid to the Contractor at a value of \$500 per extra trip.
- D. The Contractor shall notify the Engineer at least three (3) working days before he will require survey services in connection with laying out of any portion of the Work (See Project Details section of these specifications for staking request form). The Contractor at his own expense shall dig all holes necessary for line and grade stakes prior to requesting survey services that depend on such digging.

**END OF SECTION**

Construction Stakes, Lines, and Grades  
01 57 50-1

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**SECTION 01 70 00**  
**CONTRACT CLOSEOUT**

**PART 1 GENERAL**

**1.1 GENERAL**

- A. It is the intent of these Contract Documents that the Contractor shall deliver a complete and operable facility capable of performing its intended functions and ready for use.

**1.2 CLEANING**

- A. Throughout the period of construction, the Contractor shall keep the Work site free and clean of all rubbish and debris, and shall promptly remove from the site, or from property adjacent to the site of the Work, all unused and rejected materials, surplus earth, concrete, plaster, and debris, excepting select material which may be required for refilling or grading.

**1.3 FINAL SITE CLEAN-UP**

- A. Upon completion of the Work, and prior to final acceptance, the Contractor shall remove from the vicinity of the Work all paint, surplus material, and equipment belonging to him or used under his direction during construction.
- B. The Contractor shall restore to original condition all property not designated for alteration by these Contract Documents.

**1.4 FINAL BUILDING CLEAN-UP**

- A. On all building projects and wherever else applicable, besides general broom cleaning, the following special cleaning shall be performed at completion of the Work:
  - 1. Putty stains and paint shall be removed from glass; glass shall be washed and polished, inside and outside. Care shall be exercised so as not to scratch glass.
  - 2. Marks, stains, fingerprints, and other soil and dirt shall be removed from painted, decorated, or stained work.
  - 3. Waxed woodwork shall be cleaned and polished.
  - 4. Hardware shall be cleaned and polished of all traces; this shall include removal of stains, dust, dirt, paints, and blemishes.
  - 5. Spots, soil, paint, plaster, and concrete shall be removed from tile; tile work shall be washed afterwards.

6. Fixtures and equipment shall be cleaned, and stains, paint, dirt, and dust shall be removed.
7. Temporary floor protection shall be removed; floors shall be cleaned, waxed, and buffed.
8. Dust, cobwebs, and traces of insects and dirt shall be removed.

#### 1.5 WASTE DISPOSAL

- A. The Contractor shall dispose of surplus materials, waste products, demolition materials, and debris. The Contractor shall transport and dispose of waste materials in accordance with applicable laws and regulations.

#### 1.6 PROJECT RECORD DOCUMENTS

- A. The Contractor shall maintain at the site, available to the Owner and Engineer, one copy of the Contract Documents, Drawings, Shop Drawings, Change Orders, and other modifications in good order and annotated to show all changes made during construction. These Documents shall be delivered to the Engineer for the Owner upon completion of the Work.
- B. Record documents shall be reviewed during progress meetings to ascertain that all changes have been recorded.
- C. Store Record Documents separate from documents used for construction.

#### 1.7 TOUCH-UP AND REPAIR

- A. The Contractor shall touch-up or repair finished surfaces on structures, equipment, fixtures, or installations that have been damaged prior to final acceptance. Surfaces on which such touch-up or repair cannot be successfully accomplished shall be completely refinished or in the case of hardware and similar small items, the item shall be replaced. Such items shall include, but not be limited to, the following:
  1. Road surfaces
  2. Exposed structure surfaces
  3. Exposed equipment surfaces
  4. Exposed piping surfaces

#### 1.8 EQUIPMENT START-UP

- A. After all acceptance tests have been completed by the Contractor and Owner but prior to final acceptance, the Contractor shall recheck all equipment for proper alignment and adjustment, check oil levels, re-lubricate all bearings and wearing points, and in general assure that all equipment is in proper condition for continuous operation.

**1.9 FINAL EQUIPMENT CHECK**

- A. After testing and before acceptance, all equipment shall be test run by the Owner for a minimum of 7 days to ensure proper operation. At the end of the test run each piece of machinery shall be lubricated and all components and couplings checked for proper alignment and adjustment.
- B. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.
- C. Provide submittals to the Owner required by other governing authorities.

**1.10 MANUFACTURER'S CERTIFICATES OF PROPER INSTALLATION**

- 1. The Contractor shall submit manufacturers' certificates of proper installation for all items of equipment.

**PART 2 PRODUCTS**

(Not Used)

**PART 3 EXECUTION**

(Not Used)

**END OF SECTION**

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## SECTION 02 01 20

### PROTECTION OF UNDERGROUND FACILITIES AND SURVEY MONUMENTS

#### PART 1 GENERAL

##### 1.1 UNDERGROUND FACILITIES

- A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing underground facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such underground facilities, including Owner, or by others.
1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and
  2. The cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
    - a. Reviewing and checking all such information and data,
    - b. Locating all Underground Facilities shown or indicated in the Contract Documents,
    - c. Coordination of the Work with the owners of such underground facilities, including Owner, during construction, and
    - d. The safety and protection of all such underground facilities and repairing any damage thereto resulting from the Work.
- B. Not Shown or Indicated: If an underground facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated with reasonable accuracy in the Contract Documents, the following shall apply.
1. Contractor shall develop and execute a work-plan, subject to Engineer's approval to protect underground facilities.
  2. The Contractor shall expose, prior to staking and trenching, all existing utilities and existing facilities which may control proposed facility grades, and alignment. Two working days notice shall be given to the Engineer prior to commencing this work.
  3. Full compensation for all costs involved in locating, verifying, protecting, exposing, and otherwise providing for utilities shall be included in the amounts bid for the various items of work, and no separate payment shall be made therefore.



## 1.2 PROTECTION

- A. The Contractor shall not interrupt the service function or disturb the supporting base of any Utility by disrupting any facility identified in the Plans and Specifications without authority from the Owner or order from the Engineer. Where protection of such facilities is required to ensure support of utilities, the Contractor shall, unless otherwise provided, furnish and place the necessary protection at the Contractor's expense.
- B. The Contractor shall be prepared at all times with labor, equipment and materials to make repair on damaged mains or Utility facilities. The Contractor shall immediately notify the Engineer and the Utility owner if he disturbs, disconnects or damages any Utility. The Contractor shall bear the costs of repair or replacement of any Utility facility described with reasonable accuracy in the Plans and Specifications that is damaged by the Contractor. No extra compensation will be made for the repair of any services or mains damaged by the Contractor, nor for any damage incurred if the neglect or failure of providing protective barriers, lights and other devices or means required to protect such existing utilities or facilities described with reasonable accuracy in the Plans and Specifications.

## 1.3 SURVEY MARKERS AND PERMANENT REFERENCE POINTS

### A. Surveying and Permanent Survey Markers

The Engineer will take measurements to assure the preservation of survey markers (monuments and bench marks). The Contractor shall not disturb permanent survey markers without the consent of Engineer and shall bear the expense of replacing any that may be disturbed without permission.

- 1. Replacement of survey markers shall be done only by the Engineer.
- 2. If disturbing of markers cannot be avoided, the Owner shall pay the cost of replacing said markers.

### B. Lot Corner Monuments

The Contractor shall preserve property line and corner survey markers except where their destruction is unavoidable and the Contractor is proceeding in accordance with accepted practice. Markers that are lost or disturbed by his operations shall be replaced at the Contractor's expense by the Engineer.

**END OF SECTION**

## **SECTION 02 41 00**

### **DEMOLITION**

#### **PART 1 GENERAL**

##### *1.1 DESCRIPTION*

- A. The work of this section consists of demolition and removal of pavements, slabs, miscellaneous debris, signs, barriers, salvaged items, and portions of abandoned utilities.
- B. This work may also include milling of asphaltic concrete and all operations associated with crushing of Portland cement concrete for aggregate base.
- C. Definitions:
  - 1. Portland Cement Concrete: A mixture of Portland cement, fine aggregate, coarse aggregate, admixtures (if used) and water, proportioned and mixed. Also, included is rebar.
  - 2. Asphalt Concrete: A mixture of liquid asphalt and graded aggregate used as paving material for roadways and parking lots.

##### *1.2 WORK INCLUDED*

- A. Repair and restoration of areas damaged due to demolition work.
- B. Salvaging of equipment for Owner.
- C. Removal of demolished materials from site.
- D. Remove existing piping and other existing structures as shown on the Plans to be removed.
- E. Properly dispose of all removed materials.
- F. Dewatering as needed in order to complete the proposed demolition.
- G. Removal of trees and landscaping as required for construction.

##### *1.3 RELATED WORK*

- A. Section 01 57 27 – Dust Control
- B. Section 03 30 00 – Cast-In-Place Concrete
- C. Section 31 11 00 – Clearing and Grubbing
- D. Section 31 23 00 – Earthwork.

#### 1.4 SEQUENCING

- A. Sequence work to minimize interference with water facilities operation. The water system must remain in operation until the water system is complete.

#### 1.5 REGULATORY REQUIREMENTS

- A. Obtain any required permits.
- B. Dispose of removed materials in an approved disposal or salvage facility.

#### 1.6 REFERENCES

- A. Section 17-2 – Clearing and Grubbing, State Standard Specifications
- B. Section 19 – Earthwork, State Standard Specifications

#### 1.7 SUBMITTALS

- A. As specified in Section 01 33 00 – Submittal Procedures
- B. Demolition plan including sequence of operations. The plan shall specifically address methods of demolition, schedule, sequence of demolition, and procedures for archeological monitoring. Demolition shall not proceed until the plan has been approved.

#### 1.8 QUALITY ASSURANCE

- A. General: Take all necessary precautions with regard to safety in carrying out the demolition and site work. Erect suitable barriers around open excavations and fulfill all appropriate requirements of CAL/OSHA. Comply with safety requirements for demolition, ANSI A10.6-90.

#### 1.9 PROJECT CONDITIONS

- A. Underground utilities exist at this site. Contractor shall take all necessary precautions to protect said utilities. Notify Engineer of any deviation in utility location from that which is shown on the drawings.
- B. Keep dust to a minimum at removal site and on haul roads. Use sprinklers or water trucks as necessary or as directed by the Engineer.
- C. Ensure safety of persons in demolition area. Provide temporary barricades as required.
- D. Excavations may encounter groundwater and require dewatering depending on the time of year and amount of seasonal run-off. Loose sands exposed in excavation sidewalls may be unstable and require shoring or lying back in accordance with OSHA requirements. Flowing sands may also be encountered in excavations below groundwater levels.

### **1.10 CLOSEOUT SUBMITTALS**

- A. As specified in Section 01 77 00 – Contract Closeout.
- B. Show all capped and abandoned utility terminations and location of remaining facilities on project Record Drawings.

## **PART 2 PRODUCTS**

### **2.1 REPAIR AND RESTORATION MATERIALS**

- A. Concrete shall be as specified in Section 03 30 00 – Cast In Place Concrete.
- B. Backfill materials shall be as required by Section 19 – Earthwork, State Standard Specifications.
- C. Asphalt and concrete shall be replaced in conformance with governing authority standards.

### **2.2 MATERIALS**

- A. Salvaged Materials: Materials to be salvaged shall remain the property of the Owner and shall be stockpiled as directed by the Engineer. Contractor shall inventory all salvaged materials. Stockpiled materials shall be free of hazardous substances. Salvage materials as specified on the plans.
- B. Items to be Salvaged and Relocated shall be salvaged and/or relocated as shown on the drawings, or as directed by the Engineer.
- C. Materials and items demolished and not designated for reuse, salvage or transfer to the Owner, as well as all debris, rubbish and other materials resulting from the demolition operations, shall become the property of the Contractor and shall be removed from the site within 48 hours of demolition.
- D. Storage or sale of the removed items will not be permitted at the site.

## **PART 3 EXECUTION**

### **3.1 INSPECTION**

- A. Prior to demolition, inspect the site conditions, verifying all governing dimensions, notes and specification. Notify the Engineer of any errors or omissions in the contract documents.
- B. Make such explorations and probes as are necessary to ascertain any required protection measures before proceeding with the demolition and removal work.

### 3.2 *PREPARATION*

- A. Protect existing, appurtenances, structures, which are not to be demolished.
- B. Prior to demolition work, all soil erosion control measures specified in the County Standard Special Provisions Section 13- Water Pollution Control and inlet protection barriers shall be in place. Contractor shall provide appropriate measures to prohibit demolition debris and/or soil from entering any watercourse.
  - 1. Protect all buildings, structures, utilities, and vegetation to remain.

### 3.3 *DEMOLITION REQUIREMENTS*

- A. Conduct demolition to protect and minimize damage to structures and existing improvements.
- B. Conduct salvaging to protect and minimize damage to salvaged equipment.
- C. Execute the work in a careful, orderly and safe manner, with the least possible disturbance to the public. Cease operations immediately if adjacent work appears to be endangered. Do not resume operations until corrective measures have been taken.
- D. Pavement and Slabs:
  - 1. Remove completely all Portland cement concrete slabs-on-grade including, but not limited to, equipment pads, sidewalks, etc. If approved by the Engineer, the Contractor may crush Portland concrete for use as aggregate base.
  - 2. Saw cut existing asphalt concrete pavements cleanly in straight continuous lines. Remove asphalt concrete pavement as shown on the drawings. The Contractor may utilize the recycled asphalt concrete pavement for use as base course on this project. The Engineer shall determine if milling may be used in lieu of sawcutting under this contract.
    - a. Asphalt Concrete Milling Equipment: Milling machines shall be power operated, self-propelled machines capable of removing the desired thickness. They shall have sufficient power, traction and stability to accurately maintain depth of cut and slope.
  - 3. Any material thus processed shall conform to the specifications for Section 32 11 23 – Aggregate Base
  - 4. In areas that are demolished, but where no future roads or structures are shown, the exposed subgrade shall be scarified an additional 18 inches before placing backfill.

- E. Concrete and Masonry Structures: Remove structure to a minimum of 3 feet below grade. Break remaining portions to permit drainage. Remove completely if under proposed structures or roadways.
- F. Items to be Salvaged: Remove as directed by the Engineer. Remove carefully. All salvaged material remains the property of the Owner. Store where directed by the Engineer.
- G. Abandoned Utilities: Remove above ground utilities and terminate as approved by the utility company and the Engineer. Remove necessary portions of underground utilities to within 24 inches of excavation or final grade. Plug abandoned pipes and conduits with concrete plugs. Plugs shall be 6 inches or 2 times the pipe diameter in length, whichever is greater.
  - 1. Water lines shall be capped as close as possible to active mains.

### 3.4 SALVAGE EQUIPMENT

- A. Salvaged equipment shall be delivered to the Owner at a designated site within the project site. Salvaged equipment shall be placed on wood or concrete blocks so the equipment will be 4 inches minimum above ground elevation.

### 3.5 ORDER OF WORK

- A. Existing facilities shall remain in operation until the new water system is approved for operation. Coordination will be required with the Owner for temporary shut-off of existing pipeline system for connection of new pipeline to existing pipelines. Contractor shall submit plans to Owner for approval for shut-off duration at least 10 days prior to shut-off.
  - 1. Hours and duration of shut-off will be limited to a maximum of 4 hours in any single day.

### 3.6 PRESERVATION

- A. If indicated or required, preserve trees, plants, or other features designated to remain. Protect trees and plants from damage; fell trees in a manner which shall not injure standing trees, plants and improvements which are to be preserved.

### 3.7 RESTORATION

- A. All demolition areas, staging/stockpiling, and open excavations shall be filled in accordance with the Earthwork Sections. Fill all open excavations deeper than one foot to an elevation to match the surrounding topography.
  - 1. New Construction Areas: As shown on drawings.

### 3.8 DISPOSAL

- A. As specified in Section 01 50 00 – Temporary Facilities.

County of Fresno  
County Service Areas 30 and 32  
Water System Improvements

**END OF SECTION**

Demolition  
02 41 00-6

## SECTION 03 15 20

### ANCHOR BOLTS AND POST-INSTALLED ANCHORS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. The work of this section consists of furnishing and installing all materials and equipment and providing all labor necessary to complete the work shown on the drawings and/or listed below and all other work and miscellaneous items not specifically mentioned but reasonably inferred for a complete installation, including all accessories and appurtenances required for a completed system.
- B. Expansion anchors to be installed in hardened concrete.

##### 1.2 RELATED WORK

- A. Section 03 30 00 – Cast-in-Place Concrete
- B. Section 03 60 00 - Grout

##### 1.3 SUBMITTALS

- A. As specified in Section 01 33 00 – Submittal Procedures.

##### 1.4 GENERAL

- A. Expansion anchors and threaded rod anchors indicated or accepted in lieu of cast-in-place anchor bolts for equipment or structural framing shall have a diameter of at least 3/4 inch and shall be ICBO Evaluation Report listed.
  - 1. Unless otherwise specified or indicated on the drawings, or approved by the Engineer, all other expansion anchors shall have a diameter of at least 1/2 inch.

#### PART 2 MATERIALS

##### 2.1 MATERIALS

- A. Nuts and washers for anchor bolts and expansion anchors shall be the same material as the bolts or anchors they are used with.



<b>Application</b>	<b>Reference</b>
A. Anchor Bolts and Nuts	
1. Carbon Steel	ASTM A307 with A563A nuts and F844 washers
2. Stainless Steel	ASTM F593 Type 304 or 316 with ASTM F594 nuts and SS304 or 316 washers
3. Galvanized Steel	Carbon steel bolts and nuts; hot-dip galvanized, ASTM A153 and A385.
B. Threaded Rod Anchors and Nuts	
1. Carbon Steel	ASTM F1554, Grade 55 with ASTM A563 nuts and F436 washers
2. Stainless Steel	ASTM F593 with ASTM F594 nuts
3. Galvanized Steel	Carbon steel bolts and nuts; hot-dip galvanized, ASTM A153 and A385
C. Flat Washers	ANSI B18.22.1; of the same material as anchor bolts and nuts.
D. Expansion Anchors	
1. For Concrete	Fed Spec FF-S-325; wedge type, Group II, Type 4, Class 1 or 2; self-drilling type, Group III, Type 1; or nondrilling type, Group VIII, Type 1 or 2; Hilti Kwik Bolt TZ ICC ESR-1917, Simpson Strong-Bolt 2 ICC ESR 3037, or ICC approved equivalent.
E. Adhesive Anchors	Hilti HIT RE-500 V3 ICC ESR 3814, ITW Red Head A7+ICC ESR 3903 or ICC approved equivalent.

- B. Anchor bolts and threaded rod anchors for buried service and in splash zones shall be stainless steel. Anchor bolts, threaded rod anchors, and expansion anchors for immersion service shall be stainless steel. Expansion anchors for buried service and in splash zones shall be stainless steel. All other anchor bolts, threaded rod anchors, and expansion anchors shall be galvanized steel unless otherwise specified or indicated on the Plans.

## **PART 3 EXECUTION**

### **3.1 EXPANSION ANCHORS**

- A. Expansion anchors shall be installed in conformity with the manufacturer's instructions and ICBO Evaluation Report recommendations for maximum holding power, but in no case shall the depth of hold be less than four (4) bolt-hole diameters. The minimum distance between the center of any expansion anchor and an edge or exterior corner of concrete shall be at least four and one half (4-1/2) times the diameter of the hole in which the anchor is installed. Unless otherwise indicated on the Plans, the minimum distance between the centers of the expansion anchors shall be at least eight (8) times the diameter of the hole in which the anchors are installed.

- B. Anti-seize thread lubricant shall be liberally applied to threaded stainless steel components immediately before assembly.

**END OF SECTION**

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**SECTION 03 30 00**  
**CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Work required under this section consists of furnishing all materials, supplies, equipment, tools, transportation, and facilities, and performing all labor and services incidental to furnishing and installing concrete work as described in this section of the Specifications, shown on the accompanying Plans, or reasonably implied therefrom, except as hereinafter specifically excluded. The work shall include, but is not necessarily limited to:
1. All form work including special forms as required for any special construction and/or to accommodate the work of others and removal of forms.
  2. All concrete reinforcement, placement, bending and forming thereof.
  3. All concrete and cement finishing, all surface treatment and curing including non-slip finishes.
  4. Installation of all reglets, bolts, anchors, cans, sleeves, column bolts, etc., whether furnished under this section or by others.
  5. The furnishing of all items required to be or shown on the Plans as embedded in concrete, which are not specifically required under other sections.
  6. Setting headers and screens finishing, curing, and protecting concrete.
- B. Where prior inspection and test of materials are required, documentary evidence, in the form of test reports, shall be furnished prior to the time the material is incorporated into the work. All rejected material shall be promptly removed from the premises.

**1.2 RELATED WORK**

- A. Section 03 15 20 – Anchor Bolts and Post-Installed Anchors
- B. Section 03 60 00 – Grout
- C. Section 09 90 00 – Painting and Coating

**1.3 REFERENCES**

- A. American Concrete Institute (ACI)
- B. American Society for Testing and Materials (ASTM)

- C. State Standard Specifications
- D. California Building Code (CBC)

#### 1.4 DEFECTIVE WORK

- A. Work considered to be defective may be ordered, by the Engineer, to be replaced in which case the Contractor shall remove and replace the defective work at his expense. Work considered to be defective shall include, but not be limited to, the following:
  - 1. Concrete incorrectly formed, or not conforming to details and dimensions on the Plans or with the intent of these documents, or concrete the surfaces of which are out of plumb or level.
  - 2. Concrete in which defective or inadequate reinforcing steel has been placed.
  - 3. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the Plans.
  - 4. Concrete below specified strength.

#### 1.5 SUBMITTALS

- A. As specified in Section 01 33 00 – Submittal Procedures
- B. Provide material certificates, shop fabrication and placement drawings, and schedule for all reinforcing steel, embedded items, form release and curing compounds.
- C. The Contractor shall provide a proposed concrete placement plan (to minimize the effects of cracking and differential settlement) to the Engineer, and gain approval of said plan, prior to ordering of reinforcing steel. As a minimum this plan shall contain the layout of horizontal and vertical construction joints, spaced no greater than 50 feet apart (unless specifically approved otherwise by the Engineer), and a pour schedule for the individual slab and wall pours. All construction joints shall be sized in conformance with the Typical Longitudinal Keys Detail and shall contain water stops as shown on the Construction Joint With Waterstop Detail.

## PART 2 PRODUCTS

### 2.1 CONCRETE

- 1. Concrete shall conform to Section 90 of the State Standard Specifications. Unless otherwise shown or specified, all concrete shall contain not less than 611 pounds of cementitious material per cubic yard of concrete with a minimum 28-day compressive strength of 3500 psi. Portland cement shall be Type II.
- 2. Concrete shall contain 4% ±1% entrained air.

3. Water/cement ratio shall not exceed 0.45 (by weight).
  4. Slump at placement shall be 4 inches.
- B. Concrete used for thrust blocks or for pipe encasement shall contain not less than 517 pounds of cementitious material per cubic yard of concrete. Portland cement shall be Type II.

## 2.2 AGGREGATE

- A. Aggregate for normal weight concrete shall conform to Section 90-1.02C, "Aggregates" of the State Standard Specifications. Aggregates shall be free of dirt, clay balls, roots, bark and other deleterious substances and shall be thoroughly washed before use.
- B. The combined aggregates for concrete shall conform to the grading limits for the one-inch, maximum size specified in Section 90-1.02C(4)(d), "Aggregate Gradation" of the State Standard Specifications, Combined Aggregate Gradings.

## 2.3 WATER

- A. Water shall comply with Section 90-1.02D, "Water" of the State Standard Specifications, and shall be clean and free from injurious amounts of acids, alkalis, salts, oils, organic materials or other deleterious substances.

## 2.4 FLYASH

- A. Fly Ash: Shall comply with SSS Section 90-1.02B(3), "Supplementary Cementitious Materials", and shall comply with AASHTO M 295, Class F or N.
1. Type of fly ash shall be compatible with the type of cement and the intended use of the concrete.
- B. The combined weight of fly ash conforming to AASHTO M 295, Class F or N shall not exceed the amount provided for in Section 90-1.02B(3), "Supplementary Cementitious Materials" of the State Standard Specifications.

## 2.5 ADMIXTURES

Admixtures shall comply with Section 90-1.02E, "Admixtures", of the State Standard Specifications

- A. Air Entraining: ASTM C260
- B. Water Reducing: ASTM C494, Type A, D or F
- C. Accelerating: ASTM C494, Type C or E
1. No admixture containing any chloride ions is acceptable.
- D. Retarding: ASTM C494, Type B, D or G

## 2.6 REINFORCING STEEL

- A. Rebar shall be ASTM designation A615, Grade 60.
- B. Welded wire fabric shall conform to ASTM A 1064.

## 2.7 EXPOSED-TO-VIEW CONCRETE

- A. For exposed-to-view concrete, where legs of metal supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class I).
- B. Metal bar supports in slab covers for sewage-containing structures shall also be provided with plastic coated legs.

## 2.8 FORM MATERIALS

- A. Exposed Concrete: Plywood complying with U.S. Plywood Standard PS-1 "BB (Concrete Form) Plywood" Class I, or better.
- B. Textured Finish Concrete: Units of face design, size arrangement and configuration to match control sample.
- C. Cylindrical Columns and Supports: Metal, fiberglass or waxed paper tubes of sufficient wall thickness to resist imposed loads without deformation.
- D. Form Release Agent shall leave behind a paintable concrete surface.
  - 1. Release #1, The Burke Co., or Engineer approved equivalent.

## 2.9 CURING MATERIALS

- A. Polyethylene film
- B. Reinforced waterproof paper
  - 1. Sisal Kraft, Orange Label, or approved equal.
- C. Liquid-membrane curing compound
  - 1. Curing compound shall comply with ASTM C309, Type 2.
    - a. White pigmented material
    - b. Clear pigment may be used for concrete that will be exposed to public view.

## **PART 3 EXECUTION**

### **3.1 REINFORCING STEEL**

- A. Comply with CRSI, "Placing Reinforcing Bars" and as specified herein.
- B. Place reinforcing steel and embedded items in accordance with approved shop drawings.
- C. Splicing of bars shall be by lapping. Lapped splices shall be 45 bar diameters for bar size through #8 and 60 bar diameters for larger bars, unless otherwise shown on the Plans.
- D. Splicing of the wire fabric shall be by lapping. Lapped splices shall be two full mesh, minimum.
- E. All rebar in vertical walls shall be supported by concrete block spacers or metal chairs.
- F. Prior to placement of the concrete, reinforcing steel shall be cleaned and free of all concrete, dirt, oil, mill scale, rust or other coatings that would reduce or destroy the bond.
- G. All reinforcing steel and embedded items shall be reviewed and approved by the Engineer prior to concrete placement.

### **3.2 FORMS**

- A. All forms shall be cleaned and an approved agent applied each time they are used and shall be so constructed and set as to resist, without springing or settlement, the pressure of the concrete and the placing operations.
- B. In designing forms and falsework, the concrete shall be treated as a liquid weighing at least 150 lbs. per cubic foot for vertical loads and not less than 85 lbs. per cubic foot for horizontal pressure. The design of the forms and falsework system shall include allowances for temporary construction loads. The rate of placement of concrete shall be so regulated that the pressures caused by the wet concrete will not exceed the designed form pressure. The unsupported length of wooden columns and compression members shall not exceed 30 times the width of the least side.
- C. All forms shall be set and maintained in true alignment, grade and section until the concrete has sufficiently set. The interior surfaces of forms shall be adequately treated with an acceptable material to insure non-adhesion of mortar. All forms shall be mortar-tight. When forms appear to be unsatisfactory in any way, concrete placement shall be stopped until the defects have been corrected.
- D. All exposed outside corners, including the top edges of all walls, machinery bases and curbs shall have a 3/4-inch chamfer.



- E. Metal tie rods or anchorages within the forms shall be fitted with suitable cones or comparable devices. Metal tie rods or anchorages shall be removed to a depth of 1" from the surface without injury to the concrete. All fittings for metal ties shall be of such design that upon their removal, the cavities which are left will be of the smallest possible size, but of sufficient diameter to allow the cavity to be "dry packed" with cement mortar. The cavities shall be filled with cement mortar and the surface left sound, smooth and even.
- F. Form release agent shall be applied to the form so that no agent comes in contact with reinforcing steel.

### 3.3 PLACING

- A. All concrete shall be placed before it has taken its initial set and shall be placed in horizontal layers and in such a manner as to avoid segregation. The concrete adjacent to the forms and joints shall be thoroughly internal consolidated with a vibrator operating at not less than 4,500 vibrations per minute.
  - 1. Pumping equipment shall be of suitable type, without Y-sections, and with adequate pumping capacity.
  - 2. Loss of slump in pumping shall not exceed 1 $\frac{1}{2}$ ".
  - 3. Concrete shall not be placed through reinforcing that may cause separation of aggregates.
- B. The concrete shall be deposited as nearly as possible in its final position. Drop chutes and elephant trunks shall be used on drops greater than 5 feet. Concrete shall be placed at such a rate that all concrete in the same lift will be deposited on plastic concrete. The concrete comprising each unit of work shall be placed in a continuous lift.
- C. The Contractor shall notify the Engineer 24 hours (1 working day) prior to concrete placement.
  - 1. The form work and reinforcing steel placement shall be approved by the Engineer prior to ordering concrete.
- D. Form Removal. Minimum times for removal after concrete placement are as follows:

Beam sides but not shoring	3 days
Column forms and wall forms	2 days
Forms for supported slabs but not shoring	14 days
- E. Construction Joints
  - 1. At ends of the first concrete pour, provide forms that positively locate any waterstop. Ensure the end forms of walls are removable without releasing the

side forms. Provide seals around reinforcement and water stop to prevent mortar leaks.

2. Overlap the hardened concrete of the first pour with forms for the second pour. Brace the ends of the forms against the hardened concrete to prevent joint offsets and mortar leakage. Align any exterior features required on the finished surface.

### 3.4 CONCRETE JOINTS

#### A. General

1. Provide joints:
  - a. As shown on the Drawings and as noted below in these Specifications.
  - b. As required for constructability
  - c. After favorable review of layout, sequence and concrete placement program.
2. Provide minimum curing times before the second placement:
  - a. 2 days after the first concrete placement at the joint.
  - b. 10 days after each adjacent concrete placement, for infill pours or checkerboard placement pattern.

#### B. Control Joints:

1. Space typical control joints in slabs on grade or suspended slabs not exceeding 10 feet, or as shown on the Drawings. Control joints shall not be provided in water containment structures.
2. If cast-in with the concrete, positively locate the preformed joint filler and hold rigidly in place during concreting.
3. If saw-cut, use a wheeled power saw as soon as the concrete surface is firm enough. Saw-cut control joints must be constructed within 12-hours after concrete placement. Fill the groove with sealant over a backer rod.

#### C. Construction Joints:

1. Produce quality concrete, with full continuity of reinforcing and water tightness across the joints.
2. Space typical slab joints not exceeding 20 feet in the direction of the transverse or secondary reinforcing, typically the smaller reinforcing nearer to the center of the slab thickness. Space typical vertical wall joints no more than 30 feet apart.

3. Provide all joints in walls and slabs, retaining liquids, or earth with 6-inch waterstops. Continue all reinforcing through the joint unless otherwise noted.
4. After the first concrete placement at the joint, do not walk on or disturb any reinforcing extending into the second placement area for at least 48 hours.
5. Before depositing new concrete on or against concrete that has hardened, clean and roughen the entire surface of the joint exposing clean coarse aggregate solidly embedded in mortar matrix. Provide typically 1/4-inch roughness or amplitude of the concrete surface measured from the top of the exposed aggregate to the bottom of pockets between stones.
6. Drench the prepared joint with clean water and remove prior to the concrete pour.
7. Cover horizontal wall joints and wall-to-slab joints with a minimum thickness of 2 inches and a maximum of 6 inches of the modified concrete mix, consisting of the designated concrete mix with one-half of the coarse aggregate removed.
8. Use special care in vibrating adjacent to construction joints to ensure thorough consolidation of the concrete around the waterstops and against the hardened portion of the joint. Additional hand tamping may be required.
9. For joints that are shown on architectural drawings as having a continuous reveal or recess, leave the wood form or pour strip used to create the reveal or recess in place or re-insert before roughening. Prevent the next concrete placement from filling the reveal or recess.

D. Expansion Joints

1. Stop all steel reinforcing clear of the joint at each side.
2. Provide 9-inch center bulb waterstop continuously around the joint in walls and slabs retaining liquids.
3. Prepare a smooth first concrete surface with all voids filled.
4. Provide preformed joint filler, securely fastened to the existing concrete as directed by the Manufacturer.
5. Install bond breaker and sealant after curing is completed and when directed.

E. Bonding to Pre-existing Concrete: Mechanically roughen the old surface to a 1/4-inch amplitude, as defined in construction joint paragraph above. Apply epoxy bonding material prior to concreting, as recommended by the manufacturer.

F. Waterstop

1. Restrict field splices to butt joints in straight runs. For PVC type, make by heat welding, using a splicing iron. For rubber, provide sleeve joints and glue. Follow the manufacturer's specifications.
2. Positively locate and support in the forms so that concrete may be placed, consolidated, and vibrated on both sides of the embedded portion without displacement of the waterstop and without causing voids in the concrete. Protect the outstanding portion from damage during the first concrete pour and clean and positively support prior to the second pour. Place, consolidate and vibrate the second pour without displacement of the waterstop and without causing voids in the concrete.

3.5 CONCRETE CURING

- A. Exposed concrete surfaces shall be protected from premature drying by covering as soon as possible with canvas, plastic sheets with sealed joints, burlap, sand or other satisfactory materials and kept continuously moist; or, if the surfaces are not covered, they shall be kept continuously moist by flushing or sprinkling.
1. Curing shall continue for a period of not less than 7 days after placing the concrete. If curing compound is used, two (2) applications will be made for even coverage. Curing methods must be approved by the Engineer.

3.6 FINISHING

- A. Defective and honeycombed surfaces shall be chipped back to such a depth to expose solid concrete. The surface shall be dampened and coated with a bonding agent and packed with mortar.
- B. Concrete Finishes for Vertical Wall Surfaces:
1. Form facing material shall produce a smooth, hard, uniform texture.
    - a. Use forms specified for surfaces exposed to view in accordance with the Plans and other Specification Sections.
  2. At a minimum, repair the following surface defects:
    - a. Tie holes
    - b. Honeycombs deeper than 1/4"
    - c. Air pockets deeper than 1/4"
    - d. Rock holes deeper than 1/4"
    - e. Scabbing
  3. Chip or rub off fins exceeding 1/8" in height.

4. Provide SF/ESF 3.0 finish and a smooth-rubbed finish for:
  - a. Walls being waterproofed, painted, coated with some other material.
  - b. Use at all exposed surfaces not specified to receive another finish.
- C. Related Uniform Surfaces (Except Slabs):
  1. Strike smooth tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces after concrete is placed.
  2. Float surface to a texture consistent with that of formed surfaces.
  3. Continue treatment uniformly across unformed surfaces.
- D. Concrete Finishes for Horizontal Slab Surfaces:
  1. General: Tamp concrete to force coarse aggregate down from surface. Screed with straightedge, eliminate high and low places, bring surface to required finish elevations; slope uniformly to drains. Dusting of surface with dry cement or sand during finishing processes not permitted.
  2. Slab Finish shall be as follows:
    - a. Surfaces intended to receive damp proofing or water proofing membranes: Float finish.
    - b. Floors intended to receive floor coverings and MCC rooms: Trowel finish.
    - c. Sidewalks, garage floors, drive-throughs and ramps: Broom finish.
    - d. Exterior slabs, platforms, steps and landings, exterior and interior pedestrian ramps and interior stairs and all process equipment areas, not covered by other finish materials: Broom finish.
  3. Deviation in finish surface shall not exceed  $\frac{1}{4}$ " in 10 ft.
  4. No tolerance will be allowed that will result in the maximum running, or cross, slope exceeding the requirements of the Americans with Disabilities Act.

### 3.7 TESTING

- A. Testing of concrete shall be as required by the Engineer and in accordance with Section 90 of the Standard Specifications.
  1. All costs for testing are in accordance with Section 01 43 00 – Quality Control and Testing.

2. All costs involved, including those required by the Engineer, in retesting of concrete required because of a failure to meet these Specifications shall be at the expense of the Contractor.

### 3.8 *WATERTIGHTNESS OF CONCRETE WORK*

- A. It is the intent of this Specification to obtain concrete and grout with homogenous structure, which when hardened will have the required strength, is watertight, and resistance to weathering.

### 3.9 *HYDRAULIC TESTING OF STRUCTURES*

- A. It is the intent of this Specification to obtain concrete and grout with homogenous structure, which when hardened will have the required strength, watertightness, and resistance to weathering.
- B. General: Test all concrete tanks, hydraulic channels, sumps, basins and other structures designed to contain water, after concrete has reached the design strength, prior to backfilling, and application of any coating system. Test shall be performed by filling the structure with water.
- C. Preparation: Provide the following.
  1. All water necessary for testing shall be of acceptable Quality.
  2. All evaporation and level measuring devices required.
  3. All pumps, power, piping and any other equipment required. Make all hook-ups necessary to fill tanks for testing.
  4. The water disposal method after testing is complete, including pumping if necessary.
  5. Fill the structure with water to the extreme high operating surface level or to overflow weir level. Furnish and install temporary bulkheads, if required.
  6. Maintain full for 48 hours before beginning the test period to permit concrete absorption and adjustment of valves, slide gates, or temporary bulkheads.
  7. At completion of tests remove all temporary piping and connections. Dispose of wastewater without creating a nuisance of damage to adjacent property.
- D. Test Period: Five consecutive 24 hour periods totaling 5 consecutive days. Take daily measurements of air and water temperature, rainfall and water level.
- E. Test Procedure:
  1. After test period, measure water level at each side of the tank to determine leakage and loss from evaporation.

2. Determine evaporation loss, using a standard 48-inch evaporation pan and level measuring device located adjacent to the tank.
3. Mark all observed damp areas, running or dripping leaks on exposed surfaces that have not healed autogenously during the test. Damp areas includes areas if moisture can be transferred from the exterior surface to a dry hand. Repair all those areas.
4. If leakage from the structure exceeds that permitted for the types of mechanical equipment providing closure plus 0.075% of the storage capacity, in each 24-hour period over a period of five consecutive days, perform a retest after completing repairs.
5. Provide acceptable procedures prior to repairs. Repairs by painting or surface treatment will not be acceptable.
6. Continue the test and repair procedure until the structure satisfies both the leakage calculation requirement and the visible leakage requirement.

F. Test for Manholes

1. Furnish and dispose of water used for testing.
2. Hydraulically test all manholes installed.
3. After all pipe has been laid, backfilling has been completed, and after the testing of the pipes, plug the end of the pipe stubs in each manhole with flexible-joint caps, or acceptable alternate, securely fastened.
4. Fill the manhole with water and measure leakage over a period of not less than one hour.
5. Allowable Leakage: less than one (1) gallon per hour per 10-foot depth of manhole.
6. When leakage from the manhole exceeds the above amount, determine the source or sources of the leakage, and repair or replace defective materials and workmanship.
7. Repair all visible leaks even if manhole passes the leakage test.

**END OF SECTION**

## SECTION 03 33 15

### CONCRETE WALKS, CURBS, AND GUTTERS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. The work of this section consists of constructing concrete walks, drive approaches, curbs, and gutters.

##### 1.2 RELATED WORK

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 31 23 00 - Earthwork

##### 1.3 REFERENCES

- A. Section 40 – Concrete Pavement, State Standard Specifications
- B. Section 90 – Portland Cement Concrete, State Standard Specifications

##### 1.4 SUBMITTALS

- A. As specified in Section 01 33 00 – Submittal Procedures

##### 1.5 QUALITY ASSURANCE

- A. Concrete testing will be the responsibility of the Engineer at the Owner's expense. The Contractor shall cooperate by rerouting equipment or by temporarily closing the work area being tested.
  - 1. Strength Tests: Strength tests shall be made from each 100 cubic yards of concrete or fraction thereof each day. For each test, three cylinders shall be molded, one to be used for a 7-day test.
  - 2. Air Content and Slump Tests: At the time samples are taken for strength tests, the laboratory shall make slump and air content tests.

##### 1.6 PROJECT CONDITIONS:

- A. Place concrete only when temperatures are above 35° F, unless it is protected from freezing and approved in advance by the Engineer.



## **PART 2 PRODUCTS**

### **2.1 SELECT FILL**

- A. Dense, readily compactable material, free from vegetable matter and lumps of clay. Excavated material that meets this requirement may be used if approved.

### **2.2 BASE COURSE**

- A. Hard, durable particles of stone, gravel, or other finely divided mineral matter. All particles shall pass a 1-inch square mesh sieve and shall be uniformly graded from coarse to fine to produce a dense, compacted base.

### **2.3 CONCRETE**

- A. Materials: Materials, including cement, aggregates, water, and admixtures, shall meet the requirements of ASTM C94-90.

- 1. Cement: Type II.

- 2. Coarse Aggregate: Maximum size, 1-inch for hand methods, 3/4-inch for slip-form construction, and 1/2-inch for extruded curbs. For machine placed concrete, Contractor may, with Contracting Officer's approval, modify the aggregate grading specified in ASTM C94-90 to meet the recommendations of the manufacturer of the machine.

- a. Minimum Cement Content:

- 1) Sidewalks, curbs and gutters: Class "B" (5 sack).

- 2) Driveways and cross gutters: Class "A" (6 sack).

- B. Slump:

- 1. Concrete Walks: Maximum 4 inches.

- 2. Curb and Gutter:

- a. Hand Vibrated: Maximum 3 inches.

- b. Slip-Formed: Maximum 2 inches.

- C. Strength: 4,000 psi for Class "A" and 3,000 psi for Class "B" at 28 days.

- D. Manufacture and Delivery: Measurement of materials, batching, mixing, transporting, and delivery shall be as specified in ASTM C94. Discharge concrete into forms within 1-1/2 hours after introduction of water to cement. When temperature of concrete is 85° F or above, the time between introduction of water to cement and complete discharge of concrete into forms shall not exceed 45 minutes.

- E. Air Entraining Admixture: ASTM C260.

- F. Other admixtures complying with ASTM C494 or ASTM C618 may be used with approval of Engineer. No chlorides will be permitted.

#### 2.4 *EXPANSION JOINT FILLERS*

- A. ASTM D994-71, preformed bituminous type, 1/2-inch thick.

#### 2.5 *SURFACE RETARDANT*

- A. Rugasol S, manufactured by Sika Chemical Corporation, Lyndhurst, New Jersey, or approved equal.

#### 2.6 *CURING COMPOUND*

- A. In accordance with Section 90 of the State Standard Specifications.

#### 2.7 *CURING MATERIAL*

- A. Waterproof paper, polyethylene sheet, clean burlap, cotton mats, or other approved material that will not cause stain or discoloration.
- B. Using curing compound or curing materials, thoroughly cure and protect concrete keeping the surface moist for 7 days. Cure slabs with integral color in accordance with instructions of the pigment manufacturer. On exposed aggregate slabs or slabs with integral color, do not use polyethylene or paper sheeting.

### **PART 3 EXECUTION**

#### 3.1 *PREPARATION OF SUBGRADE*

- A. Excavate to required depth. Remove soft, yielding material and replace with select fill. Compact to a density of not less than 95 percent of the maximum density.

#### 3.2 *MAINTENANCE OF SUBGRADE*

- A. Maintain subgrade in a compacted condition until concrete is placed.

#### 3.3 *FORMS*

- A. Metal or uniform warp-free lumber, coated with form release agent. Grade forms to give slabs positive drainage and stake securely. Obtain approval of alignment and grade before placing concrete.

#### 3.4 *PLACING:*

- A. Concrete slabs for walks shall be formed, placed, vibrated, and finished by hand using conventional methods. Concrete curbs or curbs and gutters may be constructed in the same manner, but Contractor has the option of machine placing

curbs using the extrusion method or machine placing curb and gutter using the slip-form method.

- B. Place concrete on moistened subgrade monolithically between construction joints. Deposit to full depth in one operation. Consolidate immediately. After depositing concrete, screed and darby or bullfloat.

### 3.5 *FORM REMOVAL*

- A. Remove forms within 24 hours after concrete placement. Repair minor defects with mortar. Plastering will not be permitted on exposed faces.

### 3.6 *SLAB FINISHING*

- A. After darbying or bullfloating, stop finishing until bleeding has ceased and until concrete can support foot pressure with only about 1/4-inch indentation. Edge and joint, then float the slab. Use steel trowel to densify surface, then broom slab perpendicular to line of traffic.

### 3.7 *EXPOSED AGGREGATE FINISHING*

- A. Clean and thoroughly wet surface aggregate before use and drain to prevent free water from entering the concrete.
- B. Evenly distribute aggregate by hand, covering surface with a single layer.
- C. Embed the surface aggregate by patting with the flat side of a strike-off board or other tool.
- D. When surface is firm, lightly hand float with a float or darby.
- E. Spray retardant on the surface according to manufacturer's recommendations.
- F. When the concrete has set up sufficiently, expose aggregate by simultaneously brushing and flushing with water without overexposing or dislodging the aggregate. Expose aggregate to a depth of 1/8 to 1/4 inch.

### 3.8 *JOINTS*

- A. Construct joints true to line with faces perpendicular to surface.
  - 1. Isolation Joints: Separate walks from walls, stairways, and other structures, using expansion joint fillers.
  - 2. Contraction (Control) Joints: Space walk joints at intervals about equal to width of walk to a depth of one-fourth the slab thickness. Space curb and gutter joints not over 12 feet 6 inches on center and align them with sidewalk joints. Contraction joints may be either sawn or tooled.

- a. Sawn: Cut with a power saw fitted with an abrasive or diamond blade within 4 to 12 hours after walk has been placed and finished. Use sawn joints on exposed aggregate.
- b. Tooled: Form plane of weakness by inserting and later removing a metal divider, finish with an edger or a groover, or by saw cutting a previously tooled joint.

### 3.9 *SIDEWALK RESTORATION*

- A. Where sections of miscellaneous sidewalk work requires removal and restoration the following shall apply:
  1. The surface of the sidewalk shall match the existing weakened plane joints, score joints and construction joint patterns with the adjoining sidewalks or County standards.
  2. Where short sections of sidewalk have been removed for replacement, a minimum distance of three (3) feet or to nearest joint section of sidewalk shall be removed or as directed by the Engineer.
  3. The entire curb and gutter shall be removed to the nearest weakened plane or expansion joint. No patching at joints will be permitted.

### 3.10 *FIELD QUALITY CONTROL*

- A. Surfaces shall not vary more than 5/16 inch when tested with a 10-foot straightedge, nor curb gutters and valley gutters shall not vary more than .03 feet from a straight line between replacement section grade.

**END OF SECTION**

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**SECTION 03 41 00**  
**PRECAST CONCRETE STRUCTURES**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Work required under this section consists of furnishing and installing precast, reinforced concrete structures of the sizes and types called for on the Plans, complete with openings, inserts, and hardware

**1.2 RELATED WORK**

- A. Section 03 30 00 – Cast-In-Place Concrete
- B. Section 03 60 00 – Grout
- C. Section 31 23 00 – Earthwork
- D. Section 40 05 00 – Pipe and Fittings
- E. Section 40 05 23 – Valves and Appurtenances

**1.3 REFERENCES**

- A. American Concrete Institute (ACI)
- B. American Society for Testing and Materials (ASTM)
- C. State Standard Specifications
- D. California Building Code (CBC)

**1.4 SUBMITTALS**

- A. As specified in Section 01 33 00 – Submittal Procedures.
- B. Manufacturer's descriptive details of the manufacturer's latest standard product proposed for use on this project, including, but not limited to:
  - 1. All principal dimensions.
  - 2. Knockout locations and dimensions.
  - 3. Hardware details.
  - 4. Certification that the cement conforms to ASTM C150.

- C. Shop and erection drawings, including design criteria and calculations, locations and types of all inserts, and the locations of all openings and location and type of joints.
  - 1. The calculations and design drawings shall be stamped and signed by a civil or structural engineer registered in the State of California.

### 1.5 DEFECTIVE WORK

- A. Work considered to be defective may be ordered, by the Engineer, to be replaced in which case the Contractor shall remove and replace the defective work at his expense.

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. Design all precast structures as specified herein and in accordance with the applicable requirements of ASTM C913, except that Type II modified Portland cement shall be used.
  - 1. Comply with the provisions of Section 03 30 00 – Cast-In-Place Concrete.
- B. Structures shall be of the sizes and configurations shown on the Drawings, with openings as shown. Wall and floor thickness, roof thickness and joint location shall be determined by the fabricator.

### 2.2 STRUCTURES

- A. Precast Concrete Meter Box for 1-inch meter services shall be Christy B1017 Box, H/20 traffic rated lid with antenna mounting hole, and extensions; or equal.
- B. Precast Concrete Meter Box for 2-inch meter service shall be Christy B16 Box, H/20 traffic rated lid with antenna mounting hole and extensions; or equal.
- C. Precast Concrete Meter Box for 3-inch meter service shall be R17P36, H/20 traffic rated lid with antenna mounting hole and extensions; or equal.
- D. Precast Concrete Valve Box shall be Brooks Valve Box No. 3RT traffic rated box and lid, or Christy G05T traffic rated box & lid; or equal.
- E. Precast Concrete Utility Box for Permanent Blow-Off Assembly shall be Christy B2436 Box, H/20 traffic rated lid Christy B2436-52JHG, and extensions; or equal.

## PART 3 EXECUTION

### 3.1 GENERAL:

- A. Precast structures shall be set vertically and in true alignment, at the elevations indicated and at the locations shown on the Plans

- B. All holes in sections used for handling purposes shall be thoroughly plugged with rubber plugs or mortar.
- C. If starter couplings are not supplied, place pipe sections flush on the inside of the structure wall, projecting outside sufficiently for proper connection with the next pipe section
- D. Follow manufacture's recommended installation procedures.

**END OF SECTION**



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## SECTION 03 60 00

### GROUT

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Epoxy grouting of anchor bolts and reinforcing bars to be installed in hardened concrete.
- B. Adhesive bonding of fresh concrete to existing hardened concrete surfaces.
- C. Installation of pipe and sleeve into existing concrete.
- D. Structure and Equipment leveling pads.

##### 1.2 RELATED WORK

- A. Section 03 15 20 - Anchor Bolts and Post-Installed Anchors
- B. Section 03 30 00 - Cast-in-Place Concrete

##### 1.3 SUBMITTALS

- A. As specified in Section 01 33 00 – Submittal Procedures.

#### PART 2 PRODUCTS

Material Type	Approved Product
1. Non-shrinking Grout	L&M Chemical "Crystex", Gifford-Hill "Supreme", Master Builders "Masterflow 713 Grout" Sauereisen Cements "F-100 Level Fill Grout", U.S. Grout "Five Star Grout", UPCO "Upcon High Flow" or "Upcon Super Flow", or equal.
2. Epoxy Grout	
a. Adhesive, Moisture insensitive	
For floors and horizontal surfaces	Adhesive Engineering "Concressive 1539", Rescon "Concrete Bonder R616", or equal
For vertical walls or overhead applications, non-sagging consistency	Adhesive engineering "Concressive 1440" Rescon "Concrete Bonder R616" or equal
b. Aggregate	As recommended by the epoxy grout manufacturer
3. Epoxy Bonding Adhesive	Sikadur 32, Hi-Mod Master Builders Concressive Standard Liquid or equal.
4. Water	Clean and free from deleterious substances.

- A. Non-shrinking grout shall be furnished factory premixed, so only water is added at jobsite. Grout shall be mixed in a mechanical mixer. No more water shall be used than is necessary to produce a flowable grout.
  - 1. Cured grout shall have a minimum compressive strength of 3500 psi.
- B. Epoxy grout shall consist of a two component liquid epoxy adhesive of appropriate viscosity for the application and location and an inert aggregate filler component. Components shall be packaged separately at the factory and field mixed. All proportioning and mixing of the components shall be in accordance with the manufacturer's recommendations.
  - 1. Cured grout shall have a minimum compressive strength of 3500 psi.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. The concrete surface to receive non-shrinking grout shall be saturated with water for 24 hours prior to grouting.
- B. Where indicated on the drawings, dowels shall be epoxy grouted in holes drilled into hardened concrete. Hole diameter shall be as recommended by the manufacturer. The embedment depth for epoxy grouted dowels shall be as indicated on the Plans.
- C. Holes shall be prepared for grouting as recommended by the grout manufacturer.
- D. The existing concrete surface to receive fresh concrete shall be clean and sound. The existing surface may be dry or damp, but free of standing water, free of dust, laitance, grease, airing compounds, and disintegrated materials. The existing concrete surface and rebar shall be sand blasted or cleaned by approved mechanical methods.

#### **3.2 INSTALLATION**

- A. Non-shrinking Grout
  - 1. Placement - Unless otherwise specified or indicated on the Plans, the thickness of grout shall be 1-1/2 inches. Grout shall be placed in strict accordance with the directions of the manufacturer.
  - 2. Edge Finishing - The grout shall be finished smooth in all locations where the edge of the grout will be exposed to view after it has reached its initial set. Except where indicated to be finished on a slope, the edges of grout shall be cut off flush at the base plate, bedplate, member, or piece of equipment.

3. Curing – Non-shrinking grout shall be protected against rapid loss of moisture by covering with wet rags or polyethylene sheets. After edge finishing is complete, the grout shall be wet cured for at least 7 days.
  4. Epoxy Grout - Dowels shall be clean, dry, and free of grease and other foreign matter at time of installation. The bars shall be set and positioned and the epoxy grout shall be placed and finished in accordance with the recommendations of the grout manufacturer. Particular care shall be taken to ensure that all spaces and cavities are filled with epoxy grout, without voids.
- B. Epoxy Bonding Adhesive: Pre-mix each component as specified by manufacturer. Mix only that quantity that can be applied within its pot life. Apply as specified by manufacturer.

**END OF SECTION**

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## **SECTION 05 05 20**

### **BOLTS, WASHERS, ANCHORS AND EYEBOLTS**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. This section describes materials and installation of anchor bolts, connecting bolts, washers, drilled anchors, epoxy anchors, screw anchors, eyebolts, and stainless steel fasteners.

##### **1.2 DESIGN CRITERIA**

- A. Structural Connections: AISC Specification for Structural Steel Buildings (June 22, 2010), except connection details are shown in the Drawings.

##### **1.3 REFERENCES**

- A. American Institute of Steel Construction (AISC)
- B. American Society for Testing and Materials (ASTM)
- C. Research Council on Structural Connections (RCSC)

##### **1.4 SUBMITTALS**

- A. Submit shop drawings in accordance with Section 01 33 00 – Submittals.
- B. Submit manufacturer's catalog data and ICC Evaluation Service Reports for bolts, washers, and concrete anchors. Show dimensions and reference materials of construction by ASTM designation and grade.
- C. Submit anchor bolt layout drawings.

#### **PART 2 PRODUCTS**

##### **2.1 GENERAL**

- A. Anchor bolts, drilled anchors, and epoxy anchors for buried service, immersion service and in splash zones shall be stainless steel. All other anchor bolts, drilled anchors, and epoxy anchors shall be galvanized steel unless otherwise specified on the Plans.

##### **2.2 ANCHOR BOLTS**

- A. Steel anchor bolts shall conform to ASTM F1554, Grade 36, Class 1A or 2A unless otherwise indicated. Size, length and thread length shall be as shown on the Drawings.
- B. Bolts shall be provided with a head and two washers of a minimum of ¼ inch thick and 2 inches square. One washer shall be embedded in the concrete at the head of the bolt.
- C. Anchor bolts, nuts and washers shall be galvanized per ASTM F2329.

### 2.3 CONNECTION BOLTS

- A. Steel connection bolts shall conform to ASTM A325, Type 1 with the threads included in the shear plane.
- B. Provide galvanized bolts where shown in Drawings. Galvanizing of bolts, nuts, and washers shall be in accordance with ASTM F2329.

### 2.4 STAINLESS STEEL BOLTS

- A. Stainless steel bolts shall be ASTM A193, Grade B8 or ASTM F593, Type 316. Nuts shall be ASTM A194, Grade 316 or ASTM F594, Type 316. Use ASTM A194 nuts with ASTM A193 bolts; use ASTM F594 nuts with ASTM F593 bolts. Provide washer for each nut and bolthead. Washers shall be of the same material as the nuts.

### 2.5 LUBRICANT FOR STAINLESS STEEL BOLTS AND NUTS

- A. Lubricant shall be chloride free and shall be RAMCO TG-50, Anti-Seize by RAMCO, Huskey™ Lube-O-Seal by HUSK-ITT Corporation, or equal.

### 2.6 WASHERS

- A. Washers for bolts conforming to ASTM F1554 shall conform to ASTM F436, Type 1.
- B. Washers for bolts conforming to ASTM A307 shall conform to ASTM F844.
- C. Washers for bolts conforming to ASTM A325 shall be square or rectangular, tapered in thickness, smooth, hot-dipped galvanized, conforming to ASTM F436.
- D. Stainless steel washers shall be Type 316.

### 2.7 DRILLED ANCHORS

- A. Unless otherwise indicated in the Drawings, drilled anchors shall be 316 stainless steel wedge anchors as manufactured by ITW Red Head Trubolt+, Kwik Bolt TZ by Hilti, or equal. Anchors shall have ICC-approved testing.

## 2.8 EPOXY ANCHORS

- A. Epoxy anchors in concrete shall be 316 stainless steel threaded rod adhesive anchors. Adhesive shall be ITW Red Head Epcon S7, Hilti HIT RE 500-SD, or equal. Epoxy anchor assemblies shall be ICC approved.
- B. Epoxy anchors in grouted concrete masonry walls shall be 316 stainless threaded rods. Epoxy adhesive shall be Hilti HIT HY 70, Simpson ET-HP, or equal.

## PART 3 EXECUTION

### 3.1 STORAGE OF MATERIALS

- A. Store material, either plain or fabricated, above ground on platforms, skids, or other supports. Keep material free from dirt, grease, and other foreign matter and protect from corrosion.

### 3.2 GALVANIZING

- A. Zinc coating for bolts, anchor bolts, and threaded parts shall be in accordance with ASTM F2329.

### 3.3 INSTALLING CONNECTION BOLTS

- A. Use steel bolts to connect structural steel members. Use stainless steel bolts to connect structural aluminum members.
- B. Install ASTM A325 bolts and washers per the RCSC "Specification for Structural Joints Using High Strength Bolts".
- C. Bolt holes in structural members shall be 1/16 inch in diameter larger than bolt size. Measure cast-in-place bolt locations in the field before drilling companion holes in structural steel beam or assembly.
- D. Slotted holes, if required in the Drawings, shall conform to AISC 360-10, Chapter J, Section J3, Table J3.3.
- E. Drive bolts accurately into the holes without damaging the thread. Protect boltheads from damage during driving. Boltheads and nuts or washers shall rest squarely against the metal. Where bolts are to be used on beveled surfaces having slopes greater than 1 in 20 with a plane normal to the bolt axis, provide beveled washers to give full bearing to the head or nut. Where self-locking nuts are not furnished, bolt threads shall be upset to prevent the nuts from backing off.
- F. Bolts shall be of the length that will extend entirely through but not more than 1/4 inch beyond the nuts. Draw boltheads and nuts tight against the work.

### 3.4 INSTALLATION OF STAINLESS STEEL BOLTS AND NUTS



- A. Prior to assembly, coat threaded portions of stainless steel bolts and nuts with lubricant.

### 3.5 *INSTALLING ANCHOR BOLTS*

- A. Anchor bolts shall be delivered in time to permit setting before the structural concrete is placed. Anchor bolts which are cast in place in concrete shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or supporting template.
- B. Preset bolts and anchors by the use of templates. Do not use concrete anchors set in holes drilled in the concrete after the concrete is placed for mechanical equipment. Anchor bolts and threaded rod anchors which are to be epoxy grouted shall be clean and free of coatings that would weaken the bond with epoxy.
- C. Two nuts, a jam nut, and a washer shall be furnished for anchor bolts and threaded rod anchors indicated on the drawings to have locknuts; two nuts and a washer shall be furnished for all other anchor bolts.
- D. Anti-seize thread lubricant shall be liberally applied to projecting, threaded portions of stainless steel anchor bolts and threaded rod anchors immediately before final installation and tightening of the nuts.
- E. For static items such as storage tanks, use preset anchor bolts or drilled anchors with ICC report data.
- F. After anchor bolts have been embedded, protect projecting threads by applying grease and having the nuts installed until the time of installation of the equipment or metalwork.

### 3.6 *INSTALLING DRILLED ANCHORS*

- A. Minimum depth of embedment of drilled mechanical anchors shall be as recommended by the manufacturer, but no less than that shown in the Drawings.
- B. Prepare holes for drilled anchors in accordance with the anchor manufacturer's recommendations prior to installation.

### 3.7 *INSTALLING EXPOXY ANCHORS*

- A. Epoxy anchors shall be clean and free of coatings that would weaken the bond with epoxy.
- B. Minimum depth of embedment of epoxy anchors shall be as recommended by the manufacturer, but no less than that shown in the Drawings.
- C. Prepare holes for epoxy anchors in accordance with the anchor manufacturer's recommendations prior to installation.

**END OF SECTION**

Bolts, Washers, Anchors and Eyebolts  
05 05 20-4

## **SECTION 09 90 00**

### **PAINTING AND COATING**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. Field painting including surface preparation, surface protection, clean up, and/or other appurtenant work as indicated in the Contract Documents.
- B. All labor, materials, tools and equipment, and incidentals necessary and required for their completion.

##### **1.2 RELATED WORK**

- A. Section 03 30 00 – Cast-in-Place Concrete

##### **1.3 SUBMITTALS**

- A. Shop Drawings, Product Data, and Samples: as specific in Section 01 33 00 – Submittals.
  - 1. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Performance criteria as required by the Engineer to determine quality.
    - c. Manufacturer's installation instructions and environmental parameters.
    - d. Material Safety Data Sheets.
    - e. Color samples.

##### **1.4 AIR QUALITY REGULATORY COMPLIANCE**

- A. All paint shall conform to the applicable air quality regulations at the point of application. Any paint material which cannot be guaranteed by the manufacturer to comply, whether specified by product designation or not, shall not be used.
- B. The volatile organic compound (VOC) of coatings materials limits set forth in Rule 460.1 of the San Joaquin Valley Unified Air Pollution Control District shall apply to this project. The manufacturers' products listed in paragraphs 3.01 and 3.02 of this section have been selected on the basis of their apparent compliance with Rule 460.1; however, it shall remain the Contractor's responsibility to ensure that all coatings materials furnished are in compliance with all regulatory agencies.

- C. The product listed may meet the VOC requirement in the unthinned (as shipped) condition, but may exceed the VOC requirement if thinned to the manufacturer's allowable recommendations. In this situation, the product is not to be thinned beyond the limit indicated in Rule 460.1, and if the product cannot be suitably thinned for the intended application method or temperature requirements, it will be necessary to use another manufacturer's product subject to acceptance by the Engineer.
- D. It shall be the responsibility of the Contractor to ensure the compatibility of the field painting products which will be in contact with each other or which will be applied over shop painted or previously painted surfaces. Paint used in successive field coats shall be produced by the same manufacturer. Paint used in the first field coat over shop or field primed surfaces, or previously painted surfaces shall cause no wrinkling, lifting, or other damage to underlying paint.

### 1.5 *QUALITY OF WORK*

- A. All finishes shall be applied by skilled workmen in accordance with the best practices and standards of the painting trade. Brushes, rollers, all equipment, and the techniques used in applying finishes shall be of sufficient quality to assure the specified results. Work not conforming to this Specification shall be corrected by touching up or refinishing as directed by the Engineer.
- B. It is the purpose and intent of this Specification to cover the complete paint finishing of all exterior and interior surfaces as scheduled or specified and all surfaces which normally require a paint finish for corrosion resistance, weather protection, finished appearance or utility. Finished surfaces shall be of the type of finish, color sheen film thickness and quality specified.

### 1.6 *DELIVERY AND STORAGE*

- A. Painting materials shall be delivered to site in manufacturer's original containers with labels intact and seals unbroken. Painting materials and equipment shall be stored and protected against freezing and mixed in rooms assigned for that purpose. No chemicals, unauthorized thinners, or other materials, not included in the paint formulation shall be added to the paint for any purpose. All necessary precautions shall be taken to prevent fire. Rags or waste soiled with paint shall be removed from premises at end of each day's work, or shall be stored in covered metal containers.

### 1.7 *EQUIVALENT PRODUCTS*

- A. Whenever a coating is specified using the name of a proprietary product or the name of a particular manufacturer or vendor, the specified coating shall be understood as establishing the type and quality of coating desired.
- B. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Engineer to determine that the coatings proposed are equivalent to those named. Proposed coatings shall be submitted for review in accordance with the Section 01 30 00 – Submittals.

- C. Requests for review of equivalency will not be accepted from anyone except the Contractor, and such requests will not be considered until after the contract has been awarded.
- D. Specific products for various applications shall be as specified in Part 2. In addition to the products named in Part 2, equivalent products of the following manufacturers will also generally be acceptable:
  - Ameron
  - Carboline
  - Devoe
  - PPG (Pittsburgh)
  - Sherwin Williams Co.
  - Sinclair
  - Tnemec
  - Valspar
- E. Contractor shall provide verification that equivalent products are acceptable for the desired application.

#### 1.8 REFERENCE STANDARDS

- A. SSPC – Society of Protective Coatings, Pittsburgh, PA
- B. ASTM – American Society For Testing And Materials, West Conshohocken, PA

### **PART 2 PRODUCTS**

#### 2.1 GENERAL

- A. All paint shall be the product of a recognized manufacturer exclusively engaged in the manufacture of painting material. All paints for wood and metal surfaces shall be well-ground and shall not skin, liver, curdle, or body excessively in the containers.
- B. The paint shall not show laps or unevenness of color or texture. When applied to vertical surfaces, it shall not sag.
- C. All exposed surfaces, including sides and edges, shall be painted. Hangers, brackets, fastenings and other miscellaneous items shall be painted with the same system as the adjacent material. Paint systems shall be in addition to shop primers.
- D. Paint shall be stored inside and shall be protected against freezing. No adulterant, unauthorized thinner, or other material not included in the paint formation shall be added to the paint for any purpose.
- E. Paint used in successive field coats shall be produced by the same manufacturer. Paint used in the first field coat over shop painted or previously painted surfaces

shall cause no wrinkling, lifting, or other damage to underlying paint. Any paint system shall be the product of a single manufacturer.

- F. All paint used for intermediate and finish coats shall be guaranteed by the paint manufacturer to be lead-free, mercury-free, and fume-proof. Where paint materials are referenced to Federal or military specifications, the reference shall define general type and quality required but is not intended to limit acceptable materials to an exact formulation.
- G. For each paint, the Contractor shall follow the paint manufacturer's specific application instructions. Upon the Engineer's request, the Contractor shall furnish the following application instructions.
  - 1. Surface preparation recommendations.
  - 2. Type of primer to be used.
  - 3. Maximum dry and wet mil thickness per coat.
  - 4. Minimum and maximum curing times between coats.
  - 5. Thinner to be used with each paint.
  - 6. Ventilation requirements.
  - 7. Atmospheric conditions during which the paint shall not be applied.
  - 8. Allowable methods of application.
  - 9. Maximum allowable moisture content and minimum age of plaster, concrete and wood surfaces at time of paint application.
  - 10. Curing time before submergence in water.
- H. The minimum number of coats and minimum total dry mil thickness of the system for each surface shall be as specified in the paint schedule.

## 2.2 PAINTING SCHEDULE

- A. A schedule is appended to this section listing the surface preparation, primer, finish and dry mil thickness to be used on each surface to be coated.

## 2.3 PRIMERS AND PRETREATMENT

- A. P-1 Epoxy Primer – Minimum dry thickness 4 mils. Devoe "Bar Rust 235H", Sherwin Williams "Macropoxy 646 FC Epoxy B58-600", or Tnemec 69-1211 "Hi-Build Expoxoline."
- B. P-2 Rust Inhibitive, non-submerged – Minimum dry thickness 3 mils. Devoe "Devran 203 Waterborne Epoxy Primer", Sherwin Williams "Macropoxy 646 FC Epoxy B58-600" or Tnemec 135 "Chem Build."

- C. P-3 Rust inhibitive, submerged – Minimum dry thickness 4.0 mils. Devoe "Bar Rust 235H", Sherwin Williams "Macropoxy 646 FC Epoxy B58-600" or Tnemec 136 "Chem Build."
- D. P-4 Primer for Wood – Maximum of 400 sq. ft/gal. Devoe 2010-1200 "Ultra- Hide Durus Exterior Acrylic Primecoat", Sherwin Williams "A-100 Wood Primer B42W41" or Tnemec 151 "Elaso-Grip."
- E. P-5 Wallboard Primer – Maximum of 400 sq. ft/gal. Devoe 1060-1200 "Ultra- Hide Latex Primer- Sealer", Sherwin Williams "Preprite 200 Interior Latex Primer B28W200", or Tnemec 51-792 "PVA Sealer."
- F. P-6 High Build Acrylic – Maximum of 100 sq. ft/gal., Tnemec 180 WB Tneme-Crete, Sherwin Williams "Heavy Duty Block Filler B42W46".

#### 2.4 INTERMEDIATE AND FINISH PAINTS

- A. F-1 Epoxy Resin - Minimum dry thickness 5 mils. Devoe "Bar Rust 235H", Sherwin Williams "Macropoxy 646 FC Epoxy B58-600", or Tnemec 69 "Hi-Build" epoxy.
- B. F-2 Gloss Acrylic Emulsion - Minimum dry thickness 2.0 mils Devoe " Devflex 4208 Waterbone Acrylic Enamel", Sherwin Williams "Shercryl Hi Performance Acrylic Gloss B66-300", or Tnemec 1028.
- C. F-3 Semi-gloss Acrylic Emulsion - Minimum dry thickness 2.5 mils Devoe "Devvflex 4216 HP Waterborne", Sherwin Williams "Shercryl Hi Performance Acrylic Semi-Gloss B66-350", or Tnemec 1029 "Tuf Cryl".
- D. F-4 High Build Epoxy (Substitute for Coal Tar) - Minimum dry thickness 6 mils. Devoe "Devtar 5A HS", Sherwin Williams "Targuard Coal Tar Epoxy B69B60", or Tnemec "V69F Black"
- E. F-5 Polyurethane O - Minimum dry thickness 2 mils. Devoe "Devthane 379H Aliphatic Urethane Gloss Enamel", Sherwin Williams "Hi Solids Polyurethane CA B65j-300", or Tnemec 1075 "Endurasheild."
- F. F-6 Acrylic Epoxy – Minimum dry film thickness 4 mils. Tnemec 113 Tneme-Tufcoat, Sherwin Williams " Waterbased Tile Clad Epoxy B73-100".
- G. F-7 High Build Acrylic – Maximum of 100 sq. ft./gal. Tnemec 180 WB Tneme-Crete, Sherwin Williams "Heavy Duty Block Filler B42W46".

#### 2.5 ALUMINUM SURFACES

- A. All aluminum in contact with steel or concrete: Sherwin Williams "Macropoxy 646 FC Epoxy B58-600 series or approved equivalent..

## 2.6 SURFACES NOT TO BE PAINTED

- A. Except as otherwise required or directed, the following surfaces are to be left unpainted:
1. Exposed surfaces of aluminum.
  2. Polished or finished stainless steel. Unfinished stainless steel shall be painted.
  3. Nickel or chromium.
  4. Galvanized surfaces, except piping, conduit, electrical conduit, pipe supports, fasteners, hangers, bracing, brackets, and accessories.
  5. Rubber and plastics, including fiberglass reinforced plastics.
  6. Precast concrete.

## 2.7 SYSTEM IDENTIFICATION

- A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by preprinted marker or stenciled marking, and include arrows to show the direction of flow. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floor, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portion of lines. Marking of short branches and repetitive branches for equipment connections is not required.
- B. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-4). Provide ½-inch high lettering, white on black background. Nameplates shall be permanently secured to the unit.
- C. Valves: Provide valve tags on all valves of each piping system, excluding check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Provide brass tags or plastic laminate tags. Prepare and submit a tagged valve schedule, listing each valve by tag number, location and piping service. Mount in glazed frame where directed.

## 2.8 PIPING IDENTIFICATION

- A. Pipe shall be color coded according to the following schedule. Bands shall be 6 inches wide spaced along the pipe at 5-foot intervals. Depth of water gauges shall be painted as indicated on the Plans.

<u>LETTERS</u>	<u>COLOR OF PIPE</u>	<u>COLOR OF LETTERS</u>
Potable water	Light Blue	Black
Non-Potable water	Light Blue with Black Bands	Black
Grit	Dark Blue with Orange Bands	White
Air	Light Green	Black
Sludge	Light Brown	White
Scum	Dark Brown	White
Drain	Dark Gray	White
Reclaimed water	Purple	Black

B. Electrical conduit shall be painted to match adjacent ceiling or wall surfaces as directed by the Engineer.

C. Item	Paint Color
Valve handwheels and levers	Red

### **PART 3 EXECUTION**

#### **3.1 PRELIMINARY EXAMINATION**

A. Notify the Engineer in writing of any uncorrected defects in surfaces to be painted. Do not proceed with the finishing of surfaces in question until any discrepancies are corrected. No work on any surface shall be started, unless the surface has been inspected and approved for painting by the Engineer.

#### **3.2 SURFACE PREPARATION**

- A. The Contractor shall prepare the surfaces to be coated as specified under the paint schedule. Any surfaces to be coated which are not listed under the paint schedule shall be prepared in accordance with the manufacturer's instructions for the material to be applied.
- B. All grease, oil, dirt, and other contaminants which may affect the bond between the coating and the surface shall be removed by a cleaning agent which will leave the surface clean and dry.
- C. Cleaning and painting operations shall be performed in a manner which will prevent dust or other contaminants from getting on freshly painted surfaces.
- D. Surfaces shall be free of cracks, pits, projections, or other imperfections which would prevent the formation of smooth, unbroken paint film, except for concrete block construction where a rough surface is an inherent characteristic.
- E. When applying touch-up paint, or repairing previously painted surfaces, the surfaces to be painted shall be cleaned and sanded or wire brushed in such a manner that the edges of adjacent paint are feathered or otherwise smoothed so that they will not be noticeable when painted. All paint made brittle or otherwise damaged by heat or welding shall be completely removed.



- F. Hardware items such as bolts, screws, washers, springs, and grease fittings need not be cleaned prior to painting if there is no evidence of dirt, corrosion, or foreign material.
- G. All galvanized surfaces shall have a metal conditioner applied prior to the first prime coat.
- H. All surfaces to be finished shall be clean and dry before any materials are applied. Use a moisture meter to determine moisture content as follows. The moisture content shall be less than 18% for wood; 8% for concrete or plaster.
  - 1. Metal Surfaces – Where noted, the surface preparation for steel and other metals refer to the specifications for surface preparation by the latest revision of the Steel Structures Painting Council. All metal work shall be cleaned of grease, oil and dirt by solvent cleaning (SSPC-SP1). Do not use hydrocarbon based solvents for cleaning prior to use of acrylic materials.
    - a. Method SP-2: Surface shall be wire brushed where required to remove loose rust and dirt, etc. (SSPC-SP2)
    - b. Method SP-3: Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by power wire brushing, power impact tools or power sanders. (SSPC-SP3)
    - c. Method SP-6: Blast cleaning until at least two-thirds of each element of surface area is free of all visible residues. (SSPC-SP6)
    - d. Method SP-10: Sandblast to near white condition. This method shall remove all rust and scale, but streaks and shadows in the metal will be acceptable. (SSPC-SP10)
  - 2. Wood Surfaces
    - a. Method W-1: All unprimed millwork delivered to the jobsite shall be given the specified first coat on all surfaces immediately upon arrival. Give all unprimed woodwork the specified first coat as soon as possible following installation. Prime any wood surface that is to be in contact with concrete, or a caulking material, with the specified first coat material before installation. Unless specified otherwise, all casings and trim, and all woodwork shall be free of oil, dirt, loose fibers, etc., sealed with a sanding sealer recommended by the coating manufacturer, and sanded smooth and dusted thoroughly before application of the priming coat. Give all knots, pitch pockets and sappy areas a preliminary coat of Dutch Boy Knot Sealer, or approved equivalent, prior to application of the prime coat.
  - 3. Galvanized Surfaces
    - a. Method G-1: All galvanized surfaces shall be prepared for painting in strict conformity with the instructions of the manufacturer. All galvanized shall be cleaned per SSPC-SP7.

4. PVC Pipe

- a. Method V-1: All wax and oil shall be removed from PVC plastic surfaces by wiping with a solvent of the type used for the specified primer.

3.3 *PAINT APPLICATION*

- A. Apply all finishes evenly, free from sags, runs, crawls, brush marks, skips or other defects. Apply products at the proper consistency and do not thin or otherwise alter them except in accordance with the manufacturer's printed directions. All coats shall be applied in such manner as to produce an even film of uniform thickness completely coating all corners and crevices. All painting shall be done by thoroughly experienced workmen.
- B. Care shall be exercised during spraying to hold the nozzle sufficiently close to the surfaces being painted to avoid excessive evaporation of the volatile constituents and loss of material into the air, or the bridging over of crevices and corners. Spray equipment shall be equipped with mechanical agitators, pressure gauges, and pressure regulators. Nozzles shall be of proper size. Floors, roofs, and other adjacent areas and installations shall be satisfactorily protected by drop cloths or other precautionary measures. All over-spray shall be removed by approved methods or the affected surface repainted. Care shall be exercised to avoid lapping of paint on hardware of other unscheduled surfaces.
- C. Each coat of material shall be thoroughly dry before the application of a succeeding coat. In no case shall paint be applied at a rate of coverage per gallon which is greater than the maximum rate recommended by the manufacturer. Paint films showing sags, checks, blisters, teardrops, or fat edges will not be accepted. Paint containing any of these defects shall be entirely removed and the surface repainted.
- D. Sandpaper enamels and varnishes lightly between coats and dust thoroughly before the application of a succeeding coat.
- E. If the finish coat is to be colored, the prime coat and the intermediate coat shall be tinted to have a slight variation in color from each other and from the finish coat.

3.4 *PRIMING*

- A. Edges, corners, crevices, welds, and bolts shall be given a brush coat of primer before the specified spot or touch-up painting of metal surfaces. Special attention shall be given to filling all crevices with paint.
- B. Abraded and otherwise damaged portions of shop applied paint shall be repainted. Welded seams and other uncoated surfaces, heads and nuts of field installed bolts, and surfaces where paint has been damaged by heat, shall be given a coat of the specified primer. This patch, spot, or touch-up painting shall be completed, and shall be dry and hard, before additional paint is applied.

### 3.5 *LATEX PAINT*

- A. Latex paint shall be applied by brushing or rolling; spraying is not permitted. Latex paint shall not be thinned excessively.

### 3.6 *MIXING AND THINNING*

- A. Paint shall be thoroughly mixed each time any is withdrawn from the container. Paint containers shall be kept tightly closed except while paint is being withdrawn.
- B. Unless otherwise authorized, all paint shall be factory mixed to proper consistency and viscosity for hot weather application without thinning. Thinning will be permitted only as necessary to obtain recommended coverage at lower application temperatures. In no case shall the wet film thickness of applied paint be reduced, by addition of paint thinner or otherwise, below that represented by the recommended coverage rate.

### 3.7 *FILM THICKNESS FOR FERROUS METALS*

- A. It is intended that the dry film thickness and the continuity of painted ferrous metal surfaces be subject to continual field check by the Engineer. Dry film thickness shall be measured by the Contractor, using an approved Thickness Gauge, at locations selected by Engineer. Testing equipment provided shall be provided by Contractor and kept on site.
- B. Measurement of dry coating thickness shall conform with paint application Standard SSPC-PA2
- C. Thickness and Holiday Checking: Thickness of coatings and paint shall be checked with a non-destructive, magnetic type thickness gauge.
- D. Holiday Checking of all interior coated surfaces shall be tested with an approved holiday detection device. Non-destructive holiday detectors shall not exceed 100 volts nor shall destructive holiday detectors exceed the voltage recommended by the manufacturer of the coating system. For thicknesses between 10 and 20 mils (0.25mm and 0.50mm) a non-sudsing type wetting agent such as Kodak Photo-Flo, shall be added to the water prior to wetting the detector sponge. All pinholes shall be marked, repaired in accordance with the manufacturer's printed recommendations and re-tested. No pinholes or other irregularities will be permitted in the final coating. Holiday detection devices shall be operated in the presence of the Engineer.
- E. Continuity shall be tested by a low voltage-wet sponge per RPO 188. Contractor shall perform continuity tests as required by the Engineer on surfaces that will be submerged.

### 3.8 *ATMOSPHERIC CONDITIONS*

- A. Apply all material to dry and properly prepared surfaces when weather conditions are favorable for painting. No materials shall be applied when the temperature of the materials is below 50° F, or when the temperature of the air, surface to be

painted or substrate, is below (or likely to fall below) 50° F. Final ruling on the favorability of weather conditions shall be in accordance with the recommendations of the manufacturer and/or the Engineer.

- B. No coating or paint shall be applied to wet or damp surfaces, in rain, snow, fog, or mist, when the steel temperature or surrounding air temperature is less than five degrees above the dew point, nor in conditions not recommended by the manufacturer.

### 3.9 REPAIRING DAMAGED PAINT ON EQUIPMENT

- A. Painted surfaces on equipment, which have become damaged prior to acceptance by the Owner, shall be repainted with the same or equivalent paint used in the original application.

### 3.10 PROTECTION OF SURFACES

- A. Throughout the work the Contractor shall use drop cloths, masking tapes, and other suitable measures to protect all surfaces from accidental spraying, splattering, or spilling of paint. Contractor shall be liable for and shall correct and repair any damaged condition resulting from its operations or from the operations of all those who are responsible to the Contractor during the time its work is in progress and until the work is accepted. In case bituminous paints are spilled or dropped on any material except metals, the spots shall, after surface cleaning, be spot painted with aluminum paint prior to applying the specified paint. Any exposed concrete or masonry not specified to be painted which is damaged by paint shall be either removed and rebuilt or, where so authorized by the Owner, painted with two coats of masonry paint.

### 3.11 CLEANUP

- A. All cloths and cotton waste which might constitute a fire hazard shall be placed in metal containers or destroyed at the end of each work day. Upon completion of the work all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer.

### 3.12 PAINTING SCHEDULE

<u>SYSTEM</u>	<u>SURFACE</u>	<u>FINISH</u>			
		<u>SURF. PREP.</u>	<u>PRIME COAT</u>	<u>2<sup>ND</sup> COAT</u>	<u>3<sup>RD</sup> COAT</u>
1.	New ferrous metal in submerged or damp environment including all submerged mechanical components.	SP-10	P-1	F-1	F-1
2.	All exterior exposed new structural and miscellaneous steel. All exterior	SP-2 or 3	P-2	F-2	F-2

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	exposed surfaces of new piping, pumps, motors, electrical equipment and other unsubmerged mechanical and structural items.				
3.	All surfaces of new structural and miscellaneous steel pipe, pumps, motors and electrical equipment panels exposed inside building.	SP-6	P-2	F-3	F-3
4.	All interior exposed new galvanized metalwork including electrical conduit inside buildings, including fittings, boxes, supports and accessories.	G-1	P-3	F-3	F-3
5.	All exterior exposed new galvanized metalwork including roof flashings and other architectural items.	G-1	P-3	F-2	F-2
6.	Exposed new PVC piping	V-1	F-5	F-5	

<u>SYSTEM</u>	<u>SURFACE</u>	<u>FINISH</u>			
		<u>SURF. PREP.</u>	<u>PRIME COAT</u>	<u>2<sup>ND</sup> COAT</u>	<u>3<sup>RD</sup> COAT</u>
7.	All new buried valves and flanged joints and other buried miscellaneous ferrous piping and metal surfaces (excluding case iron pipe). All exterior surfaces of new cast iron and steel piping exposed in manholes, wet wells and similar locations, including valves, fittings, flanges, bolts, supports, and accessories. Miscellaneous new castings, including manhole rings and covers and manhole steps. (One coat, if not foundry dipped.)	SP-10	F-4	F-4	
8.	Interior wood	P-4	F-2	F-2	
9.	Exterior wood	P-4	F-3	F-3	
10.	Interior dry wall	P-5	F-6		
11.	Exterior concrete block	P-6	F-7		
12.	Concrete	P-6	F-7		

### 3.13 CONFLICTS

- A. When conflicting painting specifications or requirements are encountered in the contract documents, the more restrictive specifications or requirements shall be required.

**END OF SECTION**

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## **SECTION 31 11 00**

### **CLEARING AND GRUBBING**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. The work of this section consists of clearing, grubbing, grinding, transporting, removing and disposing of trees, stumps, roots, vegetation debris, and existing improvements, including curb, gutters, catch basins, storm drains, landscaping, fencing, utilities, and other protruding obstructions within the clearing limits.
- B. Protect trees, landscaping and shrubs that are not designated to be removed or near construction site that may be harmed by construction activities.

##### **1.2 RELATED WORK**

- A. Section 01 57 27 – Dust Control
- B. County Standard Special Provisions Section 13-Water Pollution Control
- C. Section 02 41 00 – Demolition
- D. Section 31 23 00 – Earthwork

##### **1.3 REGULATORY REQUIREMENTS**

- A. Obtain all required permits.
- B. Dispose of removed materials in a legal manner at an approved disposal facility.
- C. One hundred percent of trees, stumps, rocks and associated vegetation and soils resulting from land clearing shall be reused or recycled.

##### **1.4 REFERENCES**

- A. Section 15 – Existing Facilities, State Standard Specifications
- B. Section 17-2 – Clearing and Grubbing, State Standard Specifications
- C. Section 19 – Earthwork, State Standard Specifications



## **PART 2 PRODUCTS**

### **2.1 NOT USED**

## **PART 3 EXECUTION**

### **3.1 CLEARING AND GRUBBING**

- A. Clear the specified areas by removing, above the natural ground surface, all existing improvements including curbs, gutters, catch basins, storm drains, landscaping fencing and utilities; vegetable growth such as trees, shrubs, logs, upturned stumps, roots of down trees, brush, and similar material.
  - 1. Trees of 4-inch diameter and larger shall not be removed without Owner's authorization.
- B. Grub the specified areas below the natural ground surface, except in embankment areas where the grading plane is two feet or more above the natural ground, to a depth necessary to remove all boulders, stumps, roots, buried logs, and other objectionable material including rock and concrete. Remove and stock pile the top 4 inches of topsoil in any area which is to receive structural fill.

### **3.2 PRESERVATION**

- A. If indicated or required, preserve trees, plants, rock outcroppings, or other features designated to remain. Protect trees and plants from damage; fell trees in a manner which shall not injure standing trees, plants and improvements which are to be preserved.

### **3.3 SALVAGE EQUIPMENT**

- A. Salvaged equipment shall be delivered to the Owner at a designated site.
- B. Equipment to be salvaged is designated in Section 02 41 00, Demolition:

**END OF SECTION**

## **SECTION 31 23 00**

### **EARTHWORK**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. Excavate earth and rock as necessary to allow the installation or construction of various items of work, regardless of character and subsurface conditions.
- B. Haul, place, rough grade, compact, and finish grade excavated material as engineered fill on those portions of the project site where it is necessary in order to construct the facilities indicated on the Plans.
- C. Dispose of unsuitable material off-site or in designated areas, as directed by the Engineer.
- D. Prepare excavation and fill for compaction testing.

##### **1.2 RELATED WORK**

- A. Section 01 43 00 – Quality Control and Testing
- B. Section 01 51 36 – Water and Watering
- C. Section 31 11 00 – Clearing and Grubbing

##### **1.3 REFERENCES**

- A. ANSI/ASTM C136 – Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft lbf/ft<sup>3</sup> (600 kN m/m<sup>3</sup>))
- C. ANSI/ASTM D1557 – Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb (4.54 kg) Hammer and 18-inch (457 mm) Drop.
- D. ANSI/ASTM D1556 – Density of Soil and base rock in Place by Sand-Cone Method.
- E. ASTM D75 Standard Practice for Sampling Aggregates
- F. ASTM D 6938 – Density of soil and base rock in place by Nuclear method.
- G. ASTM D 2937 – Density of soil and in place by Tube method.
- H. Section 26 – Aggregate Bases, State Standard Specifications.

- I. Section 15 – Existing Facilities, State Standard Specifications
- J. Section 18 – Dust Palliatives, State Standard Specifications
- K. Section 19 – Earthwork, State Standard Specifications

#### 1.4 PROTECTION

- A. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.
  - 1. Trenches shall have sloping, sheeting, shoring, and bracing conforming with 29CFR1926, Subpart P – Excavations, CAL/OSHA requirements, and the Contract Documents.
- B. Notify Engineer of unexpected subsurface conditions.
- C. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.
- D. Grade excavation top perimeter to prevent surface water run-off into excavation.

#### 1.5 CONTROL AND DIVERSION OF WATER

- A. General – The Contractor shall furnish or procure all materials and labor required for constructing and maintaining all necessary cofferdams, channels, flumes, drains, sumps, and/or other temporary diversion and protective works and shall furnish, install, maintain, and operate all necessary pumping and other equipment for removal of water from the various parts of the work and for maintaining the foundations and other parts of the work free from water.
- B. Plan – Prior to beginning any work on the removal of water from foundations, the Contractor shall submit for the Engineer’s approval a water control plan showing his proposed method for the removal of water from foundations and other parts of the work.

#### 1.6 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

#### 1.2 SAMPLES

- A. Submit samples under provisions of Section 01 43 00 – Quality Control and Testing.

#### 1.7 QUALITY ASSURANCE

- A. Compaction Testing

All compaction testing shall be in accordance with Section 01 43 00 - Quality Control and Testing.

- B. Compaction tests will be performed for each lift or layer.
- C. Tests for compaction shall conform to references listed in Part 1.3 of this section
- D. Sample backfill materials per ASTM D 75.
- E. Compaction testing will be performed in accordance with State Standard Specifications, Section 19-6.03.

#### 1.8 *DEFINITION*

- A. **Unsuitable Material:** Unsuitable material is material determined to be:
  - 1. Impossible to compact to specified density using ordinary methods at optimum moisture content.
  - 2. Too wet to be properly compacted if circumstances prevent satisfactory in-place drying prior to incorporation into the work.
  - 3. Otherwise unsuitable as indicated by the engineer.

#### 1.9 *PROJECT CONDITIONS*

- A. Underground utilities may exist at this site. Contractor shall take all necessary precautions to protect said utilities. Notify Engineer of any deviation in utility location from that which is shown on the drawings.
- B. Arrange construction sequences to provide the shortest practical time that trenches will be open to avoid hazard to the public, and to minimize the possibility of trench collapse.
- C. Obtain all required permits and licenses before installing utilities and follow the rules and requirements of the authority having jurisdiction.

#### 1.10 *EXCAVATION CLASSIFICATION*

- A. Regardless of the nature of material excavated, all excavation will be considered unclassified.

#### 1.11 *HAND EXCAVATION*

- A. **Hand Excavation Requirements Near Trees**
  - 1. Hand excavation will be required within the drip line of selected trees. The Engineer will designate these trees and will direct the performance of said hand excavation.
  - 2. The contractor shall hand excavate as necessary to protect existing buried utilities and improvements.

3. Unless directed by the Engineer, roots two inches in diameter or larger shall not be cut.

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. All backfill material shall be approved before use and be free of cinders, ashes, ice, frozen soil, large hard clods, organic debris, or other deleterious items.
- B. Engineered fill materials for all fill areas shall be as required by State Standard Specifications, Section 19-6.
- C. Gravel: Pit run, natural stone; free of shale, clay, organic matter; No. 8 minimum to  $\frac{3}{8}$ " maximum size per State Standard Specifications, Section 90-1.02C(4)(a).
- D. Pea Gravel: Natural stone; washed, free of clay, shale, organic matter;  $\frac{1}{4}$ " minimum to  $\frac{5}{8}$ " maximum size.
- E. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter, graded in accordance with State Standard Specifications, Section 90-1.02C(4)(C), within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
No. 4	75 - 100
No. 200	0 - 10

- F. Imported sand shall have a Sand Equivalent of 30, per ASTM D 2419.
- G. Class 2 Aggregate Base: Material as specified for  $\frac{3}{4}$ " maximum grading in State Standard Specifications Section 26-1.02B, unless otherwise specified.
- H. Permeable material for use in backfilling under, around, and over underdrains; and permeable material for chimney drains, riprap bedding, or other subdrainage purposes shall consist of hard, durable, clean sand, gravel or crushed stone and shall be free from organic materials, clay balls, or other deleterious substances.
  1. The percentage composition by weight of permeable materials in-place shall conform to the following gradation when determined by ASTM D-422:

<u>Sieve Size</u>	<u>Percent Passing</u>
1½ inch	90-100
$\frac{3}{4}$ inch	45-75
No. 4	30-45
No. 50	4-10
No. 100	1-3
No. 200	0-2

## 2.2 MATERIALS FOR TRENCH BACKFILLING

### A. General

1. Furnish required bedding, select backfill and backfill materials listed under the appropriate types of utility line in the sections to which this work relates
2. All fill material will be subject to the approval of the Engineer.

### B. Materials used in backfill, as shown in trench details, are defined as follows:

1. Bedding: When rock, unstable material, or wet trench is encountered at the excavated grade for utility installation, bedding is required. Materials shall be predominantly sand and gravel, having a Plasticity Index less than 6.

#### a. Gradation as follows:

<u>Sieve Size</u>	<u>Percent Passing</u>
½ inch	100
No. 4	50-80
No. 200	10-25

- b. Bedding material shall have a Sand Equivalent of 30, per ASTM D 2419.

2. Bedding may be omitted if, in the opinion of the Engineer, the excavated trench bottom will adequately support and not damage the utility line.

3. Select Backfill: Materials shall be predominantly sand and gravel, having a Plasticity Index less than 6.

#### a. Gradation as follows:

<u>Sieve Size</u>	<u>Percent Passing</u>
1½ inch	100
No. 4	50-80
No. 40	10-25

- b. Select backfill material shall have a Sand Equivalent of 30 per ASTM D 2419.

4. Backfill: Soils that contain no rock larger than three inches at greatest dimension. If expansive clays are present, such content shall not exceed one-third of the material by volume, and shall be well mixed with non-cohesive soils.

5. Slurry cement backfill used in lieu of compacted soil shall contain not less than 188-pounds of Type II Portland Cement per cubic yard of concrete (2

sack) and shall comply with Section 19-3.02E of the State Standard Specifications.

### 2.3 MATERIALS FOR EMBANKMENTS

- A. Unless otherwise specified, embankment and backfill material shall be as required by State Standard Specifications Section 19, Earthwork.
- B. Embankment material shall contain no rock or hard lumps larger than three inches at greatest dimension. If expansive clays are present, such content shall not exceed one-third of the material by volume, and shall be well mixed with non-cohesive soils
- C. Embankment material for embankments shall be selected to the maximum practical extent from excavation. Deficiency of material, if any, may be made up from other sources, as approved by the Engineer.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum.

### 3.2 MOISTURE CONTROL

- A. Water development, hauling, and application shall be in accordance with State Standard Specifications Section 10-6, Watering.

### 3.3 EXCAVATION

- A. Excavate the specified areas as shown.
- B. If the Plans require placement of fill prior to pipe, or structure excavation, the fill shall first be constructed to the design grade shown for a distance each side of the pipe or structure of not less than five times the diameter of the pipe or the width of the structure after which the trench shall be excavated and the pipe or structure installed.

### 3.4 ENGINEERED FILL AND EMBANKMENT CONSTRUCTION

- A. Unless otherwise noted, placement and compaction of engineered fill materials for all fill areas shall be performed according to the provisions of the State Standard Specifications, Section 19-6. Section 19-6.02A shall be amended to say that large rocky material or hard lumps large than three inches in greatest dimension will not be allowed.
- B. Before placing embankment, scarify ground surface to provide ample bond between old and new material, as shown on the Plans. Place embankment material in layers not exceeding eight inches, loose measurement.

- C. Compaction shall be in accordance with State Standard Specifications, Section 19-5. Compact each layer before placing the next layer. As the compaction of each layer progresses, continually level and manipulate to ensure uniform moisture and density. Add water to obtain optimum moisture content. Removal of excess water shall be accomplished through aeration by plowing, blading, disking, or other methods satisfactory to the Engineer.
- D. The native soils at the project location contain extensive cemented zones. The contractor shall apply the necessary effort to achieve the specified particle size control within the material placed in the embankment prism.

**3.5 EXCAVATION FOR BUILDINGS, CONCRETE TANKS AND OTHER CONCRETE STRUCTURES**

- A. Excavate for all foundations, slabs, curbs, walks and/or similar work. Remove any curbs, slabs, paving, trees, bushes, shrubs, stumps, roots, buried objects, or any objects that interfere with construction of building foundations, or as required by the Engineer.
- B. Excavations for all footings, piers, finished walls and grade beams shall be sufficiently large so that forms for concrete may be properly placed, removed, and inspected.
- C. Excavation for footings may be made to the net footing size plus two inches if the earth banks are sufficiently stable to remain in position until the concrete is in place and if approved by the Engineer.
- D. The bottoms of footings, piers, slabs, walls, and grade beams to receive concrete shall be level before placing concrete. All foundations shall rest on firm bearing in undisturbed soil, or on controlled compacted fill.
  - 1. The exposed surface shall be scarified to a depth of eight inches, conditioned to optimum moisture content and compacted to at least 95 percent of the maximum dry density.
- E. If any existing foundations, roots, stumps, debris, waste materials, pipes, or similar items have been removed, the Contractor shall excavate below these portions to solid undisturbed earth and foundations in these areas shall be built to necessary levels.
- F. If soil conditions in excavations are not as shown in the geotechnical report, and appear to indicate that footings need not be carried down as deep as shown, or must be carried deeper, the changes shall be made by the Contractor after approval by the Engineer.



### 3.6 TRENCH EXCAVATION

- A. Paved Areas: Cut existing pavement to full depth to a true line before excavation and maintain the edge suitable for repaving. Pavement removed shall not be used as backfill.
- B. Excavation and backfilling of trenches used for construction of communications, power, process piping, and water distribution and sewer systems shall conform to State Standard Specifications, Section 19, Earthwork.
- C. Excavation shall be by open cut except that short sections of a trench may be tunneled if the utilities can be safely and properly installed and backfill can be properly compacted in such tunnel sections.
- D. Trenching Guidelines: Excavate the trench to the approximate level of the grade of the utility line to be installed, using adequate trench width and side slopes to safely accommodate worker access.
  - 1. Rocky Trench Bottom: Where ledge rock, hard pan, boulders, or sharp-edged materials are encountered, over excavate a minimum depth of 6 inches below the bottom of the utility exterior wall to permit adequate bedding preparation. The installed utility shall have at least 6 inches of clearance from any rock protrusion.
    - a. Unstable Trench Bottom: Secure approval of depth of over-excavation and stabilization method. For wet trench construction, use approved method of dewatering through diversion, damming and pumping, well points, or underdrain systems. Dispose of removed fluidized materials as approved. Use bedding material to build a suitable foundation to within 6 inches of finished utility grade, prior to bedding with the specified material. Compact layers to 95 percent of maximum density in not greater than 6-inch layers. Do not proceed with utility installation until wet trench and unstable conditions are corrected to the satisfaction of the Engineer.
- E. Remove areas of sub-grade not readily capable of it-situ compaction.
  - 1. Backfill with Bedding or Select Backfill material and compact to density equal to requirements for subsequent backfill.
- F. Correct unauthorized excavation at no cost to Owner.
  - 1. If the trench is excavated below the required grade, refill any part of the trench excavated below the grade.
  - 2. Place the refilling material over the full width of trench in compacted layers not exceeding eight inches deep to the established grade with allowance for special bedding.

- G. Trench widths in the pipe zone shall be as shown in the drawings. If no details are shown, maximum width shall be 24 inches greater than the pipe outside diameter.
  - 1. Trench width at the top of the trench will not be limited except where width of excavation would undercut adjacent structures and footings. In such case, width of trench shall be such that there is at least two feet between the top edge of the trench and the structure or footing.
- H. Hand trim for bell and spigot pipe joints.
- I. Remove lumped soil, boulders and rock.
- J. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- K. During trench excavation, place the excavated material only within the working area. Do not obstruct roadways or streets. Conform to federal, state, and local codes governing the safe loading of trenches with excavated material.
- L. Foundation stabilization
  - 1. After the required excavation has been completed, the Engineer will inspect the exposed subgrade to determine the need for any additional excavation. It is the intent that additional excavation be conducted in all areas within the influence of the pipeline where unsuitable materials exist at the exposed subgrade. Over excavation shall include the removal of all such unacceptable material that exists directly beneath the pipeline to a width 24 inches greater than the pipe outside diameter and to the depth required.
  - 2. Rock refill used by the Contractor for his convenience will not receive any additional payment.

### 3.7 *LENGTH OF OPEN TRENCH*

- A. Limit the length of open trench to 600 feet in advance of pipe laying or amount of pipe installed in one working day.
- B. Complete backfilling, temporary or first layer paving, not more than 400 feet in the rear of pipe laying operation.

### 3.8 *TRENCH EXCAVATION IN EMBANKMENT AREAS*

- A. Construct and compact the embankment to an elevation one foot, minimum, over the top of the largest pipe or conduit to be installed prior to trench excavation.

### 3.9 *UTILITY INSTALLATION*

- A. Utility Installation: Shape the trench bottom to ensure uniform contact with the full length of the installed line and remove any sharp-edged materials that might damage the line. Compaction shall be maintained beneath the line.

### 3.10 TRENCH BACKFILLING

- A. Backfilling and cleanup work shall be accomplished as sections of pipe or conduit are tested and approved. Vehicular travel through the work site shall be impeded or obstructed as little as possible.
- B. Compaction: Use vibratory compactors for sands and gravels (non-cohesive soils). Use mechanical tampers for sand and gravel containing a significant portion of fine-grained materials, such as silt and clay (cohesive soils). Hand tamp around pipe or cable to protect the lines until adequate cushion is attained. Puddling or water flooding for consolidation of backfill or compaction by wheel rolling will not be permitted.
- C. Bedding: Unless otherwise specified, compact the specified material to 95 percent of maximum density to the finished utility grade.
- D. Select Backfill: Fill by hand placement around the utility to just over half depth, and compact in a manner to ensure against lateral or vertical displacement. Place select backfill to 12 inches above the utility line by hand placement in not more than 6-inch layers.
- E. Backfill: To minimize settling, soils shall be backfilled in layers, with each layer compacted prior to addition of the next layer. Unless otherwise specified, place and compact the specified material as follows:
  - 1. Vehicular Traffic Areas: Fill and compact in 8-inch maximum layers as follows:
    - a. From top of select backfill to two feet below top of subgrade, compact to 90 percent of maximum density.
    - b. From two feet below top of subgrade to top of subgrade, compact to 95 percent of maximum density/
  - 2. Non-traffic Areas: Fill and compact in 8-inch maximum layers to 90 percent of maximum density.

### 3.11 SHORING AND SHEETING

- A. Construct and maintain all shoring, sheeting, and slope layback necessary to protect the excavation, as needed, for the safety of the employees and as required by applicable State and Federal laws. Provide suitable barricades for public safety, regardless of trench depth.

### 3.12 DEWATERING

- A. The Contractor shall keep all excavation free from water. Furnish, install, maintain, and operate all necessary pumping and other equipment for dewatering of excavations. The Contractor shall at all times have on the project sufficient

pumping equipment for immediate use, including stand-by pumps for use in case other pumps become inoperable.

- B. The dewatering operation shall be continuous, so that the excavated areas are kept free from water during the construction, until backfill has been placed to a sufficient height to anchor the work against possible floatation.
- C. Dewatering devices shall be adequately filtered to prevent the removal of fines from the soil.
- D. Repair any damage caused by the failure of any part of the protective works. Remove temporary protective works when they are no longer needed for dewatering purposes.
- E. Any drain rock required in the trench bottom to convey water or stabilize wet soil shall be included at no extra cost to the Owner.
- F. Provision of dewatering and dewatering equipment shall be considered part of the project with no additional compensation allowed.

### 3.13 *SURPLUS MATERIAL*

- A. Unless otherwise specified, surplus excavated material shall be used to widen embankments uniformly or to flatten slopes,

### 3.14 *UNSUITABLE MATERIAL*

- A. Unsuitable material shall be excavated and disposed of in a lawful manner off the project site, all disposal shall be approved by the Engineer prior to initiating the work.

### 3.15 *SURFACE FINISH WORK*

- A. Paved Areas: Replace removed paving and base course with new material of equal or better quality and of the same texture and color as the adjacent paved areas. Saw cut pavement edges to a true line and broom as needed prior to repaving.
- B. Open Areas: Grade all disturbed areas, blending with adjacent terrain. Minor irregularities will be permitted.
- C. Drainage Ditches: Restore drainage ditches to appropriate line and grade, using approved surface erosion prevention techniques.
- D. Clean Up: Remove all rubbish and excess material for disposal as approved, and leave area in a neat, satisfactory condition.

### 3.16 *TOLERANCES*

- A. Top Surface of Backfilling:  $\pm 0.10$  foot from design grade.

**3.17 SAND CEMENT SLURRY, CONCRETE ENCASEMENT AND THRUST BLOCKS**

- A. Place in accordance with the Contract drawings.

**3.18 COMPACTION REQUIREMENTS**

- A. Relative compaction requirements shall be as shown on the Plans:

**END OF SECTION**

## SECTION 31 23 35

### DISPOSAL OF MATERIALS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Disposal of unsuitable material, concrete, asphalt concrete, rubbish, and other debris, as described below.

##### 1.2 RELATED WORK

- A. County Standard Special Provisions Section 13-Water Pollution Control
- B. Section 01 57 27 – Dust Control
- C. Section 03 30 00 – Cast-In-Place Concrete
- D. Section 31 11 00 – Clearing and Grubbing

##### 1.3 REFERENCES

- A. ASTM D75 – Practice for Sampling Aggregates.
- B. ANSI/ASTM C136 – Sieve Analysis of Fine and Coarse Aggregates.
- C. ANSI/ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft lb/ft<sup>3</sup> (600 kN m/m<sup>3</sup>))
- D. ANSI/ASTM D1557 – Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb (4.54 kg) Hammer and 18-inch (457 mm) Drop.
- E. ANSI/ASTM D1556 – Density of Soil and base rock in Place by Sand-Cone Method.
- F. ASTM D 2922 and D 3017 – Density of soil and base rock in place by Nuclear method.
- G. ASTM D 2937 – Density of soil and in place by Tube method.
- H. Section 26 – Aggregate Bases, State Standard Specifications.
- I. Section 17-2 – Clearing and Grubbing, State Standard Specifications
- J. Section 10-6 – Watering, State Standard Specifications
- K. Section 19 – Earthwork, State Standard Specifications

#### 1.4 *SUBMITTALS*

- A. Submittals shall be in accordance with Section 01 33 00 - Submittal Procedures.

#### 1.5 *GENERAL*

- A. The Contractor shall be responsible for the cleanup and disposal of waste materials and rubbish. The disposal of waste materials and rubbish shall be in accordance with applicable Federal, State, and local laws and regulations, and with the requirements of this paragraph. Should a conflict exist in the requirements for cleanup and disposal of waste materials, the most stringent requirement shall apply.
- B. The Contractor shall keep records of the types and amounts of waste materials produced, and of the disposal of all waste materials on or off the jobsite.
- C. The cost of disposing of waste materials other than unsuitable materials shall be included in the prices bid in the schedule for other items of work.

### **PART 2 PRODUCTS**

Not Used

### **PART 3 EXECUTION**

#### 3.1 *DISPOSAL OF EXCAVATED MATERIAL*

- A. All excess excavated material shall be hauled off site to a location selected by the Contractor, meeting the conditions of Paragraph 3.4 below.
- B. All unsuitable material shall be hauled off-site and properly disposed.

#### 3.2 *DISPOSAL OF CONCRETE AND A. C. SURFACING*

- A. All concrete, A.C. and pavement removed from the project site shall be disposed of at a site obtained by the Contractor and approved by the Owner's Representative. No recyclable material shall be disposed of at any landfill. All disposable recyclable materials shall be disposed in a manner that facilitates recycling. Payment for disposal, including all costs of hauling, shall be as specified in the Technical Specifications or Explanation of Bid Items. The Contractor shall report quantities of disposed material in a manner that enables the Owner to utilize diverted quantities as diversion credits pursuant to California Integrated Waste Management Act of 1989 (Public Resources Code Sections 40000 et seq.)

#### 3.3 *DISPOSAL OF OTHER DEBRIS*

- A. All oil cake, wood debris, structure demolition, vegetation and any other debris removed from the project site shall be legally disposed of at a site(s) obtained by the Contractor with prior written permission of the Owner's Representative. Contractor shall identify the proposed Disposal Site(s) at the pre-construction conference. Such Disposal Site(s) shall be a properly licensed and permitted

facility pursuant to state and local regulations for purposes of accepting delivery of the respective materials. No recyclable material shall be disposed of at any landfill. All disposable recyclable materials shall be disposed in a manner that facilitates recycling. In addition to the following, a certificate of compliance stating disposal location and manner of disposal of recyclable materials shall be submitted to the Owner's Representative.

1. Disposal of combustible materials shall be by removal from the construction area. Disposal of combustible materials by burning will not be permitted. Disposal of waste materials by burying will not be permitted.
2. Waste materials shall be disposed of or recycled at a State approved disposal or recycle facility. The Contractor shall make any necessary arrangements with private parties, and State and county officials pertinent to locations and regulations of such disposal or recycle facilities, and shall pay any fees or charges required for such disposition.

### 3.4 *CONTRACTOR'S DISPOSAL SITES*

- A. Contractor shall make arrangements for disposing of the materials at the Disposal Site(s) and pay all costs involved. Arrangements shall include, but not be limited to, obtaining written authorization from the property owner of the Disposal Site(s) and before disposing of any material off the project site, Contractor shall furnish to the Owner's Representative the authorization or a certified copy thereof together with a written release from the property owner absolving the Owner from any and all responsibility in connection with the disposal of material on the property of the Disposal Site(s). Before any material is disposed of on the Disposal Site(s), the Contractor shall obtain written permission from the Owner's Representative to dispose of the material at the location designated in the authorization.
- B. It is expressly understood and agreed that the Owner assumes no responsibility to the Contractor whatsoever by the granting of such permission and Contractor shall assume all risks in connection with the use of the Disposal Site(s). The Contractor is cautioned to make such independent investigation and examination as the Contractor deems necessary to be satisfied as to the quantity and types of materials which may be disposed of on the Disposal Site(s) and the status of any permits or licenses in connection therewith.
- C. Within 24 hours of removing the respective material from the project site for disposal, Contractor shall provide Owner's Representative with a certified copy of the weight slip from the Disposal Site obtained by Contractor upon delivery of such debris, and a certified statement from Contractor identifying the material constituting the debris and that it was disposed of at the Disposal Site (identifying the and name of the owner) in accordance with all laws and applicable regulations promulgated by Federal, State, regional, or local administrative and regulatory agencies.



### 3.5 *DISPOSAL OF HAZARDOUS WASTE AND MATERIALS*

- A. Materials or wastes, defined as hazardous by 40 CFR 261.3, or by other Federal, State, or local laws or regulations, used by the Contractor or discovered in work or storage areas, shall be disposed of in accordance with these specifications and applicable Federal, State, and local laws and regulations. Unknown waste materials that may be hazardous shall be tested, and the test results shall be submitted to the Owner's Representative for review.
- B. Waste materials known or found to be hazardous shall be disposed of in approved treatment or disposal facilities. Hazardous wastes shall be recycled whenever possible. A copy of all hazardous waste manifest shall be sent to the Owner's Representative.
- C. Waste materials discovered at the construction site shall immediately be reported to the Owner's Representative. If the waste may be hazardous, the Owner's Representative may order delays in the time of performance or changes in the work, or both. If such delays or changes are ordered, an equitable adjustment will be made in the contract in accordance with the applicable clauses of the contract.
- D. If necessary, the Contractor will be required to conduct an environmental site assessment at the following Contractor use locations:
  - 1. All hazardous waste accumulation areas;
  - 2. All hazardous material and petroleum dispensing and storage areas where the aggregate storage of hazardous materials or petroleum at the site is or has been over 110 gallons.
  - 3. This site assessment shall be performed by a qualified environmental consultant or equivalent and shall document through appropriate analytical sampling that the site is free of the effects of contamination (i.e., contaminant concentrations less than State action cleanup levels).

### 3.6 *CLEANUP*

- A. The Contractor shall keep work and storage areas free from accumulations of waste materials and rubbish, and before completing the work, shall remove all plant facilities, buildings, including concrete footings and slabs, rubbish, unused materials, concrete forms, and other like materials, which are not a part of the permanent work.
- B. Upon completion of the work, and following removal of construction facilities and required cleanup, work areas shall be regraded and left in a neat manner conforming to the natural appearance of the landscape.

**END OF SECTION**

**SECTION 32 11 23**  
**AGGREGATE BASE**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Furnish, spread, and compact aggregate base in roadways, driveways and other paved areas as shown on the Plans.
- B. The work of this section consists of furnishing and placing aggregate base material and/or lean concrete base materials, and filler if required, on the prepared subgrade.

**1.2 RELATED WORK**

- A. Section 31 23 00 – Earthwork
- B. Section 32 12 13 – Bituminous Prime and Tack Coat
- C. Section 32 12 16 – Asphalt Concrete Paving

**1.3 REFERENCES**

- A. Section 10-6 – Watering, State Standard Specifications.
- B. Section 26 – Aggregate Bases, State Standard Specifications.
- C. Section 28-2 - Lean Concrete Base, State Standard Specifications.
- D. ANSI/ASTM C136 – Sieve Analysis of Fine and Coarse Aggregates.
- E. ANSI/ASTM D1557 – Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb (4.54 kg) Hammer and 18-inch (457 mm) Drop.
- F. ANSI/ASTM D1556 – Density of Soil and Base Rock in Place by Sand-Cone Method.
- G. ASTM D6938 – Density of Soil and Base Rock in Place by Nuclear Method.

**1.4 SUBMITTALS**

- A. As specified in Section 01 33 00 – Submittal Procedures.
- B. If materials are obtained from a commercial source, submit certification from the supplier certifying that aggregate base course meets the requirements of this section.

- C. Copies of certified weight tickets for each load of aggregate delivered to the project site.

## 1.5 QUALITY ASSURANCE

### A. Relative Compaction:

1. All compaction testing, curves and gradation analysis will be scheduled and paid for by the Contractor at no additional cost to the Owner. Testing shall be performed by an independent Certified Geotechnical Engineering Lab, licensed in the State of California, selected by the Contractor and approved by the Owner.
2. The cost of any retests, including time for the Engineer, shall be borne by the Contractor at no additional cost to the project. Testing will be required as directed by the Engineer. Test locations shall be determined by the Engineer upon notification from the Contractor that the grade is ready for tests. Contractor shall be present when samples of bedding, select backfill, and backfill materials are gathered for analysis or testing.

### B. Compaction tests will be performed for each lift or layer.

### C. Tests for compaction shall conform to references listed in Part 1.3 of this section

### D. Sample backfill materials per ASTM D75.

### E. Compaction testing will be performed in accordance with Section 19-5 of the State Standard Specifications.

1. Compaction testing of areas to be saw cut and replaced shall be one for every 300-LF of adjacent curb and gutter but not less than one for each curb cut area.
2. The Contractor shall not proceed with work over the area being tested until results have been verified by the Engineer. Immediately upon completion of each compaction test, a copy of the results shall be given by the testing laboratory to the Engineer.
3. Test every 10,000 square feet of engineered fill or aggregate base material placed. The Contractor shall not proceed with work over the area being tested until results have been verified by the Engineer. Immediately upon completion of each compaction test, a copy of the results shall be given by the testing laboratory to the Engineer.

### F. The percentage composition by weight shall conform to Class 2 aggregate base determined by Test Method No. Calif. 202, modified by Test Method No. Calif. 905 if there is a difference in specific gravity of 0.2 or more between the coarse and fine portion of the aggregate or between blends of different aggregates.

G. Aggregate base shall also conform to the following quality requirements:

<u>Tests</u>	<u>Test Method Calif. No</u>
R-Value	301
Sand Equivalent	217
Durability Index	229

H. Quality Control shall be under the provisions of Section 01 43 00 – Quality Control.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

#### **A. AGGREGATE BASE**

1. Class 2 Aggregate Base,  $\frac{3}{4}$ -inch maximum; as per Section 26-1.02B, State Standard Specifications.
2. Aggregate for Class 2 aggregate base shall be free from organic material and other deleterious substances

#### **B. LEAN CONCRETE BASE**

1. Lean Concrete Base shall conform to the State Standard Specifications, Section 28-4, Lean Concrete Base Rapid Setting.
2. State Standard Specifications Section 28-4.04 shall not apply.

#### **C. WATER**

1. As specified in Section 01 51 36, Watering.
2. At the time aggregate base is spread, it shall have a moisture content sufficient to obtain the require compaction. Such moisture shall be uniformly distributed throughout the materials.

## **PART 3 EXECUTION**

### **3.1 SUBGRADE PREPARATION**

A. As specified in Section 31 23 00 - Earthwork and Section 01 51 36 - Watering.

### 3.2 *SPREADING*

- A. The aggregate base course material shall be deposited and spread to the required compacted thickness by means that will maintain the uniformity of the mixture. The aggregate base course shall be free from pockets of coarse or fine material.
- B. Deliver aggregate base to the area to be paved as a uniform mixture and spread each layer in one operation.
- C. Aggregate base placed at locations which are inaccessible to the spreading equipment shall be spread in two layers by any means to obtain the specified results.
- D. The aggregate shall not be treated with lime, cement or other chemical materials before the Durability Index test has been performed.
- E. The surface of the finished aggregate base at any point shall not vary more than  $\pm 0.05$ -foot from the grade shown.

### 3.3 *PLACING*

- A. If the required compacted depth of the aggregate base course exceeds 6 inches, place course in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches.

### 3.4 *PLACING LEAN CONCRETE BASE*

- A. Lean concrete base is required at all utility crossings that are less than 30 inches below grade. This includes all water lines, gravity sewer, force main sewer, propane lines, and electric lines which are not incased in concrete.
  - 1. Place as specified in State Standard Specifications, Section 28-4 - Lean Concrete Base Rapid Setting.

### 3.5 *MIXING*

- A. Mixing shall be in accordance with one of the methods set forth in State Standard Specifications, Section 28-4.03B.

### 3.6 *MOISTURE CONTROL*

- A. When spread, aggregate base shall have a moisture content sufficient to obtain the specified compaction.

### 3.7 *SURFACE FINISHING*

- A. Use a smooth steel wheel roller for the final rolling of top surface base course. Water surface and evenly spread loose stones before final rolling. Make minimum of two complete passes over area to embed stones. Correct soft spots developed during rolling.

- B. Compacted aggregate base course surface shall be smooth and free from waves and other irregularities. Unsatisfactory portions of base course shall be corrected, at no additional expense to the Owner.

### 3.8 MATERIAL ACCEPTANCE REQUIREMENTS

- A. Acceptance will be based on periodic samples and tests taken following mixing and before placing.

### 3.9 TOLERANCES

- A. Surface: The finished surface of the base course will be tested with a 10-foot straightedge or other device. The variation between any two contacts with the surface shall not exceed  $\pm 0.05$  feet.
- B. Width: Plan dimension,  $\pm 0.10$  feet.
- C. Thickness: Plan dimension,  $\pm 0.05$  feet.
- D. Any areas not complying with these tolerances shall be reworked to obtain conformity, at no additional expense to the Owner.

### 3.10 MAINTENANCE

- A. Maintain base course in a satisfactory condition until surfaced or until final acceptance.

**END OF SECTION**

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## **SECTION 32 12 13**

### **BITUMINOUS PRIME COAT AND TACK COAT**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. Tack Coat work consists of an application of asphalt cutback between asphalt layers. Applying a very light application of asphalt emulsion diluted with water as a tack between asphalt layers to create an adhesive surface for new asphalt concrete pavement to adhere to and applied to all existing vertical surfaces where new pavement is to be surfaced.

##### **1.2 RELATED WORK**

- A. Section 32 11 23 – Aggregate Base
- B. Section 32 12 16 – Asphalt Concrete Paving

##### **1.3 REFERENCES**

- A. Section 94 – Asphalt Emulsions, State Standard Specifications

##### **1.4 SUBMITTALS**

- A. As specified in Section 01 30 00 – Submittal Procedures
- B. Two copies of manufacturer's certification for each load certifying the bituminous material is of the type, grade, and quality specified.
- C. One sample of asphalt cutback, in accordance with AASHTO T40-78, shall be taken for each load delivered to the project sites. Samples shall be stored in clean, airtight sealed containers at a temperature of not less than 40°F, until tested.

##### **1.5 PROJECT CONDITIONS**

- A. Apply bituminous material only during daylight hours, when surface is dry, temperature is above 50°F, and weather is not foggy or rainy.

#### **PART 2 PRODUCTS**

##### **2.1 BITUMINOUS TACK COAT**

- A. Asphaltic emulsion shall be furnished in accordance with the provisions in Section 94, Asphaltic Emulsions, of the State Standard Specifications.



1. Engineer may select which asphalt emulsion shall be used. Use tack coat between asphalt lifts only if applied surface has been in place over 24 hours or has been in service.

### **PART 3 EXECUTION**

#### **3.1 GENERAL**

- A. Protect the surface of sidewalks, curbs, other structures, and trees adjacent to the area being treated from being spattered or marred. If surfaces become spattered, clean in accordance with manufacturer's recommendations.
- B. Do not clean or discharge distributor outside the project limits of work.

#### **3.2 DISTRIBUTOR**

- A. Bituminous distributor and equipment for heating bituminous material shall be designed, equipped, maintained, and operated so that bituminous material, at even heat, may be applied uniformly on variable widths of surface up to 15 feet at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard, with uniform pressure, and with an allowable variation from any specified rate not to exceed 0.02 gallon per square yard. Distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and a full circulation spray bar adjustable laterally and vertically.
- B. When applying tack and prime coats, take care to give the surface a very light, even application of asphalt.

#### **3.3 PREPARATION OF SURFACE**

- A. Immediately before applying the tack or prime coat, remove loose material, dirt, clay or other objectionable material. Take particular care in cleaning the outer edges of the strip to be treated, to ensure that the prime or tack coat will adhere.
- B. Do not apply Prime Coat or Tack coat so far in advance that it might lose its adhesiveness as a result of being covered with dust or other foreign material.

#### **3.4 APPLICATION**

- A. Tack Coat: Apply tack coat uniformly at the rate of 0.10 gallon per square yard, at specified temperature. Apply within 24 hours preceding placement of the covering course.
- B. Tack coat of asphaltic emulsion shall be furnished and applied in conformance with the provisions in Section 94, State Standards Specifications and shall be applied to all vertical surfaces of existing pavement, curbs gutters and construction joints in the surfacing against which additional material is to be placed, and to other surfaces designated in the special provisions.

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**END OF SECTION**

Bituminous Prime Coat and Tack Coat  
32 12 13-3

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**SECTION 32 12 16**  
**ASPHALT CONCRETE PAVING**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. Asphalt Concrete and Asphalt Concrete Paving shall conform with Section 39  
"Asphalt Concrete" of the Special Provisions.

**END OF SECTION**

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## **SECTION 32 17 23**

### **TRAFFIC MARKINGS**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDES**

- A. The work of this section consists of furnishing and applying traffic markings.

##### **1.2 SUBMITTALS**

- A. As specified in Section 01 33 00 – Submittals.
- B. Certificate from manufacturer that materials meet the specified requirements.

##### **1.3 QUALITY ASSURANCE**

- A. Traffic markings shall be in accordance with California Manual for Uniform Traffic Control Devices (CA MUTCD) (Current Edition)

##### **1.4 PROJECT CONDITIONS**

- A. Apply traffic markings only during daylight hours, when air and pavement temperatures exceed 55 degrees F, weather conditions are favorable, and surface is clean and dry.

#### **PART 2 PRODUCTS**

##### **2.1 PAINT**

- A. AASHTO M248-86, Type F, white or yellow traffic paint.

##### **2.2 THERMOPLASTICS**

- A. AASHTO M249, yellow or white thermoplastic striping material.

##### **2.3 GLASS BEADS**

- A. AASHTO M247, Type 2, moisture resistant with flotation properties.

##### **2.4 RETROREFLECTIVE FILM**

- A. Pliant polymer retroreflective film: Stamark, by 3M Company, or Engineer approved equivalent.
  - 1. Lines: Series 420, white and yellow.
  - 2. Legends and Symbols: Series SMS-900, white, blue, and yellow.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Clean area by sweeping, air blasting, or other acceptable method. Pavement markings shall be applied to the pavement surfaces, which shall be dry and free of glaze, oil, dirt, grease, or other contaminants. Surfaces not meeting these requirements shall be cleaned by the Contractor to a width equal to two inches wider than the stripe to be applied.
- B. When new pavement markings are to be applied directly over existing worn markings (such as existing edge line), the Contractor shall clean the existing residual markings to the extent necessary to ensure adherence of the new markings.

### **3.2 MARKINGS**

- A. Lines shall be four inches wide,  $\pm 1/4$  inch.
- B. Figures are as shown on drawings.

### **3.3 PAINT APPLICATION**

- A. Line Location: Before placing paint, mark location by placing spots of paint at intervals to ensure accurate location of line. Engineer shall approve markings prior to application.
- B. Equipment: Spray machine equipped with mechanical agitator, multiple applicators, and automatic skip control, capable of painting a clean-edged stripe of the designated width. Bead dispenser shall be directly behind and synchronized with paint applicator. Spray nozzle and bead dispenser shall be shielded to prevent over spraying. Use adequate hand operated equipment in areas not accessible to striping machine.
- C. Minimum Application Rates:
  - 1. For Striping four-Inch Traffic Stripes: Solid, 16.5 gallons of paint per mile; broken, 6.2 gallons of paint per mile.
  - 2. For Legends and Symbols: One gallon of paint per 100 square feet.
  - 3. For Painted stripes, legends and symbols, Glass Beads: 5.5 pounds for each gallon of paint.

### **3.4 RETROREFLECTIVE FILM**

- A. Install in accordance with the manufacturer's recommended procedures. All traffic markings on asphalt pavement shall be inlaid. Apply plastic markings during final compaction of asphalt pavement when the pavement temperature is about 140°F. Roll the marking into the surface with steel wheel roller. The finished pavement marking may extend approximately 10 mils above the final surface. Apply edge stripes by machine.

### 3.5 *ACCEPTANCE*

- A. Markings shall be accurately placed, and appear clean and uniform day and night. Unsatisfactory markings shall be corrected at no additional expense to the Owner.
- B. The Contractor shall remove and replace at no additional expense to the Owner and to the satisfaction of the Engineer any material which exhibits any of the following deficiencies:
  - 1. Non adherence to paving surface.
  - 2. Material improperly set or tracked.
  - 3. Insufficient film thickness or width of stripe.
  - 4. Insufficient glass bead coverage or retention.
  - 5. Materials spilled or improperly placed.

### 3.6 *PROTECTION*

- A. Protect pavement markings until dry or bonded by placing guards or warning devices as necessary and in accordance with the California Manual of Uniform Traffic Control Devices, current edition. In the event any vehicle should cross the wet marking, such marking shall be reapplied and marks, made by the vehicle, removed by the Contractor at no additional expense to the Owner.

**END OF SECTION**



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**SECTION 33 05 26**  
**UTILITY LINE MARKING**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. The work of this section consists of furnishing and installing utility line marking tape in the trench above newly constructed utility lines.

**1.2 SUBMITTALS**

- A. As specified in Section 01 33 0 0 – Submittal Procedures.
- B. Certification that the materials used in the tape fabrication meet the requirements of this section.
- C. Installation procedure if the cable is installed by plowing.

**PART 2 PRODUCTS**

**2.1 MARKING TAPE**

- A. Capable of being inductively detected electronically.
- B. Construction: Metallic foil laminated between two layers of impervious plastic film not less than 3 inches wide. Total thickness of tape shall not be less than 0.005 inch (5 mil),  $\pm 10$  percent manufacturing tolerances.
  - 1. Film: Inert plastic. Each film layer shall be not less than 0.001 inch (1.0 mil) thick.
  - 2. Foil: Not less than 0.001 inch (1.0 mil) thick.
  - 3. Adhesive: Compatible with foil and film.
- C. Imprint: 3/4-inch or larger bold black letters.
- D. Legend: Identify buried utility line tape with imprint such as "Caution: Sewer Line Below". Repeat identification at approximately 24-inch intervals.
- E. Background Color: APWA color code and as specified in the following table.

Color	Utility
Safety Red	Electric
High Visibility Safety Yellow	Gas, Oil, Steam, Dangerous Materials

Color	Utility
Safety Alert Orange	Telephone, Communications, Cable Television
Safety Precaution Blue	Water System, Irrigation
Safety Green	Sanitary Sewer, Storm Sewer
Safety Brown	Force Mains and Effluent Lines
Purple	Reclaimed Water

- F. Manufacturer: Lineguard, Inc., Wheaton, Illinois; Reef Industries, Inc., Houston, Texas; Thor Enterprises, Inc., Sun Prairie, Wisconsin; or Engineer-approved equivalent.

## 2.2 FIRE HYDRANT ROAD MARKERS

- A. All markers shall be placed in the road in front of each fire hydrant as shown on the plans.
- B. The marker shall be 4"x4" blue reflective road marker manufactured by Peel-N-Stick or approved equal.

## 2.3 TRACER WIRE

- A. Minimum: No.10, solid, 12 AWG copper wire with Type HMW-PE insulation, U-Tracer Wire, and shall form a mechanically and electrically continuous line throughout the length of the pipe.
- B. Underground Splicing Connectors: 3M DBR-6 connector, or approved equal, which is UL listed under "UL 486D-Direct Burial," for wet or damp locations, 600 volts. Connectors that are not listed at all, or under UL: Standard UL 486C as "Compression Connectors," shall not be allowed.

## PART 3 EXECUTION

### 3.1 MARKING TAPE

- A. Install tape in backfill directly over each buried utility line as shown on the detailed drawings.
- B. Unless otherwise shown, tape shall be installed a minimum 1.5 feet below finish grade. However, in no case shall tape be placed closer than 18 inches above the top of the pipe.
- C. Where utilities are buried in a common trench, identify each line by a separate warning tape. Bury tapes side by side directly over the applicable line.

### 3.2 *TRACER WIRE*

- A. Wherever PVC or Polyethylene pipe is installed in the ground, a tracer wire shall be installed.
  - 1. Tracer wire shall be brought to the surface at all gate and butterfly valves, air valves, blow-offs, Fire Hydrants, Water Services, and other pipeline appurtenances
- B. Tracer Wire: Attachment of the wire to the pipe shall be made with plastic tie-wraps or other approved method.
- C. Contractor shall conduct a satisfactory continuity test prior to Owner acceptance.

### 3.3 *FIRE HYDRANT ROAD MARKERS*

- A. Install all road markers where a fire hydrant is located as shown on the plans.
- B. Install per manufacturer's recommendations.

**END OF SECTION**

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**SECTION 33 10 00**  
**DOMESTIC WATER SYSTEM**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Furnish, install, disinfect and test all pipe, fittings, valves, hydrants and water services required to complete the domestic water system complete and in place as shown on the Plans.

**1.2 RELATED WORK**

- A. Section 31 23 00 – Earthwork
- B. Section 33 12 19 – Fire Hydrants
- C. Section 33 13 00 – Disinfection of Water Distribution System
- D. Section 40 05 00 – Pipe and Fittings
- E. Section 40 05 23 – Valves and Appurtenances

**1.3 REFERENCES**

- A. California Plumbing Code.
- B. American Water Works Association Standards.
- C. County of Fresno Standard Drawings.

**1.4 SUBMITTALS**

- A. As specified in Section 01 33 00 – Submittal Procedures.

**PART 2 PRODUCTS**

**2.1 GENERAL**

- A. All materials used for the domestic water system shall conform to California Health and Safety Code, Section 11687 (commonly known as AB 1953); and NSF/ANSI 61 Annex G (NSF/ANSI 372).

**2.2 PIPE AND FITTINGS**

- A. Water mains and service laterals shall be of the pipe type and size as shown on the Plans and as specified in Section 40 05 00 – Pipe and Fittings.

### 2.3 VALVES

- A. Valves shall conform to Section 40 05 23 - Valves and Appurtenances.

### 2.4 HYDRANTS

- A. Fire hydrants shall conform to the requirements of Section 33 12 19 - Fire Hydrants.

### 2.5 WATER SERVICES

- A. Water service materials shall conform to the Water Service Installation Details shown on the plans.

### 2.6 WATER METERS

- A. All water meters shall read in gallons.
- B. 1 inch Water Meters shall be Badger Model 70 RecordAll Disc Series Meters, no substitutions allowed (see meter data in Project Details).
- C. 2 inch Water Meters shall be Badger Model 170 RecordAll Disc Series Meters, no substitutions allowed (see meter data in Project Details).
- D. 3 Inch Water Meters shall be Badger RecordAll Compound Series Meter, no substitutions allowed (see meter data in Project Details).
- E. All water meters shall be supplied with HR-E High Resolution 8-Dial Encoders and Badger Orion Cellular LTE-M endpoints, no substitutions allowed. Endpoints shall be installed flush in the lids of the meter boxes per the manufacturer's specifications and directions (See data sheets in Project Details).
- F. Compression couplings shall be used for meter installation per the Details.
- G. Meter boxes shall conform to Specification Section 03 41 00 Precast Concrete Structures.

### 2.7 BACTERIOLOGICAL SAMPLING STATIONS

- A. Bacteriological sampling stations shall be Eclipse No. 88WC as manufactured by Kupferle Foundry, no substitutions allowed. Sampling Stations shall have lockable cast aluminum enclosures.

## PART 3 EXECUTION

### 3.1 INSTALLATION OF PIPING AND VALVES

- A. Installation of piping and valves shall conform to the requirements of Section 40 05 00 – Pipe and Fittings and Section 40 05 23 – Valves and Appurtenances.

- B. Trenching and backfill shall conform to the Plan details and Section 31 23 00 - Earthwork.
- C. Restrained joint fittings shall be used in-lieu of thrust blocks, as specified in Section 40 05 00 – Pipe and Fittings, unless otherwise specified on the plans or as approved by the engineer.
- D. Thrust blocks shall be installed in accordance with the Plan details at locations specified only.

### 3.2 *INSTALLATION OF FIRE HYDRANTS*

- A. Fire hydrant installation shall be in conformance with Section 33 12 19 - Fire Hydrants.
- B. Fire hydrants shall be installed in conformance with County of Fresno Standards and the Plans.

### 3.3 *INSTALLATION OF WATER SERVICES*

- A. Water services shall be installed in conformance with County of Fresno Standards and the Plans.
- B. Installation of piping shall conform to the requirements of Section 40 05 00- Pipe and fittings.
- C. Trenching and backfill shall conform to the requirements of Section 31 23 17- Trenching, Backfilling and Compacting.
- D. Restrained joint fittings, shall be installed as specified in Section 40 05 00 – Pipes and Fittings and plan details.
- E. Thrust blocks shall be installed in accordance with the plans.

### 3.4 *INSTALLATION OF WATER METERS*

- A. Water meters shall be installed per the manufacturer's recommendations and the Plans.
- B. Water meter transmitters shall be activated and integrated with the County's automatic meter reading system. Meters and transmitters shall be activated and tested prior to acceptance.

### 3.5 *INSTALLATION OF BACTERIOLOGICAL SAMPLING STATIONS*

- A. Bacteriological sampling stations shall be installed per manufacturer's recommendations and the plans.

### 3.6 *TESTING AND DISINFECTION*

- A. Testing shall be as specified in Sections 40 05 00 – Pipe and Fittings.



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- B. Disinfection shall conform to Section 33 13 00 - Disinfection of Water Distribution System.

**END OF SECTION**

## **SECTION 33 12 19**

### **FIRE HYDRANTS**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. The work of this section consists of furnishing and installing new fire hydrants, relocating existing hydrants and salvaging existing hydrants. The work of this section also includes appurtenant auxiliary valves and valve boxes.
- B. Furnish, install, and test all hydrants, valves, water piping to main and appurtenances as indicated and as specified.

##### **1.2 RELATED WORK**

- A. Section 31 23 00 – Earthwork
- B. Section 03 30 00 – Cast-In-Place Concrete
- C. Section 40 05 00 – Pipe and Fittings
- D. Section 40 05 23 – Valves and Appurtenances
- E. Section 33 13 00 – Disinfection of Water Distribution System

##### **1.3 REFERENCES**

- A. Uniform Plumbing Code.
- B. American Water Works Association Standards.
- C. Section 90, "Portland Cement Concrete", State Standard Specification.

##### **1.4 SUBMITTALS**

- A. As specified in Section 01 33 00 – Submittal Procedures
- B. Catalog cuts, complete with maintenance data and assembly drawings for valve and hydrant.
- C. Certification from manufacturer that hydrant complies with AWWA C502.

##### **1.5 CLOSEOUT SUBMITTALS**

- A. As specified in Section 01 77 00 – Contract Closeout.
- B. Tools: One hydrant wrench, sized to fit caps provided, for every six hydrants furnished.

- C. Spare Parts: One set of break-off parts for every six hydrants.
- D. Auxiliary Valve Extension Handles: Two handles for each size valve.
- E. Manufacturer's operation and maintenance data for fire hydrants and auxiliary valves.

## **PART 2 PRODUCTS**

### **2.1 HYDRANTS**

- A. Hydrants shall comply with AWWA C502 and the following requirements:
  - 1. Valve opening shall be 5 1/4-inch minimum.
  - 2. Inlet Connection: Flanged, 6-inch size. Use anchoring fittings for mechanical joint connections, either an anchoring coupling or retainer gland.
  - 3. Nozzles: Provide one 2-1/2-inch hose outlets and one 4-1/2-inch pumper outlet nozzle for each hydrant in residential areas. Provide two 2-1/2-inch hose outlet nozzles and one 4-1/2-inch pumper outlet nozzle for each hydrant for commercial areas. Threads and gaskets for all nozzles, caps, and adapters shall comply with NFPA.
  - 4. Provide hydrants with a sidewalk break-off flange.
  - 5. Stem Seals: O-Ring type.
  - 6. Color: Hydrant shall have a shop-applied coat of paint. After installation, apply two additional coats of a compatible paint on the exposed portion of the hydrant. Color will be selected by the Engineer. Paint shall be a high gloss exterior alkyd enamel.
  - 7. Manufacturer: Dry barrel UL-FM Mueller Centurion Fire Hydrant Assembly-5-11/4-inch
  - 8. Top operating nut shall be five-sided.

### **2.2 AUXILIARY VALVE AND BOX**

- A. Auxiliary valve shall be 6-inch resilient wedge gate valve. Valve shall be as specified in Section 40 05 23 – Valves and Appurtenances.
- B. Valve box shall be as identified on the Plans and as specified in Section 03 41 00 - Precast Concrete Structures.

### **2.3 THRUST BLOCKS**

- A. Concrete for thrust blocks shall be as specified in Section 03 30 00 – Cast in Place Concrete.

### **PART 3 EXECUTION**

#### **3.1 REMOVAL AND SALVAGE OF EXISTING HYDRANTS**

- A. Water supply to hydrant shall be shut-off by closing the auxiliary gate valve to hydrant.
- B. Soil around hydrant shall be excavated with care not to disturb existing utility to remain in service and so as not to damage hydrant, auxiliary gate valve, valve box, or other appurtenances.
- C. Hydrant shall be disconnected from service at auxiliary gate valve. A blind flange shall be installed on auxiliary gate valve, for possible future connection. Hydrant shall be removed from excavation, cleaned and stored to prevent damage until reinstalled.
- D. Excavation shall be backfilled, providing proper cover and protection of remaining auxiliary gate valve. Final grading of area shall match existing grade.
- E. Hydrants not reinstalled shall be cleaned from any foreign material and delivered to park maintenance as directed by Engineer.

#### **3.2 RELOCATION OF EXISTING HYDRANTS**

- A. Water supply to hydrant shall be shut-off by closing the auxiliary gate valve to hydrant.
- B. Soil around hydrant shall be excavated with care not to disturb existing utility to remain in service and so as not to damage hydrant, auxiliary gate valve, valve box, or other appurtenances.
- C. Hydrant shall be disconnected from service at auxiliary gate valve. A blind flange shall be installed on auxiliary gate valve, for possible future connection. Hydrant shall be removed from excavation, cleaned and stored to prevent damage until reinstalled.
- D. Excavation shall be backfilled, providing proper cover and protection of remaining auxiliary gate valve. Final grading of area shall match existing grade.
- E. Hydrant shall be reinstalled in new location in the same manner as specified for new hydrants.

#### **3.3 EXCAVATION FOR HYDRANT INSTALLATION**

- A. As specified in Section 31 23 00 – Earthwork.

#### **3.4 INSTALLATION OF NEW HYDRANTS**

- A. Clean hydrant interiors of all foreign matter before installation. Tighten stuffing boxes and inspect in opened and closed positions to see that all parts are in working

condition. Install hydrants with pumper outlet facing the adjacent roadway or parking area, or as shown on the Plans.

### 3.5 OPERATIONS CHECK AND DISINFECTION

- A. Hydrants shall be checked and disinfected when the entire water system is pressure tested and disinfected. When the water system is being pressurized and flushed, remove a nozzle cap and open the hydrant to flush out dirt and sediment. After flushing, close the hydrant, replace the cap, reopen the hydrant, and inspect for leaks. Close the hydrant, remove the caps, and verify that hose connections fit the hose outlets. Verify that hydrant drains properly. Hydrants not draining properly shall be corrected by Contractor at no additional expense to Owner.
- B. Fire hydrant systems shall be tested in accordance with applicable NFPA standards. Conduct pressure test in accordance with Section 02511 – Pipe & Fittings, and disinfection in accordance with Section 02512 – Disinfection of Water Distribution System.

**END OF SECTION**

## **SECTION 33 13 00**

### **DISINFECTION OF WATER DISTRIBUTION SYSTEM**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. Disinfection of all new potable piping, components, and appurtenances.
- B. This shall include disinfection of all potable water piping.
- C. New facilities shall be kept isolated from the active distribution system using a backflow, double check valve device per ANSI/AWWA C651 - Disinfecting Water Mains.
- D. Before allowing water from the municipal supply system to enter the new potable water system, all its components shall be cleaned and disinfected.
- E. Test and report results. Cost of all testing shall be borne by the Contractor.
- F. Connect new system and existing water distribution mains, after all required test are satisfactory and approved by the Engineer.

##### **1.2 RELATED WORK**

- A. Section 33 12 19 – Fire Hydrants
- B. Section 40 05 00 – Pipe and Fittings
- C. Section 40 25 23 – Valves and Appurtenances

##### **1.3 REFERENCE**

- A. ANSI/AWWA C651 – Disinfecting Water Mains.
- B. ANSI/AWWA C652 – Disinfection of Water Storage Facilities
- C. ANSI/AWWA C654 – Disinfection of Wells

##### **1.4 SUBMITTALS**

- A. As specified in Section 01 33 00 – Submittal Procedures.
- B. Submit five copies of Contractor-prepared water system disinfection plan. Plan shall include the following information:
  - 1. Sequence and schedule for flushing and disinfection work.
  - 2. Materials to be used for disinfection.

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3. Method of chlorination.
  4. The overall order of all disinfection activities.
  5. Description of sequence for disinfection of distribution system.
  6. Description of sequence for disinfection of all components of the water distribution system, including how Contractor will isolate segments of the water system for disinfection.
  7. Description and location of bacteriological sample points throughout the system to confirm successful disinfection of entire water system. Sample point spacing not to exceed 1,200 feet per AWWA Standard C651.
  8. Description of materials and procedure to dechlorinate chlorinated water.
  9. Description of how and where flushing and dechlorinated water will be disposed of.
- C. Submit five copies of each compliance report to Engineer. Reports shall include the following information:
1. Disinfection report; accurately record:
    - a. Type and form of disinfectant used.
    - b. Date and time of disinfectant injection start and time of completion.
    - c. Test locations.
    - d. Initial and 24-hour disinfectant residuals in parts per million (ppm) for each location tested.
    - e. Date and time of flushing start and completion.
    - f. Disinfectant residual after flushing in ppm for each location tested.
    - g. Persons present during the disinfection operation.
  2. Bacteriological report; accurately record:
    - a. Date issued, project name, and testing laboratory name, address, and telephone number.
    - b. Time and date of water sample collection.
    - c. Name of person collecting samples.
    - d. Test locations.

- e. Initial and 24-hour disinfectant residuals in ppm for each location tested.
- f. Coliform bacteria test results for each location tested.
- g. Certification that water conforms, or fails to conform, to bacterial standards of the California State Water Resources Control Board.
- h. Bacteriologist's signature.

### 1.5 *QUALITY ASSURANCE*

- A. Testing laboratory certified with the State of California for examination of drinking water.
  - 1. Testing laboratory shall be selected by the Contractor and approved by the Owner.
  - 2. All samples shall be gathered and tested by said Laboratory.
  - 3. Contractor shall instruct the testing laboratory to provide the test results to the Engineer immediately upon results and a copy of the written report sent directly to the Engineer.

## **PART 2 PRODUCTS**

### 2.1 *CHLORINE*

- A. All disinfectant chemicals shall be certified to ANSI/NSF Standard 60.
- B. Chlorine-bearing compounds:
  - 1. Calcium hypochlorite (comparable to commercial products known for example as HTH, Perchloron, and Pittchlor, sold for swimming pool chlorination).
  - 2. Sodium hypochlorite (liquid bleach, sodium hypochlorite in powder or tablet form for pool chlorination).

## **PART 3 EXECUTION**

### 3.1 *PREPARE DISINFECTION PLAN*

- A. The Contractor shall prepare and submit the Plan to the Engineer for approval at least eight weeks before initiating disinfection activities.
- B. The Contractor shall address and correct any issues the Engineer identifies with the Plan and resubmit, as many times as necessary, for final approval.



### 3.2 PREPARATION

- A. Verify that system has been cleaned, inspected, and pressure tested.
- B. If a chlorine-bearing compound is to be used, the calcium hypochlorite or sodium hypochlorite shall be prepared as a water mixture before introduction into the potable water piping system. The powder shall first be made into a paste and then thinned to approximately a 1- percent chlorine solution (10,000 ppm). The preparation of 1- percent chlorine stock solution requires the following proportions of powder to water:

<u>Product</u>	<u>Amount of Compound</u>	<u>Quantity of Water (Gals)</u>
High-test Calcium Hypochlorite (65 to 70 percent Cl)	1 lb.	7.50
Sodium Hypochlorite liquid (5.25 percent Cl)	1 gal.	4.25

### 3.3 APPLICATION

- A. Provide and attach equipment required to execute work of this Section. This may include:
  - 1. A solution-feed chlorination device.
  - 2. A device to regulate rate of flow and provide effective diffusion of the gas into the water within the pipe being tested. Chlorinating devices for feeding solutions of the chlorine gas or the gas itself into the water shall provide means for preventing the backflow of water into the chlorine cylinder.
- B. Preliminary Flushing: Before disinfection, the system with outlets open shall be flushed thoroughly with water. Flushing shall be done after the pressure test has been made. Flushing shall develop a velocity in pipes of at least 2.5 feet per second (fps).
- C. Point of Application: The preferred point of application of the chlorinating agent is at the beginning of the pipeline extension of any valved section, and through a corporation stop inserted by the Contractor (except in new distribution systems) in the top of the newly laid pipe. The water injector for delivering the chlorine-bearing water into the pipe shall be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipeline extension.
- D. Retention Period: Treated water shall be retained for at least 24 hours.
- E. Chlorinating Valves and Hydrants: In the process of chlorinating newly laid pipe, all valves or other appurtenances shall be operated while the pipeline is filled with the chlorinating agent.

- F. Circulate and flush repeatedly until specified cleanliness is achieved. Before being placed in service, all new mains and repaired portions of, or extensions to, existing mains shall be chlorinated so that a chlorine residual of not less than 25 mg/l free available chlorine remains in the water after 24 hours standing in the pipe.
- G. Super Chlorinated water that is flushed after disinfection shall be dechlorinated by the Contractor.

### 3.4 TESTS

- A. Samples shall be tested in accordance with ANSI/AWWA C651, C652, and C654.
  - 1. If disinfection fails to produce satisfactory test results, the new pipes and facilities may be re-flushed and retested. If samples taken after re-flushing also fail to produce satisfactory results, sections represented by those results shall again be disinfected and retested. The cost of any retests, including time for the Engineer, shall be borne by the Contractor at no additional cost to the project.

**END OF SECTION**

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**SECTION 33 19 00**  
**WATER SYSTEM ABANDONMENT**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Abandon existing water distribution system in place, including water valves and services. Remove existing Fire hydrants as shown on the plans.
- B. Properly dispose of all removed materials.
- C. Finish grade to match existing surrounding ground.

**1.2 RELATED WORK**

Section 02 41 00 – Demolition

Section 31 11 00 – Clearing and Grubbing

Section 31 23 00 – Earthwork

Section 40 05 00 – Pipe & Fittings

**1.3 REGULATORY REQUIREMENTS**

- A. Obtain required permits from County of Fresno.
- B. Dispose of removed materials in an approved disposal or salvage facility.

**1.4 REFERENCES**

- A. Section 16 - Clearing and Grubbing, State Standard Specifications.
- B. Section 19 - Earthwork, State Standard Specifications.

**PART 2 - PRODUCTS**

Not Used.

## **PART 3 - EXECUTION**

### **3.1 ORDER OF WORK**

- A. Existing water distribution system shall remain in operation until after the installation of water lines and facilities have been completed and tested.
- B. After the new distribution system has passed pressure and bacteriological testing all customer water services shall be connected to the new system service laterals.
- C. After all customers have been transferred to the new system the old system shall be deactivated and abandoned per the Plans.

**END OF SECTION**

**SECTION 40 05 00**  
**PIPE AND FITTINGS**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Furnish, install, and test all water, utility, pipe, fittings, and appurtenances as indicated and as specified.

**1.2 RELATED WORK**

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 09 90 00 - Painting and Coating
- C. Section 31 23 00 – Earthwork
- D. Section 33 05 26 - Utility Line Marking
- E. Section 33 10 00 – Domestic Water System
- F. Section 33 13 00 – Disinfection of Water Distribution System
- G. Section 40 05 23 – Valves & Appurtenances

**1.3 REFERENCES**

- A. California Plumbing Code.
- B. American Water Works Association Standards.

**1.4 SUBMITTAL REQUIREMENTS**

- A. Submit shop drawings in accordance with the General Provisions.
- B. As specified in Section 01 33 00 – Submittal Procedures
- C. Submit manufacturer's catalog data. Show manufacturer's model number.
- D. Submit dimensions including wall thickness and materials of construction by reference standard and grade. Submit information on interior and exterior coatings as applicable.

**1.5 QUALITY ASSURANCE**

- A. All work performed under this section shall meet all recommendations and requirements of AWWA, Uniform Plumbing Code (UPC), NFPA 24, ASTM D2774, and all other applicable national, state, local, standards and regulations.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- A. All materials in contact with potable water shall conform to California Health and Safety Code, Section 11687 (commonly known as AB 1953); and NSF/ANSI 61 Annex G (NSF/ANSI 372).

### **2.2 DUCTILE IRON PIPE**

- A. General: Ductile iron pipe shall conform to ANSI A21.51 (AWWA C151) and shall be Class 52 unless shown otherwise. Pipe for grooved or flanged joints shall be no less than Class 53.
- B. Joints:
  - 1. Buried pipe and pipe fittings shall have push-on joints or mechanical joints conforming to AWWA C111. Flanged joints, sleeve-type mechanical couplings, and grooved-type couplings shall be used when shown.
  - 2. For push-on joints, shape of pipe ends shall conform to ANSI A21.11 (AWWA C111). Gaskets and lubricant for pipe and fittings shall conform to ANSI A21.11 (AWWA C111).
  - 3. For mechanical joints, dimensional and material requirements for pipe ends, glands, bolts, nuts, and gaskets shall conform to ANSI A 21.11 (AWWA C111). Pipe smaller than 4 inches shall have screwed or grooved joints
  - 4. For flanged joints, ends of pipe shall be provided with flanges conforming to ANSI A21.15 (AWWA C115), and to ANSI B16.5 for 150 lb. class. Bolts, nuts, and gaskets for flanged connections shall conform to ANSI B18.2.1. For grooved joints, groove specifications shall conform to ANSI/AWWA C606.
- C. Fittings: Fittings with push-on, mechanical joint, grooved joints and flanged ends shall conform to ANSI A21.53 (AWWA C153). Fittings shall have pressure rating of 350 psi for 3"-24" and 250 psi rating for 30"-48" pipe. Fittings shall have cement-mortar lining equivalent to that of the pipe lining.
- D. Coating and Lining: Pipe shall be bituminous seal-coated and cement-mortar lined. The lining shall conform to AWWA C104.
- E. All buried ductile iron pipe shall be encased in an 8-mil lining of polyethylene, installed per AWWA C105.

### **2.3 SEISMIC RESTRAINT DUCTILE IRON PIPE**

- A. The special ductile iron pipe under this section shall be used in CSA 30, El Porvenir, as specified on the plans.
- B. Restrained joint pipe shall be ductile iron manufactured in accordance with the requirements of ANSI/ AWWA C151/A21.51. The pipe joint shall be of a push-on

type with 2.9 inches of expansion capability when fully seated and be capable of 4° of deflection for 6"-12" and 3° of deflection for 16" when fully extended. The pipe joint shall be in accordance with ANSI/ AWWA C111/A21.11 "Rubber-Gasket Joints for Ductile-Iron Pipe and Fittings."

- C. Pipe thickness shall be Thickness Class 53, or greater, in accordance with ANSI/AWWA C150/A21.50 "Thickness Design of Ductile-Iron Pressure Pipe." Joint restraint system for pipe and fittings must be able to be assembled and disassembled quickly and be of a boltless design.
- D. Restrained joint pipe system must be easily adaptable for use with U.S. Pipe's TR FLEX® fittings and U.S. Pipe's XTRA FLEX® high deflection fittings or approved equal. Joint restraining components shall be ductile iron in accordance with applicable requirements of ANSI/ AWWA C110/A21.10 and/or C153/A21.53 with the exception of the manufacturer's proprietary design dimensions. Push-on joints for such fittings shall be in accordance with ANSI/AWWA C111/A21.11.
- E. Restrained joint pipe shall be U.S. Pipe's TR-XTREME and fittings shall be U.S. Pipe's TR FLEX, XTRA FLEX and TR TELE FLEX® COUPLING or approved equal.
- F. Restraint of field cut pipe shall be provided with U.S. Pipe's TR FLEX PIPE field weldments or approved equal.
- G. Cement mortar lining and seal coating for pipe and fittings, where applicable, shall be in accordance with ANSI/AWWA C104/ A21.4. Asphaltic outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 for fittings.
- H. Restrained push-on joints for pipe and fittings shall be designed for a water working pressure of 350 psi.

#### **2.4 RESTRAINED FLEXIBLE EXPANSION TYPE JOINT DUCTILE IRON PIPE**

- A. When joint restraint with permissible expansion for a 4" through 36" push-on joint pipe installation is required and indicated in the project plans and specifications, restrained push-on joint pipe and fittings utilizing ductile iron components shall be provided.
- B. Restrained joint pipe shall be ductile iron manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51. Push-on joints for such pipe shall be in accordance with ANSI/AWWA C111/A21.11 "Rubber-Gasket Joints for Ductile-Iron Pipe and Fittings." Pipe thickness shall be designed in accordance with ANSI/AWWA C150/A21.50 "Thickness Design of Ductile-Iron Pressure Pipe," and shall be based on laying conditions and internal pressures as stated in the project plans and specifications.
- C. Restrained joint fittings and the restraining components shall be ductile iron in accordance with applicable requirements of ANSI/AWWA C110/A21.10 and/or C153/A21.53 with the exception of the manufacturer's proprietary design



dimensions. Push-on joints for such fittings shall be in accordance with ANSI/AWWA C111/A21.11.

- D. Restrained joint pipe and fittings shall be U.S. Pipe's TR Flex Pipe and Fittings or approved equal. Restraint of field cut pipe shall be provided with U.S. Pipe's TR Flex Gripper Ring, TR Flex Pipe field weldments or approved equal.
- E. Cement mortar lining and seal coating for pipe and fittings, where applicable, shall be in accordance with ANSI/AWWA C104/A21.4. Asphaltic outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/ A21.53 for fittings.
- F. Restrained push-on joints for pipe and fittings shall be designed for a water working pressure of 350 psi for sizes 4" through 24" and 250 psi for sizes 30" through 36".

## 2.5 STEEL PIPE

- A. General: Steel pipe 12-inches in diameter and smaller shall conform to the requirements of the "Specifications for Black and Hot-Dipped Zinc-Plated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses (ASTM A120) and shall be "Standard Weight" Steel Pipe larger than 12 inches in diameter shall be ASTM A139, AWWA C200, wall thickness not less than 0.18 inches.
- B. Joints: Pipe 4-inches in diameter and larger shall be flanged or shall have grooved ends for Victaulic-type couplings. Where shown on the Plans, the pipe shall be flanged or plain end for flanged coupling adapters. Flanges shall be standard 150 psi flanges meeting the requirements of ANSI B16.1. Flanges shall be furnished with flat faces. Pipe smaller than 4 inches shall have screwed or grooved joints unless shown otherwise on the Plans.
- C. Fittings: All fittings shall be flanged cast or ductile iron, screwed malleable iron, or Victaulic-type fittings. The Contractor may substitute Victaulic-type fittings for flanged fittings or screwed fittings unless the particular joint requires a specific end for compatibility with a valve or special fitting. All Victaulic-type fittings shall be of strength equal to the pipes with lining and coatings equivalent to that specified for the pipe.
- D. Unless otherwise specified or noted in the Plans, all steel pipe 2-1/2 inch and smaller shall be Hot-Dipped galvanized, and pipes larger than 2-1/2 inch shall be black steel with epoxy or lining with minimum 10 mil dry thickness. Exterior surfaces of all pipe shall be shop primed. Finish coatings shall be as specified in Section 09 90 00 - Painting.

## 2.6 POLYVINYL CHLORIDE WATER PIPE (PVC)

- A. General: PVC pipe 4 inches through 12 inches in diameter shall conform to AWWA C900, unless otherwise specified. PVC pipe 14 inches in diameter and larger shall conform to AWWA C905, unless otherwise specified.

- B. The pipe shall be minimum PR 305 (DR 14) unless shown otherwise. Each length of pipe shall be marked with the manufacturer's name, nominal size, pressure classification, and date of manufacture.
- C. Joints: Joints shall be push-on type couplings or integral socket bell PVC pipe unless otherwise shown with rubber gaskets conforming to ASTM D 3139 and ASTM F 477. Integral socket bells of PVC pipe or separate couplings shall meet the same strength requirements as that of the pipe. All component parts of each joint including gaskets and coupling shall be clearly marked for use with the pipe for which they are intended.
- D. Fittings: Fittings shall be of ductile iron conforming to ANSI A21.10 (AWWA C153) with push-on joint bell to fit the particular make of pipe furnished. Fittings shall have a pressure rating at least equivalent to that of the pipe used and shall be cement-mortar lined in accordance with ANSI A21 (AWWA C104).
- E. Fittings: Fittings shall be of ductile iron conforming to ANSI A21.10 (AWWA C 153) for mechanical joints. Dimensional and material requirements for pipe ends, glands, bolts, nuts, and gaskets shall conform to ANSI A 21.11 (AWWA C111). Pipe smaller than 4 inches shall have screwed or grooved joints.

## 2.7 SCHEDULE 80 PVC PIPE

- A. General: PVC pipe less than 4 inches in diameter shall be domestically produced rigid polyvinyl chloride (PVC) compound, Type I Grade I, with a Cell Classification of 12454 as defined in ASTM D1784, trade name designation H707 PVC. This compound shall be gray in color as specified, and shall be approved by ANSI/NSF International for use with potable water (NSF Std 61).
- B. PVC pipe shall be manufactured in strict accordance to the requirements of ASTM D1785 for physical dimensions and tolerances. Each production run of pipe manufactured in compliance to this standard, shall also meet or exceed the test requirements for materials, workmanship, burst pressure, flattening, and extrusion quality defined in ASTM D1785. All belled-end pipe shall have tapered sockets to create an interference-type fit, which meet or exceed the dimensional requirements and the minimum socket length for pressure-type sockets as defined in ASTM D2672. All PVC Schedule 80 pipe must also meet the requirements of NSF Standard 14 and CSA Standard B137.3 rigid PVC pipe for pressure applications, and shall bear the mark of these Listing agencies. This pipe shall have a flame spread rating of 0-25 when tested for surface burning characteristics in accordance with CAN/ULC-S102-2-M88 or equivalent.
- C. Product marking shall meet the requirements of ASTM D1785 and shall include: the manufacturer's name (or the manufacturer's trademark when privately labeled); the nominal pipe size; the material designation code; the pipe schedule and pressure rating in psi for water @ 73°F; the ASTM D1785; the independent laboratory's seal of approval for potable water usage; and the date and time of manufacture.
- D. PVC fittings shall be schedule 80 grey, socket-type fabricated of ASTM D1784, Type I, Grade 1 conforming to ASTM D2467.

## 2.8 *POLYVINYL CHLORIDE GRAVITY SEWER PIPE (PVC)*

- A. PVC gravity sewer pipe 4-inches through 15-inches in diameter shall conform to ASTM D 3034, SDR 35. PVC gravity sewer pipe 18-inches through 36 inches in diameter shall conform to ASTM F679.
- B. Each length of pipe shall be marked with the manufacturers name, nominal size and ASTM designation. Pipe shall be made of PVC plastic having a cell classification of 12454B or 12364B as defined in ASTM D1784 and shall have SDR of 35 and minimum pipe stiffness of 46 PSI according to ASTM Test D2412.
- C. Joints: Pipe shall include an integral bell section with a factory assembled rubber ring gasket conforming to ASTM F477. Joint shall conform to ASTM D 3212. Bells shall meet the same strength requirements as that of the pipe.
- D. Fittings: Fittings shall be supplied by the pipe manufacturer and shall meet the strength requirement of the pipe. Integral bells and gaskets shall conform to the requirements for joints in this section. Fittings shall be marked with nominal size, manufacturers name and ASTM designation.
- E. PVC sewer pipe 3 inches to 6 inches, for chemical drain shall conform to ASTM D-2729 and D2949. Fittings shall be PVC with socket welded joints and shall conform to ASTM D2949 and ASTM D2665.

## 2.9 *FLEXIBLE COUPLINGS FOR GRAVITY PIPES*

- A. Transition type couplings shall be factory manufactured to ensure watertight fit and smooth flow transition at the joint. Couplings shall be made of resilient elastomeric PVC, with all stainless-steel coupling bands including screw and housing. All materials shall be rustproof and unaffected by soil conditions or normal sewer gases and shall be flexible with earth movement while maintaining seal. Poured concrete collar and similar coupling methods will not be accepted.

## 2.10 *STAINLESS STEEL TUBING*

- A. Stainless steel tubing shall be made of Type 316 L stainless steel to the requirements of ASTM A 269, of minimum 1/4-inch inside diameter, or as indicated, for the test pressure required. The fittings shall be swage ferrule design of Type 316 L stainless steel, of the double acting ferrule design, providing both a primary seal and a secondary bearing force. Flare bite or compression type fittings are not acceptable.

## 2.11 *POLYETHYLENE TUBING*

- A. Pipe shall be made of HDPE material with a minimum material designation code of PE3408, and shall conform to AWWA C901. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of same specification from the same raw material pipe. Polyethylene pressure pipe shall also conform to the applicable requirements of ASTM D 3035.

- B. Pipe shall be rated for 200 PSI working pressure.
- C. The pipe inside diameter shall not be less than the nominal diameter specified or shown.
- D. Unless shown otherwise on the Plans, the pipe dimension ratio shall be SDR 9 for pipes 2 inches and smaller.

#### 2.12 GROOVED COUPLINGS

- A. Groove dimensions shall conform to AWWA C606.
- B. Grooved couplings for ductile iron shall be Victaulic Style 31;
- C. Flexible grooved couplings for steel pipe shall be Victaulic Style 77 or equal; rigid grooved couplings for steel pipe shall be Victaulic Style 07 or equal. Couplings shall be rigid unless otherwise noted on the drawings.
- D. Grooved - Flanged adapters shall be Victaulic Style 341 for ductile iron pipe and Style 741 for steel pipe or equal.
- E. Grooved coupling for high density polyethylene pipe shall be Victaulic Style 995 or 997 or equal.

#### 2.13 FLANGED JOINTS

- A. Flange shall conform to ANSI B16.5, Class 150.
- B. All steel hardware installed underground shall be coated with a rust preventative, wrapped with 4 mil polyethylene sheeting, and secured with PVC tape.
- C. Gaskets shall be meet the pressure requirements of the adjoining flanges and shall conform to AWWA C-207. Gaskets for flat faced flanges shall be 1/8-inch thick.
- D. Gaskets for metallic pipe and non-potable 150 psi or less services shall be acrylic or aramid fiber bound with nitrile; Garlock Blue-Gard 3000 or equal. EPDM rubber gaskets, Garlock 98206 or equal, are also acceptable.
- E. Gaskets for metallic pipe and potable water service shall be NSF/ANSI-61 certified EPDM rubber, Garlock 98206 or equal.
- F. Gaskets for non-metallic flat faced flanges shall be constructed of a fluoroelastomeric material with a hardness of 70 durometer designed specifically for lower seating stress. Gaskets shall be certified to NSF/ANSI-61 for potable water service. Gaskets shall be Garlock Stye XP or equal.

#### 2.14 FLEXIBLE SLEEVE COUPLINGS

- A. Flexible sleeve couplings shall be one of the following, or Engineer approved equivalent:

1. Dresser, Inc., Style 38 for Steel Pipe, and Style 253 Wide- Range for Steel, PVC, Copper, and Cast/Ductile Iron pipe.
2. Smith Blair, Inc., Series 411 or Wide-Range 461
3. Romac Industries, Inc., Style 400 for 12" and larger pipe or XR501 Extended Range Coupling, 4" thru 12" pipe size.

B. Center sleeves shall comply with the following

Nominal Pipe Diameter	Minimum Sleeve Length
6 inch and smaller	Manufacturer's Standard
8 through 14 inch	7 inch
14 inch and larger	10 inch

## 2.15 FLEXIBLE SPOOL-TYPE EXPANSION COUPLINGS

- A. Flexible rubber coupling shall be flexible joints, which includes a tube, body cover and flanges. The tube shall be a leak proof liner and the body shall consist of fabric and rubber compound, reinforced with steel wire or rings for strength. Flexible rubber coupling shall be either a single arch or double arch construction as indicated in the Plans. Couplings shall have control rods to limit extension and flanges shall have backing rings. Couplings used for services with pressures greater than 75 psi shall have stainless steel flanges – rubber flanges with backing rings shall not be acceptable. Flexible couplings shall have minimum pressure ratings of 100 psi; couplings installed on suction of pumps shall have a minimum vacuum (pressure) rating of 30 inches Hg column.
1. Flexible coupling shall have Buna N liner and cover and shall be manufactured by Proco, Red Valve Company Inc., Metraflex Company or equal.

## 2.16 DOUBLE-SOCKET EXPANSION JOINT

- A. Flexible expansion joints shall be manufactured of ductile iron conforming to the material requirements of ASTM A536 and ANSI/AWWA C153/A21.53.
- B. Each flexible expansion joint shall be pressure tested prior to shipment against its own restraint to a minimum of 250 PSI. A minimum 2:1 safety factor, determined from the published pressure rating, shall apply.
- C. Each flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum per ball deflection of: 25°, 4" - 8"; 20°, 10" - 12"; 15°, 14+" and 8-inches minimum expansion. The flexible expansion fitting shall not expand or exert an axial imparting thrust under internal water pressure. The flexible expansion fitting shall not increase or decrease the internal water volume as the unit expands or contracts.
- D. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating and gaskets shall meet ANSI/NSF-61.

- E. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.
- F. Joints shall be The Force Balanced FLEX-TEND as manufactured by EBAA Iron, or equal.

#### 2.17 *MARKER TAPE FOR BURIED PIPING*

- A. As specified in Section 33 05 26 - Utility Line Marking.

#### 2.18 *TRACER WIRE*

- A. As specified in Section 33 05 26 - Utility Line Marking.

#### 2.19 *CONCRETE FOR THRUST BLOCKS*

- A. As specified in Section 03 30 00 – Cast-In-Place Concrete. Thrust blocks shall be used only where specifically permitted on the drawings or with pre-approval from the Engineer.

#### 2.20 *JOINT RESTRAINT COUPLINGS*

- A. Mechanical joint restraint coupling shall be of the type that utilizes the follower gland and shall consist of several individual lug bolts with gripping mechanism that prevents the joints from pulling apart. Glands shall be ductile iron conforming to ASTM A536-80, and dimensions shall be compatible to be used with standard mechanical joint fittings for ductile iron pipe. The mechanical restraint joint shall have a minimum working pressure rating equal to that of the pipe with a safety factor of not less than 2. Restrained joints shall have twist off nuts to insure proper installation of restraining grip mechanism. Mechanical joint restrained coupling shall be EBAA, Iron, Inc. MEGALUG; with Mega-Bond coating.; or approved equal. Coating of gland follower body shall be electrostatically applied and heat cured polyester based powder. Wedge assemblies and bolts shall be coated with heat cured fluoropolymer coatings. Restraints shall be designed for the specific type of pipe to be restrained.
- B. Restrained joint fittings shall meet Uni-B-13 for PVC and be FM and UL approved through 12-inch for both ductile iron and PVC.
- C. Restrained joint fittings for high density polyethylene pipe shall be Victaulic 995 or 997 style coupling.

#### 2.21 *FASTENERS*

- A. All fasteners shall include washers under both bolt head and nut unless the use of washers is incompatible with the fitting design.
- B. Unless otherwise noted, all bolts, tie rods, and T-bolts used to secure flanges, fittings, and couplings located underground or submerged in liquid shall be Type

304 or 316 stainless steel per ASTM A320 or ASTM A193. Nuts shall be 304 or 316 stainless steel per ASTM A 194 and washers shall be ASTM F436 Type 3.

- C. Unless otherwise noted, all bolts, tie rods, and T-bolts used to secure flanges, fittings, and couplings located indoors, above grade, and in vaults shall be carbon steel conforming to ASTM A307, Grade B with ASTM A563A nuts and ASTM F436 washers. Bolts, nuts, and washers shall be hot dipped galvanized in accordance with ASTM F2329. Stainless steel meeting the requirements of Paragraph B shall also be acceptable.

## 2.22 INSULATING FLANGE SETS

- A. Insulating flange sets shall be provided where indicated on the plans and shall consist of insulating gaskets, insulating sleeves and washers and a steel washer. Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2-inch or smaller and shall be made of acetal resin. For bolt diameters larger than 1-1/2-inch, insulating sleeves and washers shall be 2-piece and shall be made of polyethylene or phenolic. Steel washers shall comply with ASTM A 325. Insulating gaskets shall be full-face.

## PART 3 EXECUTION

### 3.1 HANDLING AND DISTRIBUTION OF MATERIALS

- A. Delivery: Handle pipe carefully to ensure delivery at the project site in sound, undamaged condition. Contractor shall replace damaged pipe at no additional expense to the Owner.
- B. Storage: Do not store materials directly on the ground. Adequately support piping to prevent warping. Use protective covers where pipe may be damaged by direct sunlight.
- C. No more than one week's supply of material shall be distributed in advance of pipe laying operations, unless otherwise approved or required.
- D. Before laying, pipe shall be inspected for cracked, broken, or defective pieces. Such pieces shall be rejected. Pipe shall be carefully lowered into the trench to prevent damage. All dirt or other foreign matter shall be removed from inside the pipe before lowering into the trench.

### 3.2 COATING

- A. Unless otherwise indicated in Part 2, all pipe and fittings shall be coated in accordance with specification Section 09 90 00 – Painting and Coating.

### 3.3 INSTALLATION OF UNDERDRAINS

- A. Perforated pipes shall be laid with the perforations down.

### 3.4 *INSTALLATION OF BURIED PRESSURE PIPING*

- A. General: Pipe, fittings, and appurtenances shall be installed in accordance with the manufacturer's instructions and in accordance with the following references as appropriate:
1. Ductile Iron Pipe - AWWA C600
  2. Polyvinyl Chloride Pipe and HDPE pipe - AWWA C605.
  3. Steel Pipe – AWWA C604
- B. Handling: The pipe shall be protected to prevent entrance of foreign materials during laying operations. When laying is not in progress, open pipe ends shall be protected with a watertight plug or other approved means to exclude water or foreign material.
- C. Alignment:
1. Mains shall be installed to the grades and elevations indicated and shall have a minimum cover of 30-inches from the top of the pipe to existing ground or paved surface unless otherwise indicated.
  2. The allowable angle of deflection at any joint shall not exceed the amount recommended by the pipe manufacturer for the particular pipe size used. Deviation of any pipe section from the line and grade indicated shall not exceed 1/2-inch.
- D. Joints:
1. Pipe shall be assembled and joined in accordance with the manufacturer's published instructions for the type of pipe and joint used. All portions of the joints shall be thoroughly cleaned before the sections of pipe are assembled. The ends of each pipe shall abut against the next pipe section in such a manner that there shall be no unevenness of any kind along the bottom half of the interior of the pipe. Where mechanical joints are used, the pipe shall be marked in such a manner that it can be determined after installation that the pipe is properly seated.
  2. Where flexible couplings are used as expansion joints, the ends of the pipes shall be separated 1-inch to allow for expansion. The welded seam at the end of each coupled steel pipe shall be ground smooth for approximately 12-inches. Couplings shall be centered on pipe ends. Runs of pipe containing flexible couplings shall be properly blocked, anchored or tied to the structure to prevent joints from separating.
  3. Mechanical restrained joints shall be installed in accordance with joint manufacturer's instructions and recommendation.
- E. Installation of Marker Tape: Install tape in backfill directly over each pipeline, 24 inches over top of pipe, unless shown otherwise on the Plans. Where utilities are



buried in a common trench, identify each line by a separate marker tape. Place tapes directly over the applicable line.

### 3.5 *THRUST BLOCKS OR MECHANICAL RESTRAINED JOINTS*

- A. Thrust blocks shall be used only where specifically allowed on the drawings or with prior approval by the Engineer.
- B. Place concrete thrust blocks at all tees, elbows, plugs, and other locations where unbalanced forces exist in underground pipe in accordance with details shown. Place blocks between undisturbed ground and fitting to be anchored. Place blocking so that pipe and fittings will be accessible for repairs. Thrust blocks shall be of such size as to give bearing against undisturbed vertical earth banks sufficient to absorb the thrust from line pressure, allowing a maximum earth bearing pressure of 500 pounds per square foot per foot of depth below natural grade or as shown.
- C. Restrained joint fittings may be used in-lieu of thrust blocks, at the discretion of the Engineer. Contractor shall submit shop drawings showing methods of joint restraint for each type of restrained joint fitting to be used including the length of pipe having restrained push-on joints on all pipes which connect to the restrained fitting.
- D. When it is necessary to restrain push-on joints adjacent to restrained fittings, a harness restraint device shall be used. All harnesses shall have a pressure rating equal to that of the pipe on which it is used. Harness assemblies including tie bolts conform to ASTM A536-80.

### 3.6 *INSTALLATION OF EXPOSED PIPING*

- A. General - Pipe shall be installed as specified, as indicated on the Plans or, in the absence of detail piping arrangement, in a manner acceptable to the Engineer.
- B. Pipe shall be cut from measurements taken at the site and not from the Plans. All necessary provisions shall be taken in laying out piping to provide throughout for expansion and contraction. Piping shall not obstruct openings or passageways. Pipes shall be held free of contact with building construction so as not to transmit noise resulting from expansion.
- C. The inside of all pipe, valves, and fittings shall be smooth, clean, and free from blisters, loose mill scale, sand, dirt, and other foreign matter when erected. The interior of all lines shall be thoroughly cleaned, to the satisfaction of the Engineer, before being placed in service.
- D. Stuffing box leakage from water sealed pumps shall be contained and not allowed to into storm drains.
- E. Taps for pressure gauge connections on piping and equipment shall be provided with a nipple and a ball type shutoff valve. Drilling and tapping of pipe walls for installation of pressure gauges or switches will not be permitted.
- F. A union shall be provided within 2 feet of each end of threaded end valves unless there are other connections that facilitate easy removal of the valve. Unions shall

also be provided in piping at locations adjacent to devices or equipment that may require removal in the future and at locations required by the Plans or other sections of the Specifications.

- G. Provide unions on exposed piping and tubing 3-inches and smaller as follows:
1. At every change in direction (horizontal and vertical).
  2. Downstream of valves, 6 to 12 inches.
  3. As shown on plans.
- H. In all piping except air piping, insulating fittings shall be provided to prevent contact of dissimilar metals.
- I. Pipe Joints - Pipe joints shall be carefully and neatly made in accordance with the requirements that follow.
1. Threaded - Pipe threads shall conform to ANSI/ASME B1.20.1, NPT, and shall be full and cleanly cut with sharp dies. Not more than three threads at each pipe connection shall remain exposed after installation. Ends of pipe shall be reamed, after threading and before assembly, to remove all burrs.  
  
Threaded joints in plastic piping shall be made up with Teflon thread tape applied to all male threads. Threaded joints in stainless steel piping shall be made up with Teflon thread sealer and Teflon thread tape applied to all male threads. At the option of the Contractor, threaded joints in other piping may be made up with Teflon thread tape, thread sealer, or a suitable joint compound. Thread tape and joint compound or sealers shall not be used in threaded joints that are to be seal welded.  
  
Threaded joints in steel piping for chlorine service shall be made up with Teflon thread tape or paste applied to all male threads.
  2. Compression - Ends of tubing shall be cut square and all burrs shall be removed. The tubing end shall be fully inserted into the compression fitting and the nut shall be tightened not less than 1-1/4 turns and not more than 1-1/2 turns past finger tight, or as recommended by the fitting manufacturer, to produce a leak tight, torque-free connection.
  3. Flared - Ends of annealed copper tubing shall be cut square and all burrs shall be removed prior to flaring. Ends shall be uniformly flared without scratches or grooves. Fittings shall be tightened as required to produce leak tight connections.
  4. Soldered and Brazed - Where solder fittings are specified for lines smaller than 2 inches, joints may be soldered or brazed at the option of the Contractor. Joints in 2 inch and larger copper tubing shall be brazed.
  5. Flanged - Flange bolts shall be tightened sufficiently to slightly compress the gasket and effect a seal, but not so tight as to fracture or distort the flanges.

A plain washer shall be installed under the head and nut of bolts connecting plastic pipe flanges. Anti-seize thread lubricant shall be applied to the threaded portion of all stainless-steel bolts during assembly. Connecting flanges shall have similar facings, i.e., flat or raised face.

6. Welded - Welding shall conform to the specifications and recommendations contained in the "Code for Pressure Piping", ANSI B31.1.
7. Grooved Couplings - Grooves for grooved couplings shall be cut with a specially designed grooving tool. Grooves cut in steel pipe shall conform to flexible grooving dimensions as set forth in AWWA C606, and shall be clean and sharp without burrs or check marks.

### 3.7 ACCEPTANCE TESTS FOR BURIED PRESSURE PIPING

#### A. General.

1. All testing and inspection shall be performed after final backfill and compaction operations are complete. If the Contractor so desires, he may pretest the lines at his own expense, but final testing must be performed after compaction requirements have been approved.

#### B. In general, tests shall be conducted in accordance with AWWA C600 and C651 except as otherwise herein specified.

#### C. All newly installed sections of buried pressure piping shall be pressure and leakage tested as described herein.

1. For buried pressure pipelines, tests shall be made on two or more valved sections not to exceed 2,500 feet in length. The Contractor shall furnish all necessary equipment, material and labor required.
2. Tests shall be made after the trench has been backfilled and compacted, but not until at least 5 days have elapsed since any thrust blocks in the section have been poured.
3. The pipe shall be slowly filled with water and ensuring all air expelled from section being tested. The line shall stand full of water for at least twenty-four hours prior to testing to allow all air to escape. A test pressure equal to 1.5 times the design pressure, of the pipe measured at the point of lowest elevation pressure, or 100 psi, whichever is greater, shall be applied.
4. The test pressure in the line shall be maintained for a period of 2 hours. Test pressure shall be maintained within 5 psi during the test period. Conduct a leakage test concurrently with the pressure test. Leakage is defined as the volume of water that must be supplied into the newly laid pipeline to maintain pressure within +/- 5 psi of the test pressure after it is filled and purged of air. The water required to maintain test pressure shall be measured by means of a graduated barrel, drum, or similar device at the pump suction or through a meter.

Allowable leakage at the specified test pressure shall not exceed the amounts allowed by AWWA C600,  $L = \frac{SD\sqrt{P}}{148,000}$

Where:

L = Testing allowance in gallon per hour.

S = Length of pipe tested in feet.

D = Nominal diameter of the pipe in inches.

P = Average test pressure during the hydrostatic test, in pounds per sq. inch.

Hydrostatic testing allowance per 1,000 ft. of pipeline in gph.

PSI	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
200	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29
175	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15
150	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99
125	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81
100	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62

5. Should testing disclose any visible leaks or leakage greater than that allowed, the defective joints or pipe shall be located, repaired, and re-tested until satisfactory. The cost of any retests, including time for the Engineer, shall be borne by the Contractor at no additional cost to the project.

### 3.8 ACCEPTANCE TEST FOR EXPOSED PIPING

- A. Pipe to be Tested - All new installed piping sections shall be pressure and leakage tested as specified herein.
- B. Pressure Testing - After the section of line to be tested has been filled with water or other test media, the test pressure shall be applied and maintained without interruption for 2 hours plus any additional time required for the Engineer to examine all piping undergoing the test and for the Contractor to locate all defective joints and materials.
  1. Test medium shall be potable water for potable water piping; all other piping may be tested using plant water subject to Engineer's approval.
  2. Pipe system shall be tested at 1-1/2 times the operating pressure, or 100 psi, whichever is greater, using the appropriate test fluid medium.

3. All piping shall be tight and free from leaks. All pipe, fittings, valves, pipe joints, and other materials that are found to be defective shall be removed and repaired or replaced with new and acceptable material, and the affected portion of the piping be retested until satisfactory. The cost of any retests, including time for the Engineer, shall be borne by the Contractor at no additional cost to the project.

Compressed air or gas under pressure shall not be used to test plastic piping unless specifically recommended by the pipe manufacturer.

Leakage may be determined by loss of pressure, soap solution, chemical indicator, or other positive and accurate method acceptable to the Engineer. All fixtures, devices, or other accessories which are to be connected to the lines and which would be damaged if subjected to the specified test pressure shall be disconnected and ends of the branch lines plugged or capped as required during the testing procedures.

**END OF SECTION**

## **SECTION 40 05 23**

### **VALVES AND APPURTENANCES**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. This section includes materials, testing, and installation of manually operated valves and check valves including gate, butterfly, ball, hose bibbs, globe, check, solenoid, mud valves, vacuum breakers and flap valves.

##### **1.2 RELATED WORK**

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 09 90 00 - Painting and Coating
- C. Section 31 23 00 – Earthwork
- D. Section 33 05 26 - Utility Line Marking
- E. Section 33 10 00 – Domestic Water System
- F. Section 33 13 00 – Disinfection of Water Distribution System
- G. Section 40 05 60 – Air-Release and Vacuum-Relief Valves

##### **1.3 REFERENCES**

- A. American Society for Testing and Materials (ASTM)
- B. American Water Works Association (AWWA)

##### **1.4 SUBMITTALS**

- A. Submit shop drawings in accordance with the General Conditions and Section 01 33 00 – Submittal Procedures.
- B. Submit manufacturer's catalog data and detail construction sheets showing all valve parts. Describe each part by material of construction, specification (such as AISI, ASTM, SAE, or CDA), and grade or type.
- C. Show valve dimensions including laying lengths. Show port sizes. Show dimensions and orientation of valve actuators, as installed on the valves. Show location of internal stops for gear actuators. State differential pressure and fluid velocity used to size actuators. For worm-gear actuators, state the radius of the gear sector in contact with the worm and state the handwheel diameter.

- D. Show valve linings and coatings. Submit manufacturer's catalog data and descriptive literature.
- E. Submit six copies of a report verifying that the valve interior linings and exterior coatings have been tested for holidays and lining thickness. Describe test results and repair procedures for each valve. Do not ship valves to project site until the reports have been returned by the Owner's Representative and marked "Resubmittal not required."
- F. For butterfly valves, show the clear diameter or size of the port. Show the actual area of the port as a percentage of the area as calculated for the nominal valve size.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- A. Valves are identified in the drawings by size, category and type number. For example, a callout in the drawings of 6" Type-1 butterfly valve refers to Type-1 valve in the butterfly valve category in these specifications, which is a Class 125 rubber seated butterfly valve.
- B. All valves installed in potable water applications shall conform to California Health and Safety Code, Section 11687 (commonly known as AB 1953) no-lead regulations and ANSI/NSF Standard 61 Annex G (ANSI/NSF 372).
- C. Install valves complete with operating handwheels or levers, chainwheels, extension stems, floor stands, gear actuators, operating nuts, chains, and wrenches required for operation.
- D. Valves shall have the name of the manufacturer and the size of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached plate.

### **2.2 VALVE ACTUATORS**

- A. Provide lever or wrench actuators for exposed valves 6-inches and smaller. For larger valves, provide handwheels.
- B. Where manually operated valves (size 4-inches and larger) are installed with their centerlines more than 6 feet 9 inches above the floor, provide chainwheel and guide actuators.
- C. Provide 2-inch AWWA operating nuts for buried and submerged valves.
- D. Provide enclosed gear actuators on butterfly valves 8 inches and larger, unless electric motorized valve actuators are shown in the drawings. Gear actuators for valves 8 through 20 inches shall be of the worm and gear, or of the traveling nut type. Gear actuators for valves 24 inches and larger shall be of the worm and gear types. Gear actuators for motorized valves shall be of the worm and gear type, regardless of size.

- E. Provide gear actuators on gate valves 14-inches and larger, unless electric motorized valve actuators are shown in the drawings. Gear actuators shall be of the bevel or spur gear type. Provide grease case. Gearing shall comply with AWWA C500.
- F. Design gear actuators assuming that the differential pressure across the plug, gate, or disc is equal to the test pressure of the connecting piping and assuming a fluid velocity of 16 fps for valves in liquid service and 80 fps for valves in air or gas service and a line fluid temperature range of 33°F to 125°F unless otherwise required in the detailed valve specifications. Size actuators using a minimum safety factor of 1.5 for valves in open/close service and 2.0 in modulating service.
- G. Gear actuators shall be enclosed, oil lubricated, with seals provided on shafts to prevent entry of dirt and water into the actuator. Gear actuators for valves located above ground or in vaults and structures shall have handwheels. The actuators for valves in exposed service shall contain a dial indicating the position of the valve disc or plug. Gear actuators for buried or submerged valves shall have 2-inch-square AWWA operating nuts.
- H. For buried or submerged service or valves installed in buried vaults, provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed actuators designed for buried or submerged service.
- I. Traveling nut and worm and gear actuators shall be of the totally enclosed design so proportioned as to permit operation of the valve under full differential pressure rating of the valve with a maximum pull of 40 pounds on the handwheel or crank. Provide stop limiting devices in the actuators in the open and closed positions. Actuators shall be of the self-locking type to prevent the disc or plug from creeping. Design actuator components between the input and the stop-limiting devices to withstand without damage a pull of 200 pounds for handwheel or chainwheel actuators and an input torque of 300 foot-pounds for operating nuts when operating against the stop.
- J. Handwheel diameters for traveling nut actuators shall not exceed 8 inches for valves 12 inches and smaller and shall not exceed 12 inches for valves 20 inches and smaller.
- K. Design actuators on buried valves to produce the required torque on the operating nut with a maximum input of 150 foot-pounds.
- L. Valve actuators, handwheels, or levers shall open by turning counterclockwise.

### 2.3 *CAST IRON VALVE BOXES AND RISERS*

- A. Valve boxes shall be Christy G5 with Christy Iron Covers or equal unless otherwise shown on the Drawings.
- B. Risers shall be 8-inch nominal diameter PVC pipe conforming to AWWA C900.



## 2.4 INDICATOR POSTS

- A. Indicator posts for buried gate valves in fire protection service shall be UL listed, FM approved for use on valves of sizes 4 through 12 inches. Provide a target or sign visible through a window on both sides of the post that indicates the open or shut position of the gate valve. Working parts shall be fully enclosed for weather protection. Body shall be cast or ductile iron. Provide post extension if trench is deeper than can be served by manufacturer's standard post. Coat buried portion of indicator posts per Section 09 90 00, System No. 21. Products: Nibco NIP-1, Stockham Figure G-951, or equal.

## 2.5 EXTENSION STEMS FOR BURIED AND SUBMERGED VALVE ACTUATORS

- A. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover. Where the valve is submerged, provide operating extension stems to bring the operating nut to 6 inches above the water surface. Extension stems shall be Type 316 stainless steel, solid core, and shall be complete with 2-inch-square operating nut. The connections of the extension stems to the operating nuts and to the valves shall withstand without damage a pull of 300 foot-pounds.
- B. Extension stem diameters shall be as tabulated below:

Valve Size (inches)	Minimum Extension Stem Diameter (inches)
2	3/4
3, 4	7/8
6	1
8	1 1/8
10, 12	1 1/4
14	1 3/8
16, 18	1 1/2
20, 24, 30, 36	1 3/4
42, 48, 54	2

## 2.6 FLOOR STANDS, EXTENSION STEMS, AND EXTENSION STEM SUPPORT BRACKETS

- A. When required by the installations, provide floor stands and extension stems for operation of valves. Floor stands shall be of the nonrising stem, indicating type, complete with steel extension stems, couplings, handwheels, stem guide brackets, and special yoke attachments as required by the valves and recommended and supplied by the stand manufacturer. Floor stands shall be cast-iron base type: Clow,

Figure F-5515; Bingham and Taylor; Stockham; or equal. Handwheels shall turn counterclockwise to open the valves.

- B. Provide Type 316 stainless steel anchor bolts.
- C. Provide steel extension stems for valves in exposed service. Provide Type 316 stainless steel stems for valves in submerged service.
- D. Provide adjustable stem guide brackets for extension stems. The bracket shall allow valve stems to be set over a range of 2 to 36 inches from walls. Provide bushings drilled to accept up to 2-inch-diameter stems. Base, arm, and clamp shall be ductile iron. Coat ductile iron components with fusion-bonded epoxy per Section 09 90 00. Bushing shall be bronze (ASTM B584, Alloy C86400 or C83600). Bolts, nuts, screws, and washers (including wall anchor bolts) shall be Type 316 stainless steel. Provide slots in the bracket to accept 3/4-inch bolts for mounting the bracket to the wall. Products: Trumbull Industries, Inc., Adjustable Stem Guide or equal.

## 2.7 CHAINWHEELS AND GUIDES

- A. Chainwheels and guides shall be Clow Figure F-5680, DeZurik Series W or LWG, Stockham, or equal. Chainwheels and guides shall be galvanized iron or steel. Chains shall extend to within 4 feet of the operating floor. Chains shall be galvanized steel.

## 2.8 BOLTS AND NUTS FOR FLANGED VALVES

- A. Bolts and nuts for flanged valves shall be as described in Section 40 05 00.

## 2.9 GASKETS FOR FLANGES

- A. Gaskets for flanged end valves shall be as described in Section 40 05 00.

## 2.10 PAINTING AND COATING

- A. Coat metal valves located above ground or in vaults and structures the same as the adjacent piping. If the adjacent piping is not coated, then coat valves per Section 09 90 00. Apply the specified prime coat at the place of manufacture. Apply intermediate and finish coats in field.
- B. Coat buried metal valves at the place of manufacture per Section 09 90 00, System No. 7.
- C. Coat submerged metal valves, stem guides, extension stems, and bonnets at the place of manufacture per Section 09 90 00, System No. 1.
- D. Line the interior metal parts of metal valves 4 inches and larger, excluding seating areas and bronze and stainless steel pieces, per Section 09 90 00, System No. 1. Apply lining at the place of manufacture.
- E. Alternatively, line and coat valves with fusion-bonded epoxy.

- F. Coat floor stands per Section 09 90 00.
- G. Test the valve interior linings and exterior coatings at the factory with a low-voltage (22.5 to 80 volts, with approximately 80,000-ohm resistance) holiday detector, using a sponge saturated with a 0.5% sodium chloride solution. The lining shall be holiday free.
- H. Measure the thickness of the valve interior linings per Section 09 90 00. Repair areas having insufficient film thickness per Section 09 90 00

**2.11 PACKING, O-RINGS AND GASKETS**

- A. Unless otherwise stated in the detailed valve specifications, packing, O-rings, and gaskets shall be one of the following nonasbestos materials:
  - 1. Teflon.
  - 2. Kevlar aramid fiber.
  - 3. Acrylic or aramid fiber bound by nitrile. Products: Garlock "Bluegard," Klinger "Klingersil C4400," or equal.
  - 4. Buna-N (nitrile).

**2.12 RUBBER SEATS**

- A. Rubber seats shall be made of a rubber compound that is resistant to free chlorine and monochloramine concentrations up to 10 mg/L in the fluid conveyed.

**2.13 VALVES**

- A. Gate Valves:
  - 1. Type 1 – Aboveground Bronze Gate Valves 3 Inches and Smaller:

Aboveground gate valves, 1/4 through 3 inches, for water and air service shall be rising stem, solid wedge disc type. Materials of construction shall be as follows:

<b>Component</b>	<b>Material</b>	<b>Specification</b>
Body and bonnet	Bronze	ASTM B61 or B62
Disc or wedge	Bronze	ASTM B61, B62, or B584 (Alloy C97600)
Stem	Bronze or copper silicon	ASTM B99 (Alloy 651), B584 (Alloy C87600), B371 (Alloy C69400)
Seat rings (Classes 200 and 300 only)	Stainless steel	AISI Type 410

Handwheels shall be aluminum, brass, or malleable iron. Packing shall be Teflon or Kevlar aramid fiber.

2. Type 2 – Aboveground Bronze Gate Valves 3 Inches and Smaller (Low Lead)

Aboveground gate valves, 1/4 through 3 inches, for water service shall be rising stem, screwed bonnet, solid wedge disc type, Class 200, having a minimum working pressure of 200 psi CWP at a temperature of 150°F and conforming to MSS SP-80. Materials of construction shall be as follows:

Component	Material	Specification
Body and bonnet, wedge	Bronze	ASTM B584, Alloy C87850, C89833, or C89836
Stem	Bronze or copper silicon	ASTM B99 (Alloy 651), B584 (Alloy C87600), B371 (Alloy C69400 or C69700)

Bronze alloys having a maximum lead content of 0.25%, a maximum zinc content of 7.0%, and a minimum copper content of 80% may be substituted for the bronze alloys specified above.

Handwheels shall be aluminum, brass, or malleable iron. Packing shall be Teflon or Kevlar aramid fiber. Valves shall be Nibco 113-LF or equal.

3. Type 3 - 2- and 3-Inch Cast-Iron Buried Gate Valves:

Buried gate valves of sizes 2 through 3 inches for water service shall be iron body, bronze mounted, nonrising stem type, double disc, parallel seat, and shall have a working pressure of at least 200 psi. Valves shall have flanged, PVC, or threaded ends to match the pipe ends. Valves shall have a 2-inch AWWA operating nut. Materials of construction shall be as follows:

Component	Material	Specification
Body, bonnet, operating nut, and stuffing box	Cast iron	ASTM A126, Class B or C
Bonnet bolts and stuffing box bolts	Stainless steel	ASTM A193, Grade B8M
Discs, disc nut, disc ring, and seat ring	Bronze	ASTM B62
O-ring	Synthetic rubber	
Stem	Copper silicon or manganese bronze	ASTM B584, Alloy C87600

Valves shall be Kennedy Figure 597X or 561X, Mueller Gate Valves, Clow F-5070 or F-5085, or equal

4. Type 4—Ductile-Iron Resilient Wedge Tapping Gate Valves 4 Through 16 Inches (AWWA C515):

Valves shall comply with AWWA C515 and the following. Valves shall be of the bolted bonnet type with nonrising stems. Valve stems shall be Type 304 or 316 stainless steel or cast, forged, or rolled bronze. Stem nuts shall be made of solid bronze. Bronze for internal working parts, including stems, shall not contain more than 2% aluminum or more than 7% zinc. Bronze shall conform to ASTM B62 or ASTM B584 (Alloy C83600), except the stem bronze shall have a minimum tensile strength of 60,000 psi, a minimum yield strength of 30,000 psi, and a minimum of 10% elongation in 2 inches (ASTM B584 or B763, Alloy C87600 or C99500). Body bolts shall be Type 316 stainless steel. Ends shall be flanged, Class 125, ASME B16.1. One end shall have slotted bolt holes per AWWA C515, paragraph 4.4.1.3.4 to fit tapping machines.

Provide reduction thrust bearings above the stem collar. Stuffing boxes shall be O-ring seal type with two rings located in stem above thrust collar. Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

Valves shall be lined and coated at the place of manufacture with either fusion-bonded epoxy or heat-cured liquid epoxy. Minimum epoxy thickness shall be 8 mils.

Manufacturers: Clow, AVK, American Flow Control, Mueller, Waterous, Kennedy, or equal.

5. Type 5—Ductile-Iron Resilient Wedge Gate Valves 4 Through 36 Inches (AWWA C515):

Valves shall comply with AWWA C515 and the following. Valves shall be of the bolted-bonnet type with nonrising stems. Valve stems shall be Type 304 or 316 stainless steel or cast, forged, or rolled bronze. Provide operating nut for buried valves. Provide handwheel for exposed valves. Stem nuts shall be made of solid bronze. Bronze for internal working parts, including stems, shall not contain more than 2% aluminum or more than 7% zinc. Bronze shall conform to ASTM B62 or ASTM B584 (Alloy C83600), except the stem bronze shall have a minimum tensile strength of 60,000 psi, a minimum yield strength of 30,000 psi, and a minimum of 10% elongation in 2 inches (ASTM B584 or B763, Alloy C87600 or C99500). Body bolts shall be Type 316 stainless steel. End connections for exposed valves shall be flanged. End connections for buried valves shall be mechanical joint type.

Provide reduction thrust bearings above the stem collar. Stuffing boxes shall be O-ring seal type with two rings located in stem above thrust collar. Each

valve shall have a smooth unobstructed waterway free from any sediment pockets.

Valves shall be lined and coated at the place of manufacture with either fusion-bonded epoxy or heat-cured liquid epoxy. Minimum epoxy thickness shall be 8 mils.

Manufacturers: Clow, AVK, American Flow Control, Waterous, Kennedy, or equal.

**B. Butterfly Valves:**

**1. Thrust Bearings for Butterfly Valves:**

Provide thrust bearings to hold the valve disc in the center of the valve seat. No bearings shall be mounted inside the valve body within the waterway. Do not use thrust bearings in which a metal bearing surface on the disc rubs in contact with an opposing metal surface on the inside of the body.

**2. Bronze Components in Butterfly Valves:**

Bronze components in contact with water shall comply with the following requirements:

<b>Constituent</b>	<b>Content</b>
Zinc	7% maximum
Aluminum	2% maximum
Lead	8% maximum 0.25% (potable use)
Copper + Nickel + Silicon	83% minimum

**3. Port Sizes for Butterfly Valves:**

For valves 24 inches and smaller, the actual port diameter shall be at least 93% of the nominal valve size. For valves larger than 24 inches, the port diameter shall not be more than 1.25 inches smaller than the nominal valve size. The dimension of the port diameter shall be the clear waterway diameter plus the thickness of the rubber seat.

**4. Corrosion-Resistant Materials in Butterfly Valves:**

Where AWWA C504 requires "corrosion resistant" material, such material shall be one of the following:

- a. Bronze as described above.
- b. Type 304 or 316 stainless steel.

- c. Monel (UNS N04400).
- d. Synthetic nonmetallic material.

5. Seating Surfaces in Butterfly Valves:

Seating surfaces in valves having motorized actuators shall be stainless steel or nickel-copper per AWWA C504 or nickel-chromium alloy containing a minimum of 72% nickel and a minimum of 14% chromium.

6. Factory Leakage Testing:

Perform factory leakage tests per AWWA C504 on both sides of the seat.

7. Type 1—Flanged, Rubber-Seated Butterfly Valves 4 Through 72 Inches, Class 150B:

Butterfly valves shall be short body, flanged type for exposed valves and valves in vaults or structures, and either flanged or mechanical joint for buried valves. Valve shall conform to AWWA C504, Class 150B. Minimum working differential pressure across the valve disc shall be 150 psi. Flanged ends shall be Class 125, ASME B16.1. Valve shafts shall be stub shaft or one-piece units extending completely through the valve disc. Materials of construction shall be as follows:

Component	Material	Specification
Body	Cast iron or ductile iron	AWWA C504
Exposed body cap screws and bolts and nuts	Stainless steel	ASTM A276, Type 304 or 316
Discs	Cast iron, ductile iron, or Ni-Resist	AWWA C504
Shafts, disc fasteners, seat retention segments, and seat fastening devices	Stainless steel	ASTM A276, Type 304 or 316
Seat material	Buna-N	—

Where the rubber seat is applied to the disc, it shall be bonded to a stainless steel seat retaining ring which is clamped to the disc by Type 304 or 316 stainless steel screw fasteners or secured to a stainless steel seat by a combination of cap screws, a serrated disc retaining ring, and molded shoulders in the seat mating with machined registers in the disc. Valves shall be Pratt, DeZurik Series BAW, M&H, Val-Matic, or equal.

8. Type 2—Not Used.

9. Type 3—Flanged, Rubber-Seated Butterfly Valves 4 Through 48 Inches, Class 250:

Butterfly valves shall be short body, flanged type for exposed valves and valves in vaults or structures, and either flanged or mechanical joint for buried valves. Valve shall conform to AWWA C504, Class 250. Minimum working pressure across the valve disc shall be 250 psi. Flanged ends shall be Class 250, ASME B16.1, with bolt hole drilling and bolt circle to match AWWA C207. Mechanical joint ends shall comply with AWWA C111. Provide the specified end connections on each end of the valve. Minimum working differential pressure across the valve disc shall be 250 psi in either direction. Valve shafts shall be stub shaft or one-piece units extending completely through the valve disc. Where the rubber seat is applied to the disc, it shall be bonded to a stainless steel seat retaining ring which is clamped to the disc by Type 304 or 316 stainless steel screw fasteners or secured to a stainless steel seat by a combination of cap screws, a serrated disc retaining ring, and molded shoulders in the seat mating with machined registers in the disc. Materials of construction shall be as follows:

Component	Material	Specification
Body	Cast iron or Ductile iron	AWWA C504
Exposed body cap screws and bolts and nuts	Stainless steel	ASTM A276, Type 304 or 316
Shaft	Stainless steel	ASTM A564, Grade S17400
Disc	Cast iron or ductile iron	AWWA C504
Disc fasteners, seat retainer segments, and seat fasteners	Stainless steel	ASTM A276, Type 304 or 316
Seat material	Buna-N	—

Valves shall be Pratt, DeZurik, M&H, Val-Matic, or equal.

10. Type 4—Wafer Style, Rubber-Seated Butterfly Valves 2 Through 3 Inches, Class 200:

Valves of sizes 2, 2 1/2, and 3 inches shall have a resilient seat mounted in the body with replaceable O-ring flange seals. The seat lining shall extend across the entire length of the body. Body design shall be of the wafer type for installation between two ASME B16.5, Class 150 weldneck flanges or two ASME B16.1, Class 125 cast-iron flanges. Materials of construction shall be as follows:



Component	Material	Specification
Body	Ductile iron	ASTM A395, Grade 60-40-18
	Ductile iron	ASTM A395, Grade 60-40-18
Shaft	Alloy steel	ASTM A564, Alloy S17400
	Stainless steel	ASTM A276, Type 316
Seat	Buna-N	—
O-rings	Buna-N	—

Pressure rating shall be at least 200 psi at a temperature of -30°F to +250°F. Valves shall be Norris R-200 or equal.

C. Ball Valves:

1. Type 1—Full Port Threaded Bronze Ball Valves 2 Inches and Smaller (Non-Potable Service):

Ball valves, 2 inches and smaller, for air or water service shall have a pressure rating of at least 600 psi WOG at a temperature of 100°F. Provide full port ball and body design. Valves shall comply with MSS SP-110. Provide bronze (ASTM B62 or ASTM B584, Alloy C83600 or C84400) body and plug ball retainer. Ball and stem shall be Type 316 stainless steel. Valves shall have threaded ends (ASME B1.20.1), nonblowout stems, reinforced Teflon seats, and have plastic-coated lever actuators. Valves shall be Stockham T-285 Series, Apollo 77C-140 Series, or equal.

2. Type 2—Full Port Threaded Bronze Ball Valves 2 Inches and Smaller (Low Lead):

Ball valves, 2 inches and smaller, for water service shall have a pressure rating of at least 600 psi WOG at a temperature of 100°F. Provide full port ball and body design. Valves shall comply with MSS SP-110. Materials of construction shall be as follows:

Component	Material	Specification
Body	Bronze	ASTM B584, Alloy C89836
Ball	Bronze	ASTM B584, Alloy C89836 or Alloy C27450, chromium plated
Ball retainer	Bronze	ASTM B584, Alloy C89836 or ASTM B371, Alloy C69430
Stem	Bronze	Alloy C27450
Seats	Reinforced Teflon	—

Bronze alloys having a maximum lead content of 0.25%, a maximum zinc content of 7.0%, and a minimum copper content of 80% may be substituted for the bronze alloys specified above. Valves shall have threaded ends (ASME B1.20.1), nonblowout stems, and have plastic-coated lever actuators.

Valves shall be Apollo 77CLF Series or equal.

3. Type 3—Bronze Ball Valve Curb Stops, 2 Inches and Smaller, for Water Service:

Ball valve curb stops shall be bronze with male inlet iron pipe threads and female outlet iron pipe threads and shall conform to AWWA C800. Components in contact with water shall be bronze (ASTM B584, Alloys C89833 or C89836). Components not in contact with water shall be bronze (ASTM B62 or ASTM B584, Alloys C83600, C89833, or C89836). Bronze alloys having a maximum lead content of 0.25%, a maximum zinc content of 7.0%, and a minimum copper content of 80% may be substituted for the bronze alloys specified above. Minimum pressure rating shall be 300 psi. Stops shall be Ford Ball Valve Curb Stop B81-777 with straight lever handle or equal.

4. Type 4—Bronze Ball/Corporation Stops, 2 Inches and Smaller, for Water Service:

Corporation stops shall be bronze with male inlet iron pipe threads and female outlet iron pipe threads and shall conform to AWWA C800. Components in contact with water shall be bronze (ASTM B584, Alloys C89833 or C89836). Components not in contact with water shall be bronze (ASTM B62 or ASTM B584, Alloys C83600, C89833, or C89836). Bronze alloys having a maximum lead content of 0.25%, a maximum zinc content of 7.0%, and a minimum copper content of 80% may be substituted for the bronze alloys specified above. Minimum pressure rating shall be 300 psi. Stops shall be Ford Ballcorp Type FB 1700, James Jones J-1931, or equal.

5. Type 5—Bronze Angle Meter Stops for Water Service:

Angle meter stops shall be bronze. Components in contact with water shall be bronze (ASTM B584, Alloys C89833 or C89836). Components not in contact with water shall be bronze (ASTM B62 or ASTM B584, Alloys C83600, C89833, or C89836). Bronze alloys having a maximum lead content of 0.25%, a maximum zinc content of 7.0%, and a minimum copper content of 80% may be substituted for the bronze alloys specified above. Minimum pressure rating shall be 150 psi.

For 1-inch service and smaller, use Ford Ball Meter Valve No. BA13-444W, James Jones J-1966W, or equal. Provide valve with inlet iron pipe threads and meter saddle nut outlet.

For larger than 1- through 2-inch service, use Ford Ball Meter Valve No. BFA13-666W or BFA13-777W or equal. Provide valve with inlet iron pipe threads and meter flange outlet.

6. Type 6—True Union CPVC Ball Valves:

Ball valves, 2 inches and smaller, for chemical or water service shall be Schedule 80 full bore design, true union type. Where used in potable water service, the valve shall be ANSI/NSF-61 certified. Valves shall be constructed from CPVC Type IV, ASTM D 1784 Cell Classification 23447 and rated for a pressure of 150 psi at a temperature of 105°F and 235 psi at a temperature of 73°F. All O-rings shall be EPDM or FKM as required for the compatibility with the chemical service and seats shall be constructed of PTFE. All valve components shall be replaceable. Valves for sodium hypochlorite and hydrogen peroxide service shall include vented balls. Valves shall be manufactured by Spears Manufacturing, Asahi, Plast-O-Matic, Harrington or equal.

7. Type 7—True Union PVC Ball Valves:

Ball valves, 3 inches and smaller, for chemical or water service shall be Schedule 80 full bore design, true union type. Where used in potable water service, the valve shall be ANSI/NSF-61 certified. Valves shall be constructed from PVC Type I, ASTM D 1784 Cell Classification 12454 and rated for a pressure of 150 psi at a temperature of 105°F and 235 psi at a temperature of 73°F. All O-rings shall be EPDM or FKM as required for the compatibility with the chemical service and seats shall be constructed of PTFE. All valve components shall be replaceable. Valves for sodium hypochlorite and hydrogen peroxide service shall include vented balls. Valves shall be manufactured by Spears Manufacturing, Asahi, Plast-O-Matic, Harrington or equal.

D. Globe Valves, Angle Valves, Hose Valves, Hose Bibbs, and Fire Hydrants:

1. Type 1—Bronze Globe Valves 2 Inches and Smaller:

Globe valves, 2 inches and smaller, shall be all bronze (ASTM B62 or ASTM B584, Alloy C83600) with screwed ends, union bonnet, inside screw, rising stem, and composition or PTFE disc. Valves shall have a pressure rating of at least 300 psi at a temperature of 150°F. Stem shall be bronze: ASTM B371 (Alloy C69400), ASTM B99 (Alloy C65100), or ASTM B584 (Alloy C87600). Valves shall be Crane No. 7TF, Walworth Figure 3095, Stockham B-22T, or equal.

2. Type 2—Bronze Angle Hose Valves (1 1/2 and 2 1/2 inches):

Angle-type hose valves of sizes 1 1/2 and 2 1/2 inches shall be brass or bronze (ASTM B62 or ASTM B584, Alloy C83600) body with rising or nonrising stem, composition disc, and bronze or malleable iron handwheel. Stem shall be bronze, ASTM B62, ASTM B584 (Alloy C83600), or ASTM

B198 (Alloy C87600). Valves shall have a cold-water service pressure rating of at least 150 psi. Provide cap and chain with valve. Threads on the valve outlet shall be American National Standard fire hose coupling screw thread. Valves shall be Powell Figure 151 with Figure 527 nipple adapter, Crane 17TF with hose nipple adapter, or equal.

3. Type 3—Brass or Bronze Angle Hose Valves 1 1/2 and 2 1/2 Inches (UL Listed):

Angle-type hose valves of sizes 1 1/2 and 2 1/2 inches shall be UL approved complying with UL 668, cast or forged brass or bronze, with handwheel. Inlet threads shall be female NPT. Outlet hose threads shall be male national standard fire hose (MNST). Minimum pressure rating shall be 300 psi. Provide caps with chains for the outlet. Products: Fire Protection Products, Inc. Series 07, National Fire Equipment, Guardian Fire Equipment Model 5000, NIBCO T-331-HC, American Fire Hose and Cabinet Series 400, or equal.

4. Type 4—Bronze Hose Bibbs:

Hose bibbs of size 1/2 inch, 3/4 inch, and 1 inch shall be all bronze (ASTM B62 or ASTM B584, Alloy C83600) with rising or nonrising stem, composition disc, bronze or malleable iron handwheel, and bronze stem (ASTM B99, Alloy C65100; ASTM B371, Alloy C69400; or ASTM B584, Alloy C87600). Packing shall be Teflon or graphite. Valves shall have a pressure rating of at least 125 psi for cold-water service. Threads on valve outlet shall be American National Standard fire hose coupling screw thread (ASME B1.20.7). Provide atmospheric vacuum breaker conforming to ASSE Standard 1011 and IAPMO code.

E. Plug Valves:

1. Type 1 – Eccentric Plug Valves 2-1/2 through 20 inches:

Eccentric plug valves shall be of the non-lubricated eccentric type with cast iron bodies, resilient faced plugs, or shall include replaceable, resilient seat in the body. Except as otherwise indicated, all valves for sizes 4-inch and larger shall have worm gear operators, nickel or stainless steel seats, and ANSI 125 psi flanged or grooved ends. Valves 2-1/2 inches and smaller shall have operating levers, nickel or stainless steel seats, and threaded ends with resilient facing suitable for the intended service. Submerged and buried valves shall be equipped with worm-gear operators, lubricated and sealed to prevent entry of dirt and water into the operator. Shaft bearings shall be stainless steel furnished with permanently-lubricated bearing surfaces. Operators shall clearly indicate valve position. Valves up to and including 20 inches in size shall have an unobstructed port area of not less than 80 percent of full pipe area, and not less than 70 percent for larger valves. Eccentric plug valves shall have a pressure rating of not less than 150 psi water, oil, or gas (WOG) service and bubble-tight shut-off. Valves shall be coated per Section 09 90 00 System 7 or with fusion bonded epoxy.

F. Check Valves:

1. Type 1—Bronze Check Valves 3 Inches and Smaller:

Check valves 3 inches and smaller shall be wye pattern, bronze, ASTM B61, B62, or B584 (Alloy C83600). Ends shall be female threaded, ASME B1.20.1. Disc shall be bronze, swing type.

Check valves 3 inches and smaller shall be Class 125, wye pattern, horizontal swing, conforming to MSS SP-80. Ends shall be female threaded, ASME B1.20.1. Minimum working pressure shall be 200 psi CWP at a temperature of 150°F. Materials of construction shall be as follows:

Component	Material	Specification
Body, bonnet, disc hanger	Bronze	ASTM B584, Alloy C87850
Hinge pin, hanger nut, seat disc nut, seat disc washer	Stainless steel	Type 304 or 316
Disc holder	Bronze	UNS C69300 or C87850
Seat disc	PTFE	—

Bronze alloys having a maximum lead content of 0.25%, a maximum zinc content of 7.0%, and a minimum copper content of 80% may be substituted for the bronze alloys specified above. Valves shall be Nibco T-413-Y-LF or equal.

2. Type 3—Bronze Check Valves 2 Inches and Smaller for Reciprocating Air Compressors:

Check valves 2 inches and smaller shall be Class 300, bronze, ASTM B61. Ends shall be female threaded ASME B1.20.1. Disc shall be Type 420 stainless steel or bronze (ASTM B61). Minimum pressure rating shall be 250 psi at 150°F. The disc shall provide air cushioning action of the compressor. Provide a disc guide to prevent cocking of the disc. The caps shall anchor the disc guide in alignment with disc travel. The bodies shall have pipe threads and clearances at ends of threads sufficient to permit tight pipe connections, precluding the possibility of pipe ends jamming against diaphragms, distorting seats, or choking the flow. Valves shall be Midwest Control Devices Series MCCB, Lunkenheimer Figure 1616, or equal.

3. Type 4—Cast-Iron Swing Check Valves 3 Inches and Larger, Class 125:

Swing check valves, 3 inches and larger, shall be iron body, bronze mounted complying with AWWA C508 with the following materials of construction.

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Description	Material	Specification
Disc or clapper seat ring and valve body seat ring	Bronze or brass	ASTM B62 or B584 (Alloy C84400 or C87600)
Body and cap (bonnet)	Cast iron	ASTM A126, Class B
Disc and hinge or arm (valves 4 inches and smaller)	Bronze	ASTM B62 or ASTM B584 (Alloy C84400)
Disc and hinge or arm (valves larger than 4 inches)	Cast iron or bronze	ASTM A126, Class B; ASTM B62.
Hinge pin	Stainless steel	Type 303, 304, or 410 stainless
Cover bolts and nuts	Stainless steel	ASTM A193, Grade B8M; ASTM A194, Grade 8M
Internal fasteners and accessories	Bronze or Type 304 or 316 stainless steel	

Bronze or brass components in contact with water shall comply with the following requirements:

Constituent	Content
Zinc	7% maximum
Aluminum	2% maximum
Lead	8% maximum 0.25% (potable use)
Copper + Nickel + Silicon	83% minimum

Ends shall be flanged, Class 125, ASME B16.1. Minimum valve working pressure shall be 150 psi. Provide check valves with outside lever.

The shop drawing submittal shall include a detail showing how the hinge pin extends through the valve body. Show packing gland, hinge pin gland, cap, and other pieces utilized.

Valves shall be M&H Style, Clow or equal.

4. Type 5—Cast-Iron Swing Check Valves 2 1/2 Inches and Larger for Fire Protection Service:

Swing check valves of sizes 2 1/2 through 12 inches for fire protection service shall be UL listed, FM approved, rated for at least 175 psi nonshock, cold

water. Ends shall be flanged, Class 125, ASME B16.1. Materials of construction shall be as follows:

Description	Material	Specification
Body and cap	Cast iron	ASTM A126, Class B
Disc	Bronze or cast iron	ASTM B62; ASTM B584, Alloy C83600; or ASTM A126, Class B
Disc bushing, disc ring, and seat ring	Bronze	ASTM B62, or ASTM B584 (Alloy C83600)
Hinge pin	Brass	ASTM B16 or ASTM B21

Valves shall be Stockham G-939, Walworth Figure 8883 F, Nibco F-908, or equal.

5. Type 6—Swing Check Valves 10 Through 66 Inches With Controlled Closing Using Bottom-Mounted Hydraulic Buffer:

Controlled closing swing check valves shall be iron body with the following materials of construction:

Description	Material	Specification
Disc or clapper seat ring	Buna-N	
Valve body seat ring	Aluminum bronze	ASTM B148
Body and cap (bonnet)	Cast iron	ASTM A126, Class B
Disc and hinge or arm	Ductile iron	ASTM A536
Shaft and hinge pin	Stainless steel	Type 303, 304, or 410
Cover bolts and nuts	Stainless steel	ASTM A193, Grade B8M; ASTM A194, Grade 8M
Buffer rod	Stainless steel	ASTM A582: Type 303, 304, or 410

Ends shall be flanged, Class 125, ASME B16.1. Minimum valve working pressure shall be 150 psi. Provide check valves with outside lever and weight.

The cushion swing check valve shall conform to AWWA C508. Provide integral flanges (not wafer). The body shall have a flush and drain hole. The seat shall be locked in place with stainless steel lock screws and be field replaced without the use of special tools. The shaft shall be one piece, extending through both sides of the body with a lever and weight mounted on each side. The disc shall utilize a double clevis hinge to prevent disc tipping and be connected to a disc arm. The disc arm assembly shall be suspended

from the shaft. The valve shall have a bottom hydraulic buffer to permit free open but positive nonslam control closure of the disc. The hydraulic buffer shall make contact with the disc during the last 10% of closure to instantly control the valve disc until shutoff. The last 10% of closure shall be externally adjustable and variable. The line media to the buffer must be separated by a combination pressure sensing, oil/water separator device to protect the buffer cylinder against corrosion from the main line media. The hydraulic buffer assembly shall be removable from valve without need to remove the entire valve from the pipeline.

Cylinders shall be of tie-rod or bolted-flange construction and shall have a pressure rating of 150 psi minimum, as determined by National Fluid Power Association Specification T3.6.8. Cylinder mounting dimensions shall comply with National Fluid Power Association Specification T3.6.8 regarding mounting and physical dimensions with slight modifications where required to adapt to the valve cylinder mounting. Construction materials shall incorporate a design factor of safety of 4:1 based on tensile strength.

Cylinder barrels, heads, and caps shall be AISI Type 304 or 316 stainless steel, or bronze. Bronze shall have the following chemical characteristics:

<b>Constituent</b>	<b>Content</b>
Zinc	7% maximum
Aluminum	2% maximum
Lead	8% maximum 0.25% (potable use)
Copper + Nickel + Silicon	83% minimum

The shop drawing submittal shall include a detail showing how the hinge pin extends through the valve body. Show packing gland, hinge pin gland, cap, and other pieces utilized.

Valve shall be APCO Series 6000B or equal.



6. Type 7—Cast-Iron Ball Check Valves, 3 Through 14 Inches, Class 125:

Valve shall consist of a body with a sinking-type hollow steel ball and flanged access port. Design shall be such that the fluid flow forces the ball into a receiving cavity in the valve. When the fluid flow stops, the ball shall fall out of the cavity into a rubber seat in the body to shut off flow. Valve shall be suitable for vertical upward or horizontal flow conditions. Body material shall be cast iron (ASTM A48 or A126) with 15-mil fusion bonded epoxy lining and coating per AWWA C550. Provide nitrile coating on ball. Provide Type 316 stainless steel fasteners. Flanges shall be Class 125 per ASME B16.1. Products: Flygt Corporation ball check valve, Flomatic Corporation Model 408, or equal.

7. Type 8—Slanting Disc Check Valves With Controlled Opening and Closing, Class 125:

Slanting disc check valves of sizes 6 through 60 inches shall have materials of construction as described below:

Component	Material	Specification
Body	Cast or ductile iron	ASTM A126, Class B or ASTM A536, Grade 65-45-12
Seat ring and disc ring	Bronze	See paragraph below
Pivot pins	Stainless steel	ASTM A582, Type 303 or 304
Bushings	Stainless steel	ASTM A269, Type 304 or 316
Oil reservoirs	Stainless steel	AISI Type 316

Bronze shall have the following chemical characteristics:

Constituent	Content
Zinc	7% maximum
Aluminum	2% maximum
Lead	8% maximum 0.25% (potable use)
Copper + Nickel + Silicon	83% minimum

Ends shall be flanged, ASME B16.1, Class 125. The body shall be of two-piece construction, bolted at the center to hold the seat at angle of 55 degrees. The area throughout the valve body shall equal the full pipe area.

Provide top-mounted hydraulic dashpot to control valve opening and closing. Dashpot shall have a control valve to adjust the speed of the opening and closing cycles. Time spreads shall be adjustable 5 to 30 seconds. Provide oil-filled dashpots to operate the opening and closing arrangement. The reservoir for the opening cycle shall contain pressurized air and shall have a 3-inch pressure gauge and pneumatic fill valve.

Provide oil-fitted bottom buffer to control valve closing (adjustable one to five seconds) over the last 10% of the closing range.

Valve shall be APCO Series 800, Val-Matic Series 9600 or 9800 or equal.

8. Type 9—Rubber Flapper Swing Check Valves (3 Through 24 Inches):

Valves shall consist of body, flapper, and bolted cover. Operating pressure shall be at least 175 psi at a temperature of 212°F. Valve seat shall be set at an angle of 35 to 45 degrees to the centerline of the pipe. Ends shall be flanged, ASME B16.1, Class 125. Body and cover shall be cast iron (ASTM A48, Class 30, or ASTM A126, Class B). Flapper shall consist of a steel disk insert and a steel bar hinge bonded to the metal pieces. Provide O-ring seal bonded onto the disk. Lining shall have a hardness of 50 to 60 durometer, Shore A. Cover bolts shall be Type 316 stainless steel.

Products: APCO Series 100R, Val-Matic Series 500, or equal.

9. Type 10—Duckbill-Shaped Check Valves, 1 Through 54 Inches, Class 125:

Valve shall consist of a contoured rubber body with a duckbill sleeve-type exit. The body entrance shall be round, with a connecting Class 125 ASME B16.1 rubber flange to match the connecting pipe. Provide synthetic fabric reinforcement. Provide stainless steel backing rings on the rubber body flanges. The valve shall open at a differential pressure of 2 inches of water column and shall close under a no-flow condition. Minimum body pressure rating shall be 50 psi. Maximum backpressure: 10 psi. Products: Red Valve Company "Tideflex" Model 35 or equal.

10. Type 11—Silent Check Valve 3 Inches and Larger:

Silent check valves, 3 inches and larger, shall be bronze mounted globe style. The seat and plug shall be hand replaceable in the field. Provide resilient seat. Flow area through valve shall be equal to or greater than the cross sectional area of the equivalent pipe size. Valve plug shall be center guided with a through integral shaft and spring loaded for silent shutoff operation. Ends shall be flanged. Materials of construction shall be as follows:

Component	Material	Specification
Body	Cast Iron	ASTM A48, Class 30, or ASTM A126, Class B
	Ductile Iron	ASTM A536, Grade 60-45-10
Plug and seal	Bronze	ASTM B62 or B584 (Alloys C83600 or C87600)
Spring	Stainless steel	Type 316 stainless

Valve shall be APCO Series 600 or equal.

11. Type 12 – CPVC Ball Check Valves

Valve bodies and balls shall be fabricated with chlorinated polyvinyl chloride (CPVC), or polyvinylidene fluoride (PVDF), as recommended by the manufacturer for the service indicated. Valves shall include unions with socket connections. Seals shall have Viton O-rings and valve design shall minimize possibility of the balls sticking or chattering. Valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F. Valves shall be manufactured by Spears Manufacturing, Asahi, Plast-O-Matic, Harrington or equal.

12. Type 13 – PVC Ball Check Valves

Valve bodies and balls shall be fabricated with polyvinyl chloride (PVC), or polyvinylidene fluoride (PVDF), as recommended by the manufacturer for the service indicated. Valves shall include unions with socket connections. Seals shall have Viton O-rings and valve design shall minimize possibility of the balls sticking or chattering. Valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F. Valves shall be manufactured by Spears Manufacturing, Asahi, Plast-O-Matic, Harrington or equal.

G. Solenoid Valves:

1. Design and construct solenoid valves such that they can be used in both horizontal and vertical piping.
2. Type 1—Metallic Solenoid Valves 1 1/2 Inches and Smaller:

Solenoid valves of sizes 1/4 through 1 1/2 inches for water and air service shall have forged brass (Alloy C23000) or bronze (ASTM B62) bodies with Teflon main seats. Internal plunger, core tube, plunger spring, and cage assembly shall be stainless steel (Types 302, 304, or 305). Valve actuators shall be 120-volt a-c. Seals shall be Teflon. Valves shall have a maximum operating pressure and a maximum differential pressure of 125 psi. Valves shall be ASCO "Redhat" ,Parker Hannifin "Skinner" or equal.

H. Mud Valves

1. Type 1—Mud Valves 4 Through 24 Inches:

Mud valves shall be rising stem with flanged end, unless otherwise shown in the drawings. Materials of construction shall be as follows:

Component	Material	Specification
Body	Cast iron	ASTM A48 or A126
Stem, nut, disc ring, and seat ring	Bronze	ASTM B62 or B584, Alloy C83600
Extension stem	Stainless steel	AISI Type 316

Provide extension stem, stem guides, and AWWA operating nut. Mud valves shall be Clow Figure F-3088, Waterman Industries, or equal.

I. Flap Valves

1. Type 1—Flap Valves:

Flap valves shall have cast-iron body (ASTM A48 or A126) with bronze (ASTM B62) hinge pin, flap ring, and seat. Ends shall be flanged, spigot end, or hub to match the connecting pipe. Products: Clow F-3012, F-3014, F-3016; Waterous Flap Valves; Waterman Industries; or equal.

## PART 3 EXECUTION

### 3.1 VALVE SHIPMENT AND STORAGE

- A. Provide flanged openings with metal closures at least 3/16-inch thick, with elastomer gaskets and at least four full-diameter bolts. Install closures at the place of valve manufacture prior to shipping. For studed openings, use all the nuts needed for the intended service to secure closures. Alternatively, ship flanged valves 3 inches and smaller in separate sealed cartons or boxes.
- B. Provide threaded openings with steel caps or solid-shank steel plugs. Do not use nonmetallic (such as plastic) plugs or caps. Install caps or plugs at the place of valve manufacture prior to shipping. Alternatively, ship valves having threaded openings or end connections in separate sealed cartons or boxes.
- C. Store resilient seated valves in sealed polyethylene plastic enclosures with a minimum of one package of desiccant inside. Store resilient seated valves in the open or unseated position. Valves with adjustable packing glands shall have the packing gland loosened prior to storage. Inspect valves at least once per week, replace desiccant if required and repair damaged storage enclosures. Do not store valves with resilient seats near electric motors or other electrical equipment.

- D. Inspect valves on receipt for damage in shipment and conformance with quantity and description on the shipping notice and order. Unload valves carefully to the ground without dropping. Use forklifts or slings under skids. Do not lift valves with slings or chain around operating shaft, actuator, or through waterway. Lift valves with eyebolts or rods through flange holes or chain hooks at ends of valve parts.
- E. Protect the valve and actuators from weather and the accumulation of dirt, rocks, and debris. Do not expose rubber seats to sunlight or ozone for more than 30 days. Also, see the manufacturer's specific storage instructions.
- F. Make sure flange faces, joint sealing surfaces, body seats, and disc seats are clean. Check the bolting attaching the actuator to the valve for loosening in transit and handling. If loose, tighten firmly. Open and close valves having manual or power actuators to make sure the valve operates properly and that stops or limit switches are correctly set so that the valve seats fully. Close valve before installing.

### 3.2 *FACTORY PRESSURE TESTING*

- A. Hydrostatically test the valve pressure-containing parts at the factory per the valve specification or per the referenced standard. If no testing requirement is otherwise specified or described in the referenced standards, then test with water for 30 minutes minimum at a pressure of 1.5 times the rated pressure but not less than 20 psig. Test shall show zero leakage. If leaks are observed, repair the valve and retest. If dismantling is necessary to correct valve deficiencies, then provide an additional operational test and verify that the valve components function.

### 3.3 *INSTALLING VALVES - GENERAL*

- A. Remove covers over flanged openings and plugs from threaded openings, after valves have been placed at the point to which the valves will be connected to the adjacent piping. Do not remove valves from storage cartons or boxes until they are ready to be installed.
- B. Handle valves carefully when positioning, avoiding contact or impact with other equipment, vault or building walls, or trench walls.
- C. Clean valve interiors and adjacent piping of foreign material prior to making up valve to pipe joint connection. Prepare pipe ends and install valves in accordance with the pipe manufacturer's instructions for the joint used. Do not deflect pipe-valve joint. Do not use a valve as a jack to pull pipe into alignment. The installation procedure shall not result in bending of the valve/pipe connection with pipe loading.
- D. Make sure valve ends and seats are clean. Check exposed bolting for loosening in transit and handling and tighten to manufacturer's recommendations. Open and close the valve to make sure it operates properly and that stops or limit switches are correctly set so that the vane, ball, gate, needle, diaphragm, disc, plug, or other seating element seats fully. Close the valve before installing. Check coatings for damage and repair. Handle valves carefully when positioning, avoiding contact or impact with other equipment or structures

- E. Prior to assembly, coat threaded portions of stainless steel bolts and nuts with lubricant.

### 3.4 *INSTALLING EXPOSED VALVES*

- A. Unless otherwise indicated in the drawings, install valves in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above the floor with their operating stems vertical. Install valves in horizontal runs of pipe having centerline elevations between 4 feet 6 inches and 6 feet 9 inches above the floor with their operating stems horizontal.
- B. Install valves on vertical runs of pipe that are next to walls with their stems horizontal, away from the wall. Valves on vertical runs of pipe that are not located next to walls shall be installed with their stems horizontal, oriented to facilitate valve operation.

### 3.5 *INSTALLING BURIED VALVES*

- A. Connect the valve, coat the flanges and place and compact the backfill to the height of the valve stem.
- B. Connect the valve, coat the flanges, apply polyethylene encasement, and place and compact the backfill to the height of the valve stem.
- C. Place block pads under the riser pipe to maintain the valve box vertical during backfilling and repaving and to prevent the riser pipe from contacting the valve bonnet.
- D. Secure the riser pipe with backfill and compact. Install the valve box and pour the concrete collar. In pavement areas pour the collar to 2 inches below the finished pavement grade to allow asphalt concrete to be placed over the collar. In non-paved areas, place the collar to the top of the valve box.

### 3.6 *FIELD COATING BURIED VALVES*

- A. Coat flanges of buried valves and the flanges of the adjacent piping, and the bolts and nuts of flanges and mechanical joints, per Section 09 90 00, System No. 24.
- B. Wrap buried metal valves 6 inches and in two layers of polyethylene conforming to AWWA C105, 8 mils in thickness each. Pass the two sheets of polyethylene under the valve and the coated flanges or joints with the connecting pipe and draw the sheets around the valve body, the valve bonnet, and the connecting pipe. Secure the sheets with plastic adhesive tape about the valve stem below the operating nut and about the barrel of the connecting pipe to prevent the entrance of soil. Fold overlaps twice and tape. Backfill the valve with care to avoid damaging the polyethylene.

### 3.7 *ASSEMBLING JOINTS*

- A. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate

threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseal or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

- B. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

### 3.8 *INSTALLING EXTENSION STEM GUIDE BRACKETS*

- A. Install at 6 to 8-foot centers. Provide at least two support brackets for stems longer than 10 feet, with one support near the bottom of the stem and one near the top.

### 3.9 *MOUNTING GEAR ACTUATORS*

- A. The valve manufacturer shall select and mount the gear actuator and accessories on each valve and stroke the valve from fully open to fully closed prior to shipment.

### 3.10 *FIELD INSTALLATION OF GEAR ACTUATOR*

- A. Provide the actuator manufacturer's recommended lubricating oil in each actuator before commencing the field testing.

### 3.11 *VALVE FIELD TESTING*

- A. Test valves for leakage at the same time that the connecting pipelines are hydrostatically tested. See Section 40 05 00 for pressure testing requirements. Protect or isolate any parts of valves, actuators, or control and instrumentation systems whose pressure rating is less than the pressure test. Valves shall show zero leakage. Repair or replace any leaking valves and retest.
- B. Operate manual valves through three full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. Do not backfill buried valves until after verifying that valves operate from full open to full closed. If valves stick or bind, or do not operate from full open to full closed, repair or replace the valve and repeat the tests.
- C. Gear actuators shall operate valves from full open to full close through three cycles without binding or sticking. The pull required to operate handwheel- or chainwheel-operated valves shall not exceed 40 pounds. The torque required to operate valves having 2-inch AWWA nuts shall not exceed 150 ft-lbs. If actuators stick or bind or if pulling forces and torques exceed the values stated previously, repair or replace the actuators and repeat the tests. Operators shall be fully lubricated in accordance with the manufacturer's recommendations prior to operating.

**END OF SECTION**

## **SECTION 40 05 60**

### **AIR-RELEASE AND VACUUM-RELIEF VALVES**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. This section includes materials and installation of combination air-release valves.

##### **1.2 RELATED WORK**

- A. Section 09 90 00 – Painting and Coating
- B. Section 33 13 00 – Disinfection of Water Distribution System
- C. Section 40 05 00 – Piping and Fittings

##### **1.3 REFERENCES**

- A. American Society of Mechanical Engineers (ASME)
- B. American Society for Testing and Materials (ASTM)
- C. American Water Works Association (AWWA)
- D. Food and Drug Administration (FDA)
- E. National Electrical Manufacturers Association (NEMA)
- F. Occupational Safety & Health Administration (OSHA)

##### **1.4 SUBMITTALS**

- A. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.
- B. Submit manufacturer's catalog data and detail drawings showing all valve parts and described by material of construction, specification (such as AISI, ASTM, SAE, or CDA), and grade or type. Show linings and coatings.

#### **PART 2 PRODUCTS**

##### **2.1 VALVE IDENTIFICATION**

- A. Valves are identified in the drawings by size, category and type number. For example, a callout in the drawings of a 3/4" Type 1 Air Release Valve refers to a Type 1 Air Release Valve in these specifications, which is a 150-psi 3/4" or smaller air-release valve.



## 2.2 *BOLTS, NUTS, AND GASKETS FOR FLANGED VALVES*

- A. See Section 40 05 00 and specification for the pipe to which the valve is attached.

## 2.3 *VALVE DESIGN-AND OPERATION*

- A. Valve design shall comply with AWWA C512, except as modified herein. Class 150 valves shall have a maximum working pressure of at least 150 psi.
- B. Air-Release Valves for Water Service:
  - 1. Air-release valves for water service 3/4 inch and smaller shall be of the direct-acting type or lever type. Valves larger than 3/4 inch shall have a float-actuated compound lever with linkage mechanism to release air.
  - 2. Air-release valves of sizes 1 and 2 inches shall incorporate a body with flanged top cover and replaceable orifice and a synthetic rubber needle or disc actuated by the float and linkage mechanism. Top cover shall include a 1/2-inch threaded port with bronze plug. Body shall include a 1/2-inch threaded drain port near the bottom with a bronze plug.
- C. Combination air valves 3 inches and smaller shall have a float with lever arm to actuate a poppet valve. A needle shall be attached to the float arm. The poppet valve shall serve to admit large quantities of air when the pipeline drains. The needle shall serve to release small quantities of air as the pipeline fills or as air accumulates in the pipeline.
- D. Combination air valves 4 inches and larger for water service shall consist of an air and vacuum valve with an air-release valve attached to it or integral with it. Connect the attached air-release valve to the air and vacuum valve with standard weight steel piping (ASME B36.10) and an isolation valve if required.

## 2.4 *MATERIALS OF CONSTRUCTION*

- A. Materials of construction for combination air valves for water service shall be as follows:

Item	Material	Specification
Body and cover	Cast iron	ASTM A48, Class 35; or ASTM A126, Class B
Float, lever or linkage, air-release mechanism, poppet, guide rod, guide bushings, fasteners, other internal metal parts	Stainless steel	AISI Type 304
Plugs	Bronze	See paragraph E below
Seat, plunger, needle	Buna-N	—

- B. Rubber seats shall be made of a rubber compound that is resistant to free chlorine and monochloramine concentrations up to 10 mg/L in the fluid conveyed.
- C. Body and cover bolts, nuts, and cap screws shall be carbon steel, ASTM A307.

## 2.5 VALVE END CONNECTIONS

- A. Valves 3 inches and smaller shall have threaded ends. Valves 4 inches and larger shall have flanged ends.
- B. Flanges for Class 150 valves shall comply with ASME B16.1, Class 125. Threaded ends shall comply with ASME B1.20.1.

## 2.6 VALVES

### A. Combination Air Valves

1. Type 1--Combination Air Valves, 1 Through 4 Inches, Class 150: Unless otherwise noted on the plans, the minimum orifice size for the air-release valve shall be 5/64 inch. Combination air-release valves shall be APCO Series 143C, Val-Matic Model 201C Series or equal.
2. Type 2--Slow-Closing Combination Air Valves, 4 Through 16 Inches, Class 150: Unless otherwise noted on the plans, the minimum orifice size for air-release valve shall be 1/4 or 3/16 inch. Combination air-release valves shall be APCO Series 1700, Val-Matic Surge Suppression Dual Body Air Valves, or equal.
3. Type 3--Sewage Combination Air Valves, 1 Through 4 Inches, Class 150: Valve system shall allow unrestricted venting or reentry of air during filling or draining of pipelines and to vent small pockets of air which collect in the pipeline. Valve shall seat to prevent sewage from leaking through the valve at any pressure. Valves shall be APCO Series 440 or equal.

### **PART 3 EXECUTION**

#### **3.1 SERVICE CONDITIONS**

- A. Valves shall seat driptight at the specified seating pressure.

#### **3.2 FACTORY TESTING**

- A. Test each valve per AWWA C512, Section 5 and the following.
- B. Hydrostatically test the pressure-containing parts at the factory with water for 30 minutes minimum at a pressure of 1.5 times the rated pressure but not less than 20 psig. Test shall show zero leakage. If leaks are observed, repair the valve and retest. If dismantling is necessary to correct valve deficiencies, provide an additional operational test per AWWA C512, Section 5 for each affected valve.
- C. The chloride content of liquids used to test austenitic stainless-steel materials shall not exceed 50 ppm. To prevent deposition of chlorides as a result of evaporative drying, remove residual liquid from tested parts at the conclusion of the test.

#### **3.3 PAINTING AND COATING**

- A. Coat cast-iron valves the same as the adjacent piping. If the adjacent piping is not coated, then coat per Section 09 90 00. Apply the specified prime and intermediate coats at the place of manufacture. Finish coat shall match the color of the adjacent piping.
- B. Coat interior surfaces of cast-iron valves at the place of manufacture per Section 09 90 00. Do not coat seating areas and plastic, bronze, stainless steel, or other high alloy parts.
- C. Alternatively, line and coat valves with fusion-bonded epoxy. Do not coat seating areas and plastic, bronze, stainless steel, or other high alloy parts.

#### **3.4 SHIPMENT AND STORAGE**

- A. Identify the equipment with item and serial numbers and pipeline station. Material shipped separately shall be identified with securely affixed, corrosion-resistant metal tags indicating the item and serial number and project equipment pipeline station or the equipment for which it is intended. In addition, ship crated equipment with duplicate packing lists, one inside and one on the outside of the shipping container.
- B. Pack and ship one copy of the manufacturer's standard installation instructions with the equipment. Provide the instructions necessary to preserve the integrity of the storage preparation after the equipment arrives at the jobsite and before start-up.
- C. Provide flanged openings with metal closures at least 3/16-inch thick, with elastomer gaskets and at least four full-diameter bolts. Provide closures at the place of pump manufacture prior to shipping. For studed openings, use all the nuts needed for the intended service to secure closures.

- D. Provide threaded openings with steel caps or solid-shank steel plugs. Do not use nonmetallic (such as plastic) plugs or caps. Provide caps or plugs at the place of pump manufacture prior to shipping.
- E. Clearly identify lifting points and lifting lugs on the valves. Identify the recommended lifting arrangement on boxed equipment.

### 3.5 *INSTALLATION*

- A. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseal or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.
- B. Clean threaded joints by wire brushing or swabbing. Apply Teflon® joint compound or Teflon® tape to pipe threads before installing threaded valves. Joints shall be watertight.
- C. Do not use duct tape and plastic for covering the ends of pipe flanges. Use a solid metal cover with rubber gasket to cover flange openings during installation. These metal covers shall remain in place until the piping is connected to the valves.
- D. Do not spring flanges of connecting piping into position. Separately work connecting piping systems into position to bring the piping flanges into alignment with the matching valve flanges. Do not move valves to achieve piping alignment. Do not use electrical heating stress relieving to achieve piping alignment.
- E. Line up pipe flange bolt holes with valve nozzle bolt holes within 1/16 inch maximum offset from the center of the bolt hole to permit insertion of bolts without applying any external force to the piping.
- F. Flange face separation shall be within the gasket spacing  $\pm 1/16$  inch. Use only one gasket per flanged connection.

### 3.6 *VALVE FIELD PRESSURE TESTING*

- A. Test valves at the same time that the connecting pipelines are pressure tested. See Section 40 05 00 – Pipe and Fittings for pressure testing requirements. Protect or isolate any parts of valves, operators, or control and instrumentation systems whose pressure rating is less than the test pressure.

**END OF SECTION**

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# **Federal Requirements**



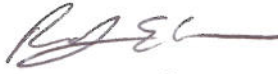
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WASHINGTON, D.C. 20460

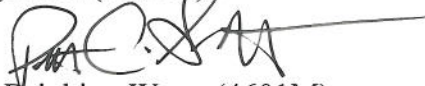
MAR 20 2014

OFFICE OF WATER

**MEMORANDUM**

SUBJECT: Implementation of American Iron and Steel provisions of P.L. 113-76,  
Consolidated Appropriations Act, 2014

FROM: For Andrew D. Sawyers, Director   
Office of Wastewater Management (4201M)

Peter C. Grevatt, Director   
Office of Ground Water and Drinking Water (4601M)

TO: Water Management Division Directors  
Regions I - X

P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), includes an “American Iron and Steel (AIS)” requirement in section 436 that requires Clean Water State Revolving Loan Fund (CWSRF) and Drinking Water State Revolving Loan Fund (DWSRF) assistance recipients to use iron and steel products that are produced in the United States for projects for the construction, alteration, maintenance, or repair of a public water system or treatment works if the project is funded through an assistance agreement executed beginning January 17, 2014 (enactment of the Act), through the end of Federal Fiscal Year 2014.

Section 436 also sets forth certain circumstances under which EPA may waive the AIS requirement. Furthermore, the Act specifically exempts projects where engineering plans and specifications were approved by a State agency prior to January 17, 2014.

The approach described below explains how EPA will implement the AIS requirement. The first section is in the form of questions and answers that address the types of projects that must comply with the AIS requirement, the types of products covered by the AIS requirement, and compliance. The second section is a step-by-step process for requesting waivers and the circumstances under which waivers may be granted.

## Implementation

The Act states:

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term “iron and steel products” means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the “Administrator”) finds that—

(1) applying subsection (a) would be inconsistent with the public interest;

(2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

(d) This section shall be applied in a manner consistent with United States obligations under international agreements.

(e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out



the provisions described in subsection (a)(1) for management and oversight of the requirements of this section.

(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

The following questions and answers provide guidance for implementing and complying with the AIS requirements:

### **Project Coverage**

#### **1) What classes of projects are covered by the AIS requirement?**

All treatment works projects funded by a CWSRF assistance agreement, and all public water system projects funded by a DWSRF assistance agreement, from the date of enactment through the end of Federal Fiscal Year 2014, are covered. The AIS requirements apply to the entirety of the project, no matter when construction begins or ends. Additionally, the AIS requirements apply to all parts of the project, no matter the source of funding.

#### **2) Does the AIS requirement apply to nonpoint source projects or national estuary projects?**

No. Congress did not include an AIS requirement for nonpoint source and national estuary projects unless the project can also be classified as a 'treatment works' as defined by section 212 of the Clean Water Act.

#### **3) Are any projects for the construction, alteration, maintenance, or repair of a public water system or treatment works excluded from the AIS requirement?**

Any project, whether a treatment works project or a public water system project, for which engineering plans and specifications were approved by the responsible state agency prior to January 17, 2014, is excluded from the AIS requirements.

#### **4) What if the project does not have approved engineering plans and specifications but has signed an assistance agreement with a CWSRF or DWSRF program prior to January 17, 2014?**

The AIS requirements do not apply to any project for which an assistance agreement was signed prior to January 17, 2014.

**5) What if the project does not have approved engineering plans and specifications, but bids were advertised prior to January 17, 2014 and an assistance agreement was signed after January 17, 2014?**

If the project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the approval date for purposes of the exemption in section 436(f).

**6) What if the assistance agreement that was signed prior to January 17, 2014, only funded a part of the overall project, where the remainder of the project will be funded later with another SRF loan?**

If the original assistance agreement funded any construction of the project, the date of the original assistance agreement counts for purposes of the exemption. If the original assistance agreement was only for planning and design, the date of that assistance agreement will count for purposes of the exemption only if there is a written commitment or expectation on the part of the assistance recipient to fund the remainder of the project with SRF funds.

**7) What if the assistance agreement that was signed prior to January 17, 2014, funded the first phase of a multi-phase project, where the remaining phases will be funded by SRF assistance in the future?**

In such a case, the phases of the project will be considered a single project if all construction necessary to complete the building or work, regardless of the number of contracts or assistance agreements involved, are closely related in purpose, time and place. However, there are many situations in which major construction activities are clearly undertaken in phases that are distinct in purpose, time, or place. In the case of distinct phases, projects with engineering plans and specifications approval or assistance agreements signed prior to January 17, 2014 would be excluded from AIS requirements while those approved/signed on January 17, 2014, or later would be covered by the AIS requirements.

**8) What if a project has split funding from a non-SRF source?**

Many States intend to fund projects with “split” funding, from the SRF program and from State or other programs. Based on the Act language in section 436, which requires that American iron and steel products be used in any project for the construction, alteration, maintenance, or repair of a public water system or treatment works receiving SRF funding between and including January 17, 2014 and September 30, 2014, any project that is funded in whole or in part with such funds must comply with the AIS requirement. A “project” consists of all construction necessary to complete the building or work regardless of the number of contracts or assistance agreements involved so long as all contracts and assistance agreements awarded are closely related in purpose, time and place. This precludes the intentional splitting of SRF projects into separate and smaller contracts or assistance agreements to avoid AIS coverage on some portion of a larger

project, particularly where the activities are integrally and proximately related to the whole. However, there are many situations in which major construction activities are clearly undertaken in separate phases that are distinct in purpose, time, or place, in which case, separate contracts or assistance agreement for SRF and State or other funding would carry separate requirements.

**9) What about refinancing?**

If a project began construction, financed from a non-SRF source, prior to January 17, 2014, but is refinanced through an SRF assistance agreement executed on or after January 17, 2014 and prior to October 1, 2014, AIS requirements will apply to all construction that occurs on or after January 17, 2014, through completion of construction, unless, as is likely, engineering plans and specifications were approved by a responsible state agency prior to January 17, 2014. There is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to January 17, 2014.

**10) Do the AIS requirements apply to any other EPA programs, besides the SRF program, such as the Tribal Set-aside grants or grants to the Territories and DC?**

No, the AIS requirement only applies to funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12)

**Covered Iron and Steel Products**

**11) What is an iron or steel product?**

For purposes of the CWSRF and DWSRF projects that must comply with the AIS requirement, an iron or steel product is one of the following made primarily of iron or steel that is permanently incorporated into the public water system or treatment works:

- Lined or unlined pipes or fittings;
- Manhole Covers;
- Municipal Castings (defined in more detail below);
- Hydrants;
- Tanks;
- Flanges;
- Pipe clamps and restraints;
- Valves;
- Structural steel (defined in more detail below);
- Reinforced precast concrete; and
- Construction materials (defined in more detail below).

**12) What does the term ‘primarily iron or steel’ mean?**

‘Primarily iron or steel’ places constraints on the list of products above. For one of the listed products to be considered subject to the AIS requirements, it must be made of greater than 50% iron or steel, measured by cost. The cost should be based on the material costs.

**13) Can you provide an example of how to perform a cost determination?**

For example, the iron portion of a fire hydrant would likely be the bonnet, body and shoe, and the cost then would include the pouring and casting to create those components. The other material costs would include non-iron and steel internal workings of the fire hydrant (i.e., stem, coupling, valve, seals, etc). However, the assembly of the internal workings into the hydrant body would not be included in this cost calculation. If one of the listed products is not made primarily of iron or steel, United States (US) provenance is not required. An exception to this definition is reinforced precast concrete, which is addressed in a later question.

**14) If a product is composed of more than 50% iron or steel, but is not listed in the above list of items, must the item be produced in the US? Alternatively, must the iron or steel in such a product be produced in the US?**

The answer to both question is no. Only items on the above list must be produced in the US. Additionally, the iron or steel in a non-listed item can be sourced from outside the US.

**15) What is the definition of steel?**

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels.

**16) What does ‘produced in the United States’ mean?**

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes, including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the

material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components do not have to be of domestic origin.

**17) Are the raw materials used in the production of iron or steel required to come from US sources?**

No. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-US sources.

**18) If an above listed item is primarily made of iron or steel, but is only at the construction site temporarily, must such an item be produced in the US?**

No. Only the above listed products made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

**19) What is the definition of ‘municipal castings’?**

Municipal castings are cast iron or steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and surface infrastructure. They are typically made of grey or ductile iron, or steel. Examples of municipal castings are:

- Access Hatches;
- Ballast Screen;
- Benches (Iron or Steel);
- Bollards;
- Cast Bases;
- Cast Iron Hinged Hatches, Square and Rectangular;
- Cast Iron Riser Rings;
- Catch Basin Inlet;
- Cleanout/Monument Boxes;
- Construction Covers and Frames;
- Curb and Corner Guards;
- Curb Openings;
- Detectable Warning Plates;
- Downspout Shoes (Boot, Inlet);
- Drainage Grates, Frames and Curb Inlets;
- Inlets;
- Junction Boxes;
- Lampposts;
- Manhole Covers, Rings and Frames, Risers;

Meter Boxes;  
Service Boxes;  
Steel Hinged Hatches, Square and Rectangular;  
Steel Riser Rings;  
Trash receptacles;  
Tree Grates;  
Tree Guards;  
Trench Grates; and  
Valve Boxes, Covers and Risers.

## **20) What is ‘structural steel’?**

Structural steel is rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zees. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

## **21) What is a ‘construction material’ for purposes of the AIS requirement?**

Construction materials are those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered “structural steel”. This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts), welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

## **22) What is not considered a ‘construction material’ for purposes of the AIS requirement?**

Mechanical and electrical components, equipment and systems are not considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment, compressors, meters, sensors, controls and switches, supervisory control and

data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

**23) If the iron or steel is produced in the US, may other steps in the manufacturing process take place outside of the US, such as assembly?**

No. Production in the US of the iron or steel used in a listed product requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

**24) What processes must occur in the US to be compliant with the AIS requirement for reinforced precast concrete?**

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered to be a construction material and must be produced in the US.

**Compliance**

**25) How should an assistance recipient document compliance with the AIS requirement?**

In order to ensure compliance with the AIS requirement, specific AIS contract language must be included in each contract, starting with the assistance agreement, all the way down to the purchase agreements. Sample language for assistance agreements and contracts can be found in Appendix 3 and 4.

EPA recommends the use of a step certification process, similar to one used by the Federal Highway Administration. The step certification process is a method to ensure that producers adhere to the AIS requirement and assistance recipients can verify that products comply with the AIS requirement. The process also establishes accountability and better enables States to take enforcement actions against violators.

Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. A step certification is a process under which each handler (supplier, fabricator, manufacturer,

processor, etc) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached, as Appendix 5, are sample certifications. These certifications should be collected and maintained by assistance recipients.

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the US. While this type of certification may be acceptable, it may not provide the same degree of assurance. Additional documentation may be needed if the certification is lacking important information. Step certification is the best practice.

## **26) How should a State ensure assistance recipients are complying with the AIS requirement?**

In order to ensure compliance with the AIS requirement, States SRF programs must include specific AIS contract language in the assistance agreement. Sample language for assistance agreements can be found in Appendix 3.

States should also, as a best practice, conduct site visits of projects during construction and review documentation demonstrating proof of compliance which the assistance recipient has gathered.

## **27) What happens if a State or EPA finds a non-compliant iron and/or steel product permanently incorporated in the project?**

If a potentially non-compliant product is identified, the State should notify the assistance recipient of the apparent unauthorized use of the non-domestic component, including a proposed corrective action, and should be given the opportunity to reply. If unauthorized use is confirmed, the State can take one or more of the following actions: request a waiver where appropriate; require the removal of the non-domestic item; or withhold payment for all or part of the project. Only EPA can issue waivers to authorize the use of a non-domestic item. EPA may use remedies available to it under the Clean Water Act, the Safe Drinking Water Act, and 40 CFR part 31 grant regulations, in the event of a violation of a grant term and condition.

It is recommended that the State work collaboratively with EPA to determine the appropriate corrective action, especially in cases where the State is the one who identifies the item in noncompliance or there is a disagreement with the assistance recipient.

If fraud, waste, abuse, or any violation of the law is suspected, the Office of Inspector General (OIG) should be contacted immediately. The OIG can be reached at 1-



888-546-8740 or [OIG\\_Hotline@epa.gov](mailto:OIG_Hotline@epa.gov). More information can be found at this website: <http://www.epa.gov/oig/hotline.htm>.

## **28) How do international trade agreements affect the implementation of the AIS requirements?**

The AIS provision applies in a manner consistent with United States obligations under international agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to such agreements. In general, SRF assistance recipients are not signatories to such agreements, so these agreements have no impact on this AIS provision. In the few instances where such an agreement applies to a municipality, that municipality is under the obligation to determine its applicability and requirements and document the actions taken to comply for the State.

### **Waiver Process**

The statute permits EPA to issue waivers for a case or category of cases where EPA finds (1) that applying these requirements would be inconsistent with the public interest; (2) iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or (3) inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

In order to implement the AIS requirements, EPA has developed an approach to allow for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow States, on behalf of the assistance recipients, to apply for waivers of the AIS requirement directly to EPA Headquarters. Only waiver requests received from states will be considered. Pursuant to the Act, EPA has the responsibility to make findings as to the issuance of waivers to the AIS requirements.

### **Definitions**

The following terms are critical to the interpretation and implementation of the AIS requirements and apply to the process described in this memorandum:

Reasonably Available Quantity: The quantity of iron or steel products is available or will be available at the time needed and place needed, and in the proper form or specification as specified in the project plans and design.

Satisfactory Quality: The quality of iron or steel products, as specified in the project plans and designs.

Assistance Recipient: A borrower or grantee that receives funding from a State CWSRF or DWSRF program.

## Step-By-Step Waiver Process

### Application by Assistance Recipient

Each local entity that receives SRF water infrastructure financial assistance is required by section 436 of the Act to use American made iron and steel products in the construction of its project. However, the recipient may request a waiver. Until a waiver is granted by EPA, the AIS requirement stands, except as noted above with respect to municipalities covered by international agreements.

The waiver process begins with the SRF assistance recipient. In order to fulfill the AIS requirement, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American made iron and steel products. It is essential that the assistance recipient include the AIS terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 3 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three conditions is met:

1. Applying the American Iron and Steel requirements of the Act would be inconsistent with the public interest;
2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Proper and sufficient documentation must be provided by the assistance recipient. A checklist detailing the types of information required for a waiver to be processed is attached as Appendix 1.

Additionally, it is strongly encouraged that assistance recipients hold pre-bid conferences with potential bidders. A pre-bid conference can help to identify iron and steel products needed to complete the project as described in the plans and specifications that may not be available from domestic sources. It may also identify the need to seek a waiver prior to bid, and can help inform the recipient on compliance options.

In order to apply for a project waiver, the assistance recipient should email the request in the form of a Word document (.doc) to the State SRF program. It is strongly recommended that the State designate a single person for all AIS communications. The State SRF designee will review the application for the waiver and determine whether the necessary information has been included. Once the waiver application is complete, the State designee will forward the application to either of two email addresses. For CWSRF waiver requests, please send the application to: [cwsrfwaiver@epa.gov](mailto:cwsrfwaiver@epa.gov). For DWSRF waiver requests, please send the application to: [dwsrfwaiver@epa.gov](mailto:dwsrfwaiver@epa.gov).

## Evaluation by EPA

After receiving an application for waiver of the AIS requirements, EPA Headquarters will publish the request on its website for 15 days and receive informal comment. EPA Headquarters will then use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.

In the event that EPA finds that adequate documentation and justification has been submitted, the Administrator may grant a waiver to the assistance recipient. EPA will notify the State designee that a waiver request has been approved or denied as soon as such a decision has been made. Granting such a waiver is a three-step process:

1. Posting – After receiving an application for a waiver, EPA is required to publish the application and all material submitted with the application on EPA’s website for 15 days. During that period, the public will have the opportunity to review the request and provide informal comment to EPA. The website can be found at: [http://water.epa.gov/grants\\_funding/aisrequirement.cfm](http://water.epa.gov/grants_funding/aisrequirement.cfm)
2. Evaluation – After receiving an application for waiver of the AIS requirements, EPA Headquarters will use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.
3. Signature of waiver approval by the Administrator or another agency official with delegated authority – As soon as the waiver is signed and dated, EPA will notify the State SRF program, and post the signed waiver on our website. The assistance recipient should keep a copy of the signed waiver in its project files.

## Public Interest Waivers

EPA has the authority to issue public interest waivers. Evaluation of a public interest waiver request may be more complicated than that of other waiver requests so they may take more time than other waiver requests for a decision to be made. An example of a public interest waiver that might be issued could be for a community that has standardized on a particular type or manufacturer of a valve because of its performance to meet their specifications. Switching to an alternative valve may require staff to be trained on the new equipment and additional spare parts would need to be purchased and stocked, existing valves may need to be unnecessarily replaced, and portions of the system may need to be redesigned. Therefore, requiring the community to install an alternative valve would be inconsistent with public interest.

EPA also has the authority to issue a public interest waiver that covers categories of products that might apply to all projects.

EPA reserves the right to issue national waivers that may apply to particular classes of assistance recipients, particular classes of projects, or particular categories of iron or steel products. EPA may develop national or (US geographic) regional categorical waivers through the identification of similar circumstances in the detailed justifications presented to EPA in a waiver request or requests. EPA may issue a national waiver based on policy decisions regarding the public's interest or a determination that a particular item is not produced domestically in reasonably available quantities or of a sufficient quality. In such cases, EPA may determine it is necessary to issue a national waiver.

If you have any questions concerning the contents of this memorandum, you may contact us, or have your staff contact Jordan Dorfman, Attorney-Advisor, State Revolving Fund Branch, Municipal Support Division, at [dorfman.jordan@epa.gov](mailto:dorfman.jordan@epa.gov) or (202) 564-0614 or Kiri Anderer, Environmental Engineer, Infrastructure Branch, Drinking Water Protection Division, at [anderer.kirsten@epa.gov](mailto:anderer.kirsten@epa.gov) or (202) 564-3134.

Attachments

## Appendix 1: Information Checklist for Waiver Request

The purpose of this checklist is to help ensure that all appropriate and necessary information is submitted to EPA. EPA recommends that States review this checklist carefully and provide all appropriate information to EPA. This checklist is for informational purposes only and does not need to be included as part of a waiver application.

Items	✓	Notes
<p>General</p> <ul style="list-style-type: none"> <li>• Waiver request includes the following information:               <ul style="list-style-type: none"> <li>— Description of the foreign and domestic construction materials</li> <li>— Unit of measure</li> <li>— Quantity</li> <li>— Price</li> <li>— Time of delivery or availability</li> <li>— Location of the construction project</li> <li>— Name and address of the proposed supplier</li> <li>— A detailed justification for the use of foreign construction materials</li> </ul> </li> <li>• Waiver request was submitted according to the instructions in the memorandum</li> <li>• Assistance recipient made a good faith effort to solicit bids for domestic iron and steel products, as demonstrated by language in requests for proposals, contracts, and communications with the prime contractor</li> </ul>		
<p>Cost Waiver Requests</p> <ul style="list-style-type: none"> <li>• Waiver request includes the following information:               <ul style="list-style-type: none"> <li>— Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products</li> <li>— Relevant excerpts from the bid documents used by the contractors to complete the comparison</li> <li>— Supporting documentation indicating that the contractor made a reasonable survey of the market, such as a description of the process for identifying suppliers and a list of contacted suppliers</li> </ul> </li> </ul>		
<p>Availability Waiver Requests</p> <ul style="list-style-type: none"> <li>• Waiver request includes the following supporting documentation necessary to demonstrate the availability, quantity, and/or quality of the materials for which the waiver is requested:               <ul style="list-style-type: none"> <li>— Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials</li> <li>— Documentation of the assistance recipient's efforts to find available domestic sources, such as a description of the process for identifying suppliers and a list of contacted suppliers.</li> <li>— Project schedule</li> <li>— Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction materials</li> </ul> </li> <li>• Waiver request includes a statement from the prime contractor and/or supplier confirming the non-availability of the domestic construction materials for which the waiver is sought</li> <li>• Has the State received other waiver requests for the materials described in this waiver request, for comparable projects?</li> </ul>		

## Appendix 2: HQ Review Checklist for Waiver Request

Instructions: To be completed by EPA. Review all waiver requests using the questions in the checklist, and mark the appropriate box as Yes, No or N/A. Marks that fall inside the shaded boxes may be grounds for denying the waiver. If none of your review markings fall into a shaded box, the waiver is eligible for approval if it indicates that one or more of the following conditions applies to the domestic product for which the waiver is sought:

1. The iron and/or steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality.
2. The inclusion of iron and/or steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Review Items	Yes	No	N/A	Comments
<b>Cost Waiver Requests</b> <ul style="list-style-type: none"> <li>• Does the waiver request include the following information?               <ul style="list-style-type: none"> <li>– Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products</li> <li>– Relevant excerpts from the bid documents used by the contractors to complete the comparison</li> <li>– A sufficient number of bid documents or pricing information from domestic sources to constitute a reasonable survey of the market</li> </ul> </li> <li>• Does the Total Domestic Project exceed the Total Foreign Project Cost by more than 25%?</li> </ul>				
<b>Availability Waiver Requests</b> <ul style="list-style-type: none"> <li>• Does the waiver request include supporting documentation sufficient to show the availability, quantity, and/or quality of the iron and/or steel product for which the waiver is requested?               <ul style="list-style-type: none"> <li>– Supplier information or other documentation indicating availability/delivery date for materials</li> <li>– Project schedule</li> <li>– Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of materials</li> </ul> </li> <li>• Does supporting documentation provide sufficient evidence that the contractors made a reasonable effort to locate domestic suppliers of materials, such as a description of the process for identifying suppliers and a list of contacted suppliers?</li> <li>• Based on the materials delivery/availability date indicated in the supporting documentation, will the materials be unavailable when they are needed according to the project schedule? (By item, list schedule date and domestic delivery quote date or other relevant information)</li> <li>• Is EPA aware of any other evidence indicating the non-availability of the materials for which the waiver is requested? Examples include:               <ul style="list-style-type: none"> <li>– Multiple waiver requests for the materials described in this waiver request, for comparable projects in the same State</li> <li>– Multiple waiver requests for the materials described in this waiver request, for comparable projects in other States</li> <li>– Correspondence with construction trade associations indicating the non-availability of the materials</li> </ul> </li> <li>• Are the available domestic materials indicated in the bid documents of inadequate quality compared those required by the project plans, specifications, and/or permits?</li> </ul>				

### **Appendix 3: Example Loan Agreement Language**

ALL ASSISTANCE AGREEMENT MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN SRF ASSISTANCE AGREEMENTS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE LAW:

Comply with all federal requirements applicable to the Loan (including those imposed by the 2014 Appropriations Act and related SRF Policy Guidelines) which the Participant understands includes, among other, requirements that all of the iron and steel products used in the Project are to be produced in the United States (“American Iron and Steel Requirement”) unless (i) the Participant has requested and obtained a waiver from the Agency pertaining to the Project or (ii) the Finance Authority has otherwise advised the Participant in writing that the American Iron and Steel Requirement is not applicable to the Project.

Comply with all record keeping and reporting requirements under the Clean Water Act/Safe Drinking Water Act, including any reports required by a Federal agency or the Finance Authority such as performance indicators of program deliverables, information on costs and project progress. The Participant understands that (i) each contract and subcontract related to the Project is subject to audit by appropriate federal and state entities and (ii) failure to comply with the Clean Water Act/Safe Drinking Water Act and this Agreement may be a default hereunder that results in a repayment of the Loan in advance of the maturity of the Bonds and/or other remedial actions.

#### **Appendix 4: Sample Construction Contract Language**

ALL CONTRACTS MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN ALL CONTRACTS IN PROJECTS THAT USE SRF FUNDS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE OR LOCAL LAW:

The Contractor acknowledges to and for the benefit of the City of \_\_\_\_\_ (“Purchaser”) and the \_\_\_\_\_ (the “State”) that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as “American Iron and Steel;” that requires all of the iron and steel products used in the project to be produced in the United States (“American Iron and Steel Requirement”) including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.



## Appendix 5: Sample Certifications

The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

\_\_\_\_\_

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Certification for Project (XXXXXXXXXXXX)

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

\_\_\_\_\_

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

# Davis-Bacon Requirements for DWSRF Projects

## Preamble

With respect to the Safe Drinking Water State Revolving Funds, EPA provides capitalization grants to each State which in turn provides sub grants or loans to eligible entities within the State. Typically, the sub recipients are municipal or other local governmental entities that manage the funds. For these types of recipients, the provisions set forth under Roman numeral I, below, shall apply. Although EPA and the State remain responsible for ensuring sub recipients' compliance with the wage rate requirements set forth herein, those sub recipients shall have the primary responsibility to maintain payroll records as described in Section 3(ii)(A), below and for compliance as described in Section I-5.

Occasionally, the sub recipient may be a private for profit or not for profit entity. For these types of recipients, the provisions set forth in Roman Numeral II, below, shall apply. Although EPA and the State remain responsible for ensuring sub recipients' compliance with the wage rate requirements set forth herein, those sub recipients shall have the primary responsibility to maintain payroll records as described in Section II-3(ii)(A), below and for compliance as described in Section II-5.

## **I. Requirements Under the Consolidated Appropriations Act, 2018 (P.L. 115-141) For Sub recipients That Are Governmental Entities:**

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon (DB) responsibilities when DB applies to EPA awards of financial assistance with respect to State recipients and sub recipients that are governmental entities. If a sub recipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. If a State recipient needs guidance, the recipient may contact Gabriela Baeza-Castaneda, [baeza-castaneda.gabriela@epa.gov](mailto:baeza-castaneda.gabriela@epa.gov), and 415-972-3038, of EPA, Region 9 for guidance. The recipient or sub recipient may also obtain additional guidance from DOL's web site at <http://www.dol.gov/whd/>

### **1. Applicability of the Davis-Bacon (DB) prevailing wage requirements.**

DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a sub recipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the sub recipient must discuss the situation with the recipient State before authorizing work on that site.

### **2. Obtaining Wage Determinations.**

(a) Sub recipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime

contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

- (i) While the solicitation remains open, the sub recipient shall monitor [www.wdol.gov](http://www.wdol.gov) weekly to ensure that the wage determination contained in the solicitation remains current. The sub recipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the sub recipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the sub recipient.
- (ii) If the sub recipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the sub recipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The sub recipient shall monitor [www.wdol.gov](http://www.wdol.gov) on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the sub recipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the sub recipient shall insert the appropriate DOL wage determination from [www.wdol.gov](http://www.wdol.gov) into the ordering instrument.

(c) Sub recipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a sub recipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the sub recipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the sub recipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The sub recipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

### **3. Contract and Subcontract provisions.**

(a) The Recipient shall insure that the sub recipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning

is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the Consolidated Appropriations Act, 2018, the following clauses:

(1) Minimum wages.

(i) 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 (a)(1)(iv) 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 § 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 (a)(1)(ii) 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.

Sub recipients may obtain wage determinations from the U.S. Department of Labor's web site, [www.dol.gov](http://www.dol.gov).

(ii)(A) The sub recipient(s), on behalf of EPA, 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 State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the sub recipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the sub recipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the sub recipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) 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.

(iii) 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.

(iv) 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 sub recipient(s), shall upon written request of the EPA Award Official or 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 (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, 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.

(i) 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.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the sub recipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the sub recipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls 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 the weekly payrolls. 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/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 sub recipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, 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 sub recipient(s).

(B) 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:

(1) 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;

(2) 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;

(3) 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.

(C) 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 (a)(3)(ii)(B) of this section.

(D) 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.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA 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 Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, 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

(i) Apprentices. 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.

(ii) Trainees. 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.

(iii) 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.

(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 in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses 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 sub recipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) 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).

(ii) 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).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

#### **4. Contract Provision for Contracts in Excess of \$100,000.**

(a) Contract Work Hours and Safety Standards Act. The sub recipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any 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 Item 3, above 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 (a)(1) of this section the contractor and any subcontractor responsible therefore 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 (a)(1) of this section, in the sum of \$25 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 (a)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The sub recipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall 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 (a)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(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 (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Sub recipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Sub recipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made

available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

## **5. Compliance Verification**

(a) The sub recipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(3), all interviews must be conducted in confidence. The sub recipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The sub recipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. Sub recipients must conduct more frequent interviews if the initial interviews or other information indicated that there is a risk that the contractor or subcontractor is not complying with DB.

Sub recipients shall immediately conduct interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence."

(c) The sub recipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The sub recipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the sub recipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Sub recipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the sub recipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The sub recipient shall periodically review contractors and subcontractor's use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Sub recipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/whd/america2.htm>.

**<https://beta.SAM.gov>, under CA20200018**

# **Project Details**

**CONTRACTOR'S REQUEST FOR CONSTRUCTION STAKING**

**Project:** County of Fresno-County Service Areas 30 & 32 Water System Improvement Project

**RETURN TO:** **PROVOST & PRITCHARD ENGINEERING**  
**ATTN:** **DOUG LAWLER, dlawler@ppeng.com**  
**FAX:** **559-449-2715**

Restake:  Yes  No  
 Sketch Attached:  Yes  No

Survey Crew on Site Date: \_\_\_\_\_  
 (Date)

Stakes will be used: \_\_\_\_\_  
 (Date)

Staking Requested (circle requested items)

Rough Grade	Final Grade			Other:	_____
Off Set:	3'	5'	10'	Other:	_____
Feature:	EP	TFC	FL	Other:	_____
Stations:	50'	100'		Other:	_____

Description of Staking Request (Offset, Line and/or Grade, Etc.):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Additional Notes:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

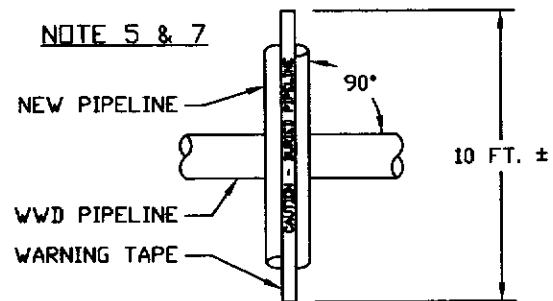
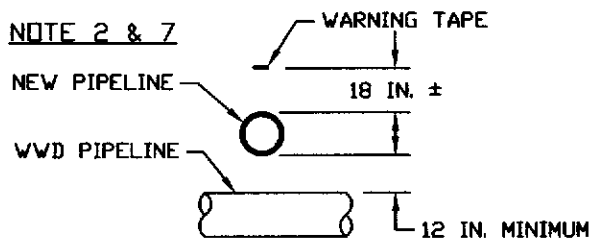
BY (NAME): \_\_\_\_\_

DATE: \_\_\_\_\_

UNDERGROUND SERVICE ALERT (USA) GUIDELINES/SYMBOL LEGEND

PIPE CROSSINGS:

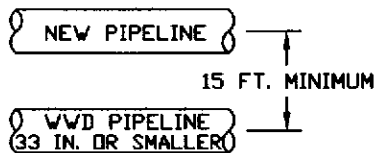
1. EXCAVATORS SHALL PROVIDE WWD NOTIFICATION OF PROPOSED PIPELINE CROSSING (CALL USA).
2. EXCAVATORS SHALL PROVIDE 12 IN. MINIMUM CLEARANCE BETWEEN NEW PIPELINE OUTSIDE DIAMETER (O.D.) AND WWD PIPELINE O.D. (SEE BELOW).
3. WHEN PREPARING TO CROSS WWD PIPELINE, EXCAVATORS SHALL LOCATE (POTHOLE) WWD PIPELINE PRIOR TO INSTALLATION OF NEW PIPELINES BY EXCAVATING WITH HAND TOOLS.
4. WWD SHALL PROVIDE "STANDBY" OPERATOR DURING POTHOILING OPERATIONS. WWD SHALL CONFIRM 12 IN. CLEARANCE ON PIPELINE CROSSINGS (SEE NOTE 2 ABOVE).
5. USERS PIPELINES SHALL CROSS PERPENDICULAR (90°) TO WWD PIPELINES (SEE BELOW).
6. USERS ARE ENCOURAGED TO CROSS UNDERNEATH WWD PIPELINES.
7. WHEN CROSSING ABOVE WWD PIPELINES, USERS ARE ENCOURAGED TO INCLUDE A 10 FT. LONG X 3 IN. WIDE DETECTABLE WARNING TAPE IMPRINTED WITH "CAUTION BURIED PIPELINE" OR SIMILAR MESSAGE IN THE AREA OF CROSSING (CENTERED ON WWD PIPELINE - SEE BELOW).



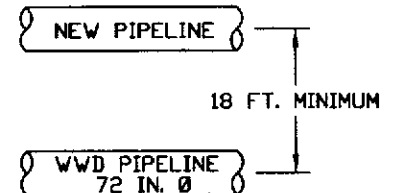
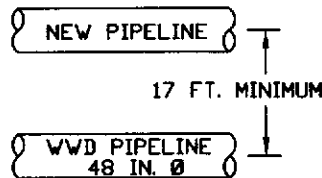
PARALLEL PIPELINES:

1. WHEN WWD PIPELINES MEASURE 33 IN. DIAMETER (Ø) OR LESS, NEW PIPELINES SHALL BE LAID PARALLEL TO WWD PIPELINES A MINIMUM OF 15 FT. AWAY (SEE BELOW).
2. WHEN WWD PIPELINES MEASURE 36 IN. Ø OR GREATER, NEW PIPELINES SHALL BE LAID PARALLEL TO WWD PIPELINES A MINIMUM OF 15 FT. AWAY + 1/2 Ø OF WWD PIPELINE E.G. - WWD PIPELINE = 72 IN. Ø/2 = 36 IN. // USERS PIPELINE SHALL BE LAID 18 FT. AWAY [15 FT. + 36 IN.] (SEE BELOW).
3. PARALLEL PIPELINE CLEARANCE DIMENSIONS SHALL BE DETERMINED FROM CENTER TO CENTER.

NOTE 1



NOTE 2



CLEARANCE GUIDELINES:

WWD PIPE SIZE                      CLEARANCE REQUIREMENTS

33 IN. Ø OR LESS	15 FT.
36 IN. Ø	16 FT. - 6 IN.
45 IN. Ø	16 FT. - 10.5 IN.
54 IN. Ø	17 FT. - 3 IN.
66 IN. Ø	17 FT. - 9 IN.
72 IN. Ø	18 FT.
84 IN. Ø	18 FT. - 6 IN.

CSERRANO\MYBDCS\AUTOCAD\2009\USA

NUMBER	DATE	DRAWN	CHECKED	APPROVED
REVISION				

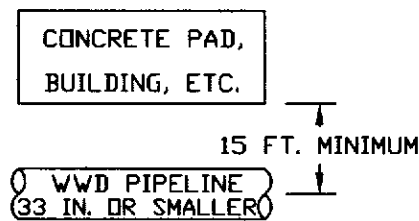
<b>WESTLANDS WATER DISTRICT</b> 3130 N. FRESNO ST. FRESNO, CALIFORNIA 93703 558.224.1523 Fax 558.241.6277	
<b>USA GUIDELINES</b> PG 1 OF 2	
DRAWN <b>CSERRANO</b>	APPROVED <b>B. PIERCE</b>
CHECKED	
DATE <b>10-19-09</b>	DRAWING



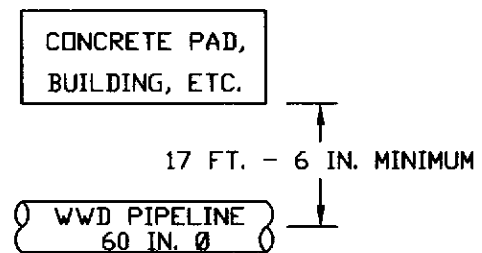
FACILITIES LOCATION:

1. WHEN WWD PIPELINES MEASURE 33 IN. Ø OR LESS, NEW FACILITIES (CONCRETE PADS, TELEPHONE POLES, BUILDINGS, ETC) SHALL BE LOCATED A MINIMUM OF 15 FT. AWAY FROM WWD PIPELINES (SEE BELOW).
2. WHEN WWD PIPELINES MEASURE 36 IN. Ø OR GREATER, NEW FACILITIES (CONCRETE PADS, TELEPHONE POLES, BUILDINGS, ETC) SHALL BE LOCATED A MINIMUM OF 15 FT. + 1/2 Ø AWAY FROM WWD PIPELINES (E.G. - WWD PIPELINE = 72 IN. Ø/2 = 36 IN. // USERS FACILITY SHALL BE LAID 18 FT. AWAY [15 FT. +36 IN.]) (SEE BELOW).
3. FACILITY CLEARANCE DIMENSIONS SHALL BE DETERMINED FROM EDGE OF NEW FACILITY TO CENTER OF WWD PIPELINES.

NOTE 1



NOTE 2




SYMBOL LEGEND

- ⊗ GROUND VALVE
- DELIVERY
- ↪ CONTINUATION OF PIPELINE
- A AIR RELEASE VALVE (MAY OR MAY NOT BE LOCATED INLINE)
- ◆ SECTION CORNER
- ◎ MANHOLE
- ⚡● POWER LINES/POWER POLE
- ▣ SLIDE GATE
- SW QTR 7 SECTION IDENTIFICATION BLOCK
- ∅ PIPE DIAMETER
- O.D. OUTSIDE DIAMETER

ADDITIONAL INFORMATION MAY BE FOUND ON:  
 DRAWING # 987-W-0020 (SITING ON FARM  
 RESERVOIRS, DITCHES & PIPELINES)

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NUMBER	DATE	DRAWN	CHECKED	APPROVED
REVISION				

 <b>WESTLANDS WATER DISTRICT</b> <small>3130 N. FRESNO ST. FRESNO, CALIFORNIA 93703                  558.224.1523 Fax 558.241.6277</small>	
<b>USA GUIDELINES</b> PG 2 OF 2	
DRAWN CSERRANO	APPROVED B.PIERCE
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DATE 10-19-09	DRAWING





**Badger Meter**

## Recordall® Industrial Meters

Nutating Disc Meter, Bronze and Thermoplastic

### DESCRIPTION

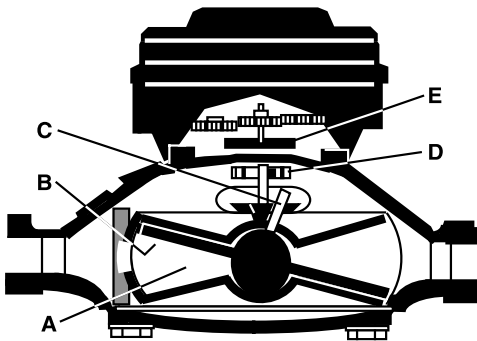
The Badger Meter Recordall (RCDL) positive displacement meters are one of the most cost effective methods in metering industrial fluids. The RCDL meter has a simple, efficient design for high accuracy and repeatability over the entire meter flow range.

Available in five sizes, 1/2...2 in. for flows up to 170 gpm, these meters are extremely rugged and reliable. Maintenance is seldom required, but if necessary, takes only a few minutes. All parts are designed and built of materials that meet your application requirements and provide an enduring and a trouble-free, precision flow meter.

To complement the RCDL meter line, Badger Meter offers a complete line of accessories that includes totalizers, electromechanical and electronic transmitters, rate of flow indicators and batch/process controllers.

### OPERATION

The metering principle, known as positive displacement, is based on the continuous filling and discharging of the measuring chamber. Controlled clearances between the disc and the chamber provide precise measurement of each volume cycle. As the disc nutates, the center spindle rotates a magnet. The movement of the magnet is sensed through the meter wall by a follower magnet or by various sensors. Each revolution of the magnet is equivalent to a fixed volume of fluid, which is converted to any engineering unit of measure for totalization, indication or process control.

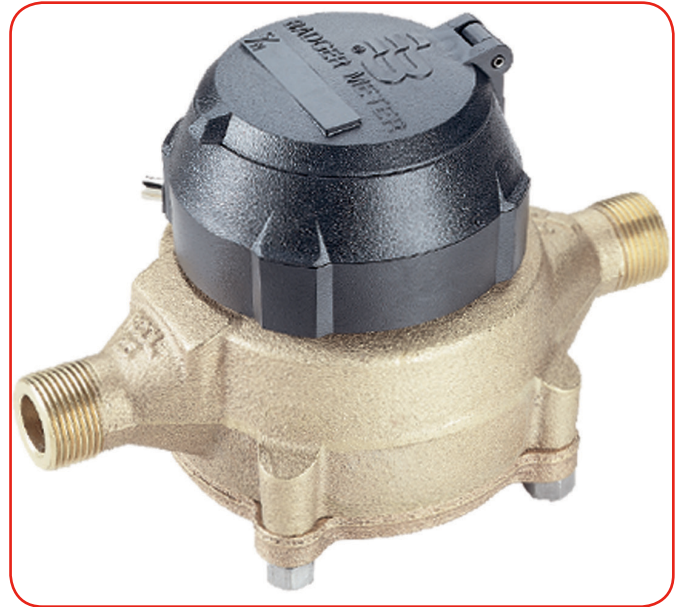


Liquid flowing through the meter chamber (A) causes a disc (B) to nutate or wobble. This motion, in turn, results in the rotation of a spindle (C) and drive magnet (D). Rotation is transmitted through the wall of the meter to a second magnet (E) or varied style of sensor pickup.

### LEAD-FREE MODELS AVAILABLE

The Recordall Disc Series meters meet or exceed the most recent revision of AWWA Standard C700 and are available in a lead-free bronze alloy. The meters comply with the lead-free provisions of the Safe Drinking Water Act, are certified to NSF/ANSI Standards 61 and 372 and carry the NSF-61 mark on the housing. All components of the lead-free bronze alloy meter (housing, measuring element, seals, and so on) comprise the certified system.

IDM-DS-00113-EN-06 (April 2017)



### FEATURES

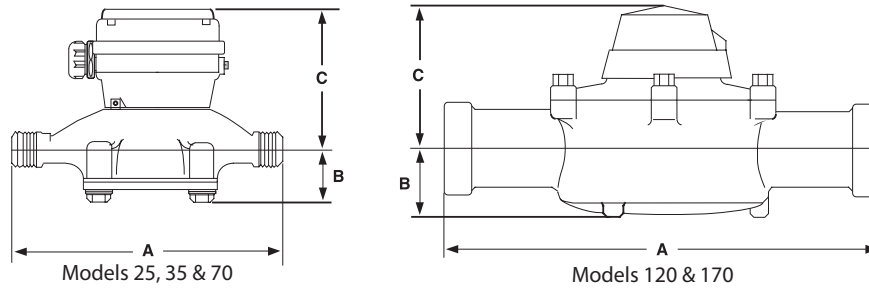
- Wide flow range
- Rugged bronze or thermoplastic housing
- Models 25 and 70—Bronze: 250° F option
- Easily maintained without removing from line
- Durable components for minimal maintenance
- Wide range of compatible accessories

### PERFORMANCE

- Accuracy:  $\pm 1.5\%$
- Repeatability:  $\pm 0.5\%$
- Max. Operating Pressure: 150 psi
- Maximum Operating Temperature:  
Plastic housing: 100° F  
Bronze housing: 120° F

# Product Data Sheet

## SPECIFICATIONS



Dimensions in Inches without Register						Flow Rate in Gallons		
Meter Model	Meter Size	Housing Material	A Meter Length	B Centerline to Base	Meter Length with Conn.	Cold Liquids 32...120° F	Chemicals & Oils 32...250° F (BZ) 32...100° F (PL)	Approx. Weight
M25	5/8 in.	BZ or PL	7-1/2 in.	1-3/8 in.	12-7/16 in.	1/2...25 gpm	1...25 gpm	5 lb
M25	3/4 in.	BZ or PL	7-1/2 in.	1-3/8 in.	12-5/8 in.	1/2... 30 gpm	1...30 gpm	5 lb
M35	3/4 in.	BZ	9 in.	1-3/4 in.	14-1/8 in.	3/4... 35 gpm	N/A	6 lb
M40	1 in.	PL	10-3/4 in.	2-1/4 in.	16-3/16 in.	3/4... 50 gpm	N/A	5 lb
M70	1 in.	BZ	10-3/4 in.	2-1/4 in.	16-5/8 in.	1...70 gpm	5...70 gpm	12 lb
M120	1-1/2 in.	BZ	12-5/8 in.	2-5/8 in.	19-3/4 in.	2...120 gpm	*See Note	20 lb
M170	2 in.	BZ	15-1/4 in.	3-3/8 in.	22-7/8 in.	2...170 gpm	N/A	30 lb

BZ = Bronze; PL = Plastic  
NPT connection set assemblies available.

N/A = Not available in high temperature/chemical option.  
\*Note: Available for chemicals or fluids not to exceed 110° F (43° C)

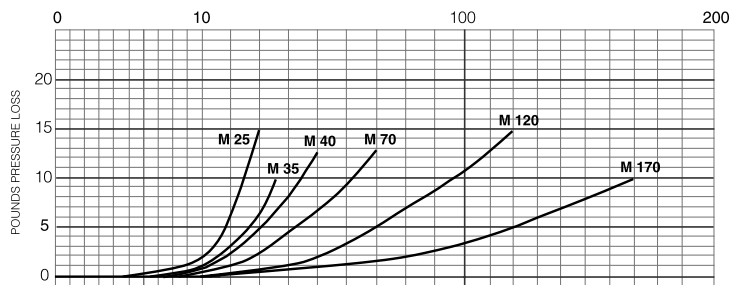
Height Dimensions in Inches with Register and Accessories						
Meter Size	With Non Resettable Register	With Transmitter	With MS-ER1 Transmitter	With ECA Transmitter	With 258 Register	With Series 76 Register
5/8 in. & 5/8 x 3/4 in.	5-3/4 in.	7-3/8 in.	11-1/4 in.	9-3/8 in.	8 in.	15-1/4 in.
3/4 in.	6-1/8 in.	7-3/4 in.	11-5/8 in.	9-3/8 in.	8-3/8 in.	15-5/8 in.
1 in.	7-1/2 in.	9-1/8 in.	13 in.	11-3/16 in.	9-3/4 in.	17 in.
1-1/2 in.	9-1/8 in.	10-3/8 in.	14-1/4 in.	12-3/4 in.	11 in.	18-1/4 in.
2 in.	10-3/4 in.	12-1/4 in.	16-1/8 in.	14-3/8 in.	12-7/8 in.	20-1/8 in.

## MATERIALS OF CONSTRUCTION

	Cold Liquid Units	High Temp. and/or Chemical Units Models 25 & 70
Housing	BZ or PL	BZ: 250° F, PL: 100° F
Chamber	Noryl	LCP
Disc	SAN	LCP
Crossbar	Nylon	Ultem
Magnetic Assembly	Nylon	Ultem
Chamber Retainer	Polyethylene	Metal Clip
Screen	Polypropylene	None

## PRESSURE LOSS CHART

Rate of Flow in Gallons Per Minute



## Control. Manage. Optimize.

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[www.badgermeter.com](http://www.badgermeter.com)

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**Badger Meter**

## Recordall® Compound Series Meter

Lead-Free Bronze Alloy, Sizes 2, 3, 4 & 6 inch  
NSF/ANSI Standards 61 and 372 Certified

### DESCRIPTION

The Recordall® Compound Series meters meet or exceed the most recent revision of AWWA Standard C702 and are available in a lead-free bronze alloy. The Compound Series meters comply with the lead-free provisions of the Safe Drinking Water Act, are certified to NSF/ANSI Standards 61 and 372 (Trade Designation: LL-NS) and carry the NSF-61 mark on the housing. All components of the lead-free bronze alloy meter (housing, measuring element, seals, and so on) comprise the certified system.

Badger Meter Recordall Compound Series meters combine two metering technologies in one innovative package. A positive displacement chamber measures low flow, while a turbine chamber records high flow.

#### Offered in four sizes, the Compound Series meter features:

- Patented design that eliminates the need for a trigger valve and maintains crossover accuracy.
- Permanently sealed, tamper-resistant register or encoder.
- Meters and encoders that are compatible with Badger Meter AMR/AMI systems and other approved reading technologies

Badger Meter ORION® and GALAXY® AMR/AMI meter reading systems are available for all Compound Series meters. Itron® ERT reading systems are also available. An optional summator can be provided as an integral part of the register assembly. All register options are removable from the meter without disrupting water service.

### TAMPER-PROOF FEATURES

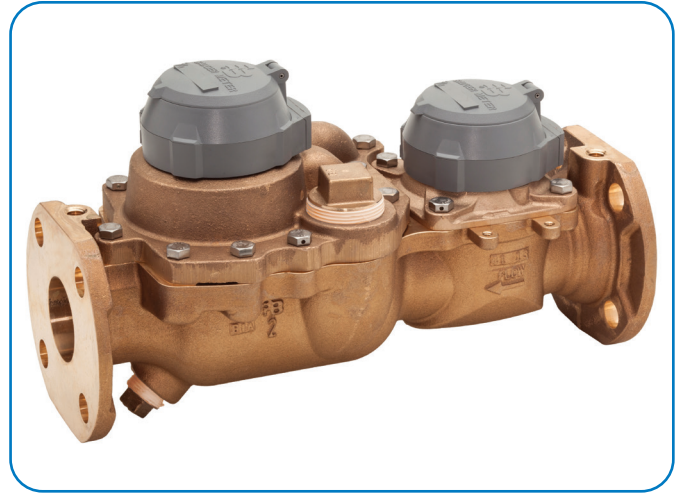
Unauthorized removal of the register or encoder is inhibited by the use of an optional tamper detection seal wire screw, TORX® tamper-resistant seal screw or the proprietary tamper-resistant keyed seal screw. Each can be installed at the meter site or at the factory.

### APPLICATIONS

Use the Recordall Compound meter for measuring potable cold water in commercial and industrial applications where flow is in one direction only. The meter is an ideal choice for facilities that experience rapid and wide fluctuations in water demand, such as hospitals, universities, residential complexes and manufacturing or processing facilities.

### OPERATION

At low flow rates, the Compound Series meter diverts water up through a bypass to the disc chamber. Leaving the chamber's outlet port, water flows beyond the turbine element and main valve. As the flow rate increases, a pressure differential is created that opens the main valve. The water then flows straight through the turbine chamber. In addition, a portion still flows through the disc chamber before exiting the meter.



Rotor and disc movements are transmitted by magnetic drive couplings to individual register odometers. The direct magnetic drive provides a positive, reliable and dependable register coupling for straight-reading or remote reading options. The self-lubricating thermoplastic register gearing is designed to minimize friction and provide long life.

### OPERATING PERFORMANCE

The Recordall Compound Series meets or exceeds registration accuracy for low, normal operating, maximum continuous operation, and changeover flow rates as specified in AWWA Standard C702.

### CONSTRUCTION

The Recordall Compound Series meter's construction complies with ANSI and AWWA C702 standards. It consists of three basic components: meter housing, interchangeable measuring elements, and sealed direct reading registers. The measuring element consists of the disc measuring chamber, turbine head assembly, and high flow valve assembly. To simplify maintenance, the registers and measuring elements can be removed without removing the meter housing from the line.

### METER INSTALLATION

The meter is designed for installations where flow is in one direction only. A separate strainer is required to ensure optimum flow conditioning and protection of the measuring element. Companion flanges for installation of meters on various pipe types and sizes are available in cast iron or NL bronze as an option.

## REGISTERS / ENCODERS

### Standard—Sweep-Hand Registration

The standard register is a straight-reading, permanently sealed magnetic drive register. Dirt, moisture, tampering and lens fogging problems are eliminated. The register has a six-odometer wheel totalization display, 360° test circle with center sweep hand, and flow finder to detect leaks. Register gearing is made of self-lubricating engineered polymer, which minimizes friction and provides long life. The multi-position register simplifies meter installation and reading. The register capacity is 100,000,000 gallons (10,000,000 ft<sup>3</sup>, 1,000,000 m<sup>3</sup>).

### Optional—Encoders for AMR/AMI Reading Solutions

AMR/AMI solutions are available for all Recordall Compound Series meters. All reading options can be removed from the meter without disrupting water service. Badger Meter encoders provide years of reliable, accurate readings for a variety of applications and are also available pre-wired to Badger Meter approved AMR/AMI solutions. See details at [www.badgermeter.com](http://www.badgermeter.com).

## SPECIFICATIONS

Compound Series Model	2 in. (50 mm)	3 in. (80 mm)	4 in. (100 mm)	6 in. (150 mm)
<b>Meter Flanges, Class 150</b>	2 in. elliptical or round	3 in. round	4 in. round	6 in. round
	(50 mm)	(80 mm)	(100 mm)	(150 mm)
<b>Typical Operating Range</b>	0.5...200 gpm	0.5...450 gpm	0.75...1000 gpm	0.75...2000 gpm
<b>(100% ± 1.5%)</b>	(0.1...45 m <sup>3</sup> /h)	(0.1...102 m <sup>3</sup> /h)	(0.17...227 m <sup>3</sup> /h)	(0.17...454.4 m <sup>3</sup> /h)
<b>Low Flow Registration (95% minimum)</b>	0.25 gpm (0.06 m <sup>3</sup> /h)	0.25 gpm (0.06 m <sup>3</sup> /h)	0.375 gpm (0.09 m <sup>3</sup> /h)	0.375 gpm (0.09 m <sup>3</sup> /h)
<b>Maximum Continuous Flow</b>	170 gpm (38.3 m <sup>3</sup> /h)	400 gpm (90.3 m <sup>3</sup> /h)	800 gpm (181.6 m <sup>3</sup> /h)	1500 gpm (340.5 m <sup>3</sup> /h)
<b>Pressure Loss at Maximum Continuous Flow</b>	5.4 psi at 170 gpm	6.0 psi at 400 gpm	11.0 psi at 800 gpm	9.3 psi at 1500 gpm
	(0.38 bar at 38.3 m <sup>3</sup> /h)	(0.41 bar at 90.3 m <sup>3</sup> /h)	(0.75 bar at 181.6 m <sup>3</sup> /h)	(0.64 bar at 340.5 m <sup>3</sup> /h)
<b>Crossover Flow Rate, Typical</b>	12 gpm (2.73 m <sup>3</sup> /h)	12 gpm (2.73 m <sup>3</sup> /h)	20 gpm (4.54 m <sup>3</sup> /h)	30 gpm (6.81 m <sup>3</sup> /h)
<b>Pressure Loss at Crossover</b>	3.5 psi (0.24 bar)	4.0 psi (0.28 bar)	4.0 psi (0.28 bar)	5.0 psi (0.35 bar)
<b>Minimum Crossover Accuracy</b>	97%	97%	97%	95%
<b>Maximum Operating Pressure</b>	150 psi (10 bar)			
<b>Maximum Operating Temperature</b>	105° F (41° C)			
<b>Test Plug</b>	1-1/2 in.		2 in.	

### Materials

<b>Meter Housing &amp; Cover</b>	Lead-free bronze alloy
<b>Turbo Cast Head</b>	Lead-free bronze alloy
<b>Nose Cone &amp; Straightening Vanes</b>	Thermoplastic
<b>Rotor</b>	Thermoplastic
<b>Rotor Radial Bearings</b>	Lubricated thermoplastic
<b>Rotor Thrust Bearing</b>	Sapphire jewels
<b>Rotor Bearing Pivots</b>	Passivated 316 stainless steel
<b>Calibration Mechanism</b>	Stainless steel & thermoplastic
<b>Measuring Chamber &amp; Disc</b>	Thermoplastic
<b>High Flow Valve</b>	Stainless steel & thermoplastic
<b>Magnets</b>	Ceramic
<b>Register Lens</b>	Glass
<b>Register Housing &amp; Cover</b>	Thermoplastic or bronze
<b>Trim</b>	Stainless steel
<b>Drain Plug (3/4 in.)</b>	Stainless steel or lead-free bronze alloy
<b>Test Plug</b>	Stainless steel or lead-free bronze alloy

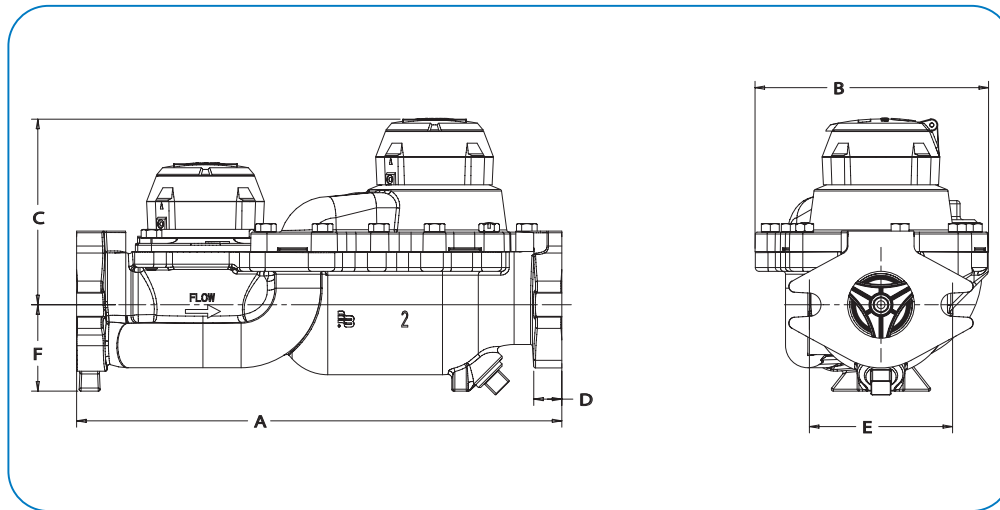
## PHYSICAL DIMENSIONS

Compound Series Model	2 in. Elliptical (50 mm)	2 in. Round (50 mm)	3 in. (80 mm)	4 in. (100 mm)	6 in. (150 mm)
Meter & Pipe Size	2 in. (50 mm)		3 in. (80 mm)	4 in. (100 mm)	6 in. (150 mm)
Net Weight	45 lb (20 kg)		51 lb (23 kg)	85 lb (38 kg)	152 lb (69 kg)
Shipping Weight	63 lb (29 kg)		79 lb (36 kg)	120 lb (54 kg)	200 lb (90 kg)
Length (A)	15-1/4 in. * (387 mm)		17 in. (432 mm)	20 in. (508 mm)**	24 in. (610 mm)
Width (B)	7-3/8 in. (187 mm)		8-1/2 in. (216 mm)	9-1/8 in. (232 mm)	12-3/8 in. (314 mm)
Height (C)	5-7/8 in. (149 mm)		6-5/8 in. (168 mm)	7-1/4 in. (184 mm)	8-7/8 in. (225 mm)
Flange (D)	5/8 in. (16 mm)		3/4 in. (19 mm)	7/8 in. (22 mm)	15/16 in. (24 mm)
Bolt Circle (E)	4-1/2 in. (114 mm)	4-3/4 in. (121 mm)	6 in. (152 mm)	7-1/2 in. (191 mm)	9-1/2 in. (241 mm)
Centerline (C) to Base (F)	2-3/4 in. (70 mm)		3-5/8 in. (92 mm)	4-1/4 in. (108 mm)	5-3/8 in. (137 mm)
Number of Bolts	2	4	4	8	8

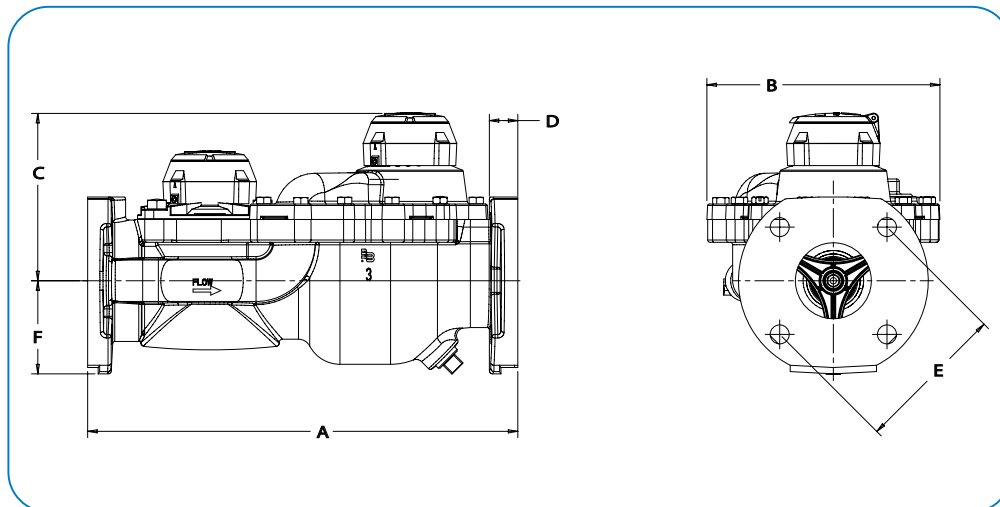
\* Adapter available to increase total length to 17 in. (432 mm).

\*\*Adapter available to increase total length to 24 in. (610 mm).

### Elliptical Flange (2 in. Only)

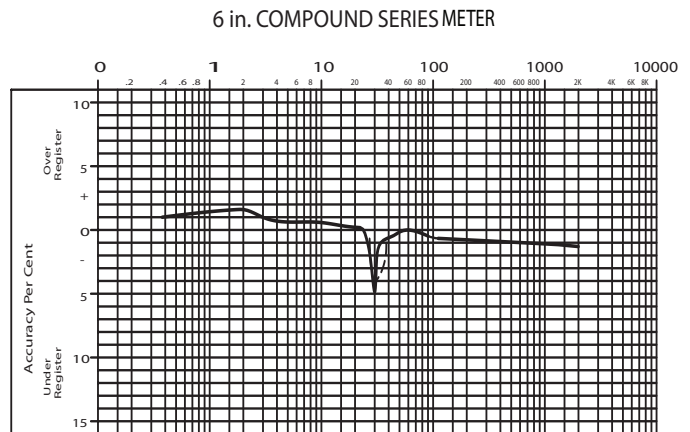
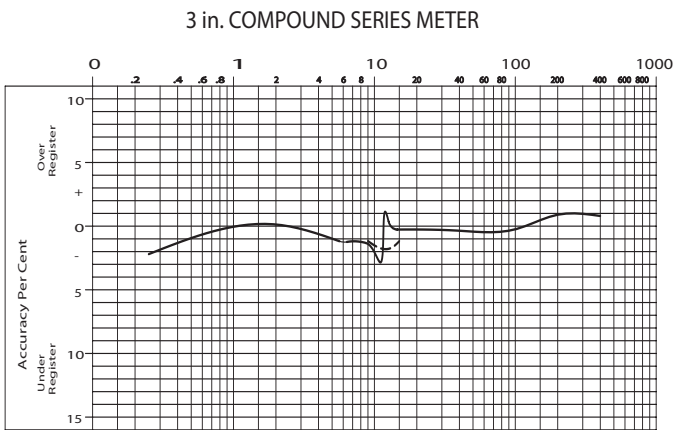
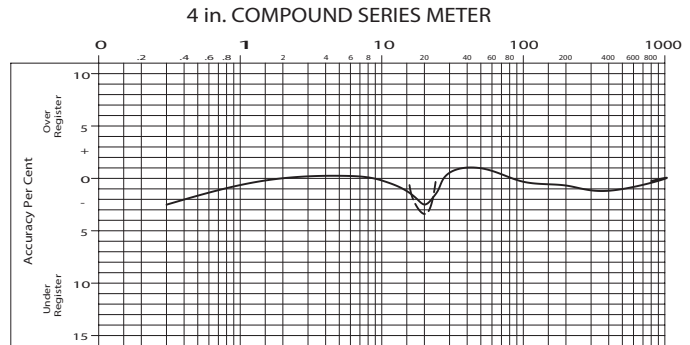
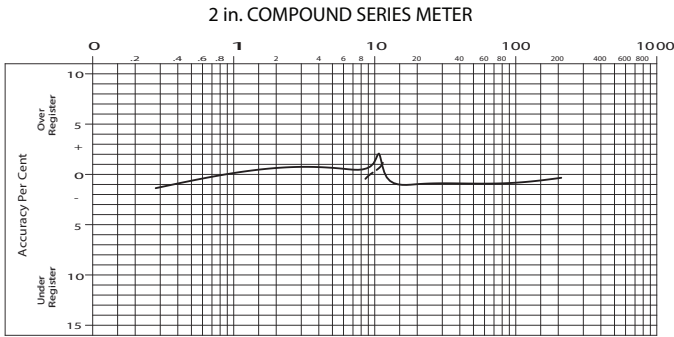


### Round Flange



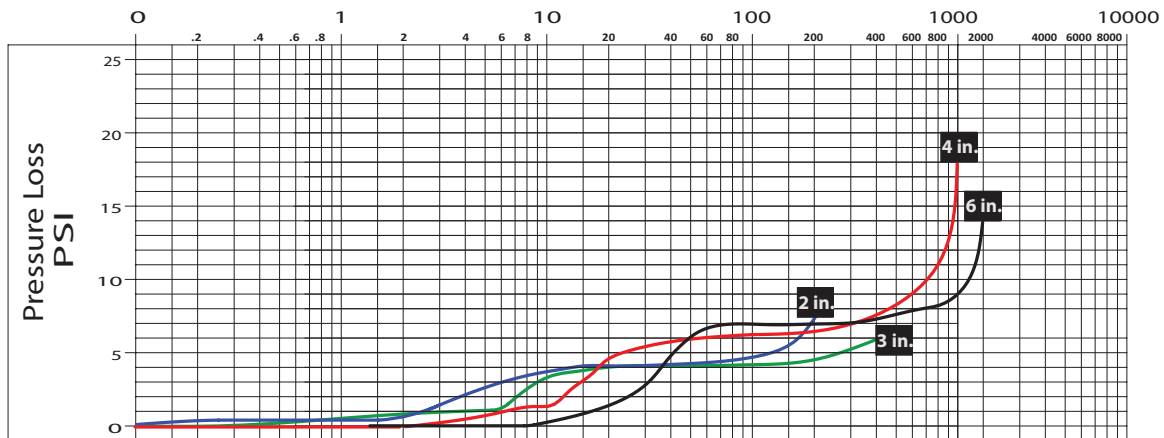
## ACCURACY CHARTS

Rate of flow in gallons per minute (gpm). Dashed line on each chart (— — —) represents crossover flow accuracy.



## PRESSURE LOSS CHART

Rate of flow in gallons per minute (gpm)



## SMART WATER IS BADGER METER

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**Badger Meter**

## ORION® Water Endpoints

### Cellular LTE-M Endpoint

#### DESCRIPTION

The ORION® Cellular LTE-M endpoint is an innovative, two-way water endpoint for smart water applications. The endpoint utilizes existing IoT (Internet of Things) cellular infrastructure to efficiently and securely deliver meter reading data to the utility via the reliable cellular network.

The Cellular endpoint is a member of the time-tested ORION family of products from Badger Meter, designed for maximum flexibility. Since 2002, the ORION product family has provided comprehensive Advanced Metering Analytics (AMA) for interval meter reading and data capture using both one-way and two-way communications.

#### FUNCTIONALITY

**Operation:** The Cellular LTE-M endpoint communicates with the encoder and captures 15-minute interval read data and meter status information. The endpoint then automatically broadcasts the information, including endpoint status information, via the cellular network to BEACON® AMA. The endpoint is designed to call in four times each workday and features a configurable schedule that enables utility customers to select call-in times that best support their processes.

**Activation:** All ORION Cellular LTE-M endpoints are shipped in an inactive, non-transmitting state. The Badger Meter IR Communication Device can be used to activate the endpoint and verify the encoder connection. Successful endpoint function can be confirmed through a web app demonstrating that communication has been verified to both the encoder and the network.

Alternatively, the endpoints offer a Smart Activation feature. After installation, the endpoint begins broadcasting data when the encoder senses the first usage of water. No field programming or special tools are required.

**Broadcast Mode:** The Cellular LTE-M endpoint broadcasts fixed network reading data through the secure cellular network within the service area. Based on the results of cellular coverage analysis, there are primary and secondary carrier options to support full network coverage. The endpoint also transmits a mobile message to facilitate troubleshooting in the field.

**Data Storage:** The endpoint stores 42 days of 15-minute data.

**Output Message:** The Cellular LTE-M endpoint broadcasts its unique serial number, meter reading data, and applicable status indicators. As an advanced data security measure, each message is securely transported to the BEACON AMA software only via private network and never over the public internet.



#### APPLICATION

**Configurations:** The Cellular LTE-M endpoint is a multi-purpose endpoint that can be deployed in indoor, outdoor and pit (non-metal pit lid) applications. The electronics and battery assembly are fully encapsulated in epoxy for environmental integrity. The endpoint is available with a connector assembly for ease of installation.

**Meter Compatibility:** When attached to a Badger Meter High Resolution Encoder, the Cellular LTE-M endpoint is compatible with all current Badger Meter Recordall® Disc, Turbo Series, Compound Series, Combo Series and Fire Service meters and assemblies, and with E-Series® Ultrasonic, E-Series® Ultrasonic Plus, and M-Series® Electromagnetic flow meters.

**Encoder Compatibility:** The Cellular LTE-M endpoint is suitable for use with Badger Meter High Resolution Encoders as well as the following Badger Meter approved three-wire encoder registers that have a manufacture date of 2005 or newer, are programmed into the AMR/AMI three-wire output mode, and have three-wires connected: Honeywell® InVISION encoder and evoQ4 meter (encoder output); Master Meter® Octave® Ultrasonic meter encoder output; Metron-Farnier Hawkeye; Mueller Systems 420 Solid State Register (SSR) LCD; Neptune® ProRead, E-Coder® and ARB-V®; and Sensus® Electronic Register encoder (ECR) and ICE.

## SPECIFICATIONS

<b>Dimensions</b>	5.125 in. (130 mm) (H)
	1.75 in. (44 mm) Diameter at top
	2.625 in. (W) x 2.875 in. (D) at base 67 mm (W) x 73 mm (D) at base
<b>Broadcast Network</b>	Primary LTE-M cellular network, NB-IoT (Narrow Band-Internet of Things)
	Mobile backup frequency is FCC-regulated 902...928 MHz frequency hopping modulation
<b>Operating Temperature Range</b>	
	<ul style="list-style-type: none"> <li>Storage, Meter Reading and Mobile Backup</li> <li>Cellular Communications</li> </ul>
<b>Humidity</b>	0%...100% condensing
<b>Battery</b>	One (1) lithium thionyl chloride D cell (nonreplaceable)

## FEATURES

<b>Smart City Ready</b>	Future-proof technology
<b>Communication Type</b>	Two-way
<b>Application Type</b>	Control/Monitor
<b>Endpoint Communication</b>	Configurable call-in schedule, up to four times each workday
<b>Reading Interval Type</b>	15-minute
<b>Encoder Compatibility</b>	Absolute
<b>Fixed Network Reading</b>	✓
<b>Cut-Wire Indication</b>	✓
<b>Encoder Error</b>	✓
<b>Low Battery Indication</b>	✓
<b>Remote Clock Synchronization</b>	✓
<b>Firmware Upgrades</b>	✓

**Construction:** All ORION LTE-M Cellular endpoints are housed in an engineered polymer enclosure with an ORION RF board, battery and antenna. To ensure long-term performance, the enclosure is fully potted to withstand harsh environments and to protect the electronics in flooded or submerged pit applications.

**Wire Connections:** ORION Cellular LTE-M endpoints are available with in-line connectors (Twist Tight® or Nicor®) for easy installation and connection to compatible encoders/meters. The endpoints are also available with flying leads for field splice connections. Other wire connection configurations may be available upon request.

**License Requirements:** ORION Cellular LTE-M and LTE endpoints comply with Part 15, Part 22, Part 24, and Part 27 of the FCC Rules. No license is required by the utility to operate an ORION meter reading system. This device complies with Industry Canada license-exempt RSS standard(s).

**Transportation:** WARNING: The operation of transmitters and receivers on airlines is strictly prohibited by the Federal Aviation Administration. As such, the shipping of radios and endpoints via air is prohibited. Please follow all Badger Meter return and/or shipping procedures to prevent exposure to liability.

**Warning:** To reduce the possibility of electrical fire and shock hazards, never connect the cable from the endpoint to any electrical supply source. The endpoint cable provides SELV low voltage limited energy power to the load and should only be connected to passive elements of a water meter register.

**Caution:** The endpoint batteries are *not* replaceable. Users should make no attempt to replace the batteries. Changes or modifications to the equipment that are not expressly approved by Badger Meter could void the user's authority to operate the equipment.

## Making Water Visible®

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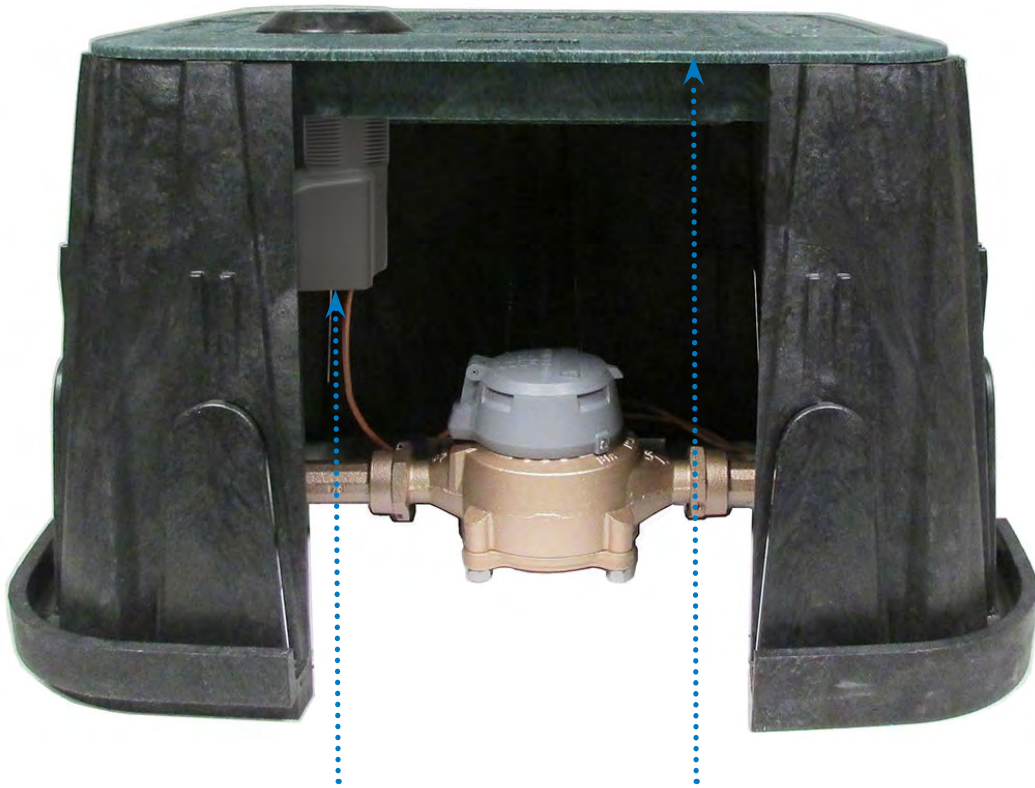
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Badger Meter

ORION® Water Endpoints



*Image shown represents ORION Cellular LTE endpoint installed, as per instructions, through non-metal pit lid*

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## SCOPE OF THIS MANUAL

This manual contains installation instructions for ORION® Cellular LTE-M, LTE, and ORION Fixed Network (SE), Migratable (ME) and Classic (CE) water endpoints.



ORION endpoints installation must comply with all applicable federal, state and local rules, regulations and codes.

Failure to read and follow these instructions can lead to misapplication or misuse of this product, resulting in personal injury and damage to equipment.

Proper performance and reliability of ORION endpoints depend upon installation in accordance with these instructions. Endpoints not properly installed may not be covered under warranty.

**WARNING:** The operation of transmitters and receivers on airlines is strictly prohibited by the Federal Aviation Administration. As such, the shipping of radios and endpoints via air is prohibited. Please follow all Badger Meter return and/or shipping procedures to prevent exposure to liability.

### Related Literature

These related documents are available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com).

- *ORION Water Endpoint Installation Kits Ordering Guide*
- *ORION Cellular CDMA Endpoints Installation Manual*
- *ORION Water Endpoint Parts List*
- *ORION Cellular INTL Installation Manual*
- *ORION Endpoint Utility Software Manual*, software version 2.7.2 or later required for LTE-M endpoints

## PRODUCT UNPACKING AND INSPECTION

Upon receipt of the product, perform the following unpacking and inspection procedures.

**NOTE:** If damage to shipping container is evident upon receipt, request the carrier to be present when product is unpacked. Carefully open the shipping package, following any instructions that may be marked on the exterior. Remove all cushioning material surrounding the product.

ORION Endpoints: Carefully remove the pre-wired ORION endpoint or ORION endpoint encoder assembly from the container and inspect for damage. Retain the contents of the installation kit for use in mounting the endpoint in the field.

Other products: Carefully lift the product from the package. Visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts or any other sign of damage that may have occurred during shipment. Retain the package and all packing material for possible use in reshipment or storage.

**NOTE:** If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

## LICENSE REQUIREMENTS

ORION Fixed Network, Migratable and Classic endpoints comply with Part 15 of FCC Rules. ORION Cellular LTE-M and LTE endpoints comply with Part 15, Part 22, Part 24, and Part 27 of FCC Rules. Operation is subject to the following conditions: (1) These devices may not cause harmful interference, and (2) these devices must accept any interference received, including interference that may cause undesired operation of the device.

In accordance with FCC Regulations, "Code of Federal Regulations" Title 47, Part 2, Subpart J, Section 1091, transmitters pass the requirements pertaining to radiation exposure. However, to avoid public exposure in excess of limits for general population (uncontrolled exposure), a 20 centimeter distance between the transmitter and the body of the user must be maintained during operation.

No FCC license is required by a utility to operate an ORION meter reading system.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

## IDENTIFICATION

### Endpoints

The ORION water endpoint is a three-wire metering device (Figure 1) for indoor/outdoor use. Each endpoint has a unique numeric serial number on the tag attached to the cable harness (wire) and etched on the endpoint housing.

Endpoints require connection to an encoder to complete the assembly. Badger Meter encoders are shown in Figure 4.

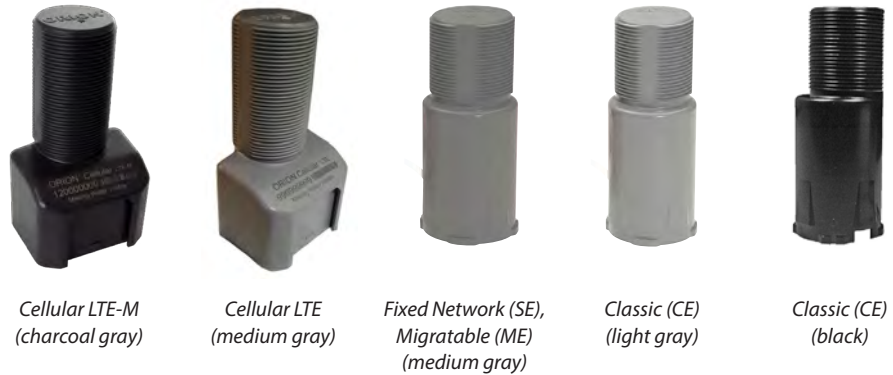


Figure 1: ORION endpoints

### Endpoint Dimensions

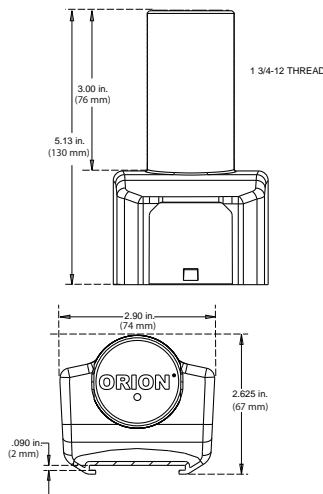


Figure 2: ORION Cellular LTE-M, LTE endpoint dimensions

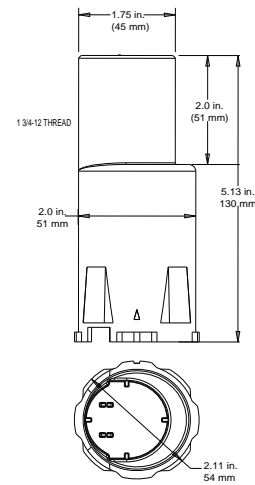


Figure 3: ORION endpoint dimensions (all except ORION Cellular LTE-M, LTE)

### Encoders/Register

The encoder connects to the endpoint to complete the assembly. Each Badger Meter encoder is identified on the face of the register with an assembly number, unit of measure and meter model. Current and legacy products are shown in Figure 4.



Figure 4: Encoders and register

## ORION CELLULAR LTE-M, LTE ENDPOINTS

This section includes configuration, encoder compatibility and installation information for ORION Cellular LTE-M and LTE endpoints.

The serial number is engraved on one side of the endpoint base, and the yellow FCC label is displayed on the other side (*Figure 5*).

ORION Cellular LTE serial numbers range upward from 11xxxxxx. ORION Cellular LTE-M serial numbers range upward from 12xxxxxx.

### Endpoint Configurations

The following configuration options are available.



Figure 5: ORION Cellular LTE-M endpoint pictured

#### Endpoint Configurations

Endpoint only with in-line connector  
(Twist Tight® or Nicor®)

Endpoint only with flying lead for field splice

Endpoint/encoder assembly  
with in-line connector

#### Encoder Connection

Connect the endpoint to an encoder using the in-line connector.  
See ["In-line Connectors"](#) on page 29.

See [Field Wiring, Encoder Connectivity and Read Resolution](#) below.

Endpoint/encoder assemblies (endpoints connected by an in-line connector to a Badger Meter encoder) are shipped from the factory, ready for installation. See [Field Wiring, Encoder Connectivity and Read Resolution](#) and ["In-line Connectors"](#) on page 29.

### Field Wiring, Encoder Connectivity and Read Resolution

ORION Cellular LTE-M and LTE endpoints with flying leads are shipped from the factory pre-programmed. Connect all three endpoint wires to an encoder to complete installation. The endpoint connection can be made to existing wires from the encoder or directly to the encoder terminal screws, depending on the application and manufacturer. Endpoints can be connected to Badger Meter high resolution encoders and E-Series Ultrasonic meters as well as a number of competitive encoders.

See the wiring chart on the next page.

**NOTE:** For instructions on field wiring using gel connectors, see ["Using Gel Caps to Connect an Encoder"](#) on page 31. Follow the manufacturer's instructions provided with the gel cap/field splice kit you are using.

ORION endpoint wires: **Red** = Power/Clock; **Black** = Ground; **Green** = Data

Endpoint Label	Encoder Connectivity	Endpoint Wire Colors			Reading Resolution	
		Red	Black	Green		
ORION Cellular LTE-M, LTE	Badger Meter HR-E LCD or HR-E encoders or E-Series Ultrasonic and Ultrasonic Plus Meter with High Resolution output	Encoder Wire/Termination Colors	Red	Black	Green	Up to nine (9) most significant digits
	Elster InVISION and ScanCoder® encoders and evoQ4 meter (encoder output)*		Green	Black	Red	Up to nine (9) most significant digits
	Metron-Farnier Hawkeye*		Red	Black	Green	Up to nine (9) most significant digits
	Mueller Systems 420 Solid State Register (SSR) LCD*		Red	Black	Green	Up to nine (9) most significant digits
	Neptune ProRead, E-coder or ARB-V*		Black	Green	Red	Up to nine (9) most significant digits
	Sensus Electronic Register encoder (ECR) or ICE*		Red	Black	Green	Up to nine (9) most significant digits
	Master Meter® Octave® Ultrasonic meter (encoder output)*		Red	Black	Green	Up to eight (8) most significant digits
	Hersey Translator*		Due to the customized, factory wire configurations of the Hersey Translator, the terminal posts may not match the ORION endpoint wire colors. Please contact Hersey for the terminal post wiring schematic of your encoders to determine how the posts correspond to ORION endpoint wires.			

**NOTE:** Competitive encoder output is determined by the encoder configuration.

\*ORION Cellular endpoints are compatible with the encoders/meters noted above that have a manufacture date within 10 years of the current date as long as the encoder has three wires connected to it and is programmed into the three-wire output mode for AMR/AMI. Encoder registers with two-wire mode of operation require programming by the Utility, including registers that support auto two- or three-wire detection systems that do not automatically switch to three-wire mode of operation when a compatible endpoint is connected for ORION connectivity.

### Installation Guidelines (Indoor, Outdoor, Pit)

Install the endpoint/encoder assembly according to these guidelines:

- **Indoor/Outdoor Installation:**
  - Indoor installation is **recommended**. Mount endpoints indoors, in the floor joist near an outside wall and away from large metal objects.
  - Outdoor installation is acceptable and may be required where signal strength does not support an indoor installation.

### IMPORTANT

- **Pit Installation:** Mount ORION Cellular LTE-M, LTE endpoints through a NON-METAL pit lid—**REQUIRED**.

**NOTE:** Endpoints not properly installed may not be covered under warranty.

### Endpoint Activation

See "[Activating Endpoints](#)" on page 11 for details of the process.



## ORION FIXED NETWORK AND MIGRATABLE ENDPOINTS

This section includes configuration, encoder compatibility and installation information for ORION Fixed Network (SE) and ORION Migratable (ME) endpoints.

The serial number is engraved on the endpoint body. Serial numbers range from 30000000 to 59999999.

### Endpoint Configurations

The following configuration options are available.



Figure 6: ORION Fixed Network (SE) and ORION Migratable (ME) endpoint

#### Endpoint Configurations

Endpoint only with in-line connector  
(Twist Tight, Nicor, 308)

Endpoint only with flying lead for field splice

Endpoint/encoder assembly with  
in-line connector

Prewired integral endpoint/encoder assembly

#### Encoder Connection

Connect the endpoint to an encoder using the in-line connector.  
See ["In-line Connectors"](#) on page 29.

See [Field Wiring, Encoder Connectivity and Read Resolution](#) below.

Endpoint/encoder assemblies (endpoints connected by an in-line connector to a Badger Meter encoder) are shipped from the factory, ready for installation.

Mount the assembly on the bayonet of the meter. See ["Integral Endpoint Installation"](#) on page 23 for details.

### Field Wiring, Encoder Connectivity and Read Resolution

ORION SE and ME endpoints with flying leads are shipped from the factory pre-programmed. Connect all three wires to an encoder to complete installation. The endpoint connection can be made to existing wires from the encoder or directly to the encoder terminal screws, depending on the application and manufacturer. Endpoints can be connected to Badger Meter high resolution encoders and E-Series Ultrasonic meters as well as a number of competitive encoders.

See the wiring chart on the next page.

**NOTE:** For instructions on field wiring using gel connectors, see ["Using Gel Caps to Connect an Encoder"](#) on page 31. Follow the manufacturer's instructions provided with the gel cap/field splice kit you are using.

ORION endpoint wires: **Red** = Power/Clock; **Black** = Ground; **Green** = Data

Endpoint Label	Encoder Connectivity	Endpoint Wire Colors			Reading Resolution
		Red	Black	Green	
ELCD or ENC	Badger Meter HR-E LCD or HR-E encoders, or E-Series Ultrasonic Meter with High Res output	Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Badger Meter ADE or E-Series Ultrasonic Meter with ADE output	Red	Black	Green	Up to six (6) most significant digits
RTR	Badger Meter RTR or E-Series Ultrasonic Meter with RTR output	Red	Black	Green	Up to seven (7) most significant digits
ADE or ENC	Elster/AMCo ScanCoder or Invision* Elster evoQ4 meter (encoder output)*	Green	Black	Red	Up to eight (8) most significant digits
C700D	Elster/AMCo C700 Digital*	Red	Black	Not used – cut green wire flush with outer sheath	Up to seven (7) most significant digits
ADE or ENC	Master Meter Octave Ultrasonic meter (encoder output)*	Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Metron Hawkeye*	Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Mueller Systems 420 Solid State Register (SSR) LCD*	Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Neptune ProRead, E-coder or ARB-V*	Black	Green	Red	Up to eight (8) most significant digits
ADE or ENC	Sensus Electronic Register encoder (ECR) or ICE*	Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Hersey Translator*	Due to the customized, factory wire configurations of the Hersey Translator, the terminal posts may not match the ORION endpoint wire colors. Please contact Hersey for the terminal post wiring schematic of your encoders to determine how the posts correspond to ORION endpoint wires.			

**NOTE:** Competitive encoder output is determined by the encoder configuration.

\*ORION SE and ME ADE or ENC endpoints are compatible with the encoders/meters noted above with a manufacture date within 10 years of the current date as long as the encoder is programmed into the three-wire output mode for AMR/AMI and has three wires connected to it. Encoder registers with two-wire mode of operation require programming by the Utility, including registers that support auto two- or three-wire detection systems that do not automatically switch to three-wire mode of operation once a compatible endpoint is connected for ORION connectivity.

### Installation Guidelines (Indoor, Outdoor, Pit)

Install the endpoint/encoder assembly according to these guidelines:

- **Indoor/Outdoor Installation:** Mount outside the building, or indoors in the floor joist near an outside wall and away from large metal objects.
- **Pit Installation, ORION SE Endpoints:** Mount through a NON-METAL pit lid—**REQUIRED**.
- **Pit Installation, ORION ME Endpoints:** Mount through a NON-METAL pit lid—**Recommended**.

**NOTE:** Endpoints not properly installed may not be covered under warranty.

### Endpoint Activation

See "[Activating Endpoints](#)" on page 11 for details of the process.

## ORION CLASSIC ENDPOINTS

This section includes configuration, encoder compatibility and installation information for ORION Classic (CE) endpoints.

The serial number is engraved on the endpoint body. Serial numbers range from 70000000 to 89999999.

### Endpoint Configurations

The following configuration options are available.



Figure 7: ORION Classic (CE) Endpoint

Endpoint Configurations	Encoder Connection
Endpoint only with in-line connector (Twist Tight, Nicor, 308)	Connect the endpoint to an encoder using the in-line connector. See <a href="#">"In-line Connectors" on page 29</a> .
Endpoint only with flying lead for field splice	See <a href="#">Field Wiring, Encoder Connectivity and Read Resolution</a> .
Endpoint/encoder assembly with in-line connector	Factory prewired endpoints, connected to a Badger Meter encoder, are shipped, ready for installation. No splicing required. See <a href="#">"Endpoint Installation Kits" on page 13</a> .
Prewired integral endpoint/encoder assembly	Mount the assembly on the bayonet of the meter. See <a href="#">"Integral Endpoint Installation" on page 23 for details</a> .

### Field Wiring, Encoder Connectivity and Read Resolution

ORION CE endpoints with flying leads are shipped from the factory pre-programmed. Connect all three wires to an encoder to complete installation. The endpoint connection can be made to existing wires from the encoder or directly to the encoder terminal screws, depending on the application and manufacturer. Endpoints can be connected to Badger Meter high resolution encoders and E-Series Ultrasonic meters as well as a number of competitive encoders as shown in the wiring chart on the next page.

**NOTE:** For instructions on field wiring using gel connectors, see ["Using Gel Caps to Connect an Encoder" on page 31](#).

ORION endpoint wires: **Red** = Power/Clock; **Black** = Ground; **Green** = Data

Endpoint Label	Encoder Connectivity	Endpoint Wire Colors			Reading Resolution
		Red	Black	Green	
ADE	Badger Meter ADE, HR-E LCD or HR-E encoders, or E-Series Ultrasonic Meter with High Res or ADE output	Red	Black	Green	Up to seven (7) most significant digits
RTR	Badger Meter RTR or E-Series Ultrasonic Meter with RTR output	Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Elster/AMCo ScanCoder or Invision	Green	Black	Red	Up to seven (7) most significant digits
UNIV*	Master Meter Octave Ultrasonic meter (encoder output)	Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Metron Hawkeye	Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Mueller Systems 420 Solid State Register (SSR) LCD	Red	Black	Green	Up to seven (7) most significant digits
ARB-V*/**	Neptune ARB-V for connectivity to ORION endpoint > serial number 80000000	Black	Green	Red	Up to seven (7) most significant digits
ARB-V*/**	Neptune ARB-V for connectivity to ORION endpoint < serial number 79999999	Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Neptune ProRead or E-coder	Black	Green	Red	Up to seven (7) most significant digits
UNIV*	Sensus Electronic Register Encoder (ECR) or ICE	Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Hersey Translator	Due to the customized, factory wire configurations of the Hersey Translator, the terminal posts may not match the ORION endpoint wire colors. Please contact Hersey for the terminal post wiring schematic of your encoders to determine how the posts correspond to ORION endpoint wires.			

**NOTE:** Competitive encoder output is determined by the encoder configuration.

\*ORION Classic UNIV and ARB-V endpoints are compatible with the encoders/meters noted above with a manufacture date within 10 years of the current date as long as the encoder is programmed into the three-wire output mode for AMR/AMI and has three wires connected to it. Encoder registers that are currently in two-wire mode of operation require programming by the Utility, including registers that support auto two- or three-wire detection systems that do not automatically switch to three-wire mode of operation once a compatible endpoint is connected for ORION connectivity.

\*\*A separate ORION CE Universal endpoint is available for connectivity to the Neptune ARB-V encoder. Make sure the ORION Classic endpoint has "ARB-V" on the harness label when wiring to an ARB-V encoder. Wiring differs depending on the serial number of the ORION endpoint you are connecting to the ARB-V encoder, so make sure to verify wiring is correct per the above chart.

### Installation Guidelines (Indoor, Outdoor, Pit)

Install the endpoint/encoder assembly according to these guidelines:

- **Indoor/Outdoor Installation:** Mount outside the building, or indoors in the floor joist, near an outside wall, and away from large metal objects.
- **Pit Installation:** Mount through a NON-METAL pit lid—**Recommended**.

**NOTE:** Endpoints not properly installed may not be covered under warranty.

### Endpoint Activation

See "Activating Endpoints" on page 11 for details of the process.

## ACTIVATING ENDPOINTS

Activation is dependent on whether the endpoint is in “Pause” (soft sleep) or “Stop” (hard sleep) mode. The ORION Endpoint Utility software can be used to identify the endpoint radio mode.

### Smart Activation for Endpoints in Pause Mode

All ORION endpoints offer a Smart Activation feature which utilizes consumption to automatically start an endpoint in Pause mode. After installation, the endpoint radio “wakes up” and begins broadcasting data when the encoder to which it is connected detects enough water usage from the register. No field programming or special tools are required, but the amount of water consumption depends on the encoder output and meter size so activation times will vary. Infrared (IR) activation tools are available for use if immediate activation is desired. See the *ORION Endpoint Utility User Manual*, available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com).

**NOTE:** Using the IR Alignment Tool (PN: 68779-001) is recommended for IR activation.

### Endpoint/Encoder Assemblies

An initial encoder read is stored by the endpoint at the time the encoder and endpoint are factory connected and the endpoint is placed in Pause mode. While in Pause mode, the endpoint monitors the encoder for consumption, checking once every fifteen minutes. When the endpoint/encoder assembly is installed and sufficient water is running through the meter, the endpoint automatically “wakes up” and transitions to its operational mode when the required consumption is registered (see table below).

Encoder Output	Dial Change Required to Activate
7-dial	Any 1 unit change in the least significant digit
8-dial	Any 5 unit change in the least significant digit
9-dial	Any 5 unit change in the least significant digit

Table 1: Activation consumption thresholds

### Endpoint Only

Like endpoint/encoder assemblies, ORION endpoint only configurations can be shipped in Pause mode. The initial encoder read will be established the first time an endpoint is field connected to an encoder.

**NOTE:** It may take up to fifteen (15) minutes for an endpoint to recognize the initial encoder read. To expedite this process, Badger Meter recommends connecting an ORION endpoint to an encoder in advance of field installation so the baseline encoder read can be captured before installing the endpoint.

After the initial encoder read is stored, the endpoint monitors the encoder for consumption, checking for a change in the encoder read once every fifteen minutes thereafter. The endpoint automatically “wakes up” and transitions to its operational mode once the required amount of consumption is registered (see [Table 1](#)).

### Activation for Endpoints in Stop Mode

Endpoints in Stop mode must be manually activated via IR communication using either the Badger Meter IR Communication Device (PN: 68891-001) or the ORION Endpoint Utility software with an ORION handheld or mobile reading system. The software can also be used to identify the endpoint radio mode. For more information, see the *ORION Endpoint Utility User Manual* for Handheld or Tablet/Laptop in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com).

## IMPORTANT

*Badger Meter IR Communication Devices that shipped prior to January 15, 2019 require a firmware update to use with ORION Cellular LTE-M endpoints. Contact Badger Meter Utility Technical Support (800-616-3837) or your National Meter Field Support Team Representative for help.*

## Confirming Installation - ORION Cellular LTE-M, LTE

Before leaving the installation site, the installer can confirm endpoints are active and communicating.

1. BEACON® AMA users can check ORION Cellular endpoint activation status with the **ORION Endpoint Status** tool. Endpoints do not need to be provisioned in BEACON AMA to display using the tool. See "[Endpoint Status Tool for ORION Cellular Endpoints](#)" on [page 27](#) for more information.
2. The IR Communication Device (PN: 68891-001) can be used to confirm endpoint activation and verify the encoder connection. Instructions are included with the device. See the **IMPORTANT** note on [page 11](#) in the [Activation for Endpoints in Stop Mode](#) section regarding required device firmware update.

Active endpoints automatically transition to the appropriate network.

## Confirming Installation - ORION SE, ME, CE

Before leaving the installation site, the installer can use an ORION handheld or ORION Mobile Reading system to confirm the endpoint is broadcasting RF data for reading. See the appropriate handheld or ORION Mobile Reading system user manuals, available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com), for more information.

## Active Endpoints

<b>ORION Cellular LTE-M, LTE</b>	When the endpoint transitions to <i>Active</i> mode, it begins the network registration process. BEACON AMA assigns a daily call-in time to the endpoint as part of this process. An active operating ORION Cellular LTE-M or LTE endpoint obtains a current encoder read every 15 minutes.
<b>ORION SE, ME and CE</b>	When the endpoint transitions to <i>On-Mobile</i> mode, it begins broadcasting its message for fixed network or mobile data collection. An active operating ORION endpoint obtains a current encoder read once an hour.

# CHANGING REGISTRATION FOR AN EXISTING ENDPOINT ASSEMBLY

## ORION Cellular LTE-M, LTE

If you change the encoder connected to an ORION Cellular LTE-M or LTE endpoint, the endpoint will recognize the new encoder, once connected, and report previous and current interval data.

## ORION SE, ME, CE

If you change the encoder connected to an ORION Fixed Network, Migratable or Classic endpoint that has previously logged historical profile data, best practice recommends following this process:

1. Extract and save the historical profile data from the endpoint. See the *ORION Endpoint Utility User Manual* for handheld or tablet/laptop, available at [www.badgermeter.com](http://www.badgermeter.com), if you need help.
2. Clear the profile data from the endpoint.
3. Connect the new encoder. Follow applicable installation instructions in this manual. The endpoint will recognize the new encoder, once connected, and record interval data.

## ENDPOINT INSTALLATION KITS

Type	For Use With	Description	Kit Part Number (PN)
REMOTE	All ORION endpoints	<a href="#">64394-032 Wall Cover Install Kit</a>	64394-032
REMOTE	64394-032, 66009-004	<a href="#">67625-001 IR Holder for Wall Cover Install Kit</a>	67625-001
REMOTE	ORION Cellular LTE-M, LTE	<a href="#">64394-031 Wall Bracket Install Kit - ORION Cellular LTE</a>	64394-031
REMOTE or PIT	SE, ME, CE	<a href="#">64394-029 Wall Bracket Install Kit - ORION</a>	64394-029
REMOTE	All ORION endpoints	<a href="#">64394-008 C-Clamp Wall Bracket Install Kit - ORION</a>	64394-008
REMOTE or PIT	All ORION endpoints	<a href="#">64394-003 Pipe Install Kit-ORION</a>	64394-003
REMOTE	All ORION endpoints	<a href="#">64394-023 Commercial Meter Mounting Bracket Install Kit-ORION</a>	64394-023
PIT	All ORION endpoints	<a href="#">64394-030 Thru-the-Lid Install Kit</a>	64394-030
PIT	ORION SE, ME, CE	<a href="#">64394-009 Integrated Pit Lid Hanger Install Kit</a>	64394-009

Instructions for using each installation kit follow in this section.

Refer to the *ORION Water Endpoints Installation Kit Ordering Guide* and the *ORION Water Endpoint Parts List* for individual endpoint kit components. Both documents are available in the *Resource Library* at [www.badgermeter.com](http://www.badgermeter.com).

## 64394-032 WALL COVER INSTALL KIT

**Wall Cover Install Kit PN: 64394-032** is recommended for proper mounting of an endpoint for indoor and outdoor remote applications, and is designed to provide an environmentally protected area for gel splice connections (if needed). Outside dimensions are shown in [Figure 9](#).

**For use with:** All ORION endpoints



Figure 8: 64394-032 wall cover enclosure

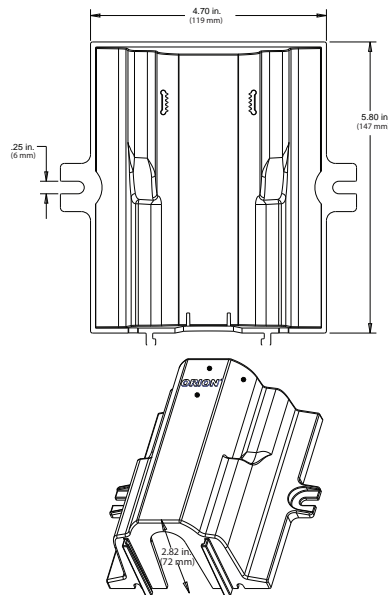


Figure 9: 64394-032 Outside dimensions

To install an ORION endpoint, follow these steps.

1. Choose an appropriate installation location within the limits of the endpoint cable/connector harness.
2. Verify the proper orientation ([Figure 10](#)). The bottom of the enclosure has an opening for IR programming. The opening gives access to the endpoint IR LED port ([Figure 13](#) and [Figure 14](#)) without having to disassemble the unit.
3. Place the endpoint into the wall cover enclosure, antenna (threaded portion) up.

**Cellular LTE-M, LTE endpoints:** [Figure 10](#) shows the correct endpoint placement.

**All other ORION endpoints:** Make sure the flat side of the endpoint faces in and fits up against the inside wall of the enclosure.

- NOTE:** If double-sided tape is included in the kit, you can use the tape to temporarily secure the endpoint inside the enclosure before mounting.
4. Position the endpoint cable.
    - Route the endpoint cable through the cutout on the bottom of the wall cover.

**NOTE:** If you are drilling a hole through the wall behind the enclosure for the endpoint cable, the cable does not need to route through the cutout at the bottom.

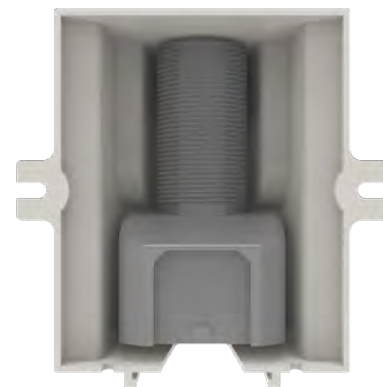


Figure 10: ORION Cellular LTE endpoint orientation



- If the endpoint has an in-line connector, place the connector *inside* with the endpoint and route the connector cable through the cutout on the bottom.

**NOTE:** If used, place gel splice connections inside the enclosure.

**NOTE:** See "[Outdoor Installation for Endpoint with In-line Connector](#)" on [page 16](#) for additional information about installing the endpoint outdoors with the wall cover enclosure.

5. Make sure the wall cover is properly positioned, with the endpoint antenna straight up and the endpoint IR LED port visible through the bottom opening.
6. Secure the wall cover using customer-supplied screws. Installation is complete.



Figure 11: 64394-032 installation complete

## 67625-001 IR Holder for Wall Cover Install Kit

**IR Holder for Wall Cover Install Kit (PN: 67625-001)** is an optional part which can be ordered for use with the Wall Cover install kit (**64394-032**). The IR holder bracket fits on the wall cover adapter rails to hold an IR programming head in place.

1. Place the optical head of an IR programming cable into the holder. The nubs on the optical head fit into the cutouts on the holder.



(PN: 67625-001) IR holder bracket



Optical head of the IR programming cable



Optical head in the bracket

Figure 12: IR holder and programming cable optical head

2. Slide the bracket into the adapter rails at the bottom of the wall cover enclosure (64394-032) so the IR optical head is aligned with the endpoint LED port. See [Figure 13](#) and [Figure 14](#).
3. Connect the IR programming cable to a Badger Meter mobile reading device to perform IR functions. Refer to the mobile reading device user manual for IR programming instructions.



Figure 13: IR LED port ORION Cellular LTE endpoint (bottom up view)



Figure 14: IR LED port ORION ME endpoint (bottom up view)

## Outdoor Installation for Endpoint with In-line Connector

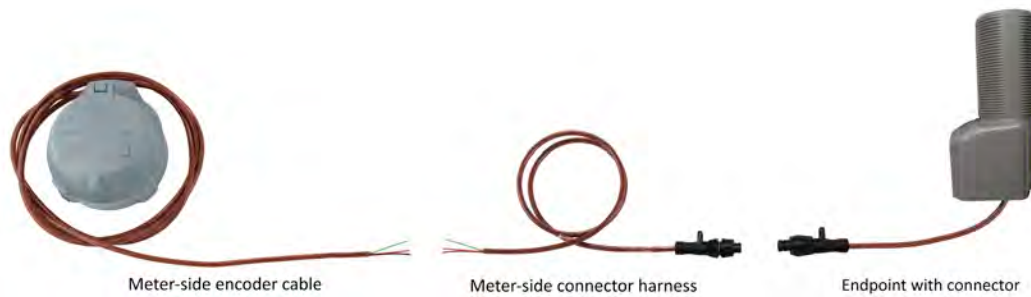


Figure 15: Outdoor endpoint installation

Meter-side connector harnesses are available with Twist Tight and Nicor connectors in the following lengths.

### Harness with Twist Tight Connector

Part Number	Harness Lead Length
68307-006	10 ft harness
68307-003	25 ft harness

### Harness with Nicor Connector

Part Number	Harness Lead Length
66488-006	10 ft harness
66488-003	25 ft harness

Follow these recommended installation steps for an outdoor endpoint installation and refer to the image in [Figure 15](#).

**NOTE:** The Twist Tight connector is pictured above. The installation steps also apply to endpoints with Nicor and 308 connectors as well. See ["In-line Connectors"](#) on page 29 for more information.

1. Choose an appropriate outdoor location, within the limits of the connector harness, and mount the endpoint.

**NOTE:** If using a wall cover enclosure, see ["64394-032 Wall Cover Install Kit"](#) on page 14 for additional information on mounting.

2. Join the endpoint connector with the connector mate of the encoder cable.  
If you are using a wall cover enclosure, place the in-line connector inside the enclosure.
3. Drill a small hole in the wall of the house/structure to accommodate the endpoint/encoder cable.
4. Pass the cable end with the flying leads through the wall of the house.
5. Inside the house, connect the encoder wires. Depending on the encoder connection, use a field splice kit or connect the wires directly to the encoder terminal screws. See the appropriate wiring charts in this manual if you need help.

**NOTE:** Refer to the *Field Splice Kit Application Data Sheet*, available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com), for field splice instructions.

When the meter, encoder and endpoint are installed and connected, installation is complete.

## 64394-031 WALL BRACKET INSTALL KIT - ORION CELLULAR LTE

**Wall Bracket Kit PN: 64394-031** ([Figure 16](#)) is available for mounting an ORION Cellular LTE-M or LTE endpoint.

**For use with:** ORION Cellular LTE-M, LTE endpoints only

The bracket clips into the slot on the endpoint and can be used to attach the endpoint to a wall. A screwdriver and two (2) customer-supplied screws are required. Drill pilot holes for the screws (**recommended**) before attaching the wall bracket and endpoint.

The bracket can also be used to mount the endpoint to a pole with cable ties (customer supplied) threaded through the bracket openings.



Figure 16: 64394-031

## 64394-029 WALL BRACKET INSTALL KIT

**Wall Bracket Install Kit (PN: 64394-029)** can be used to securely install an ORION endpoint. For non-submerged indoor and outdoor applications, the bracket can be used in any indoor or outdoor *nonmetallic* joist, wall or pit application.

**For use with:** All ORION endpoints **except** ORION Cellular LTE-M, LTE endpoints

You will need the following items.

- Wall Bracket install kit
- Two customer-supplied screws
- Screwdriver and drill

To connect the bracket to the endpoint and mount, follow these steps.

1. Using the screw holes of the wall bracket as a guide, drill two pilot holes on the joist or wall where the bracket is to be installed.



Figure 17: Endpoint wall bracket

### Connect the endpoint

2. Carefully slide the encoder cable harness through the slit in the bracket with the screw holes at the bottom (Figure 18).
3. Locate the small triangle and hole underneath the bracket (Figure 19). The triangle is used to align the bracket with the endpoint.



Figure 18: Threading cable harness

4. Locate the small raised triangle at the bottom of the ORION endpoint housing (Figure 20).



Figure 19: Aligning triangle



Figure 20: Housing triangle

5. Align the endpoint and bracket triangles. Then push the bracket and endpoint together. This should be easy.
6. With one hand holding the bracket, use the other hand to twist the endpoint approximately 1/4 turn clockwise until you feel it lock into place (Figure 22).

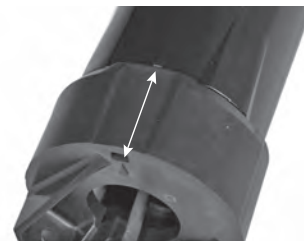


Figure 21: Align triangles and push bracket onto endpoint

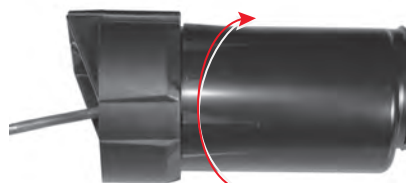


Figure 22: Twist endpoint to lock

### Mount the endpoint assembly

7. Make sure the endpoint antenna is upright ([Figure 23](#)) when you place it into its final position.
8. Using two customer-supplied screws, secure the bracket assembly using the pilot holes you drilled in Step 1.

Installation is complete.



Figure 23: Endpoint positioning

## 64394-008 C-CLAMP WALL BRACKET INSTALL KIT

**C-Clamp Wall Bracket Install Kit (PN: 64394-008)** can be used when mounting an endpoint to a wall.

**For use with:** All ORION endpoints. For ORION Cellular endpoints, the kit can be used for indoor and remote installations, but should NOT be used in a vault.

To mount an ORION endpoint using this kit, follow these steps and refer to [Figure 24](#).

1. Choose an appropriate location on the wall for the endpoint. Using an appropriate size fastener and washer (customer-supplied), mount the C-clamp to the wall through the opening at the back. When mounting in a vault, install the C-clamp close to the top to prevent damage when accessing the meter is required.
- NOTE:** ORION Cellular endpoints should NOT be mounted in a vault.
2. Place the neoprene spacer from the installation kit around the endpoint, approximately 1/2 inch (13 mm) from the top of the endpoint. Hold the neoprene spacer in place with your fingers.
  3. Thread the lock nut onto the endpoint until it makes contact with the neoprene spacer.
  4. Insert the endpoint into the C-clamp, making sure the neoprene spacer stays inside the C-clamp.
  5. Close the C-clamp and lock it in place so that it closes over the neoprene spacer and securely holds the endpoint as shown in [Figure 24](#).

Installation is complete.

**NOTE:** ORION radio endpoints perform best with a clear line of sight. Performance varies with installation.



C-Clamp



C-Clamp around endpoint

Figure 24: C-Clamp and placement

## 64394-003 PIPE INSTALL KIT

**Pipe Install Kit (PN: 64394-003)** with mounting support bracket (*Figure 25*) is designed for pipe installations on a 3/8, 5/8 and 1/2 inch rebar or 1/2 inch schedule 40 PVC pipe.

**For use with:** All ORION endpoints. For ORION Cellular endpoints, the kit can be used for indoor and remote installations, but should NOT be used under a pit lid.

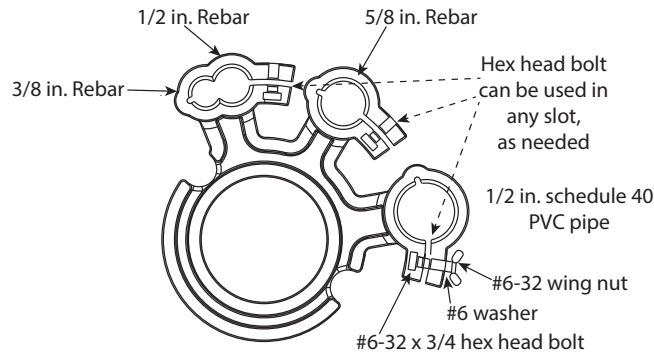


Figure 25: Support bracket (knuckles)

To install an ORION endpoint using the mounting support bracket, follow these steps.

1. Drive rebar or stake into the ground, or use a free-standing pipe or rebar.

### **CAUTION**

**DRIVE REBAR OR STAKE INTO THE GROUND PRIOR TO ATTACHING THE ENDPOINT TO AVOID DAMAGE.**

2. Slide the mounting support bracket on the rebar/stake/pipe and secure using the enclosed washer, wing nut and hex head bolt provided with the bracket. The hex head bolt fits in any slot.

**NOTE:** The bracket can be installed with either side up, but installing with the smooth side up is recommended if installed outdoors to avoid potential rainwater build up.

3. Insert the threaded end of the endpoint up through the bottom of the bracket opening. Then thread the lock nut onto the endpoint and tighten the lock nut to secure the bracket (*Figure 26*). For pit installations, mount the endpoint a maximum of 1...2 inches (25...51 mm) below the pit lid. (NOT for ORION Cellular endpoints!)
4. Install the bracket anywhere along the length of the endpoint threaded end, as long as it is at least 0.5 in. (13 mm) below the top where the antenna is located. Installation is complete.

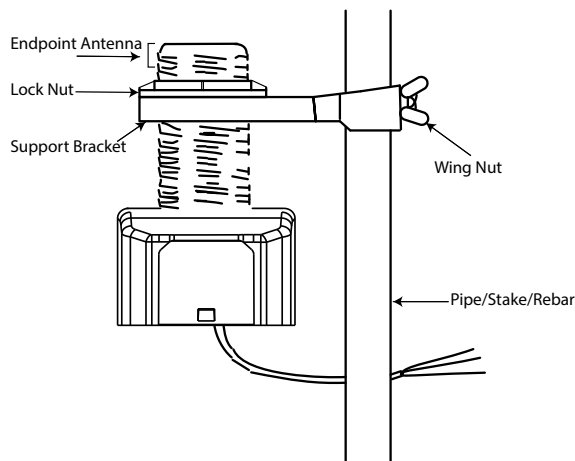


Figure 26: Pipe installation kit with ORION Cellular LTE-M, LTE endpoints

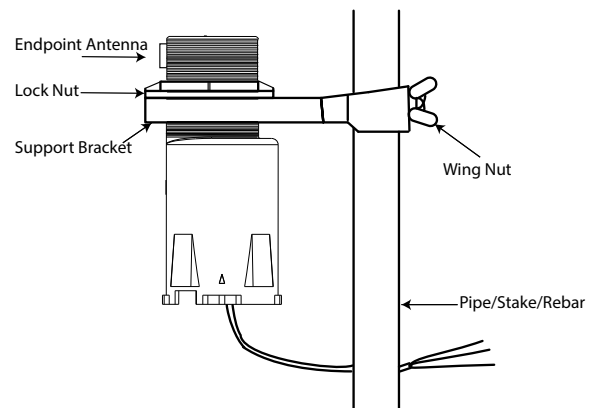


Figure 27: Pipe installation kit with ORION SE, ME, CE endpoints

## 64394-023 COMMERCIAL METER MOUNTING BRACKET INSTALL KIT

**Commercial Meter Mounting Bracket Install Kit (PN: 64394-023)** is designed for use with most Badger Meter Turbo, Compound Series and Fire Service Disc bypass meter lines. Use the kit to securely mount an ORION endpoint to a meter.

**For use with:** All ORION endpoints

You will need a torque wrench set for installation. The kit components are:

- Stainless steel mounting bracket PN: 66360-001
- Lock nut PN: 62825-001

To install the bracket, follow these steps:



Figure 28: Stainless steel mounting bracket



Figure 29: Lock nut with gussets

1. Verify that the water is turned off.
2. Slip the mounting bracket over the top of the ORION endpoint, as shown.
3. Screw the lock nut from the kit onto the threaded section of the endpoint. Hand tighten the lock nut to secure the bracket.
4. At the meter, unscrew the head assembly bolt at the location where you plan to mount the endpoint.
5. Position the bracket, reinsert the bolt and hand tighten it.

**NOTE:** For visual clarity, the photo in [Figure 32](#) shows the bracket without the endpoint attached.



Figure 30: Mounting bracket over endpoint



Figure 31: Tighten lock nut



Figure 32: Bracket attached with bolt

6. Position the bracket so the endpoint is as far from the meter as possible to provide adequate space for the endpoint signal to propagate ([Figure 33](#)).

### IMPORTANT

*If two ORION endpoints are required for a fire series assembly or a compound meter application, mount the endpoints on OPPOSITE sides of the meter head assembly.*

7. With the torque wrench, tighten the bolt as indicated in the chart that follows.



Figure 33: Endpoint connected to meter with bracket

Meter	Ft-lb		Meter	Ft-lb
2-inch Turbo Series Meter	10.9		2-inch Compound Series Meter	16.7
3-inch Turbo Series Meter	37.5		3-inch Compound Series Meter	33.3
4-inch Turbo Series Meter	37.5		4-inch Compound Series Meter	33.3
6-inch Turbo Series Meter	37.5		6-inch Compound Series Meter	33.3
			Heavy Duty Bypass M70	21.0
			Heavy Duty Bypass M170	50.0

Installation is complete. Turn the water back on.

## 64394-030 THRU-THE-LID INSTALL KIT

The ADA-compliant **Thru-the-Lid Install Kit (PN: 64394-030)** is designed for use with a NON-METAL PIT LID, 2 inches (51 mm) maximum thickness, with a standard hole diameter of 1-7/8 inches (48 mm).

**For use with:** All ORION endpoints

To install an endpoint through a non-metal pit lid, follow these steps and refer to [Figure 34](#).

1. Screw the lock nut (large diameter side up) onto the endpoint tube threads as shown.
2. Insert the endpoint tube through the bottom of the pit lid.
3. Screw the top nut onto the endpoint tube threads.
4. Tighten the lock nut and top nut to make sure the endpoint is secure.

Installation is complete.

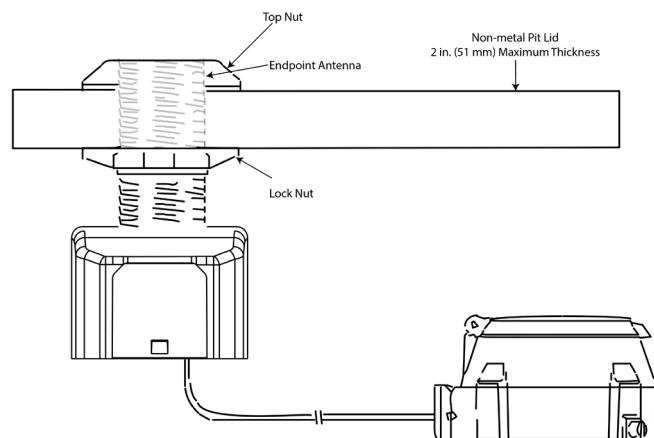


Figure 34: ORION LTE-M endpoint thru non-metal pit lid

**NOTE:** When installing an endpoint through a thick lid, you can use a **Pit Tube Extender (PN: 67025-001)**. The Extender requires a 2 inch (51 mm) diameter hole. It screws onto the threaded portion of the endpoint. Radio frequency (RF) performance may be reduced when using the Pit Tube Extender.



Figure 35: Endpoint pit tube extender – NOT for ORION Cellular endpoints

**Do not use Pit Tube Extender with ORION Cellular endpoints.**

## 64394-009 INTEGRATED PIT LID HANGER INSTALL KIT

**Integrated Pit Lid Hanger Install Kit (PN: 64394-009)** is designed for ORION endpoints installed below composite and plastic lids that have an integrated AMR/AMI endpoint hanger.

**For use with:** ORION Fixed Network, Migratable, and Classic endpoints

To install an ORION endpoint with this kit, follow these steps and refer to [Figure 36](#).

1. Thread the lock nut onto the top of the ORION endpoint as shown.
2. Slide the endpoint into the lid bracket.
3. Tighten the lock nut so that the endpoint is held firmly in place.

Installation is complete.

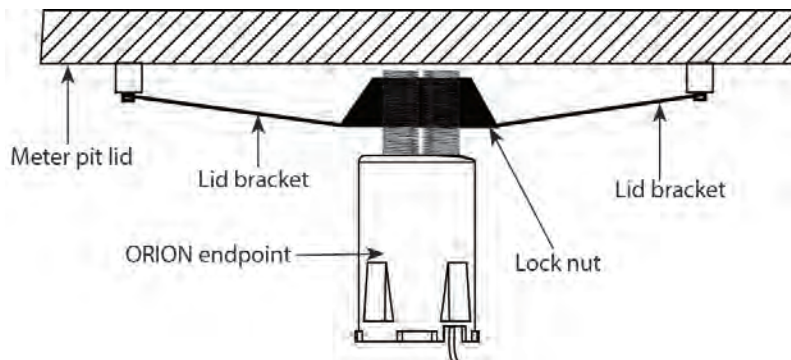


Figure 36: Integrated pit lid hanger installation



## INTEGRAL ENDPOINT INSTALLATION

ORION SE, ME and CE endpoints are available in an integral configuration in which the endpoint and encoder are connected in one assembly. There are two types of integral configurations. This section includes instructions for mounting an integral endpoint on a meter and also provides instructions for disassembling both types of integrals.

### Mounting an Integral Endpoint on the Meter

An integral endpoint can be installed on any Badger Meter Disc, Turbo, or Compound Series meter. Both integral configuration styles mount to the meter the same way, by placing the assembly onto the bayonet of the meter and rotating it into its locking position. See [Figure 37](#).

1. Loosen the security screw on the endpoint encoder assembly.
2. Mount the assembly housing on the meter bayonet.
3. Turn the assembly clockwise 1/4 turn to lock the assembly into place on the meter.
4. After the assembly is mounted on the meter, tighten the security screw to secure the assembly to the register.

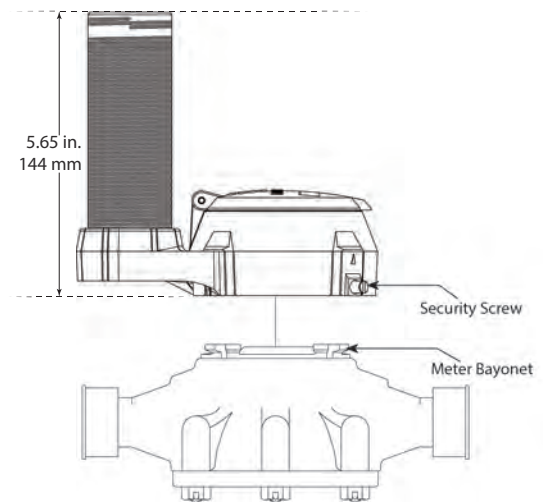


Figure 37: Integral assembly on meter

### HR-E LCD Encoder Integral Configuration



Figure 38: HR-E LCD Integral

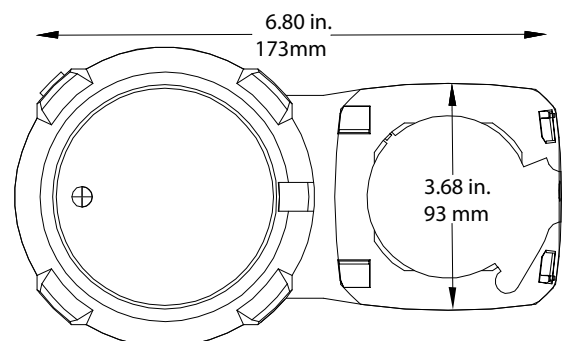


Figure 39: HR-E LCD Integral base dimensions

### Configuration

The ORION HR-E LCD Integral Assembly is shown in [Figure 38](#). In an HR-E LCD integral assembly, the endpoint is factory-wired to the encoder and both are mounted to the shroud bracket. Endpoints are available with a 3-foot or 10-foot wire that is wrapped around the body of the endpoint. The endpoint wire is contained under a removable cover. With this option, the endpoint can be removed from the housing, if necessary, and mounted away from the encoder. The endpoint can also be returned to the housing assembly without damage.

## Removing the Endpoint from the Assembly Housing

**NOTE:** The endpoint cover connects to the base with three tabs: one in the back and two in the front (closest to the encoder.)

1. Remove the integral assembly from the meter.
  - Remove the security screw at the base of the assembly. Keep the screw for remounting the encoder assembly.
  - Turn the assembly (as one piece) 1/4 turn, counter-clockwise and lift the assembly off the meter.
2. With the endpoint side of the assembly facing toward you, grasp the bottom of the cover with one hand on either side of the endpoint cover base.
3. With your thumbs, push the cover at the center of the base to release the back tab (*Figure 40*). Then lift up to release the front tabs and remove the cover from the base.



Figure 40: Push at center of endpoint base to release the cover



Figure 41: Cover tabs released, endpoint wire exposed

4. Twist the endpoint to release it from the housing and uncoil the wire.
5. Mount the endpoint according to recommended installation guidelines within the limits of the endpoint wire.

**NOTE:** The encoder cannot be removed from the assembly housing.

6. Remount the encoder (in the assembly housing) onto the meter bayonet.
  - Turn the assembly clockwise 1/4 turn so it locks in place.
  - Replace and tighten the security screw.

## Reattaching the Endpoint

To reattach the endpoint to the assembly housing, follow these steps.

1. Wrap the wire around the endpoint. Make sure the wire is wrapped tightly and neatly around the endpoint or the cover will not fit.
2. Insert the endpoint base into the shroud bracket.  
Adjust the endpoint so the tabs on the endpoint base align with the openings on the bracket, and the wire at the endpoint base fits into the opening at the back of the bracket. See *Figure 42*.
3. When the endpoint is correctly inserted into the bracket opening, turn the endpoint clockwise to make sure it is secure.
4. Place the cover over the endpoint, with the single tab at the back.
5. When the cover is almost completely on, align the two front tabs with the openings on the shroud bracket (closest to the encoder) and then push down until all three tabs click into place.



Figure 42: Integral bracket without endpoint

## HR-E Encoder Integral Configuration



Figure 43: HR-E Integral assembly with additional wire

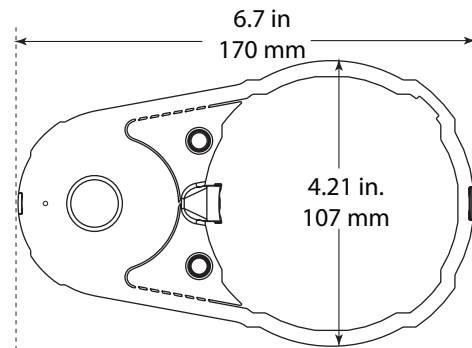


Figure 44: HR-E Integral base dimensions

### Configuration

The ORION HR-E Integral Assembly is shown in [Figure 43](#). The endpoint has a 3-foot length of wire stored inside the bottom of the assembly housing. The endpoint can be removed from the housing, if necessary, and mounted away from the encoder.

**NOTE:** Once removed, the endpoint CANNOT be reassembled into an integral configuration.

### Removing the Endpoint from the Assembly Housing

## IMPORTANT

Removing the endpoint from the assembly housing can only be done once with this integral configuration.

### CAUTION

**PRIOR TO DISASSEMBLING AN INTEGRAL ENDPOINT, VERIFY THAT THE ENDPOINT HAS THREE FEET OF WIRE PACKAGED WITH THE ASSEMBLY. CHECK THE SERIAL NUMBER LABEL ON THE SIDE OF THE INTEGRAL BRACKET TO MAKE SURE IT INDICATES "3 FT WIRE." DO NOT CONTINUE WITH THE STEPS LISTED BELOW IF YOUR INTEGRAL ENDPOINT DOES NOT HAVE THIS DESCRIPTION ON THE SERIAL NUMBER LABEL, AS ENDPOINT DAMAGE WILL OCCUR.**

1. Remove the assembly from the meter.
  - Remove the security screw at the base of the assembly. Keep the screw for remounting the encoder assembly.
  - Turn the assembly (as one piece) 1/4 turn, counter-clockwise.
  - Lift the assembly off the meter.



Figure 45: Remove assembly from meter

2. Remove the endpoint wire under the breakaway plate.
  - Turn the endpoint/encoder assembly over.
  - Grasp the pull tab located to the right of the encoder seal screw with pliers (*Figure 46*). Then pull and remove the bottom breakaway plate from the housing to expose the wire. The plate is scored to facilitate removal.
  - With your fingers, remove the three feet of endpoint wire from the housing.

**NOTE:** The wire is attached to the endpoint.



Figure 46: Pull tab to remove the breakaway plate

3. Rotate the endpoint counter-clockwise 1/4 turn and pull the endpoint and endpoint wire out from the assembly base.



Figure 47: Rotate endpoint clockwise



Figure 48: Pull endpoint away from base

4. Mount the endpoint according to recommended installation guidelines within the limits of the endpoint wire.

**NOTE:** The encoder cannot be removed from the assembly housing.
5. Remount the encoder (in the assembly housing) onto the meter bayonet.
  - Turn the assembly clockwise 1/4 turn so it locks in place.
  - Replace and tighten the security screw.

## ENDPOINT STATUS TOOL FOR ORION CELLULAR ENDPOINTS

BEACON® AMA users can check the activation status of ORION Cellular endpoints with the ORION Endpoint Status tool. Several minutes after installation, the tool displays ORION Cellular endpoints assigned to you. Endpoints do not need to be provisioned in BEACON AMA to display.

The browser-based tool can be viewed on a computer or mobile device. An Internet connection is required. Follow these steps to use the ORION Endpoint Status tool.

1. Go to <https://orionstatus.beaconama.net>.
2. Sign in with your BEACON email address and password (Figure 49).

Result: The ORION Endpoint Status screen (Figure 50) opens showing the list of activated Cellular endpoints.

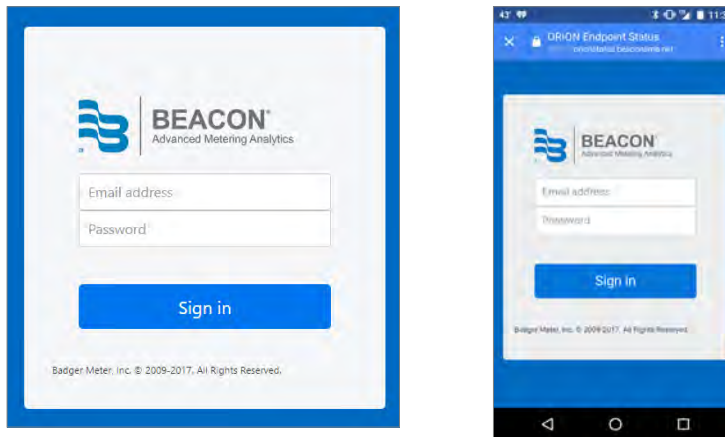


Figure 49: Tool sign in screen - computer and mobile

**NOTE:** It can take several minutes for a newly installed endpoint to communicate with the cellular network and display on the ORION Endpoint Status screen.

3. View the endpoint list.
 

The list displays endpoint serial number, activation time, and activation signal strength. The current endpoint and meter status are also shown. Endpoints are listed according to their activation time, with the most recent endpoint activation times listed first (top of list).

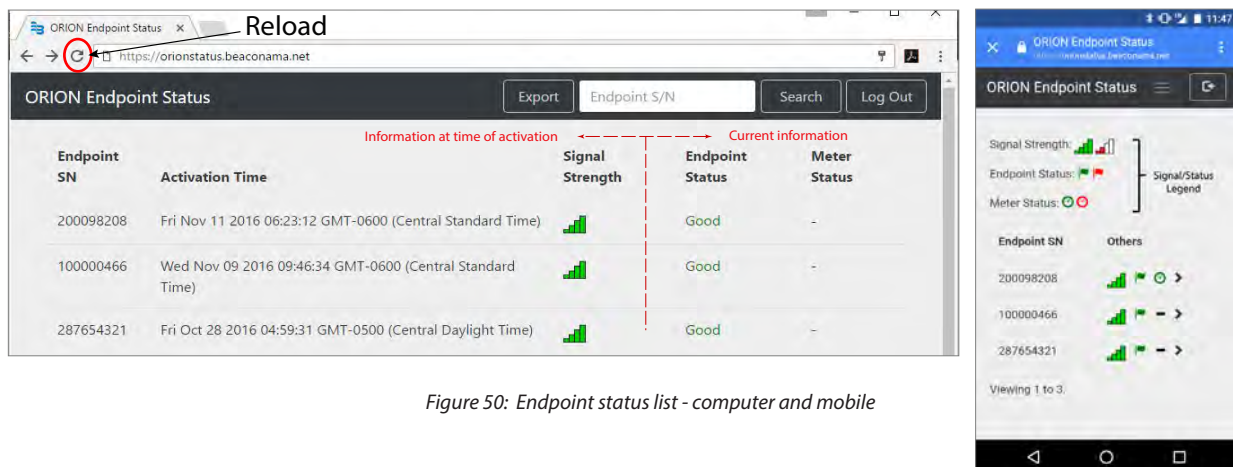



Figure 50: Endpoint status list - computer and mobile

You can also **Export** endpoints into a program such as Excel®, or **Search** to find a specific endpoint.

4. To see any new endpoints that have been added since logging in, reload/refresh the browser window. On a computer, use the reload button  at the top left of the screen. On a mobile device, swipe down the screen to refresh.

- Select an endpoint in the list to see the endpoint raw read. A window opens, like the examples shown in [Figure 51](#).

**NOTE:** Information in the first three fields is captured at the time of activation. Information in the next three fields is current information.

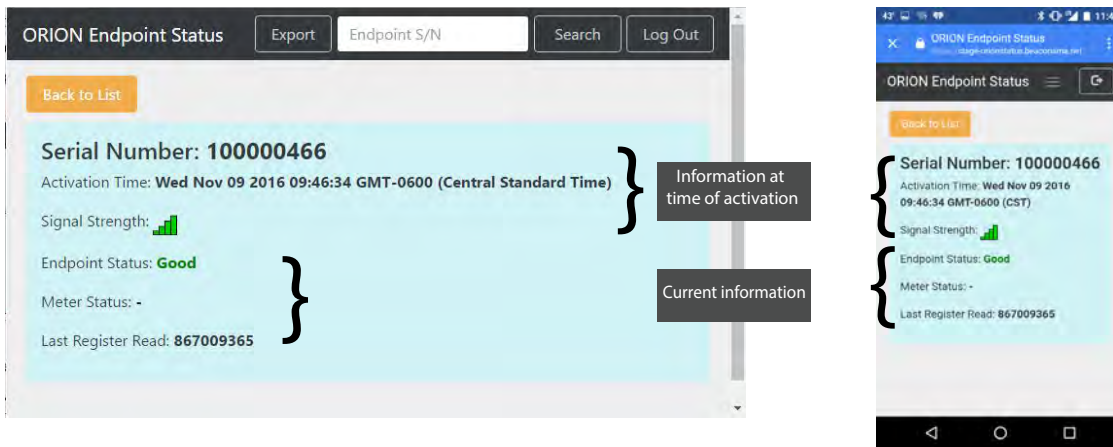


Figure 51: Status detail screen - computer and mobile

The *Endpoint Status* field displays one of the following:

Endpoint Status	Response
Good	No response required.
Endpoint Tamper or Encoder Error	Incomplete information. This message updates at the next scheduled communication.
Endpoint Tamper	Endpoint* requires attention.
Encoder Error	Encoder* requires attention.


\*For additional endpoint information, see the ORION Endpoint Utility User Manual for handheld or laptop. For additional encoder information, see the appropriate encoder user manual. All documents are available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com).

The *Meter Status* field displays one of the following:

**NOTE:** *Meter Status* only displays for E-Series Ultrasonic meters. For other meters, the field will have a dash mark (-).

Meter Status	Response
Good	No response required.
Sensor Error	Meter* requires attention.

\*For additional information, see the appropriate E-Series Ultrasonic Meter User Manual, available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com).

- Tap/click **Back to List** to return to the previous screen.
- When finished using the tool, tap the **Log Out** button or  on a mobile device.

## IN-LINE CONNECTORS

In-line connectors are used to allow AMA/AMR/AMI device connectivity without the need for a field splice kit. There are three available in-line connector types: Twist Tight, 308, Nicor.

When ordered separately, the endpoint and encoder (or electronic meter) in-line connectors come with removable caps, which can be removed in the field before joining the connector ends. With the proper orientation, the connector ends go together easily. No tools are necessary.

**NOTE:** Additional removable caps are available for order. Part numbers are listed in [Figure 53](#), [Figure 55](#), and [Figure 57](#).

### ⚠ CAUTION

**BEFORE JOINING, MAKE SURE ALL SURFACES OF THE CONNECTOR ENDS ARE CLEAN, DRY, AND FREE OF ANY DEBRIS OR DIRT. THIS STEP IS ESSENTIAL TO MAKE SURE THE CONNECTOR REMAINS WATER TIGHT AND SUBMERSIBLE.**

### Twist Tight Connector

To use the Twist Tight connector, follow these steps and refer to [Figure 53](#).

1. Remove the protective caps. Twist the rotating collar on each connector counter clockwise (left) to loosen and remove the cap.
2. Align the notches inside each connector and push the ends together until the endpoint-side is fully seated in the encoder-side connector.



Figure 52: Twist Tight in-line connector



Figure 53: Twist Tight connector ends and caps - close up view

3. On the endpoint-side connector, twist the rotating collar clockwise (right) until the ends are tightly connected. When tightly connected, the tabs at the top of the connectors should be aligned and the red O ring on the encoder-side connector should NOT be visible.

### IMPORTANT

Do NOT use tools to tighten the connector ends. Hand tighten only.

### Twist Tight Extension Harness

An extension harness connects in-line between the meter- and endpoint-side connectors. Extension harnesses are available in the lengths shown, with and without a cable shield. The cable shield offers extra protection for harsh environments such as pit installations.

Part Number Harness only	Extension Harness Length	Part Number Harness with Cable Shield
68307-009	5 ft extension	68883-002
68307-010	10 ft extension	68883-004

**NOTE:** For more information about the Twist Tight connector, refer to the *Twist Tight In-line Connector Assembly Application Data Sheet*, available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com).

## 308 Connector

To use the 308 connector, follow these steps and refer to [Figure 55](#).

1. Squeeze the notched area and pull to remove the cap(s).
2. Align the notches inside each connector and push the ends together. You will hear a “click” when the connector ends are firmly seated and secure.



Figure 54: 308 in-line connector



Figure 55: 308 connector ends and caps - close up view

**NOTE:** For additional information, refer to the *308 In-line Connector Assembly Application Data Sheet*, available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com).

## Nicor Connector

To use the Nicor connector, follow these steps and refer to [Figure 57](#).

1. Pull the cap(s) straight off to remove.
2. Locate the arrow on each connector.  
With the arrows pointed toward each other, push the ends together until the encoder-side connector is fully seated into the endpoint-side connector. There should be no visible gap.



Figure 56: Nicor in-line connector



Figure 57: Nicor connector ends and caps - close up view

### Nicor Extension Harness

An extension harness connects in-line between the meter- and endpoint-side connectors. An extension harness in this lead length is available with the Nicor connector.

Part Number	Extension Harness Length
66488-024	10 ft extension



## USING GEL CAPS TO CONNECT AN ENCODER

For those connections that are not factory wired or equipped with in-line connectors, follow these guidelines for using gel caps when splicing is required, either for installation or to fix a connection after a tamper. Refer to the wiring charts for each ORION endpoint, starting on [page 6](#).

### NOTE:

- For pit environments, splice connections require a field splice kit (**PN: 62084-001**), which can be ordered separately. Refer to *Field Splice Kit for Badger Meter AMR/AMI Products*, available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com).
- For all installations, excess wire should be coiled and cable tied to avoid any damage.

### Required Tools

Splicing Tools (Customer Supplied)	Badger Meter Part Number
• Parallel Pliers	59983-001
• Coax Wire Stripper	59989-001
• Diagonal Cutting Pliers	n/a

### Connecting an Encoder Using Gel Caps

Follow these steps when using Badger Meter supplied gel caps.

1. To connect an encoder with existing wires to an ORION endpoint, strip approximately 1-1/2 inches (38 mm) of outer insulation sheath from the encoder and endpoint cables using a coax wire stripping tool. We recommend using the Badger Meter Coax Wire Stripper (**PN: 59989-001**).

#### **CAUTION**

**USE CAUTION WHEN REMOVING THE OUTER SHEATH SO THAT THE INNER SIGNAL WIRE INSULATION IS NOT NICKED OR DAMAGED.**

2. Unwind the outer foil shield from the endpoint cable and cut it off even with the outer sheath using diagonal cutting pliers.
3. Connect the ORION endpoint to an approved encoder. Verify the endpoint serial number prior to completing the wiring setup.
  - Connect the encoder cable wires to the ORION endpoint wires using the insulation gel caps provided in the installation kit. Refer to the wiring charts for the endpoint type starting on [page 6](#) and determine which wires need to be connected to complete an installation.

**NOTE:** The terminal posts and wire colors may not match.

#### **CAUTION**

**DO NOT STRIP ANY INSULATION FROM THE ENDS OF THE WIRES BEFORE YOU PUSH THEM INTO THE GEL CAP.**

- Insert the wires from each cable end as far as possible into the gel cap. See [Figure 58: Wires in gel cap](#).



Figure 58: Wires in gel cap

- Using a crimping tool such as the Badger Meter Parallel Pliers (**PN: 59983-001**), place the gel cap with the wires into the jaws of the crimping tool.



Figure 59: Gel cap in crimping tool

- Crimp the gel cap by squeezing the crimping tool handles until the gel cap is completely compressed. The Badger Meter Parallel Pliers is designed to apply just enough pressure to crimp the gel cap. Apply pressure for three seconds.

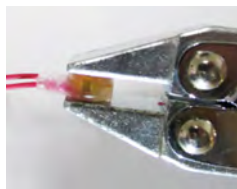


Figure 60: Compress the gel cap

- Repeat the crimping procedure for the remaining gel caps and wires.
- Attach the two plastic cable ties and tighten securely for strain relief. Snip off the excess cable tie with the wire cutter.
  - For remote installations, the connection is complete.

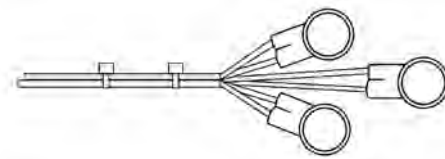


Figure 61: Cable tie attachment locations

**NOTE:** For pit installations, an appropriate field splice kit should be used. If using the Badger Meter Field Splice Kit, refer to the *Field Splice Kit Application Data Sheet* provided with the kit.

## Testing Wire Connections

Test all wiring connections to confirm connectivity, and to verify the ORION endpoint reading and the encoder reading are the same. The connections can be tested using the Quick Read function with either an ORION handheld or mobile data collector. See the appropriate software manual, available in the Resource Library at [www.badgermeter.com](http://www.badgermeter.com), for more information.

## Making Water Visible®

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## PROJECT SIGNAGE


The Contactor shall place a funding sign at a prominent location, as designated by the County. The sign shall be at least four feet tall by eight feet wide and made of ¾ inch thick exterior grade plywood. The sign shall be supported by two 16 feet tall, 4x4 smooth wood posts, painted white. Logos are available from the California State Water Resources Control Board, Division of Financial Assistance, and are downloadable on their website. The sign shall be prepared in a professional manner. The sign shall be kept in good condition for the duration of construction.

See below for the sign template.

**County of Fresno - Westside Groundwater Project**  
**Project No. SWRCB 1000359-005C & DWR 4600011626**  
**Total Project Cost: \$Award\$**

Funding for this project has been provided by the Department of Water Resources and the State Water Resources Control Board through Proposition 1 - the Water Quality, Supply, and Infrastructure Improvement Act of 2014 and the Drinking Water State Revolving Fund through an agreement. California's Drinking Water State Revolving Fund is capitalized through a variety of funding sources, including grants from the United States Environmental Protection Agency and state bond proceeds.

This institution is an equal opportunity provider.



The logos on the right side of the sign template include: the Department of Water Resources logo for the State of California; the Drinking Water State Revolving Fund logo with the slogan 'Protect Our Health from Source to Tap'; the Proposition 1 logo for Governor Edmund G. Brown, Jr.'s Water Bond 2014; the California Water Boards logo, which is part of the State Water Resources Control Board and Regional Water Quality Control Boards; and the EPA logo for the United States Environmental Protection Agency.

Actual Text size should reflect the text size depicted in the example.

Actual text style shall be Arial (normal) and the text color shall be black on a white background.

Actual Graphic Size should reflect the graphic size depicted in the example.

Project Cost should reflect the awarded bid.

**\*\*END OF SECTION\*\***

# SELF-DEALING TRANSACTION DISCLOSURE FORM

(1) Company Board Member Information:

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Job Title: \_\_\_\_\_

(2) Company/Agency Name and Address:

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(3) Disclosure (Please describe the nature of the self-dealing transaction you are a party to)

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(4) Explain why this self-dealing transaction is consistent with the requirements of Corporations Code 5233 (a)

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(5) Authorized Signature

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## **SELF-DEALING TRANSACTION DISCLOSURE FORM INSTRUCTIONS**

In order to conduct business with the County of Fresno (hereinafter referred to as "County"), members of a contractor's board of directors (hereinafter referred to as "County Contractor"), must disclose any self-dealing transactions that they are a party to while providing goods, performing services, or both for the County. A self-dealing transaction is defined below:

*"A self-dealing transaction means a transaction to which the corporation is a party and which one or more of its directors has a material financial interest"*

The definition above will be utilized for purposes of completing the disclosure form.

- (1) Enter board member's name, job title (if applicable), and date this disclosure is being made.
- (2) Enter the board member's company/agency name and address.
- (3) Describe in detail the nature of the self-dealing transaction that is being disclosed to the County. At a minimum, include a description of the following:
  - a. The name of the agency/company with which the corporation has the transaction; and
  - b. The nature of the material financial interest in the Corporation's transaction that the board member has.
- (4) Describe in detail why the self-dealing transaction is appropriate based on applicable provisions of the Corporations Codes.
- (5) Form must be signed by the board member that is involved in the self-dealing transaction described in Sections (3) and (4).



expression, age, sexual orientation, or military and veteran status. Contractor shall insure that the evaluation and treatment of employees and applicants for employment are free of such discrimination.

2. Contractor shall comply with the provisions of the Fair Employment and Housing Act (Gov. Code, § 12900 et seq.), the regulations promulgated thereunder (Cal. Code Regs., tit. 2, § 11000 et seq.), the provisions of Article 9.5, Chapter 1, Part 1, Division 3, Title 2 of the Government Code (Gov. Code, §§ 11135-11139.5), and the regulations or standards adopted by the awarding state agency to implement such article.
3. Contractor or recipient shall permit access by representatives of the Department of Fair Employment and Housing and the awarding state agency upon reasonable notice at any time during the normal business hours, but in no case less than 24 hours' notice, to such of its books, records, accounts, and all other sources of information and its facilities as said Department or Agency shall require to ascertain compliance with this clause.
4. Recipient, contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.
5. The contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

Under 2 CA Code of Regs § 11122:

### **STANDARD CALIFORNIA NONDISCRIMINATION CONSTRUCTION CONTRACT SPECIFICATIONS (GOV. CODE SECTION 12990)**

These specifications are applicable to all state contractors and subcontractors having a construction contract or subcontract of \$5,000 or more.

1. As used in the specifications:
  - a. "Act" means the Fair Employment and Housing Act.
  - b. "Administrator" means Administrator, Office of Compliance Programs, California Department of Fair Employment and Housing, or any person to whom the Administrator delegates authority;
2. Whenever the contractor or any subcontractor subcontracts a portion of the work, it shall include in each subcontract of \$5,000 or more the nondiscrimination clause in this contract directly or through incorporation by reference. Any subcontract for work involving a construction trade shall also include the Standard California Construction Contract Specifications, either directly or through incorporation by reference.
3. The contractor shall implement the specific nondiscrimination standards provided in paragraphs 6(a) through (e) of these specifications.
4. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the contractor has a collective bargaining agreement, to refer members of any group protected by the Act shall excuse the contractor's obligations under these specifications, Government Code section 12990, or the regulations promulgated pursuant thereto.5. In order for the nonworking training hours of apprentices and trainees to be counted, such apprentices and trainees must be employed by the contractor during the training period, and the contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor or the California Department of Industrial Relations.
5. In order for the nonworking training hours of apprentices and trainees to be counted, such apprentices and trainees must be employed by the contractor during the training period, and the contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor or the California Department of Industrial Relations.
6. The contractor shall take specific actions to implement its nondiscrimination program. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor must be able to demonstrate fully its efforts under steps a. through e. below:
  - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and at all facilities at which the contractor's employees are assigned to work. The contractor shall specifically ensure that all foremen, superintendents, and other on-site

- supervisory personnel are aware of and carry out the contractor's obligations to maintain such a working environment.
- b. Provide written notification within seven days to the director of the DFEH when the referral process of the union or unions with which the contractor has a collective bargaining agreement has impeded the contractor's efforts to meet its obligations.
  - c. Disseminate the contractor's equal employment opportunity policy by providing notice of the policy to unions and training, recruitment and outreach programs and requesting their cooperation in assisting the contractor to meet its obligations; and by posting the company policy on bulletin boards accessible to all employees at each location where construction work is performed.
  - d. Ensure all personnel making management and employment decisions regarding hiring, assignment, layoff, termination, conditions of work, training, rates of pay or other employment decisions, including all supervisory personnel, superintendents, general foremen, on-site foremen, etc., are aware of the contractor's equal employment opportunity policy and obligations, and discharge their responsibilities accordingly.
  - e. Ensure that seniority practices, job classifications, work assignments, and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the equal employment opportunity policy and the contractor's obligations under these specifications are being carried out.
7. Contractors are encouraged to participate in voluntary associations that assist in fulfilling their equal employment opportunity obligations. The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on equal employment opportunity in the industry, ensures that the concrete benefits of the program are reflected in the contractor's workforce participation, and can provide access to documentation that demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation to comply, however, is the contractor's.
  8. The contractor is required to provide equal employment opportunity for all persons. Consequently, the contractor may be in violation of the Fair Employment and Housing Act (Government Code section 12990 et seq.) if a particular group is employed in a substantially disparate manner.
  9. The contractor shall not use the nondiscrimination standards to discriminate against any person because race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, genetic information, marital status, sex, gender, gender identity, gender expression, age, sexual orientation, or military and veteran status.
  10. The contractor shall not enter into any subcontract with any person or firm decertified from state contracts pursuant to Government Code section 12990.
  11. The contractor shall carry out such sanctions and penalties for violation of these specifications and the nondiscrimination clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Government Code section 12990 and its implementing regulations by the awarding agency. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Government Code section 12990.
  12. The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company equal employment opportunity policy is being carried out, to submit reports relating to the provisions hereof as may be required by OCP and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, status, (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in any easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

**Add to the end of the 2nd sentence in the 1st paragraph of section 7-1.02K(1):**

, and hauling and delivery of ready-mixed concrete.

04-22-16





## 8 PROSECUTION AND PROGRESS

07-15-16

Replace the table in the 3rd paragraph of section 8-1.10A with:

07-15-16

### Liquidated Damages

Total bid		Liquidated damages per day
From over	To	
\$0	\$60,000	\$1,400
\$60,000	\$200,000	\$2,900
\$200,000	\$500,000	\$3,200
\$500,000	\$1,000,000	\$3,500
\$1,000,000	\$2,000,000	\$4,000
\$2,000,000	\$5,000,000	\$4,800
\$5,000,000	\$10,000,000	\$6,800
\$10,000,000	\$20,000,000	\$10,000
\$20,000,000	\$50,000,000	\$13,500
\$50,000,000	\$100,000,000	\$19,200
\$100,000,000	\$250,000,000	\$25,300

AA

## 9 PAYMENT

01-15-16

Replace *may withhold* in the 1st paragraph of section 9-1.16E(4) with:

01-15-16

withholds

AA

## DIVISION II GENERAL CONSTRUCTION

### 10 GENERAL

04-15-16

Replace section 10-1.02B with:

04-15-16

#### 10-1.02B Traffic Elements

Before starting the operational test of a traffic management system that directly impacts traffic, the system must be ready for operation, and all signs, pavement delineation, and pavement markings must be in place at the system's location.

If maintaining existing traffic management system elements during construction is shown on the Bid Item List, a list of the systems shown within the project limits and their operational status is included in the *Information Handout*. Before starting job site activities, conduct a preconstruction operational status check of the existing system's elements and each element's communication status with the transportation management center to which it communicates. If an existing system element is discovered and has not been identified, the Department adds the element to the list of systems. The pre- and postconstruction operational status check of the discovered elements is change order work.

If maintaining existing traffic management system elements during construction is not shown on the Bid Item List and an existing system element is discovered during the work, notify the Engineer. The Engineer orders a pre- and postconstruction operational status check of the discovered elements. The status check of the discovered elements is change order work.



To prevent encroachment onto the traveled way where the useable shoulder area is less than 15 feet wide, you may use a smaller message panel with at least 12-inch-high characters.

The message displayed on the sign must be visible from a distance of 1,500 feet and legible from a distance of 750 feet at noon on a cloudless day and during the night by persons with 20/20 vision or vision corrected to 20/20.

The characters on a sign panel may be 10 inches in height if:

1. PCMS is mounted on a service patrol truck or other incident response vehicle or used for traffic control operations on a highway facility where the posted speed limit is less than 40 mph
2. Message is legible from a distance of at least 650 feet at noon on a cloudless day and during the night by persons with 20/20 vision or vision corrected to 20/20

A matrix sign must provide a complete alphanumeric selection.

A PCMS must automatically adjust its brightness under varying light conditions to maintain the legibility of the message. The sign must be equipped with an automatic-dimming mode that automatically compensates for the influence of temporary light sources or abnormal lighting conditions. The sign must have 3 or more manual dimming modes of different intensities.

During the hours of darkness, a matrix sign not using lamps must be either internally or externally illuminated.

The controller must be an all solid-state unit containing the necessary circuitry for the storage of at least 5 preprogrammed messages. The controller must be installed at a location that allows the operator to perform all functions from a single position. The controller must have a keyboard entry system that allows the operator to generate an infinite number of additional messages in addition to the preprogrammed stored messages. The keyboard must be equipped with a security lockout feature to prevent unauthorized use of the controller.

The controller must have:

1. Nonvolatile memory that stores keyboard-created messages during periods when the power is not activated
2. Variable display rate that allows the operator to match the information display to the speed of approaching traffic
3. Screen upon which messages may be reviewed before being displayed on the sign

The flashing-off time must be adjustable from within the control cabinet.

### **12-3.32C Construction**

Place a PCMS as far from the traveled way as practicable where it is legible to approaching traffic without encroaching on the traveled way. Where the vertical roadway curvature restricts the sight distance of approaching traffic, place the sign on or before the crest of the curvature where it is most visible to the approaching traffic. Where the horizontal roadway curvature restricts the sight distance of approaching traffic, place the sign at or before the curve where it is most visible to approaching traffic. Where practicable, place the sign behind guardrail or Type K temporary railing.

Make a taper consisting of 9 traffic cones placed 25 feet apart to delineate the location of a PCMS except where the sign is placed behind guardrail or Type K temporary railing.

When in full operation, the bottom of a sign must be at least 7 feet above the roadway in areas where pedestrians are anticipated and 5 feet above the roadway elsewhere, and the top of the sign must be not more than 14.5 feet above the roadway.

Operate the PCMS under the manufacturer's instructions.

Keep the PCMS clean to provide maximum visibility.

If multiple signs are needed, place each sign on the same side of the road at least 1,000 feet apart on freeways and expressways and at least 500 feet apart on other types of highways.

If more than one PCMS is simultaneously visible to traffic, only 1 sign may display a sequential message at any time. Do not use dynamic message displays, such as animation, rapid flashing, dissolving, exploding, scrolling, horizontal movement, or vertical movement of messages. The message must be centered within each line of the display.

You may use an additional PCMS if more than 2 phases are needed to display a message.

Display only messages shown or ordered.

Repeat the entire message continuously in not more than 2 phases of at least 3 seconds per phase. The sum of the display times for both of the phases must be a maximum of 8 seconds. If more than 2 phases are needed to display a message, use an additional PCMS.

You must be available by cell phone during activities that require a sign. Be prepared to immediately change the displayed message if ordered. You may operate the sign with a 24-hour timer control or remote control if authorized.

After the initial placement, move a sign from location to location as ordered.

When a PCMS is not in use, move it to an area at least 15 feet from the edge of the traveled way or remove it from the job site away from traffic.

### **12-3.32D Payment**

Not Used

### **Add between the 1st sentence and 2nd sentences in the 1st paragraph of section 12-4.02A(3)(a):**

07-15-16

For a project in District 7, submit the request at least 15 days before the proposed closure date.

### **Replace section 12-4.02C(2) with:**

01-15-16

### **12-4.02C(2) Lane Closure System**

#### **12-4.02C(2)(a) General**

The Department provides LCS training. Request the LCS training at least 30 days before submitting the 1st closure request. The Department provides the training within 15 days after your request.

LCS training is web-based or held at a time and location agreed upon by you and the Engineer. For web-based training, the Engineer provides you the website address to access the training.

With 5 business days after completion of the training, the Department provides LCS accounts and user IDs to your assigned, trained representatives.

Each representative must maintain a unique password and current user information in the LCS.

04-15-16

The project is not accessible in LCS after Contract acceptance.

01-15-16

#### **12-4.02C(2)(b) Status Updates for Authorized Closures**

Update the status of authorized closures using the LCS Mobile web page.

For a stationary closure, use code:

1. 10-97 immediately before you place the 1st advance warning sign
2. 10-98 immediately after you remove all of the advance warning signs

For a moving closure, use code:

1. 10-97 immediately before the actual start time of the closure
2. 10-98 immediately after the actual end time of the closure



AA

**16 TEMPORARY FACILITIES**

04-15-16

**Add between the 1st and 2nd sentences of section 16-2.03A(1):**

04-15-16

Constructing a high-visibility fence includes the installation of any signs specified in the special provisions.

AA

**DIVISION III EARTHWORK AND LANDSCAPE**

**20 LANDSCAPE**

07-15-16

**Replace 86 in the 1st paragraph of section 20-2.01C(2) with:**

04-15-16

87

**Replace the 8th paragraph of section 20-2.01C(2) with:**

07-15-16

Trenches for irrigation supply lines and conduits 3 inches and larger in diameter must be a minimum of 18 inches below the finished grade, measured to the top of the installed pipe.

**Replace 86 in the 1st paragraph of section 20-2.01C(3) with:**

04-15-16

87

**Replace section 20-2.04A(4) with:**

04-15-16

Perform conductors test. The test must comply with the specifications in section 87.

Where the conductors are installed by trenching and backfilling, perform the test after a minimum of 6 inches of backfill material has been placed and compacted over the conductors.

**Replace the 1st paragraph of section 20-2.04C(4) with:**

04-15-16

Splice low voltage control and neutral conductors under section 87, except do not use Method B.

**Replace the 3rd paragraph of section 20-2.05B with:**

07-15-16

The impeller must be glass reinforced nylon on a tungsten carbide shaft.

**Replace 86 in the 2nd paragraph of section 20-2.06C with:**

04-15-16

87

**Replace section 20-2.07B(5) with:**

04-15-16

**20-2.07B(5) PVC Pipe Conduit Sleeve**

PVC pipe conduit sleeves must be schedule 40 complying with ASTM D1785.

Fittings must be schedule 80.

**Replace section 20-2.07C(3) with:**

04-15-16

**20-2.07C(3) PVC Pipe Conduit Sleeve**

Where PVC pipe conduit sleeves 2 inches or less in outside diameter is installed under surfacing, you may install by directional boring under section 20-2.07C(2)(b).

For sleeves 2 inches or less in diameter, the top of the conduit must be a minimum of 18 inches below surfacing.

Extend sleeves 6 inches beyond surfacing. Cap ends of conduit until used.

**Replace sections 20-2.09B and 20-2.09C with:**

07-15-16

**20-2.09B Materials**

**20-2.09B(1) General**

Swing joints must match the inlet connection size of the riser.

Where shown, a sprinkler assembly must include a check valve.

Threaded nipples for swing joints and risers must be schedule 80, PVC 1120 or PVC 1220 pipe, and comply with ASTM D1785. Risers for sprinkler assemblies must be UV resistant.

Fittings for sprinkler assemblies must be injection-molded PVC, schedule 40, and comply with ASTM D2466.

Flexible hose for sprinkler assemblies must be leak-free, non-rigid and comply with ASTM D2287, cell Type 6564500. The hose must comply with ASTM D2122 and have the thickness shown in the following table:

Nominal hose diameter (inch)	Minimum wall thickness (inch)
1/2	0.127
3/4	0.154
1	0.179

Solvent cement and fittings for flexible hose must comply with section 20-2.08B(5).

**20-2.09B(2) Pop-Up Sprinkler Assemblies**

Each pop-up sprinkler assembly must include a body, nozzle, swing joint, pressure reducing device, fittings, and sprinkler protector where shown.

**20-2.09B(3) Riser Sprinkler Assemblies**

Each riser sprinkler assembly must include a body, flexible hose, threaded nipple, nozzle, swing joint (except for a Type V riser), pressure reducing device, fittings, and riser support where shown.

**20-2.09B(4) Tree Well Sprinkler Assemblies**

Each tree well sprinkler assembly must include a threaded nipple, nozzle, swing joint, fittings, perforated drainpipe, and drain grate.



The perforated drainpipe must be commercial-grade, rigid PVC pipe with holes spaced not more than 6 inches on center on 1 side of the pipe.

The drain grate must be a commercially-available, 1-piece, injection-molded grate manufactured from structural foam polyolefins with UV light inhibitors. Drain grate must be black.

Gravel for filling the drainpipe must be graded such that 100 percent passes the 3/4-inch sieve and 100 percent is retained on the 1/2-inch sieve. The gravel must be clean, washed, dry, and free from clay or organic material.

#### **20-2.09C Construction**

Where shown, install a flow shut-off device under the manufacturer's instructions, unless you use equipment with a preinstalled flow shut-off device.

Where shown, install a pressure reducing device under the manufacturer's instructions, unless you use equipment with a preinstalled pressure reducing device.

Install pop-up and riser sprinkler assembly:

1. From 6-1/2 to 8 feet from curbs, dikes, and sidewalks
2. At least 10 feet from paved shoulders
3. At least 3 feet from fences and walls

If sprinkler assembly cannot be installed within these limits, the location will be determined by the Engineer.

Set sprinkler assembly riser on slopes perpendicular to the plane of the slope.

#### **Replace the paragraph of section 20-2.10B(3) with:**

07-15-16

Each check valve must be one of the following:

1. Schedule 80 PVC with a factory setting to withstand a minimum 7-foot head on risers
2. Class 200 PVC if used on a nonpressurized plastic irrigation supply line
3. Internal to the sprinkler body with a factory setting to withstand a minimum 7-foot head

#### **Replace the paragraph of section 20-2.10C(3) with:**

07-15-16

Install check valves as necessary to prevent low-head drainage.

#### **Replace the paragraphs of section 20-3.01B(10) with:**

07-15-16

Each plant stake for vines must be nominal 1 by 1 inch and 18 inches long.

Each plant stake for trees must be nominal 2 by 2 inches or nominal 2 inches in diameter and long enough to keep the tree in an upright position.

#### **Replace the paragraph of section 20-3.01B(11) with:**

07-15-16

Each plant tie for vines must be extruded vinyl-based tape, 1 inch wide and at least 8 mils thick.

Each plant tie for trees must be a (1) minimum 3/4-inch-wide, UV-resistant, flexible vinyl tie complying with ASTM D412 for tensile and elongation strength, or (2) lock-stitch, woven polypropylene with a minimum 900 lb tensile strength.

**Add between the 7th and 8th paragraphs of section 20-3.02C(3)(b):**

07-15-16

Spread the vine shoots and tie them with a plant tie to each stake above the crossing point.

**Replace the 8th paragraph of section 20-3.02C(3)(b) with:**

07-15-16

Tie trees to the stakes with 2 tree ties, 1 tie to each stake. Each tie must form a figure eight by crossing the tie between the tree and the stake. Install ties at the lowest position that will support the tree in an upright position. Install the ties such that they provide trunk flexibility but do not allow the trunk to rub against the stakes. Wrap each end of the tie 1-1/2 turns around the stake and securely tie or nail it to the stake.

**Replace the 1st paragraph of section 20-5.02C(1) with:**

07-15-16

Where edging is used to delineate the limits of inert ground cover or wood mulch areas, install the edging before installing the inert ground cover or wood mulch.

**Delete *AND MULCHES* in the heading of section 20-5.03.**

07-15-16

**Delete *and mulches* in the paragraph of section 20-5.03A(1)(a).**

07-15-16

**Replace the paragraph of section 20-5.03A(3)(a) with:**

07-15-16

Before installing inert ground cover, remove plants and weeds to the ground level.

**Delete *or mulch* at each occurrence in sections 20-5.03A(3)(c) and 20-5.03A(3)(d).**

07-15-16

**Replace section 20-5.03E with:**

07-15-16

**20-5.03E Reserved**

**Replace section 20-5.04 with:**

07-15-16

**20-5.04 WOOD MULCH**

**20-5.04A General**

**20-5.04A(1) Summary**

Section 20-5.04 includes specifications for placing wood mulch.

**20-5.04A(2) Definitions**

Reserved

**20-5.04A(3) Submittals**

Submit a certificate of compliance for wood mulch.

Submit a 2 cu ft mulch sample with the mulch source shown on the bag. Obtain authorization before delivering the mulch to the job site.

**20-5.04A(4) Quality Assurance**

Reserved

## **20-5.04B Materials**

### **20-5.04B(1) General**

Mulch must not contain more than 0.1 percent of deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or chemical residues harmful to plant or animal life.

### **20-5.04B(2) Tree Bark Mulch**

Tree bark mulch must be derived from cedar, Douglas fir, or redwood species.

The mulch must be ground such that at least 95 percent of the material by volume is less than 2 inches long in any dimension and no more than 30 percent by volume is less than 1 inch long in any dimension.

### **20-5.04B(3) Wood Chip Mulch**

Wood chip mulch must:

1. Be derived from clean wood
2. Not contain leaves or small twigs
3. Contain at least 95 percent by volume of wood chips with a width and thickness from 1/16 to 3/8 inch and a length from 1/2 to 3 inches

### **20-5.04B(4) Shredded Bark Mulch**

Shredded bark mulch must:

1. Be derived from trees
2. Be a blend of loose, long, thin wood, or bark pieces
3. Contain at least 95 percent by volume of wood strands with a width and thickness from 1/8 to 1-1/2 inches and a length from 2 to 8 inches

### **20-5.04B(5) Tree Trimming Mulch**

Tree trimming mulch must:

1. Be derived from chipped trees and may contain leaves and small twigs
2. Contain at least 95 percent by volume of material less than 3 inches long for any dimension and not more than 30 percent by volume of material less than 1 inch long for any dimension

### **20-5.04B(6)–20-5.04B(11) Reserved**

### **20-5.04C Construction**

Before placing wood mulch, remove plants and weeds to the ground level.

Maintain the planned flow lines, slope gradients, and contours of the job site. Grade the subgrade to a smooth and uniform surface.

Place mulch after the plants have been planted.

Place mulch in the plant basin at the rate described. Mulch must not come in contact with the plant crown and stem.

Place mulch as shown in areas outside of plant basins to a uniform thickness.

Spread mulch from the outside edge of the plant basin to the adjacent edges of shoulders, paving, retaining walls, dikes, edging, curbs, sidewalks, walls, fences, and existing plantings. If the plant is 12 feet or more from the adjacent edges of any of these elements, spread the mulch 6 feet beyond the outside edge of the plant basin.

Do not place mulch within 4 feet of:

1. Flow line of earthen drainage ditches
2. Edge of paved ditches
3. Drainage flow lines



If the independent third party determines the Department's test results are valid, the Engineer deducts the independent third party testing costs from payments. If the independent third party determines your test results are valid, the Department pays the independent third party testing costs.

**23-1.01D(2) Quality Control**

**23-1.01D(2)(a) General**

Provide a QC manager when the quantity of subbase or base is as shown in the following table:

<b>QC Manager Requirements</b>	
Subbase or base	Requirement
Stabilized soil (sq yd)	≥ 20,000
Aggregate subbases (cu yd)	≥ 20,000
Aggregate bases (cu yd)	≥ 20,000
CTB (cu yd)	≥ 10,000
Lean concrete base (cu yd)	≥ 2,000
Rapid strength concrete base (cu yd)	≥ 1,000
Lean concrete base rapid setting (cu yd)	≥ 1,000
Concrete base (cu yd)	≥ 1,000
Treated permeable bases (cu yd)	≥ 2,000
Reclaimed pavements (sq yd)	≥ 10,000

Provide a testing laboratory to perform quality control tests. Maintain sampling and testing equipment in proper working condition.

You are not entitled to compensation for the suspension of work resulting from noncompliance with quality control requirements, including those identified within the QC plan.

**23-1.01D(2)(b) Quality Control Plan**

The QC plan must describe the organization and procedures used to:

1. Control the production process
2. Determine if a change to the production process is needed
3. Implement a change

The QC plan must include action and suspension limits and details of corrective action to be taken if any process is outside of those limits. Suspension limits must not exceed specified acceptance criteria.

The QC plan must describe how test results will be submitted including times for sampling and testing for each quality characteristic.

**23-1.01D(2)(c) Qualifications**

Testing laboratories and testing equipment must comply with the Department's Independent Assurance Program.

Personnel performing sampling and testing must be qualified under the Department's Independent Assurance Program for the sampling and testing performed.

**23-1.01D(3) Department Acceptance**

Reserved

**23-1.02 MATERIALS**

Not Used

**23-1.03 CONSTRUCTION**

Not Used

**23-1.04 PAYMENT**

Not Used





**QC Testing Frequencies**

Quality characteristic	Test method	Sampling location	Minimum frequency
R-value	California Test 301	Stockpiles, transportation units, windrows, or roadways	1 test before beginning work and every 2000 cu yd thereafter <sup>a</sup>
Aggregate gradation	California Test 202	Stockpiles, transportation units, windrows, or roadways	1 per 500 cu yd but at least one per day of placement
Sand equivalent	California Test 217	Stockpiles, transportation units, windrows, or roadways	
Relative compaction	California Test 231	Roadway	1 per 500 sq yd on each layer

<sup>a</sup>Additional R-value frequency testing will not be required when the average of 4 consecutive sand equivalent tests is 4 or more above the specified operating range value.

**Add between the 2nd and 3rd paragraphs of section 25-1.01D(3):**

07-15-16

The Engineer takes aggregate subbase samples for R-value, aggregate gradation, and sand equivalent from any of the following locations:

1. Windrow
2. Roadway

**Delete for each noncompliant test result in the 4th paragraph of section 25-1.01D(3).**

07-15-16

**Delete a in the 5th paragraph of section 25-1.01D(3).**

07-15-16

^^

**26 AGGREGATE BASES**

07-15-16

**Replace Reserved in section 26-1.01C with:**

07-15-16

Submit an aggregate base QC plan.

**Replace Reserved in section 26-1.01D(1) with:**

07-15-16

Aggregate samples must not be treated with lime, cement, or chemicals before testing for durability index. Aggregate from untreated reclaimed processed AC, PCC, LCB, or CTB is not considered treated.



**Replace *Reserved* in section 26-1.01D(2) with:**

07-15-16

**26-1.01D(2)(a) General**

Reserved

**26-1.01D(2)(b) Quality Control Plan**

Reserved

**26-1.01D(2)(c) Qualifications**

Reserved

**26-1.01D(2)(d) Quality Control Testing**

AB quality control must include testing the quality characteristics at the frequencies shown in the following table:

**QC Testing Frequencies**

Quality characteristic	Test method	Sampling location	Minimum frequency
R-value	California Test 301	Stockpiles, transportation units, windrows, or roadways	1 test before starting work and every 2,000 cu yd thereafter <sup>a</sup>
Aggregate gradation	California Test 202	Stockpiles, transportation units, windrows, or roadways	1 per 500 cu yd but at least one per day of placement
Sand equivalent	California Test 217	Stockpiles, transportation units, windrows, or roadways	1 per project
Durability index <sup>b</sup>	California Test 229	Stockpiles, transportation units, windrows, or roadways	
Relative compaction	California Test 231	Roadway	1 per 500 sq yd on each layer

<sup>a</sup>Additional R-value frequency testing will not be required when the average of 4 consecutive sand equivalent tests is 29 or greater for Class 2 AB or 25 or greater for Class 3 AB.

<sup>b</sup>Applies if section 26-1.02 contains an applicable requirement for durability index

**Add between *requirements*, and *and* in the 1st paragraph of section 26-1.01D(3):**

07-15-16

durability,

**Add between the 2nd and 3rd paragraphs of section 26-1.01D(3):**

07-15-16

The Engineer takes aggregate base samples for R-value, aggregate gradation, sand equivalent, and durability index from any of the following locations:

1. Windrow
2. Roadway

**Delete the 3rd paragraph of section 26-1.01D(3).**

07-15-16

AA

**27 CEMENT TREATED BASES**

07-15-16

**Add to section 27-1.01C:**

Submit cement treated base QC plan.

07-15-16

**Replace the headings and paragraphs in section 27-1.01D with:**

07-15-16

**27-1.01D Quality Assurance**

**27-1.01D(1) General**

After the CTB has been spread on the subgrade and before initial compaction, the cement content of the completed mixture of CTB must not vary from the specified cement content by more than 0.6 percent of the weight of the dry aggregate when tested under California Test 338.

For Class A CTB, compaction is tested under California Test 312 or 231.

The relative compaction of CTB must be at least 95 percent. Each layer of CTB may be tested for compaction, or all layers may be tested together at the option the Engineer. If all layers are tested together, you are not relieved of the responsibility to achieve the required compaction in each layer placed.

**27-1.01D(1)(a) Aggregate**

When tested under California Test 301, aggregate for Class B CTB must have (1) an R-value of at least 60 before mixing with cement and (2) an R-value of at least 80 when aggregate is mixed with an amount of cement that does not exceed 2.5 percent by weight of the dry aggregate.

Before sand equivalent testing, aggregate samples must not be treated with lime, cement, or chemicals.

If the aggregate gradation test results, the sand equivalent test results, or both comply with contract compliance requirements but not operating range requirements, you may continue placing CTB for the remainder of the work day. Do not place additional CTB until you demonstrate to the Engineer that the CTB to be placed complies with the operating range requirements.

If the aggregate gradation test results, sand equivalent test results, or both do not comply with contract compliance requirements, remove the CTB or request a payment deduction. If your request is authorized, \$2.50/cu yd is deducted. If CTB is paid for by weight, the Engineer converts tons to cubic yards for the purpose of reducing payment for noncompliant CTB left in place. An aggregate gradation and a sand equivalent test represents up to (1) 500 cu yd or (2) 1 day's production if less than 500 cu yd.

**27-1.01D(1)(b) Road-Mixed Cement Treated Base Moisture Content**

Just before initial compaction the moisture content of the completed mixture must be at least the optimum moisture content less 1 percent. The moisture content is determined under California Test 226 and optimum moisture content is determined under California Test 312.

**27-1.01D(1)(c) Plant-Mixed Cement Treated Base Moisture Content**

At the point of delivery to the work, the moisture content of the completed mixture must be at least the optimum moisture content less 1 percent. The moisture content is determined under California Test 226 and optimum moisture content under California Test 312.

**27-1.01D(2) Quality Control**

**27-1.01D(2)(a) General**

Reserved

**27-1.01D(2)(b) Quality Control Plan**

Reserved

### 27-1.01D(2)(c) Qualifications

Reserved

### 27-1.01D(2)(d) Quality Control Testing

CTB quality control must include testing the quality characteristics at the frequencies shown in the following table:

**QC Testing Frequencies**

Quality characteristic	Test method	Sampling location	Minimum frequency
Aggregate gradation	California Test 202 modified	Stockpiles, plant, transportation units, windrow, or roadway	1 per 500 cu yd but at least one per day of placement
Sand equivalent	California Test 217	Stockpiles, plant, transportation units, windrow, or roadway	
R-value <sup>a</sup>	California Test 301	Stockpiles, plant, transportation units, windrows, or roadway	1 test before starting work and every 2000 cu yd thereafter <sup>b</sup>
Optimum moisture content	California Test 312	Plant, transportation units, windrow, or roadway	1 per day of placement
Moisture content	California Test 226	Roadway	1 per 500 cu yd but at least one per day of placement
Cement content	California Test 338	Windrows or roadway	1 per 1000 cu yd but at least one per day of placement
Relative compaction	California Test 312 or 231	Roadway	1 per 2000 sq yd but at least one per day of placement
Compressive strength <sup>c</sup>	California Test 312	Windrow or roadways	1 per day of placement

<sup>a</sup>R-value is required for Class B CTB only

<sup>b</sup>Additional R-value frequency testing will not be required while the average of 4 consecutive sand equivalent tests is 4 or more above the specified operating range value.

<sup>c</sup>Compressive strength is required for Class A CTB only when specified

### 27-1.01D(3) Department Acceptance

The Department's acceptance testing includes testing the CTB quality characteristics shown in the following table:

**CTB Requirements for Acceptance**

Quality characteristic	Test method
Aggregate gradation	California Test 202 modified
Sand equivalent	California Test 217
R-value <sup>a</sup>	California Test 301
Optimum moisture content	California Test 312
Moisture content	California Test 226
Cement content	California Test 338
Relative compaction	California Test 312 or 231
Compressive strength <sup>b</sup>	California Test 312

<sup>a</sup>R-value is required for Class B CTB only

<sup>b</sup>Compressive strength is required for Class A CTB only when specified

The Engineer takes samples for aggregate gradation and sand equivalent from any of the following locations:

1. Plant



**Replace the headings and paragraphs in section 28-2.01D with:**

07-15-16

**28-2.01D Quality Assurance**

**28-2.01D(1) General**

**28-2.01D(1)(a) General**

The molds for compressive strength testing under ASTM C31 or ASTM C192 must be 6 by 12 inches.

If the aggregate gradation test results, sand equivalent test results or both comply with the contract compliance requirements but not the operating range requirements, you may continue placing LCB for the remainder of the work day. Do not place additional LCB until you demonstrate the LCB to be placed complies with the operating range requirements.

**28-2.01D(1)(b) Qualifications**

Field qualification tests and calculations must be performed by an ACI certified "Concrete Laboratory Technician, Grade I.

**28-2.01D(1)(c) Aggregate Qualification Testing**

Qualify the aggregate for each proposed aggregate source and gradation. The qualification tests include (1) a sand equivalent and (2) an average 7-day compressive strength under ASTM C39 of 3 cylinders manufactured under ASTM C192 except cure cylinders in molds without lids after initial curing.

For the compressive strength test, the cement content for each cylinder must be 300 lb/cu yd. The 7-day average compressive strength must be at least 610 psi. The cement must be Type II portland cement.

LCB must have from 3 to 4 percent air content during aggregate qualification testing.

**28-2.01D(1)(d) Field Qualification Testing**

Before placing LCB, you must perform field qualification testing and obtain authorization for each mix design. Retest and obtain authorization for changes to the authorized mix designs.

Notify the Engineer at least 5 business days before field qualification. Perform the field qualification at the job site or an authorized location.

Field qualification testing includes tests for compressive strength, air content, and penetration or slump.

For compressive strength field qualification testing:

1. Prepare 12 cylinders under ASTM C31 except final cure cylinders in molds without lids from a single batch.
2. Perform 3 tests; each test consists of determining the average compressive strength of 2 cylinders at 7 days under ASTM C39. The average compressive strength for each test must be at least 530 psi

If you submitted a notice to produce LCB qualifying for a transverse contraction joint waiver, manufacture additional specimens and test the LCB for compressive strength at 3 days. Prepare the compressive strength cylinders under ASTM C31 except final cure cylinders in molds without lids at the same time using the same material and procedures as the 7-day compressive strength cylinders except do not submit 6 additional test cylinders. The average 3-day compressive strength for each test must be not more than 500 psi.

**28-2.01D(2) Quality Control**

**28-2.01D(2)(a) General**

Reserved

**28-2.01D(2)(b) Quality Control Manager**

Reserved

**28-2.01D(2)(c) Quality Control Testing**

Test the LCB under the test methods and at the locations and frequencies shown in the following table:

**LCB Sampling Location and Testing Frequencies**

Quality characteristic	Test method	Sampling location	Minimum sampling and testing frequency
Sand equivalent	ASTM D2419	Source	1 per 500 cubic yards but at least 1 per day of production
Aggregate gradation	ASTM C136		
Air content	ASTM C231	Job site	
Penetration <sup>a</sup>	ASTM C360		
Slump <sup>a</sup>	ASTM C143		
Compressive strength	ASTM C39 <sup>b</sup>		

<sup>a</sup>Test for either penetration or slump

<sup>b</sup>Prepare cylinders under ASTM C31 except final cure cylinders in molds without lids.

**28-2.01D(3) Department Acceptance**

The Department accepts LCB based on compliance with the requirements shown in the following table:

**LCB Requirements for Acceptance**

Quality characteristic	Test method	Requirement
Compressive strength (min, psi at 7 days)	ASTM C39 <sup>a</sup>	530 <sup>b</sup>

<sup>a</sup>Cylinders prepared under ASTM C31 except final cure cylinders in molds without lids.

<sup>b</sup>A compressive strength test represents up to (1) 1,000 cu yd or (2) 1 day's production if less than 1,000 cu yd.

**Replace section 28-2.01D(4) in item 3 of the 5th paragraph in section 28-2.03D with:**

07-15-16

section 28-2.01D(1)(c)

**Replace the 1st paragraph in section 28-2.03F with:**

07-15-16

After finishing LCB, cure LCB with pigmented curing compound under section 90-1.03B(3) and 40-1.03I. Apply curing compound:

1. In 2 separate applications
2. Before the atmospheric temperature falls below 40 degrees F
3. At a rate of 1 gal/150 sq ft for the first application
4. At a rate of 1 gal/200 sq ft for the second application

**Replace *Reserved* in section 28-3.01C(3) with:**

07-15-16

Submit a rapid strength concrete base QC plan.

**Replace the headings and paragraphs in section 28-3.01D with:**

07-15-16

**28-3.01D Quality Assurance**

**28-3.01D(1) General**

**28-3.01D(1)(a) General**

At the preconstruction meeting be prepared to discuss the project specifications and methods of performing each item of work. Items discussed must include the processes for:

1. Production
2. Transportation

3. Placement
4. QC plan, if specified in the special provisions
5. Contingency plan
6. QC sampling and testing
7. Acceptance criteria

Beams for modulus of rupture testing must be fabricated and tested under California Test 524. The beams may be fabricated using an internal vibrator under ASTM C31. For each test, 3 beam must be fabricated and the test results averaged. No single test represents more than that day's production or 130 cu yd, whichever is less.

For early age testing, beams must be cured so the monitored temperatures in the beams and the test strip are always within 5 degrees F. The internal temperatures of the RSC base and early age beams must be monitored and recorded at intervals of at least 5 minutes. Thermocouples or thermistors connected to strip-chart recorders or digital data loggers must be installed to monitor the temperatures. Temperature recording devices must be accurate to within  $\pm 2$  degrees F. Until early age testing is completed, internal temperatures must be measured at 1 inch from the top, 1 inch from the bottom, and no closer than 3 inches from any edge.

For other age testing, beams must be cured under California Test 524 except beams must be placed into sand at a time that is the earlier of either from 5 to 10 times the final set time, or 24 hours.

RSC base must have an opening age modulus of rupture of not less than 400 psi and a 7-day modulus of rupture of not less than 600 psi.

**28-3.01D(1)(b) Preconstruction Meeting**

Reserved

**28-3.01D(1)(c) Test Strip**

Reserved

**28-3.01D(2) Quality Control**

**28-3.01D(2)(a) General**

Reserved

**28-3.01D(2)(b) Quality Control Manager**

Reserved

**28-3.01D(2)(c) Quality Control Testing**

Test the rapid strength concrete base under the test methods and at the locations and frequencies shown in the following table:

**Rapid Strength Concrete Base Sampling Location and Testing Frequencies**

Quality characteristic	Test method	Sample Location	Minimum testing frequency <sup>a</sup>
Cleanness value	California Test 227	Source	1 per 500 cubic yards but at least 1 per shift
Sand equivalent	California Test 217		
Aggregate gradation	California Test 202		
Air content	California Test 504	Job site	1 per 130 cu yd but at least 1 per shift
Yield	California Test 518		1 per shift
Slump or penetration	ASTM C143 or California Test 533		1 per 2 hours of placement
Density	California Test 518		1 per shift
Aggregate moisture meter calibration <sup>b</sup>	California Test 223 or California Test 226		1 per shift
Modulus of rupture	California Test 524		1 per 130 cu yd but at least 1 per shift

<sup>a</sup>Test at the most frequent interval.

<sup>b</sup>Check calibration of the plant moisture meter by comparing moisture meter readings with California Test 223 or California Test 226 test results.

Notify the Engineer at least 2 business days before any sampling and testing. Submit testing results within 15 minutes of testing completion. Record inspection, sampling, and testing on the forms accepted with the QC plan and submit them within 48 hours of completion of each day of production and within 24 hours of 7-day modulus of rupture tests.

During the placement of RSC base, fabricate beams and test for the modulus of rupture:

1. At opening age
2. At 7 days after placing the first 30 cu yd
3. At least once every 130 cu yd
4. Within the final truckload

Opening age tests must be performed in the presence of the Engineer.

**28-3.01D(3) Department Acceptance**

The Department accepts RSC base based on compliance with the requirements shown in the following table:

**RSC Base Requirements for Acceptance**

Quality characteristic	Test method	Requirement
Modulus of rupture (min, psi at 7 days)	California Test 524	600

The Engineer adjust payment for RSC base for the 7-day modulus of rupture as follows:

1. Payment for a base with a modulus of rupture of 600 psi or greater is not adjusted.
2. Payment for a base with a modulus of rupture of less than 600 and greater than or equal to 550 psi is reduced by 5 percent.
3. Payment for a base with a modulus of rupture of less than 550 and greater than or equal to 500 psi is reduced by 10 percent.
4. Payment for a base with a modulus of rupture of less than 500 psi is not adjusted and no payment is made. Remove and replace this base.

**Add to section 28-4.01C(1):**

Submit a lean concrete base rapid setting QC plan.



**Replace the headings and paragraphs in section 28-4.01D with:**

07-15-16

**28-4.01D Quality Assurance**

**28-4.01D(1) General**

**28-4.01D(1)(a) General**

For compressive strength testing, prepare 6 cylinders under California Test 540. Test cylinders must be 6 by 12 inches. As an alternative to rodding, a vibrator may be used under California Test 524. Test cylinders under California Test 521 and perform 3 tests with each test consisting of 2 cylinders. The test result is the average from the 2 cylinders.

**28-4.01D(1)(b) Field Qualification**

Before placing lean concrete base rapid setting, you must perform field qualification testing and obtain authorization for each mix design. Retest and obtain authorization for changes to authorized mixed designs.

Proposed mix designs must be field qualified before you place the base represented by those mix designs. The technician performing the field test must hold current ACI certification as a Concrete Field Testing Technician-Grade I.

Notify the Engineer at least 5 days before field qualification. Perform field qualification within the job site or a location authorized.

Field qualification testing includes compressive strength, air content, and penetration or slump in compliance with the table titled "Lean Concrete Base Rapid Setting Requirements."

Field qualification must comply with the following:

1. Test for compressive strength at opening age and 7 days of age
2. At opening age, the compressive strength for each test must be at least 180 psi and the average strength for the 3 tests must be at least 200 psi
3. At 7 days age, the compressive strength for each test must be at least 600 psi and the average strength for the 3 tests must be at least 725 psi

**28-4.01D(2) Quality Control**

**28-4.01D(2)(a) General**

Reserved

**28-4.01D(2)(b) Quality Control Manager**

Reserved

**28-4.01D(2)(c) Quality Control Testing**

Test the base under the test methods and at the locations and frequencies shown in the following table:

**LCB Rapid Setting Sampling Location and Testing Frequencies**

Quality characteristic	Test method	Sampling location	Minimum sampling and testing frequency
Sand equivalent	ASTM D2419	Source	1 per 500 cu yd, minimum 1 per day of production
Aggregate gradation	ASTM C136		
Air content	ASTM C231	Job site	1 per 4 hours of placement work, plus one in the last hour of placement work
Penetration <sup>a</sup>	ASTM C360		
Slump <sup>a</sup>	ASTM C143		
Compressive strength	California Test 521		

<sup>a</sup>Test either penetration or slump

During placement of lean concrete base rapid setting, fabricate cylinders and test compressive strength for opening age and 7 days. Opening age tests must be performed in the presence of the Engineer.

**28-4.01D(3) Department Acceptance**

The Department accepts LCB rapid setting based on compliance with the requirement shown in the following table:

**LCB Rapid Setting Requirements for Acceptance**

Quality characteristic	Test method	Requirement
Compressive strength (min, psi at 7 days)	California Test 521 <sup>a</sup>	725

<sup>a</sup>Cylinders made under California Test 540

**Replace the 2nd and 3rd paragraphs in section 28-4.03A with:**

07-15-16

Concrete paving operations with equipment not supported by the base may start before opening age. Do not open pavement for traffic before opening age of the LCB rapid setting.

Any other paving operations must start after the final set time of the base. The base must have a compressive strength of at least 450 psi under California Test 521 before:

1. Placing HMA
2. Placing other base material
3. Operating equipment on the base

**Replace Reserved in section 28-5.01C with:**

07-15-16

Submit a concrete base QC plan.

**Replace the headings and paragraphs in section 28-5.01D(2) with:**

07-15-16

**28-5.01D(2) Quality Control**

**28-5.01D(2)(a) General**

Reserved

**28-5.01D(2)(b) Quality Control Manager**

Reserved

**28-5.01D(2)(c) Quality Control Testing**

Test the concrete base under the test methods and at the locations and frequencies shown in the following table:

**Concrete Base Sampling Location and Testing Frequencies**

Quality characteristic	Test method	Sample location	Minimum testing frequency <sup>a</sup>
Cleanness value	California Test 227	Source	1 per 500 cubic yards but at least 1 per shift
Sand equivalent	California Test 217		
Aggregate gradation	California Test 202		
Air content	California Test 504	Job site	1 per 500 cu yd but at least 1 per shift
Yield	California Test 518		1 per shift
Slump or penetration	ASTM C143 or California Test 533		1 per 2 hours of placement
Density	California Test 518		1 per shift
Aggregate moisture meter calibration <sup>b</sup>	California Test 223 or California Test 226		1 per shift
Modulus of rupture	California Test 524		1 per 500 cu yd but at least 1 per shift

<sup>a</sup>Test at the most frequent interval.

<sup>b</sup>Check calibration of the plant moisture meter by comparing moisture meter readings with California Test 223 or California Test 226 test results.

**28-5.01D(3) Department Acceptance**

The Department accepts a concrete base based on compliance with the requirements shown in the following table:

**Concrete Base Requirements for Acceptance**

Quality characteristic	Test method	Requirement
Modulus of rupture (min, psi at 28 days)	California Test 523	570

Acceptance for the modulus of rupture is on a lot basis. The Department provides the molds and machines for the modulus of rupture acceptance testing. Provide any material and labor the Engineer may require for the testing.

AA

**29 TREATED PERMEABLE BASES**

07-15-16

**Replace the headings and paragraphs in section 29-1.01 with:**

07-15-16

**29-1.01 GENERAL**

**29-1.01A Summary**

Section 29-1 includes general specifications for constructing treated permeable bases.

**29-1.01B Definitions**

Reserved

**29-1.01C Submittals**

Submit a treated permeable base quality control plan.

**29-1.01D Quality Assurance**

**29-1.01D(1) General**

Reserved

**29-1.01D(2) Quality Control****29-1.01D(2)(a) General**

Reserved

**29-1.01D(2)(b) Quality Control Plan**

Reserved

**29-1.01D(2)(c) Qualifications**

Reserved

**29-1.01D(3) Department Acceptance**

Reserved

**Replace the headings and paragraphs in section 29-2.01D with:**

07-15-16

**29-2.01D Quality Assurance****29-2.01D(1) General**

The Engineer determines the asphalt content of the asphalt mixture under California Test 382. The bitumen ratio, pounds of asphalt per 100 lb of dry aggregate, must not vary more than 0.5 lb of asphalt above or below the quantity designated by the Engineer. Samples used to determine the bitumen ratio are obtained from trucks at the plant or from the mat behind the paver before rolling. If the sample is taken from the mat behind the paver, the bitumen ratio must not be less than the quantity designated by the Engineer, less 0.7 lb of asphalt per 100 lb of dry aggregate.

**29-2.01D(2) Quality Control****29-2.01D(2)(a) General**

Reserved

**29-2.01D(2)(b) Quality Control Testing**

ATPB quality control must include testing the quality characteristics at the frequencies shown in the following table:

**QC Testing Frequencies**

Quality characteristic	Test method	Sampling location	Minimum frequency
Gradation	California Test 202	Stockpiles or plant	1 for every 4 hours of production but at least one per day of placement
Cleanness value	California Test 227	Stockpiles or plant	1 for every 4 hours of production but at least one per day
Percentage of crushed particles	California Test 205	Stockpiles or plant	1 test before production and one every 5,000 cu yd thereafter
Los Angeles rattler loss at 500 rev	California Test 211	Stockpiles or plant	1 test before production and one every 5,000 cu yd thereafter
Film stripping	California Test 302	Plant	1 test before production and one every 5000 cu yd thereafter
Asphalt content of the asphalt mixture	California Test 382	Plant, transportation units, windrows, or roadway	1 for every 4 hours of production but at least one per day

**29-2.01D(3) Department Acceptance**

The Department accepts ATPB based on aggregate gradation, cleanness value, percent of crushed particles, Los Angeles rattler, film stripping and asphalt content requirements specified in section 29-2.02 and section 29-2.01D(1).

The Engineer takes samples for aggregate gradation, cleanness value, percent of crushed particles, Los Angeles rattler, and film stripping from the plant.

The Engineer takes samples for asphalt content of the asphalt mixture from any of the following locations:

1. Plant
2. Truck
3. Windrow
4. Roadbed

**Replace the headings and paragraphs in section 29-3.01 with:**

07-15-16

**29-3.01 GENERAL**

**29-3.01A Summary**

Section 29-3 includes specifications for constructing cement treated permeable bases.

**29-3.01B Definitions**

Reserved

**29-3.01C Submittals**

Reserved

**29-3.01D Quality Assurance**

**29-3.01D(1) General**

Reserved

**29-3.01D(2) Quality Control**

**29-3.01D(2)(a) General**

Reserved

**29-3.01D(2)(b) Quality Control Testing**

CTPB quality control must include testing the quality characteristics at the frequencies shown in the following table:

**QC Testing Frequencies**

Quality characteristic	Test method	Sampling location	Minimum frequency
Gradation	California Test 202	Stockpiles or plant	1 for every 4 hours of production but at least one per day of placement
Cleanness value	California Test 227	Stockpiles or plant	1 for every 4 hours of production but at least one per day
Los Angeles rattler loss at 500 rev	California Test 211	Stockpiles or plant	1 test before production and one every 5,000 cu yd thereafter
Soundness	California Test 214	Stockpiles or plant	1 test before production and one every 5,000 cu yd thereafter





# DIVISION V SURFACINGS AND PAVEMENTS

## 37 BITUMINOUS SEALS

07-15-16

Replace section 37 with:

07-15-16

## 37 SEAL COATS

### 37-1 GENERAL

#### 37-1.01 GENERAL

##### 37-1.01A Summary

Section 37-1 includes general specifications for applying seal coats.

##### 37-1.01B Definitions

Reserved

##### 37-1.01C Submittals

At least 10 days before the preconstruction meeting submit a list of participants in the preconstruction meeting. Provide each participant's name, employer, title, and role in the production and placement of the seal coats.

At least 10 days before starting seal coat activities, submit the names of the authorized laboratories for quality control testing.

For each delivery of asphalt binder or asphaltic emulsion to the job site, submit a certificate of compliance and a copy of the specified test results.

For a seal coat that uses crumb rubber modifier, submit a Crumb Rubber Usage Report form monthly and at the end of project.

##### 37-1.01D Quality Assurance

###### 37-1.01D(1) General

For aggregate testing, quality control laboratories must be in compliance with the Department's Independent Assurance Program to be an authorized laboratory. Quality control personnel must be qualified under the Department's Independent Assurance Program.

For emulsion testing, quality control laboratories must participate in the AASHTO Material's Reference Laboratory proficiency sample program.

###### 37-1.01D(2) Preconstruction Meeting

Hold a preconstruction meeting within 5 days before start of seal coat work at a mutually agreed time and place with the Engineer and your:

1. Project superintendent
2. Project foreman
3. Traffic control foreman

Make arrangements for the conference facility. Preconstruction meeting participants must sign an attendance sheet provided by the Engineer. Be prepared to discuss:

1. Quality control testing
2. Acceptance testing
3. Seal coat placement
4. Proposed application rates for asphaltic emulsion or asphalt binder and aggregate.
5. Training on placement methods
6. Checklist of items for proper placement
7. Unique issues specific to the project, including:
  - 7.1. Weather
  - 7.2. Alignment and geometrics
  - 7.3. Traffic control requirements



- 7.4. Haul distances
- 7.5. Presence and absence of shaded areas
- 7.6. Any other local conditions
- 8. Contingency plan for material deliveries, equipment breakdowns, and traffic handling
- 9. Who in the field has authority to adjust application rates and how adjustments will be documented
- 10. Schedule of sweepings

### **37-1.02 MATERIALS**

Not Used

### **37-1.03 CONSTRUCTION**

#### **37-1.03A General**

If seal coat activities affect access to public parking, residential property, or commercial property, post signs at 100-foot intervals on the affected streets. Signs must display *No Parking – Tow Away*. Signs must state the dates and hours parking or access will be restricted. Notify residents, businesses, and local agencies at least 24 hours before starting activities. The notice must:

- 1. Describe the work to be performed
- 2. Detail streets and limits of activities
- 3. Indicate dates and work hours
- 4. Be authorized

Asphaltic emulsion or asphalt binder for seal coats may be reheated if necessary. After loading the asphaltic emulsion or asphalt binder into a truck for transport to the job site, do not heat asphaltic emulsion above 160 degrees F and asphalt rubber binder above 425 degrees F. During reheating, circulate or agitate the asphaltic emulsion or asphalt binder to prevent localized overheating.

Except for fog seals, apply quick setting Grade 1 asphaltic emulsions at a temperature from 75 to 130 degrees F and apply quick setting Grade 2 asphaltic emulsions at a temperature from 110 to 185 degrees F.

You determine the application rates for asphaltic emulsion or asphalt binder and aggregate and the Engineer authorizes the application rates.

#### **37-1.03B Equipment**

A self-propelled distributor truck for applying asphaltic emulsion or asphalt binder must be equipped with:

- 1. Pressure-type system with insulated tanks with circulating unit
- 2. Spray bars:
  - 2.1. With minimum length of 9 feet and full-circulating type
  - 2.2. With full-circulating-type extensions if needed to cover a greater width
  - 2.3. Adjustable to allow positioning at various heights above the surface to be treated
  - 2.4. Operated by levers such that 1 or all valves may be quickly opened or closed in one operation
- 3. Devices and charts to provide for accurate and rapid determination and control of asphaltic emulsion or asphalt binder quantities being applied. Include an auxiliary wheel type meter that registers:
  - 3.1. Speed in ft/min
  - 3.2. Trip by count
  - 3.3. Total distance in feet
- 4. Distribution system:
  - 4.1. Capable of producing a uniform application of asphaltic emulsion or asphalt binder in controlled quantities ranging from 0.02 to 1 gal/sq yd of surface and at a pressure ranging from 25 to 75 psi
  - 4.2. Pumps that spray asphaltic emulsion or asphalt binder within 0.02 gal/sq yd of the set rate
  - 4.3. With a hose and nozzle for application of asphaltic emulsion to areas inaccessible to the spray bar
  - 4.4. With pressure gauges and a thermometer for determining temperatures of the asphaltic emulsion or asphalt binder

You may use cab-controlled valves for the application of asphaltic emulsion or asphalt binder. The valves controlling the flow from nozzles must act positively to provide a uniform unbroken application of asphaltic emulsion or asphalt binder.

Maintain distributor and storage tanks at all times to prevent dripping.

**37-1.04 PAYMENT**

Not Used

**37-2 CHIP SEALS**

**37-2.01 GENERAL**

**37-2.01A General**

**37-2.01A(1) Summary**

Section 37-2.01 includes general specifications for applying chip seals.

**37-2.01A(2) Definitions**

Reserved

**37-2.01A(3) Submittals**

At least 15 days before starting placement of chip seal, submit:

1. Samples for:
  - 1.1. Asphaltic emulsion chip seal, two 1-quart wide mouth plastic containers with screw top lid of asphaltic emulsion
  - 1.2. Polymer modified asphaltic emulsion chip seal, two 1-quart wide mouth plastic containers with screw top lid of polymer modified asphaltic emulsion
  - 1.3. Asphalt rubber binder chip seal, two 1-quart cans of base asphalt binder
  - 1.4. Asphalt rubber binder chip seal, five 1-quart cans of asphalt rubber binder
2. Asphaltic emulsion, polymer modified asphaltic emulsion, asphalt binder or asphalt rubber binder data as follows:
  - 2.1. Supplier and Type/Grade of asphaltic emulsion or asphalt binder
  - 2.2. Type of modifier used including polymer or crumb rubber or both
  - 2.3. Percent of crumb rubber, if used as modifier
  - 2.4. Copy of the specified test results for asphaltic emulsion or asphalt binder
3. 50 lb of uncoated aggregate
4. Aggregate test results for the following:
  - 4.1. Gradation
  - 4.2. Los Angeles Rattler
  - 4.3. Percent of crushed particles
  - 4.4. Flat and elongated particles
  - 4.5. Film stripping
  - 4.6. Cleanness value
  - 4.7. Durability
5. Vialit test results

Submit quality control test results for the quality characteristics within the reporting times allowance after sampling shown in the following table:

**Quality Control Test Result Reporting**

Quality characteristic	Maximum reporting time allowance
Los Angeles Rattler loss (max, %)	48 hours
Percent of crushed particles (min, %)	48 hours
Flat and elongated particles (max by weight at 3:1, %)	48 hours
Film stripping (max, %)	48 hours
Durability (min)	48 hours
Gradation (percentage passing)	24 hours
Cleanness value (min)	24 hours
Asphaltic emulsion spread rate (gal/sq yd)	24 hours

Within 3 days after taking asphaltic emulsion or asphalt binder quality control samples, submit the authorized laboratory's test results.

**37-2.01A(4) Quality Assurance**

**37-2.01A(4)(a) General**

Reserved

**37-2.01A(4)(b) Quality Control**

**37-2.01A(4)(b)(i) General**

Reserved

**37-2.01A(4)(b)(ii) Aggregate**

All tests must be performed on uncoated aggregate except for film stripping which must be performed on precoated aggregate.

For aggregate, the authorized laboratory must perform sampling and testing at the specified frequency and location for the following quality characteristics:

**Aggregate Quality Control Requirements**

Quality characteristic	Test method	Minimum sampling and testing frequency	Location of sampling
Los Angeles Rattler loss (max, %) At 100 revolutions At 500 revolutions	California Test 211	1st day of production	See California Test 125
Percent of crushed particles Coarse aggregate (min, %) One-fractured face Two-fractured faces Fine aggregate (min, %) (Passing No. 4 sieve and retained on No. 8 sieve) One fractured face	AASHTO T 335	1st day of production	See California Test 125
Flat and elongated particles (max by weight at 3:1, %)	ASTM D4791	1st day of production	See California Test 125
Film stripping (max, %)	California Test 302	1st day of production	See California Test 125
Durability (min)	California Test 229	1st day of production	See California Test 125
Gradation (% passing)	California Test 202	2 per day	See California Test 125
Cleanness value (min)	California Test 227	2 per day	See California Test 125

**37-2.01A(4)(b)(iii) Chip Seals**

For a chip seal, the authorized laboratory must perform sampling and testing at the specified frequency and location for the following quality characteristics:

**Chip Seal Quality Control Requirements**

Quality characteristic	Test method	Minimum sampling and testing frequency	Location of sampling
Asphaltic emulsion binder spread rate (gal/sq yd)	California Test 339	1 per day per distributor truck	Pavement surface

**37-2.01A(4)(c) Department Acceptance**

Department Acceptance shall not apply to identified areas where the existing surfacing before application of chip seal, contains defective areas as determined by the Engineer and Contractor. At least 7 days

before starting placement of the chip seal, the Contractor shall submit a written list of existing defective areas, identifying the lane direction, lane number, starting and ending highway post mile locations, and defect type. The Engineer must agree on which of the identified areas are defective.

Defective areas are defined as one of the following:

1. Areas with wheel path rutting in excess of 3/8 inch when measured by placing a straightedge 12 feet long on the finished surface perpendicular to the center line and measuring the vertical distance between the finished surface and the lower edge of the straightedge
2. Areas exhibiting flushing

For a chip seal, acceptance is based on visual inspection for the following:

1. Uniform surface texture
2. Raveling, which consists of the separation of the aggregate from the asphaltic emulsion or asphalt binder
3. Flushing, which consists of the occurrence of a film of asphaltic material on the surface of the chip seal.
4. Streaking, which consists of alternating longitudinal bands of asphaltic emulsion or asphalt binder without uniform aggregate retention, approximately parallel with the lane line.

Areas of raveling, flushing or streaking that are greater than 0.5 sq ft shall be considered defective and must be repaired.

Raveling and streaking must be repaired by placing an additional layer of chip seal over the defective area.

For asphaltic emulsion or asphalt binder, acceptance is based on the Department's sampling and testing for compliance with the requirements for the quality characteristics specified.

For aggregate, acceptance is based on the Department's sampling and testing for compliance with the requirements shown in the following table:

**Chip Seal Aggregate Acceptance Criteria**

Quality characteristic	Test method	Requirements
Los Angeles Rattler loss (max, %)		
At 100 revolutions	California Test 211	10
At 500 revolutions		40
Percent of crushed particles:	AASHTO T 335	
Coarse aggregate (min, %)		
One-fractured face		95
Two-fractured faces		90
Fine aggregate (min, %)		
(Passing No. 4 sieve and retained on No. 8 sieve)		
One fractured face		70
Flat and elongated particles (max by weight at 3:1, %)	ASTM D4791	10
Film stripping (max, %)	California Test 302	25
Durability (min)	California Test 229	52
Gradation (% passing by weight)	California Test 202	Aggregate Gradation table shown under Materials for the chip seal type specified.
Cleanness value (min)	California Test 227	80

If test results for the aggregate gradation do not comply with specifications, you may remove the chip seal represented by these tests or request that it remain in place with a payment deduction. The deduction is \$1.75 per ton for the aggregate represented by the test results.

If test results for aggregate cleanness value do not comply with the specifications, you may remove the chip seal represented by these tests or you may request that the chip seal remain in place with a pay deduction corresponding to the cleanness value shown in the following table:

**Chip Seal Cleanness Value Deductions**

Cleanness value	Deduction
80 or over	None
79	\$2.00 /ton
77-78	\$4.00 /ton
75-76	\$6.00 /ton

If the aggregate cleanness value is less than 75, remove the chip seal.

**37-2.01B Materials**

**37-2.01B(1) General**

Reserved

**37-2.01B(2) Asphaltic Emulsions and Asphalt Binders**

Reserved

**37-2.01B(3) Aggregate**

**37-2.01B(3)(a) General**

Aggregate must be broken stone, crushed gravel, or both.

Aggregate must comply with the requirements shown in the following table:

**Chip Seal Aggregate Requirements**

Quality characteristic	Test method	Requirements
Los Angeles Rattler loss (max, %)		
At 100 revolutions	California Test 211	10
At 500 revolutions		40
Percent of crushed particles	AASHTO T 335	
Coarse aggregate (min, %)		
One-fractured face		95
Two-fractured faces		90
Fine aggregate (min, %)		
(Passing No. 4 sieve and retained on No. 8 sieve)		
One fractured face		70
Flat and elongated particles (max by weight at 3:1, %)	ASTM D4791	10
Film stripping (max, %)	California Test 302	25
Durability (min)	California Test 229	52
Gradation (% passing by weight)	California Test 202	Aggregate Gradation table shown under Materials for the chip seal type specified.
Cleanness value (min)	California Test 227	80

The authorized laboratory must conduct the Vialit test using the proposed asphaltic emulsion or asphalt binder and aggregate for compliance with the requirements shown in the following table:

### Chip Retention Requirements

Quality characteristic	Test method	Requirement
Chip retention (%)	Vialit test method for aggregate in chip seals, French chip (Modified) <sup>a</sup>	95

<sup>a</sup>The asphaltic emulsion or asphalt binder must be within the field placement temperature range and application rate during specimen preparation. For asphalt binder cure the specimen for first 2 hours at 100 °F.

#### **37-2.01B(3)(b) Precoated Aggregate**

Precoating of aggregate must be performed at a central mixing plant. The plant must be authorized under the Department's *MPQP*.

When precoating aggregate, do not recombine fine materials collected in dust control systems.

Precoated aggregate must be preheated from 260 to 325 degrees F. Coat with any of the asphalts specified in the table titled "Performance Graded Asphalt Binder" in section 92. The asphalt must be from 0.5 to 1.0 percent by weight of dry aggregate. You determine the exact asphalt rate for precoating of aggregate.

Do not stockpile precoated aggregate.

#### **37-2.01C Construction**

##### **37-2.01C(1) General**

For chip seals on 2-lane, 2-way roadways, place a W8-7 (LOOSE GRAVEL) sign and a W13-1 (35) plaque at 2,000-foot maximum intervals along each side of the traveled way where aggregate is spread on a traffic lane and at public roads or streets entering the chip seal area. Place the 1st W8-7 sign in each direction where traffic first encounters the loose aggregate, regardless of which lane the aggregate is spread on. A W13-1 (35) plaque is not required where the posted speed limit is less than 40 mph.

For chip seals on freeways, expressways, and multilane conventional highways, place a W8-7, (LOOSE GRAVEL) sign and a W13-1 (35) plaque at 2,000-foot maximum intervals along the outside edge of the traveled way nearest to the lane worked on, at on ramps, and at public roads or streets entering the chip seal area. Place the 1st W8-7 sign where the aggregate starts with respect to the direction of travel on that lane. A W13-1 (35) plaque is not required where the posted speed limit is less than 40 mph.

Pilot cars must have cellular or radio contact with other pilot cars and personnel in the work zone. The maximum speed of the pilot cars conveying or controlling traffic through the traffic control zone must be 15 mph on 2-lane, two-way highways and 25 mph on multilane divided and undivided highways. Pilot cars must only use traffic lanes open to traffic.

On the days that closures are not allowed, you may use a moving closure to maintain the seal coat surface. The moving closure is only allowed during daylight hours when traffic will be the least inconvenienced and delayed. The Engineer determines the hours for the moving closure.

Maintain signs in place at each location until the final sweeping of the chip seal surface for that location is complete. Signs may be set on temporary portable supports with the W13-1 sign below the W8-7 sign or on barricades with the W13-1 sign alternating with the W8-7 sign.

Schedule chip seal activities so that the chip seals are placed on both lanes of the traveled way each work shift.

If traffic is routed over a surface where a chip seal application is intended, the chip seal must not be applied to more than half the width of the traveled way at a time, and the remaining width must be kept free of obstructions and open to traffic until the previously applied width is ready for traffic use.

Wherever maintenance sweeping of the chip seal surface is complete, place permanent traffic stripes and pavement markings within 10 days.

If you fail to place the permanent traffic stripes and pavement markings within the specified time, the Department withholds 50 percent of the estimated value of the chip seal work completed that has not received permanent traffic stripes and pavement markings.

### **37-2.01C(2) Equipment**

Equipment for chip seals must include and comply with the following:

1. Aggregate haul trucks must have:
  - 1.1. Tailgate that discharge aggregate
  - 1.2. Device to lock onto the rear aggregate spreader hitch
  - 1.3. Dump bed that will not push down on the spreader when fully raised
  - 1.4. Dump bed that will not spill aggregate on the roadway when transferred to the spreader hopper
  - 1.5. Tarpaulin to cover precoated aggregate when haul distance exceeds 30 minutes or ambient temperature is less than 65 degrees F
2. Self-propelled aggregate spreaders must have:
  - 2.1. Aggregate hopper in the rear
  - 2.2. Belt conveyor that carries the aggregate to the front
  - 2.3. Spreading hopper capable of providing a uniform aggregate spread rate over the entire width of the traffic lane in 1 application.
3. Self-propelled power brooms must:
  - 3.1. Not be steel-tined brooms on emulsion chip seals
  - 3.2. Be capable of removing loose aggregate adjacent to barriers that prevent aggregate from being swept off the roadway, including curbs, gutters, dikes, berms, and railings
4. Pneumatic or foam filled rubber tired rollers must:
  - 4.1. Be an oscillating type at least 4 feet wide
  - 4.2. Be self-propelled and reversible
  - 4.3. Have tires of equal size, diameter, type, and ply
  - 4.4. Carry at least 3,000 lbs of load on each wheel
  - 4.5. Have tires with an air pressure of  $100 \pm 5$  psi or be foam filled

### **37-2.01C(3) Surface Preparation**

Before applying chip seals, cover manholes, valve and monument covers, grates, or other exposed facilities located within the area of application, using a plastic or oil resistant construction paper secured by tape or adhesive to the facility being covered. Reference the covered facilities with enough control points to relocate the facilities after the application of the chip seal.

Immediately before applying chip seals, clean the surface to receive a chip seal by removing any extraneous material affecting adhesion of the chip seal with the existing surface and drying. Use self-propelled power brooms to clean the existing pavement.

### **37-2.01C(4) Placement**

#### **37-2.01C(4)(a) General**

Schedule the operations so that chip seals are placed on both lanes of the traveled way each work shift. At the end of the work shift, the end of the chip seals on both lanes must generally match.

#### **37-2.01C(4)(b) Applying Asphaltic Emulsions or Asphalt Binders**

Prevent spraying on existing pavement not intended for chip seals or on previously applied chip seals using a material such as building paper. Remove the material after use.

Align longitudinal joints between chip seal applications with designated traffic lanes.

For asphaltic emulsion or asphalt binder, overlap longitudinal joints by not more than 4 inches. You may overlap longitudinal joints up to 8 inches if authorized.

For areas not accessible to a truck distributor bar apply:

1. Asphaltic emulsions by hand spraying
2. Asphalt binders with a squeegee or other authorized means

You may overlap the asphaltic emulsion or asphalt binder applications before the application of aggregate at longitudinal joints.

Do not apply the asphaltic emulsion or asphalt binder unless there is sufficient aggregate at the job site to cover the asphaltic emulsion or asphalt binder.

Discontinue application of asphaltic emulsion or asphalt binder early enough to comply with lane closure requirements. Apply to 1 lane at a time and cover the lane width entirely in 1 operation.

### **37-2.01C(4)(c) Spreading Aggregates**

#### **37-2.01C(4)(c)(i) General**

Prevent vehicles from driving on asphaltic emulsion or asphalt binder before spreading aggregate.

Spread aggregate within 10 percent of your determined rate.

Spread aggregate at a uniform rate over the full lane width in 1 application. Apply to 1 lane at a time.

Sweep excess aggregate at joints before spreading adjacent aggregate.

Operate the spreader at speeds slow enough to prevent aggregate from rolling over after dropping.

If the spreader is not moving, aggregate must not drop. If you stop spreading and aggregate drops, remove the excess aggregate before resuming activities.

#### **37-2.01C(4)(c)(ii) Precoated Aggregate Application**

During transit, cover precoated aggregate with tarpaulins if the ambient air temperature is below 65 degrees F or the haul time exceeds 30 minutes.

When applied, precoated aggregate must be from 225 to 325 degrees F.

### **37-2.01C(4)(d) Finishing**

#### **37-2.01C(4)(d)(i) General**

Remove piles, ridges, or unevenly distributed aggregate. Repair permanent ridges, bumps, streaks or depressions in the finished surface. Spread additional aggregate and roll if aggregate is picked up by rollers or vehicles.

Chip seal joints between adjacent applications of a chip seal must be smooth, straight, uniform, and completely covered.

A coverage is 1 roller movement over the entire width of lane. A pass is 1 roller movement parallel to the chip seal application in either direction. Overlapping passes are part of the coverage being made and are not part of a subsequent coverage. Do not start a new coverage until completing the previous coverage.

Before opening to traffic, finish the chip seals in the following sequence:

1. Perform initial rolling consisting of 1 coverage with a pneumatic-tired roller
2. Perform final rolling consisting of 2 coverages with a pneumatic-tired roller
3. Sweep excess aggregate from the roadway and adjacent abutting areas
4. Apply a flush coat if specified
5. Remove covers from the facilities

#### **37-2.01C(4)(d)(ii) Traffic Control With Pilot Car**

For 2-lane 2-way roadways under 1-way traffic control, upon completion of final rolling, traffic must be controlled with pilot cars and routed over the new chip seal for a period of 2 to 4 hours before opening the lane to traffic not controlled with pilot cars.

For multilane roadways, when traffic is controlled with pilot cars, a maximum of 1 lane in the direction of travel must be open to traffic. Traffic must be controlled with pilot cars and be routed on the new chip seal surface of the lane for a minimum of 2 hours after completion of the initial sweeping and before opening the lane to traffic not controlled with pilot cars. Once traffic controlled with pilot cars is routed over the chip seal at a particular location, continuous control must be maintained at that location until the chip seal placement and sweeping on adjacent lanes to receive a chip seal is completed.



### **37-2.01C(4)(d)(iii) Sweeping**

Sweeping must be performed after the chip seal has set and there is no damage or dislodging of aggregate from the chip seal surface. As a minimum, sweeping is required at the following times:

1. On 2-lane 2-way roadways, from 2 to 4 hours after traffic, controlled with pilot cars, has been routed on the chip seal
2. On multilane roadways, from 2 to 4 hours after aggregate have been placed
3. In addition to previous sweeping, perform final sweeping immediately before opening any lane to public traffic, not controlled with pilot cars

### **37-2.01C(4)(d)(iv) Excess Aggregate**

Dispose of excess aggregate. If ordered, salvaging and stockpiling of excess aggregate is change order work.

### **37-2.01C(4)(e) Chip Seal Maintenance**

Perform sweeping on the morning following the application of aggregate on any lane that has been open to traffic not controlled with pilot cars and before starting any other activities.

Chip seal surfaces must be maintained for 4 consecutive days from the day aggregate is applied. Maintenance must include sweeping to maintain a surface free of loose aggregate and to prevent formation of corrugations. Sweeping must not dislodge aggregate set in asphaltic emulsion or asphalt binder.

After 4 consecutive days, excess aggregate must be removed from the paved areas.

### **37-2.01D Payment**

If there is no bid item for traffic control system, furnishing and using a pilot car is included in the various items of the work involved in applying the chip seal.

The payment quantity for precoated aggregate is the weight measured after the aggregate is preheated and precoated with asphalt binder.

If recorded batch weights are printed automatically, the payment quantity for aggregate is the weight determined from the printed batch weights if:

1. Total weight for the precoated aggregate per batch is printed
2. Total asphalt binder weight per batch is printed
3. Zero tolerance weight is printed before weighing the first batch and after weighing the last batch for each truckload
4. Time, date, mix number, load number, and truck identification are correlated with a load slip
5. Copy of the recorded batch weights is certified by a licensed weighmaster

## **37-2.02 ASPHALTIC EMULSION CHIP SEALS**

### **37-2.02A General**

#### **37-2.02A(1) Summary**

Section 37-2.02 includes specifications for applying asphaltic emulsion chip seals. An asphaltic emulsion chip seal includes applying an asphaltic emulsion, followed by aggregate, and then a flush coat.

A double asphaltic emulsion chip seal is the application of an asphaltic emulsion followed by aggregate, applied twice in sequence and then a flush coat.

#### **37-2.02A(2) Definitions**

Reserved

#### **37-2.02A(3) Submittals**

Immediately after sampling, submit two 1-quart plastic containers of asphaltic emulsion taken in the presence of the Engineer. Samples must be submitted in insulated shipping container.

**37-2.02A(4) Quality Assurance****37-2.02A(4)(a) General**

Reserved

**37-2.02A(4)(b) Quality Control****37-2.02A(4)(b)(i) General**

Reserved

**37-2.02A(4)(b)(ii) Asphaltic Emulsions**

Circulate asphaltic emulsion in the distributor truck before sampling. Take samples from the distributor truck at mid load or from a sampling tap or thief. Before taking samples, draw and dispose of 1 gallon. In the presence of the Engineer, take two 1-quart samples in a plastic container with lined sealed lid for acceptance testing.

For asphaltic emulsion, the authorized laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

**Asphaltic Emulsion**

Quality characteristic	Test method	Minimum sampling and testing frequency	Sampling location
Saybolt Furol Viscosity, at 25 °C (Saybolt Furol seconds)	AASHTO T 59	Minimum 1 per day per delivery truck	Distributor truck
Sieve Test (%)			
Storage stability, 1 day (%)			
Residue by distillation (%)			
Particle charge <sup>a</sup>			
Tests on Residue from Distillation Test:			
Penetration, 25 °C	AASHTO T 49	Minimum 1 per day per delivery truck	Distributor truck
Ductility	AASHTO T 51		
Solubility in trichloroethylene	AASHTO T 44		

<sup>a</sup>If the result of the particle charge is inconclusive, the asphaltic emulsion must be tested for pH under ASTM E70. Grade QS1h asphaltic emulsion must have a minimum pH of 7.3. Grade CQS1h asphaltic emulsion must have a maximum pH of 6.7.

**37-2.02A(4)(c) Department Acceptance**

Aggregate acceptance is based on the Department's sampling and testing for compliance with the requirements shown in the following table:

**Aggregate Gradation Acceptance Criteria**

Quality characteristic	Test method	Requirement		
Gradation (% passing by weight)	California Test 202	3/8"	5/16"	1/4"
Sieve size:		--	--	--
3/4"		100	--	--
1/2"		85-100	100	100
3/8"		0-15	0-50	60-85
No. 4		0-5	0-15	0-25
No. 8		--	0-5	0-5
No. 16		--	0-3	0-3
No. 30		0-2	0-2	0-2
No. 200				

**37-2.02B Materials****37-2.02B(1) General**

Reserved

### 37-2.02B(2) Asphaltic Emulsions

Reserved

### 37-2.02B(3) Aggregate

Aggregate gradation for an asphaltic emulsion chip seal must comply with the requirements shown in the following table:

Asphaltic Emulsion Chip Seal Aggregate Gradation				
Quality characteristic	Test method	Requirement		
Gradation (% passing by weight)	California Test 202	3/8"	5/16"	1/4"
Sieve size:		--	--	--
3/4"		100	--	--
1/2"		85–100	100	100
3/8"		0–15	0–50	60–85
No. 4		0–5	0–15	0–25
No. 8		--	0–5	0–5
No. 16		--	0–3	0–3
No. 30		0–2	0–2	0–2
No. 200				

### 37-2.02C Construction

#### 37-2.02C(1) General

Reserved

#### 37-2.02C(2) Asphaltic Emulsions

Asphaltic emulsions must be applied within the application rate ranges shown in the following table:

Asphaltic Emulsion Application Rates	
Aggregate gradation	Application rate range (gal/sq yd)
3/8"	0.30–0.45
5/16"	0.25–0.35
1/4"	0.20–0.30

For double asphaltic emulsion chip seals, the asphaltic emulsions must be applied within the application rates shown in the following table:

Asphaltic Emulsion Application Rates	
Double chip seals	Application rate range (gal/sq yd)
1st application	0.30–0.45
2nd application	0.20–0.30

When applied, the temperature of the asphaltic emulsions must be from 130 to 180 degrees F.

Apply asphaltic emulsions when the ambient air temperature is from 65 to 110 degrees F and the pavement surface temperature is at least 80 degrees F.

Do not apply asphaltic emulsions when weather forecasts predict the ambient air temperature will fall below 39 degrees F within 24 hours after application.

#### 37-2.02C(3) Spreading Aggregates

Aggregate must be spread within the spread rate ranges shown in the following table:

### Aggregate Spread Rates

Aggregate gradation	Spread rate range (lb/sq yd)
3/8"	20–30
5/16"	16–25
1/4"	12–20

For double asphaltic emulsion chip seals, aggregate must be spread within the spread rate ranges shown in the following table:

### Aggregate Spread Rates

Double chip seal	Spread rate range (lb/sq yd)
1st application	23–30
2nd application	12–20

Remove excess aggregate on the 1st application before the 2nd application of asphaltic emulsion.

You may stockpile aggregate for asphaltic emulsion chip seals if you prevent contamination. Aggregate must have a damp surface at spreading. If water visibly separates from the aggregate, do not spread. You may re-dampen aggregate in the delivery vehicle.

Spread aggregate before an asphaltic emulsion sets or breaks.

Do not spread aggregate more than 2,500 feet ahead of the completed initial rolling.

#### **37-2.02D Payment**

Not Used

### **37-2.03 POLYMER MODIFIED ASPHALTIC EMULSION CHIP SEALS**

#### **37-2.03A General**

##### **37-2.03A(1) Summary**

Section 37-2.03 includes specifications for applying polymer modified asphaltic emulsion chip seals. A polymer modified asphaltic emulsion chip seal includes applying a polymer modified asphaltic emulsion, followed by aggregate, and then a flush coat.

A double polymer modified asphaltic emulsion chip seal is the application of a polymer modified asphaltic emulsion followed by aggregate, applied twice in sequence and then a flush coat.

##### **37-2.03A(2) Definitions**

Reserved

##### **37-2.03A(3) Submittals**

Immediately after sampling, submit two 1-quart cans of polymer modified asphaltic emulsion taken in the presence of the Engineer. A sample must be submitted in an insulated shipping container.

##### **37-2.03A(4) Quality Assurance**

###### **37-2.03A(4)(a) General**

Reserved

###### **37-2.03A(4)(b) Quality Control**

###### **37-2.03A(4)(b)(i) General**

Reserved

###### **37-2.03A(4)(b)(ii) Polymer Modified Asphaltic Emulsions**

Circulate polymer modified asphaltic emulsions in the distributor truck before sampling. Take samples from the distributor truck at mid load or from a sampling tap or thief. Before taking samples, draw and dispose of 1 gallon. In the presence of the Engineer, take two 1-quart samples for acceptance testing.

For polymer modified asphaltic emulsions, the authorized laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

**Polymer Modified Asphaltic Emulsion**

Quality characteristic	Test method	Minimum sampling and testing frequency	Sampling location
Saybolt Furol Viscosity, at 50 °C (Saybolt Furol seconds)	AASHTO T 59	Minimum 1 per day per delivery truck	Distributor truck
Settlement, 5 days (max, %)			
Storage stability test, 1 day (max, %)			
Sieve test (max, %)			
Demulsibility (min, %)			
Particle charge			
Ash content (max, %)			
Residue by evaporation (min, %)	California Test 331		
Tests on residue from evaporation test:			
Penetration, 25 °C	AASHTO T 49	Minimum 1 per day per delivery truck	Distributor truck
Penetration, 4 °C, 200g for 60 seconds	AASHTO T 49		
Ductility, 25 °C (min, mm)	AASHTO T 51		
Torsional recovery (min, %)	California Test 332		
Ring and Ball Softening Point (min, °F)	AASHTO T 53		

**37-2.03A(4)(c) Department Acceptance**

Aggregate acceptance is based on the Department's sampling and testing for compliance with the requirements shown in the following table:

**Aggregate Gradation Acceptance Criteria**

Quality characteristic	Test method	Requirement		
		3/8"	5/16"	1/4"
Gradation (% passing by weight)	California Test 202	3/8"	5/16"	1/4"
Sieve size:				
3/4"		--	--	--
1/2"		100	--	--
3/8"		85–100	100	100
No. 4		0–15	0–50	60–85
No. 8		0–5	0–15	0–25
No. 16		--	0–5	0–5
No. 30		--	0–3	0–3
No. 200		0–2	0–2	0–2

**37-2.03B Materials**

**37-2.03B(1) General**

Reserved

**37-2.03B(2) Polymer Modified Asphaltic Emulsions**

A polymer modified asphaltic emulsion must include elastomeric polymer.

A polymer modified asphaltic emulsion must be Grade PMRS2, PMRS2h, PMCRS2, or PMCRS2h. Polymer content in percent by weight does not apply.

A polymer modified asphaltic emulsion must comply with section 94 and the quality characteristic requirements in the following table:

### Polymeric Asphaltic Emulsion

Quality characteristic	Test method	Requirement
Penetration, 4 °C, 200g for 60 seconds (min)	AASHTO T 49	6
Ring and Ball Softening Point (min, °F)	AASHTO T 53	135

#### 37-2.03B(3) Aggregate

The aggregate gradation for a polymer modified asphaltic emulsion chip seal must comply with the requirements shown in the following table:

#### Asphaltic Emulsion Chip Seal Aggregate Gradation

Quality characteristic	Test method	Requirement		
Gradation (% passing by weight) Sieve Size	California Test 202	3/8"	5/16"	1/4"
3/4"		--	--	--
1/2"		100	--	--
3/8"		85–100	100	100
No. 4		0–15	0–50	60–85
No. 8		0–5	0–15	0–25
No. 16		--	0–5	0–5
No. 30		--	0–3	0–3
No. 200		0–2	0–2	0–2

#### 37-2.03C Construction

Polymer modified asphaltic emulsions must be applied within the application rate ranges shown in the following table:

#### Polymer Modified Asphaltic Emulsion Application Rates

Aggregate gradation	Application rate range (gal/sq yd)
3/8"	0.30–0.45
5/16"	0.25–0.35
1/4"	0.20–0.30

For double polymer modified asphaltic emulsion chip seals, polymer modified asphaltic emulsions must be applied within the application rates shown in the following table:

#### Polymer Modified Asphaltic Emulsion Application Rates

Double application	Application rate range (gal/sq yd)
1st application	0.30–0.45
2nd application	0.20–0.30

Apply polymer modified asphaltic emulsions when the ambient air temperature is from 60 to 105 degrees F and the pavement surface temperature is at least 80 degrees F.

Do not apply polymer modified asphaltic emulsions when weather forecasts predict the ambient air temperature will fall below 39 degrees F within 24 hours after application.

Aggregate must be spread within the spread rate ranges shown in the following table:

### Aggregate Spread Rates

Chip seal type	Spread rate range (lb/sq yd)
3/8"	20–30
5/16"	16–25
1/4"	12–20

For double chip seals, aggregate must be spread within spread rate ranges shown in the following table:

### Aggregate Spread Rates

Double application	Spread rate range (lb/sq yd)
1st application	23–30
2nd application	12–20

Remove excess aggregate on the 1st application before the 2nd application of asphaltic emulsion.

You may stockpile aggregate for the polymer modified asphaltic emulsion chip seals if you prevent contamination. Aggregate must have damp surfaces at spreading. If water visibly separates from the aggregate, do not spread. You may redampen aggregate in the delivery vehicle.

Spread aggregate before the polymer modified asphaltic emulsion sets or breaks.

Do not spread aggregate more than 2,500 feet ahead of the completed initial rolling.

#### 37-2.03D Payment

Not Used

#### 37-2.04 ASPHALT RUBBER BINDER CHIP SEALS

##### 37-2.04A General

##### 37-2.04A(1) Summary

Section 37-2.04 includes specifications for applying asphalt rubber binder chip seals.

An asphalt rubber binder chip seal consists of applying asphalt rubber binder followed by heated aggregate precoated with asphalt binder followed by a flush coat.

##### 37-2.04A(2) Definitions

**crumb rubber modifier:** Combination of ground or granulated high natural scrap tire crumb rubber and scrap tire crumb rubber derived from waste tires described in Pub Res Code § 42703.

**descending viscosity reading:** Subsequent viscosity reading at least 5 percent lower than the previous viscosity reading.

**high natural scrap tire crumb rubber:** Material containing 40 to 48 percent natural rubber.

**scrap tire crumb rubber:** Any combination of vehicle tires or tire buffing.

##### 37-2.04A(3) Submittals

At least 5 business days before use, submit the permit issued by the local air district for asphalt rubber binder field blending equipment and application equipment. If an air quality permit is not required by the local air district for producing asphalt rubber binder, submit verification from the local air district that an air quality permit is not required.

For each delivery of asphalt rubber binder ingredients to the job site, submit a certificate of compliance with a copy of the specified test results.

Submit a certified volume or weight slip for each delivery of asphalt rubber binder ingredients and asphalt rubber binder.

Submit a SDS for each asphalt rubber binder ingredient and the asphalt rubber binder.

At least 15 days before use, submit:

1. Samples of each asphalt rubber binder ingredient:
  - 1.1. 2 lbs of scrap tire crumb rubber
  - 1.2. 2 lbs of high natural scrap tire crumb rubber
  - 1.3. Two 1-quart cans of base asphalt binder
  - 1.4. Two 1-quart cans of asphalt modifier
2. Asphalt rubber binder formulation and data as follows:
  - 2.1. For asphalt modifier, include:
    - 2.1.1. Source of asphalt modifier
    - 2.1.2. Type of asphalt modifier
    - 2.1.3. Percentage of asphalt modifier by weight of asphalt binder
    - 2.1.4. Percentage of combined asphalt binder and asphalt modifier by weight of asphalt rubber binder
    - 2.1.5. Test results for the specified quality characteristics
  - 2.2. For crumb rubber modifier, include:
    - 2.2.1. Each source and type of scrap tire crumb rubber and high natural scrap tire crumb rubber
    - 2.2.2. Percentage of scrap tire crumb rubber and high natural scrap tire crumb rubber by total weight of asphalt rubber binder
    - 2.2.3. Test results for the specified quality characteristics
  - 2.3. For asphalt rubber binder, include minimum reaction time and temperature

Immediately after sampling, submit five 1-quart cans of asphalt rubber binder taken in the presence of the Engineer. Sample must be submitted in insulated shipping containers.

Submit notification 15 minutes before each viscosity test or submit a schedule of testing times.

Submit the log of asphalt rubber binder descending viscosity test results within 1 business day after sampling.

Submit asphalt rubber binder quality control viscosity test results within 1 business day after sampling.

**37-2.04A(4) Quality Assurance**

**37-2.04A(4)(a) General**

The equipment used in producing asphalt rubber binder and the equipment used in spreading asphalt rubber binder must be permitted for use or exempted by the local air district.

**37-2.04A(4)(b) Quality Control**

**37-2.04A(4)(b)(i) General**

Reserved

**37-2.04A(4)(b)(ii) Asphalt Modifiers**

For asphalt modifiers, the authorized laboratory must perform quality control sampling and testing at the specified frequency for the following quality characteristics:

<b>Asphalt Modifier for Asphalt Rubber Binder</b>		
Quality characteristic	Test method	Frequency
Viscosity	ASTM D445	1 per shipment
Flash point	ASTM D92	
Molecular Analysis:		
Asphaltenes	ASTM D2007	1 per shipment
Aromatics	ASTM D2007	

**37-2.04A(4)(b)(iii) Crumb Rubber Modifiers**

Sample and test scrap tire crumb rubber and high natural scrap tire crumb rubber separately.

Perform quality control sampling and testing at the specified frequency for the following quality characteristics:



**Crumb Rubber Modifier**

Quality characteristic	Test method	Frequency
Scrap tire crumb rubber gradation	California Test 385	1 per 10,000
High natural scrap tire crumb rubber gradation	California Test 385	1 per 3,400 lb
Wire in CRM	California Test 385	1 per 10,000 lb
Fabric in CRM	California Test 385	
CRM particle length	--	
CRM specific gravity	California Test 208	
Natural rubber content in high natural scrap tire crumb rubber	ASTM D297	1 per 3,400 lb

**37-2.04A(4)(b)(iv) Asphalt Rubber Binders**

For asphalt rubber binders, the authorized laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

**Asphalt Rubber Binder Quality Control Requirements**

Quality characteristic	Test method	Sampling location	Frequency
Descending viscosity <sup>a</sup> at 375 °F (Pa•s x 10 <sup>-3</sup> )	ASTM D7741	Reaction vessel	1 per lot <sup>b</sup>
Viscosity at 375 °F (Pa•s x 10 <sup>-3</sup> )	ASTM D7741	Distribution truck	15 minutes before use per lot <sup>b</sup>
Cone penetration at 25 °C (0.10 mm)	ASTM D217	Distribution truck	1 per lot <sup>b</sup>
Resilience at 25 °C (% rebound)	ASTM D5329		
Softening point (°C)	ASTM D36		

<sup>a</sup>Start taking viscosity readings at least 45 minutes after adding crumb rubber modifier and continue taking viscosity readings every 30 minutes until 2 consecutive descending viscosity readings have been obtained and the final viscosity complies with the specification requirement.

<sup>b</sup>A lot is defined in the *MPQP*.

Retain samples from each lot. Test samples for cone penetration, resilience, and softening point for the first 3 lots and if all 3 lots pass, the testing frequency may be reduced to once for every 3 lots.

If QC test results indicate that the asphalt rubber binder does not comply with the specifications, take corrective action and notify the Engineer.

**37-2.04A(4)(c) Department Acceptance**

**37-2.04A(4)(c)(i) General**

Reserved

**37-2.04A(4)(c)(ii) Asphalt Modifiers**

The Department accepts asphalt modifier based on compliance with the requirements shown in the following table:

**Asphalt Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Requirement
Viscosity at 100 °C (m <sup>2</sup> /s x 10 <sup>-6</sup> )	ASTM D445	X ± 3 <sup>a</sup>
Flash point (min, °C)	ASTM D92	207
Molecular Analysis:		
Asphaltenes (max, % by mass)	ASTM D2007	0.1
Aromatics (min, % by mass)	ASTM D2007	55

<sup>a</sup>The symbol "X" is the asphalt modifier viscosity.

**37-2.04A(4)(c)(iii) Crumb Rubber Modifiers**

Scrap tire CRM and high natural CRM are sampled and tested separately.

The Department accepts scrap tire CRM and high natural CRM based on compliance with the requirements shown in the following table:

**Crumb Rubber Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Requirement
Wire in CRM (max, %)	California Test 385	0.01
Fabric in CRM (max, %)	California Test 385	0.05
CRM particle length (max, in)	--	3/16
CRM specific gravity	California Test 208	1.1–1.2
Natural rubber content in high natural CRM (%)	ASTM D297	40.0–48.0

The Department accepts CRM gradation based on the requirements shown in the following table:

**Crumb Rubber Modifier Gradation Requirements**

Quality characteristic	Test method	Requirement			
		Scrap tire crumb rubber		High natural scrap tire crumb rubber	
Gradation (% passing by weight) Sieve size:	California Test 385	Operating range	Contract compliance	Operating range	Contract compliance
No. 8		100	100	--	--
No. 10		95–100	90–100	100	100
No. 16		35–85	32–88	92–100	85–100
No. 30		2–25	1–30	25–95	20–98
No. 50		0–10	0–15	6–35	2–40
No. 100		0–5	0–10	0–7	0–10
No. 200		0–2	0–5	0–3	0–5

If a test result for CRM gradation does not comply with the specifications, the Department deducts the corresponding amount for each gradation test as shown in the following table:

Material	Gradation test result <sup>a</sup>	Deduction
Scrap tire crumb rubber	Operating range < TR < Contract compliance	\$250
Scrap tire crumb rubber	TR > Contract compliance	\$1,100
High natural scrap tire crumb rubber	Operating range < TR < Contract compliance	\$250
High natural scrap tire crumb rubber	TR > Contract compliance	\$600

<sup>a</sup>Test Result = TR

Each gradation test for scrap tire crumb rubber represents 10,000 lb or the quantity used in that day's production, whichever is less.

Each gradation test for high natural scrap tire crumb rubber represents 3,400 lb or the quantity used in that day's production, whichever is less.

**37-2.04A(4)(c)(iv) Asphalt Rubber Binders**

For Department acceptance testing, take a sample of asphalt rubber binder in the Engineer's presence every 5 lots or once a day, whichever is greater. Each sample must be in five 1-quart cans with an open top and friction lid.

For an asphalt rubber binder, acceptance is based on the Department's sampling and testing for compliance with the requirements shown in the following table:

### Asphalt Rubber Binder

Quality characteristic	Test method	Requirement
Cone penetration at 25 °C (0.10 mm)	ASTM D217	25–60
Resilience at 25 °C (% rebound)	ASTM D5329	18–50
Softening point (°C)	ASTM D36	55–88
Viscosity at 375 °F (Pa•s x 10 <sup>-3</sup> ) <sup>a</sup>	ASTM D7741	1,500–2,500

<sup>a</sup>Prepare sample for viscosity test under California Test 388.

#### 37-2.04A(4)(c)(v) Precoated Aggregate

The Department accepts precoated aggregate based on compliance with the requirements shown in the following table:

#### Precoated Aggregate Gradation Acceptance Criteria

Quality Characteristic	Test method	Requirement
1/2" gradation (% passing by weight)	California Test 202	
Sieve size:		
3/4"		100
1/2"		85–90
3/8"		0–30
No. 4		0–5
No. 8		--
No. 200	0–1	
3/8" gradation (% passing by weight)	California Test 202	
Sieve size:		
3/4"		100
1/2"		95–100
3/8"		70–85
No. 4		0–15
No. 8		0–5
No. 200	0–1	

#### 37-2.04B Materials

##### 37-2.04B(1) General

Reserved

##### 37-2.04B(2) Asphalt Binders

Asphalt binder used as the base binder for asphalt rubber binder must comply with the specifications for asphalt binder. Do not modify asphalt binder with polymer.

##### 37-2.04B(3) Asphalt Modifiers

An asphalt modifier must be a resinous, high flash point, and aromatic hydrocarbon. An asphalt modifier must comply with the requirements shown in the following table:

#### Asphalt Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Requirement
Viscosity at 100 °C (m <sup>2</sup> /s x 10 <sup>-6</sup> )	ASTM D445	X ± 3 <sup>a</sup>
Flash point (min, CL.O.C., °C)	ASTM D92	207
Molecular analysis:		
Asphaltenes by mass (max, %)	ASTM D2007	0.1
Aromatics by mass (min, %)	ASTM D2007	55

<sup>a</sup>X denotes the proposed asphalt modifier viscosity from 19 to 36. A change in X requires a new asphalt rubber binder submittal.

##### 37-2.04B(4) Crumb Rubber Modifiers

The CRM to be used must be on the Authorized Materials List for crumb rubber modifier.

The CRM must be ground or granulated at ambient temperature.

Scrap tire crumb rubber and high natural scrap tire crumb rubber must be delivered to the asphalt rubber binder production site in separate bags.

Steel and fiber must be separated. If steel and fiber are cryogenically separated, it must occur before grinding and granulating. Cryogenically-produced CRM particles must be large enough to be ground or granulated.

The CRM must be dry, free-flowing particles that do not stick together. A maximum of 3 percent calcium carbonate or talc by weight of CRM may be added. The CRM must not cause foaming when combined with the asphalt binder and asphalt modifier.

The CRM must comply with the requirements shown in the following table:

**Crumb Rubber Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Requirement
Wire in CRM (max, %)	California Test 385	0.01
Fabric in CRM (max, %)	California Test 385	0.05
CRM particle length (max, in)	--	3/16
CRM specific gravity	California Test 208	1.1–1.2

The CRM must comply with the requirements shown in the following table:

**Crumb Rubber Modifier Requirements**

Quality characteristic	Test method	Requirement	
		Scrap tire crumb rubber	High natural scrap tire crumb rubber
Acetone extract (%)	ASTM D297	6.0–16.0	4.0–16.0
Rubber hydrocarbon (min, %)		42.0–65.0	50.0
Natural rubber content (%)		22.0–39.0	40.0–48.0
Carbon black content (%)		28.0–38.0	--
Ash content (max, %)		8.0	--

Scrap tire crumb rubber gradation must comply with the gradation requirements shown in the following table:

**Scrap Tire Crumb Rubber Gradation**

Quality characteristic	Test method	Requirement		
		Gradation limit	Operating range	Contract compliance
Gradation (% passing by weight) Sieve size:	California Test 385			
No. 8		100	100	100
No. 10		98–100	95–100	90–100
No. 16		45–75	35–85	32–88
No. 30		2–20	2–25	1–30
No. 50		0–6	0–10	0–15
No. 100		0–2	0–5	0–10
No. 200		0	0–2	0–5

High natural scrap tire crumb rubber gradation must comply with the gradation requirements shown in the following table:

### High Natural Scrap Tire Crumb Rubber Gradation

Quality characteristic	Test method	Requirement		
		Gradation limit	Operating range	Contract compliance
Gradation (% passing by weight) Sieve size:	California Test 385			
No. 10		100	100	100
No. 16		95–100	92–100	85–100
No. 30		35–85	25–95	20–98
No. 50		10–30	6–35	2–40
No. 100		0–4	0–7	0–10
No. 200		0–1	0–3	0–5

#### 37-2.04B(5) Asphalt Rubber Binders

An asphalt rubber binder must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. Crumb rubber modifier

Asphalt rubber binder blending equipment must be authorized under the Department's *MPQP*.

The blending equipment must allow the determination of weight percentages of each asphalt rubber binder ingredient.

An asphalt rubber binder must be  $79 \pm 1$  percent by weight asphalt binder and  $21 \pm 1$  percent by weight of CRM. The minimum percentage of CRM must be 20.0 percent and lower values must not be rounded up.

The CRM must be  $75 \pm 2$  percent by weight scrap tire crumb rubber and  $25 \pm 2$  percent by weight high natural scrap tire crumb rubber.

An asphalt modifier and asphalt binder must be blended at the production site. An asphalt modifier must be from 2.5 to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder. The asphalt rubber binder supplier determines the exact percentage.

If blended before adding CRM, the asphalt binder must be from 375 to 440 degrees F when an asphalt modifier is added and the mixture must circulate for at least 20 minutes. An asphalt binder, asphalt modifier, and CRM may be proportioned and combined simultaneously.

The blend of an asphalt binder and an asphalt modifier must be combined with the CRM at the asphalt rubber binder production site. The asphalt binder and asphalt modifier blend must be from 375 to 440 degrees F when the CRM is added. Combined ingredients must be allowed to react at least 45 minutes at temperatures from 375 to 425 degrees F except the temperature must be at least 10 degrees F below the flash point of the asphalt rubber binder.

After reacting, the asphalt rubber binder must comply with the requirements shown in the following table:

#### Asphalt Rubber Binder

Quality characteristic	Test method	Requirement
Cone penetration at 25 °C (0.10 mm)	ASTM D217	25–60
Resilience at 25 °C (% rebound)	ASTM D5329	18–50
Softening point (°C)	ASTM D36	55–88
Viscosity at 375 °F ( $\text{Pa}\cdot\text{s} \times 10^{-3}$ ) <sup>a</sup>	ASTM D7741	1,500–2,500

<sup>a</sup>Prepare sample for viscosity test under California Test 388.

Maintain asphalt rubber binder at a temperature from 375 to 415 degrees F.

Stop heating unused asphalt rubber binder 4 hours after the 45-minute reaction period. Reheating asphalt rubber binder that cools below 375 degrees F is a reheat cycle. Do not exceed 2 reheat cycles. If reheating, the asphalt rubber binder must be from 375 to 415 degrees F before use.

During reheating, you may add CRM. The CRM must not exceed 10 percent by weight of the asphalt rubber binder. Allow added CRM to react for at least 45 minutes. Reheated asphalt rubber binder must comply with the specifications for asphalt rubber binder.

**37-2.04B(6) Precoated Aggregate**

Before precoating with asphalt binder, aggregate for an asphalt rubber binder chip seal must comply with the gradation requirements shown in the following table:

**Asphalt Rubber Binder Chip Seal Aggregate Gradation**

Quality characteristic	Test method	Requirement	
Gradation (% passing by weight)	California Test 202	1/2"	3/8"
Sieve size:			
3/4"		100	100
1/2"		85–90	95–100
3/8"		0–30	70–85
No. 4		0–5	0–15
No. 8		--	0–5
No. 200		0–1	0–1

**37-2.04C Construction**

**37-2.04C(1) General**

Reserved

**37-2.04C(2) Equipment**

Distributor trucks must be equipped with:

1. Mixing and heating unit
2. Observation platform on the rear of the truck for an observer on the platform to see the nozzles and unplug them if needed

**37-2.04C(3) Asphalt Rubber Binder Application**

Apply the asphalt rubber binder when the ambient temperature is from 60 to 105 degrees F and the pavement surface temperature is at least 55 degrees F.

Do not apply the asphalt rubber binder unless enough aggregate is available at the job site to cover the asphalt rubber binder within 2 minutes. Intersections, turn lanes, gore points, and irregular areas must be covered within 15 minutes.

Do not apply asphalt rubber binder when pavement is damp or during high wind conditions. If authorized, you may adjust the distributor bar height and distribution speed and use shielding equipment during high wind conditions.

When applied, the temperature of the asphalt rubber binder must be from 385 to 415 degrees F.

Apply the asphalt rubber binder at a rate from 0.55 to 0.65 gal/sq yd. You may reduce the application rate by 0.050 gal/sq yd in the wheel paths.

**37-2.04C(4) Precoated Aggregate Spreading**

Spread aggregate at a rate from 28 to 40 lb/sq yd. Do not spread aggregate more than 200 feet ahead of the completed initial rolling.

**37-2.04C(5) Rolling and Sweeping**

Perform initial rolling within 90 seconds of spreading aggregate. If authorized for final rolling, you may use a steel-wheeled roller weighing from 8 to 10 tons in static mode only.

Perform a final sweeping before Contract acceptance. The final sweeping must not dislodge aggregate.

#### **37-2.04D Payment**

Asphalt rubber binder is measured as specified for asphalt binder.

### **37-2.05 STRESS ABSORBING MEMBRANE INTERLAYERS**

#### **37-2.05A General**

Section 37-2.05 includes specifications for placing stress absorbing membrane interlayers (SAMI).

Comply with section 37-2.04 except a flush coat is not required.

Traffic must not be allowed on a SAMI.

#### **37-2.05B Materials**

For a SAMI, aggregate must comply with the 3/8-inch gradation.

#### **37-2.05C Construction**

If a SAMI is overlaid in the same work shift, section 37-2.01C(4)(e) does not apply.

Final sweeping is not required for a SAMI.

#### **37-2.05D Payment**

Not Used

### **37-2.06 MODIFIED ASPHALT BINDER CHIP SEALS**

Reserved

### **37-2.07 SCRUB SEALS**

Reserved

## **37-3 SLURRY SEALS AND MICRO-SURFACINGS**

### **37-3.01 GENERAL**

#### **37-3.01A General**

##### **37-3.01A(1) Summary**

Section 37-3.01 includes general specifications for applying slurry seals and micro-surfacings.

##### **37-3.01A(2) Definitions**

Reserved

##### **37-3.01A(3) Submittals**

At least 15 days before starting placement of a slurry seal or micro-surfacing, submit:

1. Samples for:
  - 1.1. Asphaltic emulsion slurry seal, two 1-quart wide mouth plastic containers with screw top lid of asphaltic emulsion
  - 1.2. Polymer modified asphaltic emulsion slurry seal, two 1-quart wide mouth plastic containers with screw top lid of polymer modified asphaltic emulsion
  - 1.3. Micro-surfacing, two 1-quart wide mouth plastic containers with screw top lid of micro-surfacing emulsion
2. Asphaltic emulsion, polymer modified asphaltic emulsion, or micro-surfacing emulsion data as follows:
  - 2.1. Supplier and Type/Grade of asphaltic emulsion
  - 2.2. Type of modifier polymer for polymer modified asphaltic emulsion or micro-surfacing emulsion
  - 2.3. Copy of the specified test results for asphaltic emulsion, polymer modified asphaltic emulsion, or micro-surfacing emulsion
3. 50 lb of aggregate
4. Aggregate test results for the followings:
  - 4.1. Gradation
  - 4.2. Los Angeles Rattler
  - 4.3. Percent of crushed particles

- 4.4 Sand equivalent
- 4.5 Durability

At least 10 days before starting placement of a slurry seal or micro-surfacing, submit a laboratory report of test results and the proposed mix design from an authorized laboratory. The authorized laboratory must sign the laboratory report and mix design.

The report must include:

1. Test results used in the mix design compared with specification requirements
2. Proportions based on the dry weight of aggregate, including ranges, for:
  - 2.1. Aggregate
  - 2.2. Water
  - 2.3. Additives
  - 2.4. Mineral filler
  - 2.5. Slurry seal emulsion or micro-surfacing emulsion residual asphalt content
3. Recommended changes to the proportions based on heating the mixture to 100 degrees F and mixing for 60 seconds, if atmospheric temperatures during application will be 90 degrees F or above, for:
  - 3.1. Water
  - 3.2. Additives
  - 3.3. Mineral filler
4. Quantitative moisture effects on the aggregate's unit weight determined under ASTM C29M

If the mix design consists of the same materials covered by a previous laboratory report, you may submit the previous laboratory report that must include material testing data performed within the previous 12 months for authorization.

If you change any of the materials in the mix design, submit a new mix design and laboratory report at least 10 days before starting slurry seal or micro-surfacing work.

Submit a certificate of compliance as specified for asphaltic emulsion in section 94-1.01C with each shipment of asphaltic emulsion, polymer modified asphaltic emulsion or micro-surfacing emulsion.

Submit quality control test results for the quality characteristics within the reporting times allowance after sampling shown in the following table:

**Quality Control Test Reporting Requirements**

Quality characteristic	Maximum reporting time allowance
Los Angeles Rattler loss (max, %)	2 business days
Percent of crushed particles (min, %)	2 business days
Durability (min)	2 business days
Resistance of fine aggregate to degradation by abrasion in the Micro-Deval Apparatus (% loss by weight)	2 business days
Gradation (% passing by weight)	48 hours
Sand equivalent (min)	48 hours
Moisture content (%)	48 hours

Within 3 days after taking asphaltic emulsion, polymer modified asphaltic emulsion or micro-surfacing emulsion quality control samples, submit the authorized laboratory's test results.

**37-3.01A(4) Quality Assurance**

**37-3.01A(4)(a) General**

Your authorized laboratory must be able to perform International Slurry Surfacing Association tests and mix design.



**37-3.01A(4)(b) Quality Control****37-3.01A(4)(b)(i) General**

Reserved

**37-3.01A(4)(b)(ii) Aggregate**

For aggregate, the authorized laboratory must perform sampling and testing at the specified frequency and location for the following quality characteristics:

**Aggregate Quality Control**

Quality characteristic	Test method	Minimum sampling and testing frequency	Location of sampling
Los Angeles Rattler loss (max, %) At 500 revolutions	California Test 211	1st day of production	See California Test 125
Percent of crushed particles (min, %)	AASHTO T 335	1st day of production	See California Test 125
Sand equivalent (min)	California Test 217	1 per working stockpile per day	See California Test 125
Resistance of fine aggregate to degradation by abrasion in the Micro-Deval Apparatus (% loss by weight)	ASTM D7428	1 per working stockpile per day	See California Test 125
Gradation (% passing by weight)	California Test 202	1 per working stockpile per day	See California Test 125
Moisture content, from field stockpile (%)	AASHTO T 255 <sup>a</sup>	1 per working stockpile per day	See California Test 125

<sup>a</sup>Test aggregate moisture at field stockpile every 2 hours if you are unable to maintain the moisture content to within a maximum daily variation of  $\pm 0.5$  percent.

**37-3.01A(4)(b)(iii) Slurry Seals and Micro-surfacings**

Reserved

**37-3.01A(4)(c) Department Acceptance**

Slurry Seal and micro-surfacing acceptance is based on:

1. Visual inspection for the following:
  - 1.1. Uniform surface texture throughout the work limits.
  - 1.2. Marks in the surface:
    - 1.2.1. Up to 4 marks in the completed slurry seal or micro-surfacing surface that are up to 1 inch wide and up to 6 inches long per 1000 square feet of slurry seal or micro-surfacing placed.
    - 1.2.2. No marks in the completed slurry seal or micro-surfacing surface that are over 1 inch wide or 6 inches long.
  - 1.3. Excessive raveling consisting of the separation of the aggregate from the asphaltic emulsion, polymer modified asphaltic emulsion or micro-surfacing emulsion.
  - 1.4. Bleeding consists of the occurrence of a film of asphaltic material on the surface of the slurry seal or micro-surfacing.
  - 1.5. Delaminating of slurry seal or micro-surfacing from the existing pavement.
  - 1.6. Rutting or wash-boarding.
2. Department's sampling and testing for compliance with the requirements for aggregate shown in the following table:

### Aggregate Gradation Acceptance Criteria

Quality characteristic	Test method	Requirements		
Gradation (% passing by weight) Sieve Size:	California Test 202	Type I	Type II	Type III
3/8"		--	100	100
No. 4		100	94-100	70-90
No. 8		90-100	65-90	45-70
No. 16		60-90	40-70	28-50
No. 30		40-65	25-50	19-34
No. 200		10-20	5-15	5-15

An aggregate gradation test represents 300 tons or 1 day's production, whichever is less.

If test results for aggregate gradation do not comply with the specifications, you may remove the slurry seal or micro-surfacing represented by the test results or request it remain in place with a payment deduction. If your request is authorized, the Department deducts:

1. \$1.75 per ton of slurry seal for each noncompliant aggregate gradation
2. \$2.00 per ton of micro-surfacing for each noncompliant aggregate gradation

#### **37-3.01B Materials**

##### **37-3.01B(1) General**

Additional water must not cause separation of the asphaltic emulsion, polymer modified asphaltic emulsion or micro-surfacing emulsion from the aggregate before placement.

You may use an additive that does not adversely affect the slurry seal or micro-surfacing.

##### **37-3.01B(2) Aggregate**

Aggregate must be rock dust. Aggregate must be free from vegetable matter, deleterious substances, caked or clay lumps, and oversized particles.

Aggregate for a slurry seal and micro-surfacing must comply with the gradations shown in the following table:

#### Aggregate Gradation

Quality characteristic	Test method	Requirements		
Gradation (% passing by weight) Sieve size:	California Test 202	Type I	Type II	Type III
3/8"		--	100	100
No. 4		100	94-100	70-90
No. 8		90-100	65-90	45-70
No. 16		60-90	40-70	28-50
No. 30		40-65	25-50	19-34
No. 200		10-20	5-15	5-15

#### **37-3.01C Construction**

##### **37-3.01C(1) General**

Before applying slurry seals or micro-surfacings, cover manholes, valve and monument covers, grates, and other exposed facilities located within the area of application using plastic or oil resistant construction paper secured by tape or adhesive to the facility being covered. Reference the covered facilities with enough control points to relocate the facilities after application of the slurry seals or micro-surfacings.

##### **37-3.01C(2) Proportioning**

Proportion slurry seal and micro-surfacing ingredients in compliance with the authorized mix design.

### **37-3.01C(3) Mixing and Spreading Equipment**

#### **37-3.01C(3)(a) General**

Mixing and spreading equipment for slurry seals and micro-surfacings must proportion the asphaltic emulsions, water, aggregate, and any additives by volume and mix them in continuous pug mill mixers.

Introduce emulsions into the mixer with a positive displacement pump. If you use a variable-rate pump, the adjusting unit must be sealed in its calibrated position.

Introduce water into the mixer through a meter that measures gallons.

Choose a truck mounted mixer-spreader or continuous self-loading mixer spreader.

#### **37-3.01C(3)(b) Truck Mounted Mixer Spreaders**

Truck mounted mixer spreaders must comply with:

1. Rotating and reciprocating equipment must be covered with metal guards.
2. Proportion aggregate using a belt feeder with an adjustable cutoff gate. The Engineer verifies the height of the gate opening.
3. Belt feeder must have a depth monitor device. The depth monitor device must automatically shut down power to the belt feeder when the aggregate depth is less than 70 percent of the target depth.
4. Separate monitor device must detect the revolutions of the belt feeder. This device must automatically shut down power to the belt feeder if it detects no revolutions. If the belt feeder is an integral part of the equipment's drive chain, the monitor device is not required.
5. Aggregate belt feeder must be connected directly to the drive on the emulsion pump. The aggregate feeder drive shaft must have a revolution counter reading the nearest 0.10 revolution for micro-surfacing, and nearest 1 revolution for slurry seal.
6. Emulsion storage must be equipped with a device that automatically shuts down power to the emulsion pump and aggregate belt feeder when the level of stored emulsion is lowered. To allow for normal fluctuations, there may be a delay of 3 seconds between detection of low emulsion storage levels or low aggregate depths and automatic power shut down.
7. Emulsion storage must be located immediately before the emulsion pump.
8. Emulsion storage tank must have a temperature indicator at the pump suction level. The indicator must be accurate to  $\pm 5$  degrees F.
9. No-flow and revolution warning devices must be in working condition. Low-flow indicators must be visible while walking alongside the equipment.

#### **37-3.01C(3)(c) Continuous Self-Loading Mixer Spreaders**

Continuous self-loading mixer spreaders must be automatically sequenced and self-propelled. The mixing machine must deliver each material to a double shafted mixer and discharge the mixed material on a continuous flow basis. The mixing machines must have sufficient storage capacity to maintain a continuous supply of material to the proportioning controls. The mixing machine operators must have full control of forward and reverse speeds during placement.

#### **37-3.01C(3)(d) Spreader Boxes**

The spreader boxes used to spread slurry seals and micro-surfacings must be:

1. Capable of spreading the slurry seal or micro-surfacing a minimum of 12 feet wide and preventing the loss of slurry seal or micro-surfacing.
2. Equipped with flexible rubber belting on each side. The belting must contact the pavement to prevent the loss of slurry seal or micro-surfacing from the box.
3. Equipped to uniformly apply the slurry seal or micro-surfacing on superelevated sections and shoulder slopes. Micro-surfacing spreader box must be equipped with reversible motor driven augers.
4. Equipped with a series of strike-off devices at its rear.
  - 4.1. The leading strike off device must be:
    - 4.1.1. Fabricated of a suitable material such as steel or stiff rubber
    - 4.1.2. Designed to maintain close contact with the pavement during spreading
    - 4.1.3. Capable of obtaining the specified thickness
    - 4.1.4. Capable of being adjusted to the various pavement cross sections
  - 4.2. The final strike-off device must be:
    - 4.2.1. Fabricated of flexible material that produces a uniform texture in the finished surface

4.2.2. Cleaned daily and changed if longitudinal scouring occurs in the slurry seal or micro-surfacing

5. Clean and free of slurry seal or micro-surfacing at the start of each work shift.

#### **37-3.01C(3)(e) Shoulder Equipment**

Spread the slurry seal or micro-surfacing on shoulders with a device such as an edge box that forms clean and straight joints and edges.

#### **37-3.01C(3)(f) Equipment Calibration**

Equipment calibration must comply with the *MPQP*. Notify the Engineer at least 5 business days before calibrating.

If the Department authorizes a truck or continuous mixer spreader, its calibration is valid for 6 months provided you:

1. Use the same truck or continuous mixer spreader verified with a unique identifying number
2. Use the same materials in compliance with the authorized mix design
3. Do not perform any repair or alteration to the proportioning systems

Calibrate the adjustable cut-off gate settings of each truck or continuous mixer spreader on the project to achieve the correct delivery rate of aggregate and emulsion per revolution of the aggregate feeder under the *MPQP*.

Checks must be performed for each aggregate source using an authorized vehicle scale.

Individual checks of the aggregate belt feeder's delivery rate to the pug mill mixer must not vary more than 2 percent from the average of 3 runs of at least 3 tons each.

Before using a variable-rate emulsion pump, the pump must be calibrated and sealed in the calibrated condition under the *MPQP*.

Individual checks of the emulsion pump's delivery rate to the pug mill mixer must not vary more than 2 percent from the average of 3 runs of at least 500 gal each.

#### **37-3.01C(4) Surface Preparation**

Immediately before applying slurry seals or micro-surfacings, clean the surface to receive slurry seals or micro-surfacings by removing any extraneous material affecting adhesion of the slurry seal or micro-surfacing with the existing surface. Use self-propelled power brooms or other methods such as flushing to clean the existing pavement.

#### **37-3.01C(5) Placement**

##### **37-3.01C(5)(a) General**

If truck-mounted mixer-spreaders are used, keep at least 2 operational spreaders at the job site during placement.

Spread slurry seals and micro-surfacings uniformly and do not spot, rehandle, or shift the mixture. However in areas inaccessible to spreading equipment, spread the slurry seal or micro-surfacing mixtures with hand tools or other authorized methods. If placing with hand tools, lightly dampen the area first.

You may fog the roadway surface with water ahead of the spreader box. The fog spray must be adjusted for pavement:

1. Temperature
2. Surface texture
3. Dryness

You determine the application rates for slurry seals or micro-surfacings and the Engineer authorizes the application rates. Spread within 10 percent of authorized rate.

The mixtures must be uniform and homogeneous after spreading, and there must not be separation of the emulsion and aggregate after setting.

### **37-3.01C(5)(b) Weather Conditions**

Only place slurry seals or micro-surfacings if both the pavement and air temperatures are at least 50 degrees F and rising. The expected high temperature must be at least 65 degrees F within 24 hours after placement.

Do not place slurry seals or micro-surfacings if rain is imminent or the air temperature is expected to be below 36 degrees F within 24 hours after placement.

### **37-3.01C(5)(c) Joints**

Transverse and longitudinal joints must be:

1. Uniform
2. Straight
3. Neat in appearance
4. Without material buildup
5. Without uncovered areas

Transverse joints must be butt-type joints.

Prevent double placement at transverse joints over previously placed slurry seals or micro-surfacings.

Place longitudinal joints:

1. On centerlines, lane lines, edge lines, or shoulder lines
2. With overlaps not more than 4 inches

You may request other longitudinal joint patterns if they do not adversely affect the slurry seals or micro-surfacings.

The maximum difference between the pavement surface and the bottom edge of a 12-foot straightedge placed perpendicular to the longitudinal joint must be 0.04 foot.

### **37-3.01C(5)(d) Finished Surfaces**

Finished slurry seals or micro-surfacings must be smooth and free of irregularities such as scratch or tear marks. You may leave up to 4 marks that are up to 1 inch wide and 6 inches long per 75 linear feet of slurry seal or micro-surfacing placed. Do not leave any marks that are over 1 inch wide or 6 inches long.

### **37-3.01C(5)(e) Maintenance Sweeping**

Sweep the slurry seals or micro-surfacings 24 hours after placement without damaging the slurry seals or micro-surfacings. For 4 days afterwards, sweep the slurry seals or micro-surfacings daily unless determined otherwise by the Engineer.

### **37-3.01C(5)(f) Repair of Early Distress**

The slurry seals or micro-surfacings must not show bleeding, raveling, separation, or other distresses for 15 days after placing. If bleeding, raveling, delaminating, rutting, or wash-boarding occurs after placing the slurry seals or micro-surfacings, make repairs using an authorized method.

### **37-3.01D Payment**

Not Used

## **37-3.02 SLURRY SEALS**

### **37-3.02A General**

#### **37-3.02A(1) Summary**

Section 37-3.02 includes specifications for applying slurry seals.

Applying a slurry seal consists of spreading a mixture of asphaltic emulsion or polymer modified asphaltic emulsion, aggregate, additives, and water on a surface or pavement.

#### **37-3.02A(2) Definitions**

Reserved

**37-3.02A(3) Submittals**

Immediately after sampling, submit two 1-quart wide mouth plastic containers of asphaltic emulsion or polymer modified asphaltic emulsion taken in the presence of the Engineer. Samples must be submitted in insulated shipping containers.

**37-3.02A(4) Quality Assurance****37-3.02A(4)(a) General**

Reserved

**37-3.02A(4)(b) Quality Control****37-3.02A(4)(b)(i) General**

Take samples of asphaltic emulsion and polymer modified asphaltic emulsion from the tank truck at mid load or from a sampling tap or thief. Before taking samples, draw and dispose of 1 gallon. In the presence of the Engineer take two 1-quart samples in wide mouth plastic containers with lined, sealed lids for acceptance testing.

**37-3.02A(4)(b)(ii) Asphaltic Emulsion**

For asphaltic emulsions, the authorized laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

**Asphaltic Emulsion**

Quality characteristic	Test method	Minimum sampling and testing frequency	Sampling location
Saybolt Furol Viscosity, at 25 °C (Saybolt Furol seconds)	AASHTO T 59	Minimum 1 per day per delivery truck	Delivery truck
Sieve Test (%)			
Storage stability, 1 day (%)			
Residue by distillation (%)			
Particle charge <sup>a</sup>			
Tests on Residue from Distillation Test:			
Penetration, 25 °C	AASHTO T 49	Minimum 1 per day per delivery truck	Delivery truck
Ductility	AASHTO T 51		
Solubility in trichloroethylene	AASHTO T 44		

<sup>a</sup>If the result of the particle charge is inconclusive, the asphaltic emulsion must be tested for pH under ASTM E70. Grade QS1h asphaltic emulsion must have a minimum pH of 7.3. Grade CQS1h asphaltic emulsion must have a maximum pH of 6.7.

**37-3.02A(4)(b)(iii) Polymer Modified Asphaltic Emulsion**

For polymer modified asphaltic emulsions, the authorized laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

**Polymer Modified Asphaltic Emulsion**

Quality characteristic	Test method	Minimum sampling and testing frequency	Sampling Location
<b>Tests on emulsion:</b>			
Saybolt Furol Viscosity at 25 °C (Saybolt Furol seconds)	AASHTO T 59	Minimum 1 per day per delivery truck	Delivery truck
Sieve test (%)	AASHTO T 59		
Storage stability after 1 day (%)	AASHTO T 59		
Residue by evaporation (min, %)	California Test 331		
Particle charge	AASHTO T 59		
<b>Tests on residue by evaporation:</b>			
Penetration at 25 °C	AASHTO T 49	Minimum 1 per day per delivery truck	Delivery truck
Ductility at 25 °C (min, mm)	AASHTO T 51		
Torsional recovery (min, %)	California Test 332		
Or  Polymer content based on residual asphalt (min, %)	California Test 401		

**37-3.02A(4)(c) Department Acceptance**

For a slurry seal asphaltic emulsion and polymer modified asphaltic emulsion, acceptance is based on the Department's sampling and testing for compliance with the requirements for the quality characteristics specified.

Aggregate acceptance is based on the Department's sampling and testing for compliance with the requirements shown in the following table:

**Aggregate Acceptance Criteria**

Quality characteristic	Test method	Requirement
Los Angeles Rattler loss (max, %) At 500 revolutions	California Test 211 <sup>a</sup>	35
Percent of crushed particles (min, %)	California Test 205	95
Durability (min)	California Test 229	55
Sand equivalent (min)	California Test 217	45
Type I		
Type II		
Type III		60

<sup>a</sup>California Test 211 must be performed on the source aggregate before crushing.

A sand equivalent test represents 300 tons or 1 day's production, whichever is less.

If test results for sand equivalent do not comply with the specifications, you may remove the slurry seal represented by the test results or request it remain in place with a payment deduction. If your request is authorized, the Department deducts \$1.75 per ton of slurry seal for each noncompliant sand equivalent test.

**37-3.02B Materials**

**37-3.02B(1) General**

Reserved

**37-3.02B(2) Asphaltic Emulsions**

An asphaltic emulsion must comply with the requirements in Section 94. The asphaltic emulsion must be Grade CQS1h.

**37-3.02B(3) Polymer Modified Asphaltic Emulsions**

A polymer modified asphaltic emulsion must:

1. Consist of an elastomeric polymer mixed with an asphaltic material uniformly emulsified with water and an emulsifying or stabilization agent.
2. Use either neoprene polymer or butadiene and styrene copolymer. The polymer must be homogeneous and milled into the asphaltic emulsion at the colloid mill.
3. Be Grade PMCQS1h and must comply with the requirements shown in the following table:

**Polymer Modified Asphaltic Emulsion Requirements**

Quality characteristic	Test method	Requirement
<b>Tests on emulsion:</b>		
Saybolt Furol Viscosity at 25 °C (Saybolt Furol seconds)	AASHTO T 59	15–90
Sieve test (%)	AASHTO T 59	0–0.3
Storage stability after 1 day (%)	AASHTO T 59	0–1
Residue by evaporation (min, %)	California Test 331	60
Particle charge	AASHTO T 59	Positive
<b>Tests on residue by evaporation:</b>		
Penetration at 25 °C	AASHTO T 49	40–90
Ductility at 25 °C (min, mm)	AASHTO T 51	400
Torsional recovery (min, %)	California Test 332	18
Or		
Polymer content based on residual asphalt (min, %)	California Test 401	2.5

**37-3.02B(4) Aggregate**

Aggregate must comply with the quality characteristic requirements shown in the following table:

**Aggregate Requirements**

Quality characteristic	Test method	Requirement
Los Angeles Rattler loss (max, %) At 500 revolutions	California Test 211 <sup>a</sup>	35
Percent of crushed particles (min, %)	California Test 205	95
Durability (min)	California Test 229	55
Sand equivalent (min)		
Type I	California Test 217	45
Type II		55
Type III		60

<sup>a</sup>California Test 211 must be performed on the source aggregate before crushing. The aggregate supplier must certify that the crushed aggregate being used on the project is manufactured from the source aggregate complying with the LA rattler requirements.

**37-3.02B(5) Slurry Seal Mix Design**

The slurry seal mix design, using project source aggregate, an asphaltic emulsion, and set-control agents if any, must comply with the requirements shown in the following table:



### Slurry Seal Mix Design Requirements

Quality characteristic	Test method <sup>a</sup>	Requirement
Consistency (max, mm)	Technical Bulletin 106	30
Wet stripping	Technical Bulletin 114	Pass
Compatibility	Technical Bulletin 115	Pass <sup>b</sup>
Cohesion test, within 1 hour (min, kg-mm)	Technical Bulletin 139	200
Wet track abrasion (max, g/m <sup>2</sup> )	Technical Bulletin 100	810

<sup>a</sup>Test methods are by the International Slurry Surfacing Association.

<sup>b</sup>Mixing test must pass at the maximum expected air temperature at the job site during placement.

The mix design must have the percent of asphaltic residue, based on percentage by weight of the dry aggregate, within the ranges shown in the following table:

Slurry seal type	Residue range
Type I	10–16
Type II	7.5–13.5
Type III	6.5–12.0

Determine the exact percentage based on the design asphalt binder content and the asphalt residual content of the asphaltic emulsion furnished.

#### **37-3.02C Construction**

##### **37-3.02C(1) General**

Reserved

##### **37-3.02C(2) Proportioning**

After proportioning, slurry seal mixtures must be workable.

##### **37-3.02C(3) Mixing and Spreading Equipment**

Reserved

##### **37-3.02C(4) Placement**

The slurry seal spread rates must be within the ranges shown in the following table:

<b>Slurry Seal Spread Rates</b>	
Slurry seal type	Application range (lb of dry aggregate/sq yd)
Type I	8–12
Type II	10–18
Type III	20–25

Within 4 hours after placement, slurry seals must be set enough to allow traffic without pilot cars. Protect slurry seals from damage until it has set and will not adhere or be picked up by vehicle tires. Slurry seals must not exhibit distress from traffic such as bleeding, raveling, separation or other distresses.

#### **37-3.02D Payment**

The payment quantity for slurry seal is the weight determined by combining the weights of the aggregate and asphaltic emulsion or polymeric asphaltic emulsion. The payment quantity for slurry seal does not include the weights of the added water and set-control additives.

### **37-3.03 MICRO-SURFACINGS**

#### **37-3.03A General**

##### **37-3.03A(1) Summary**

Section 37-3.03 includes specifications for applying micro-surfacings.

Applying a micro-surfacing consists of spreading a mixture of a micro-surfacing emulsion, water, additives, mineral filler, and aggregate on the pavement.

**37-3.03A(2) Definitions**

Reserved

**37-3.03A(3) Submittals**

Immediately after sampling, submit two 1-quart wide mouth plastic containers of micro-surfacing emulsion taken in the presence of the Engineer. Samples must be submitted in insulated shipping container.

**37-3.03A(4) Quality Assurance**

**37-3.03A(4)(a) General**

Reserved

**37-3.03A(4)(b) Quality Control**

**37-3.03A(4)(b)(i) General**

Reserved

**37-3.03A(4)(b)(ii) Micro-surfacing Emulsions**

Take samples from the truck tank at mid load from a sampling tap or thief. Before taking samples, draw and dispose of 1 gallon. In the presence of the Engineer, take two 1-quart wide mouth plastic containers for acceptance testing.

For a micro-surfacing emulsion, the authorized laboratory must perform quality control sampling and testing at the specified frequency and location for the quality characteristics shown in the following table:

**Micro-Surfacing Emulsion**

Quality characteristic	Test method	Minimum sampling and testing frequency	Sampling location
Tests on emulsion:			
Saybolt Furol Viscosity, at 25°C (Saybolt Furol seconds)	AASHTO T 59	Minimum 1 per day per delivery truck	Delivery truck
Storage stability, 1 day (max, %) <sup>a</sup>			
Sieve test (max, %)			
Residue by evaporation (min, %)	California Test 331	Minimum 1 per day per delivery truck	Delivery truck
Tests on residue from evaporation test:			
Penetration at 25 °C	AASHTO T 49	Minimum 1 per day per delivery truck	Delivery truck
Softening point (min, °C)	AASHTO T 53		

<sup>a</sup>Storage stability test will be run if the storage exceeds 48 hours

**37-3.03A(4)(c) Department Acceptance**

For micro-surfacing emulsions, acceptance is based on the Department's sampling and testing for compliance with the requirements shown in the following table:

### Micro-surfacing Emulsion Acceptance Criteria

Quality characteristic	Test method	Requirement
Tests on emulsion:		
Saybolt Furol Viscosity at 25 °C (Saybolt Furol seconds)	AASHTO T 59	15–90
Sieve test (%)	AASHTO T 59	0.30
Storage stability, 1 day (max, %)	AASHTO T 59	0–1
Settlement <sup>a</sup> , 5 days (max, %)	ASTM D244	5
Residue by evaporation (min, %)	California Test 331	62
Tests on residue by evaporation:		
Penetration at 25 °C	AASHTO T 49	40–90
Softening point (min, °C)	AASHTO T 53	57

<sup>a</sup>Settlement test on emulsion is not required if used within 48 hours of shipment.

Acceptance of aggregate, except mineral filler, is based on the Department's sampling and testing for compliance with the requirements shown in the following table:

### Aggregate Acceptance Criteria

Quality characteristic	Test method	Requirement
Los Angeles Rattler loss (max, %) At 500 revolutions	California Test 211 <sup>a</sup>	35
Percent of crushed particles (min, %)	California Test 205	95
Durability (min)	California Test 229	65
Sand equivalent (min)	California Test 217	
Type II		65
Type III		65

<sup>a</sup>California Test 211 must be performed on the aggregate before crushing. The aggregate supplier must certify that the crushed aggregate being used on the project is manufactured from the source aggregate complying with the LA rattler requirements.

An aggregate sand equivalent test represents 300 tons or 1 day's production, whichever is less.

If the test results for aggregate sand equivalent do not comply with the specifications, you may remove the micro-surfacing represented by the test results or request it remain in place with a payment deduction. If your request is authorized, the Department deducts \$2.00 per ton of micro-surfacing for each noncompliant aggregate sand equivalent test.

#### 37-3.03B Materials

##### 37-3.03B(1) General

Reserved

##### 37-3.03B(2) Micro-surfacing Emulsions

A micro-surfacing emulsion must be a homogeneous mixture of asphalt, an elastomeric polymer and an emulsifier solution.

Add an elastomeric polymer modifier to asphalt or emulsifier solution before emulsification. An elastomeric polymer solid must be a minimum of 3 percent by weight of the micro-surfacing emulsion's residual asphalt.

A micro-surfacing emulsion must comply with the requirements shown in the following table:

### Micro-surfacing Emulsion Requirements

Quality characteristic	Test method	Requirement
<b>Tests on emulsion:</b>		
Saybolt Furol Viscosity at 25 °C (Saybolt Furol seconds)	AASHTO T 59	15–90
Sieve test (%)	AASHTO T 59	0.30
Storage stability, 1 day (max, %)	AASHTO T 59	0–1
Settlement <sup>a</sup> , 5 days (max, %)	ASTM D244	5
Residue by evaporation (min, %)	California Test 331	62
<b>Tests on residue by evaporation:</b>		
Penetration at 25 °C	AASHTO T 49	40–90
Softening point (min, °C)	AASHTO T 53	57

<sup>a</sup>Settlement test on emulsion is not required if used within 48 hours of shipment.

### 37-3.03B(3) Aggregate

Aggregate must comply with the quality characteristic requirements shown in the following table:

#### Aggregate Requirements

Quality characteristic	Test method	Requirement
Los Angeles Rattler loss (max, %) At 500 revolutions	California Test 211 <sup>a</sup>	35
Percent of crushed particles (min, %)	California Test 205	95
Durability (min)	California Test 229	65
Sand equivalent (min)	California Test 217	
Type II		65
Type III		65

<sup>a</sup>California Test 211 must be performed on the source aggregate before crushing. The aggregate supplier must certify that the crushed aggregate being used on the project is manufactured from the source aggregate complying with the LA rattler requirements.

### 37-3.03B(4) Mineral Fillers

If a mineral filler is used, it must be type I or type II Portland cement. A mineral filler used during mix design must be used during production.

### 37-3.03B(5) Micro-Surfacing Mix Designs

The micro-surfacing mix design must have the material proportion limits shown in the following table:

#### Micro-surfacing Mix Design Proportion Limits

Material	Proportion limits
Micro-surfacing emulsion asphalt residual content (% of dry weight of aggregate)	5.5–10.5
Water and additives	As Required
Mineral filler (% of dry weight of aggregate)	0–3

The micro-surfacing mix design must comply with the requirements shown in the following table:

### Micro-surfacing Mix Design Requirements

Quality characteristics	Test method <sup>a</sup>	Requirement
Wet cohesion At 30 minutes (set) (min, kg-cm) At 60 minutes (traffic) (min, kg-cm)	Technical Bulletin 139	12 20
Excess asphalt (max, g/m <sup>2</sup> )	Technical Bulletin 109	540
Wet stripping (min, %)	Technical Bulletin 114	90
Wet track abrasion loss 6-day soak (max, g/m <sup>2</sup> )	Technical Bulletin 100	810
Displacement Lateral (max, %) Specific gravity after 1000 cycles of 57 kg (max)	Technical Bulletin 147A	5 2.10
Classification compatibility (min, grade points)	Technical Bulletin 144	(AAA, BAA) 11
Mix time at 25 °C (min)	Technical Bulletin 113	Controllable to 120 seconds

<sup>a</sup>Test methods are by the International Slurry Surfacing Association.

#### 37-3.03B(6) Tack Coats

If there is a bid item for tack coat, you must coat the pavement surface with an asphaltic emulsion mixed with additional water before applying a micro-surfacing. The maximum ratio of water to asphaltic emulsion must be 2 to 1. Apply the tack coat at a rate from 0.08 to 0.15 gal/sq yd. The exact rate must be authorized.

You determine the grade of slow-setting or quick setting asphaltic emulsion to be used.

#### 37-3.03C Construction

##### 37-3.03C(1) General

Reserved

##### 37-3.03C(2) Proportioning

Field conditions may require adjustments to the proportions within the authorized mix design during construction.

##### 37-3.03C(3) Mixing and Spreading Equipment

###### 37-3.03C(3)(a) General

Reserved

###### 37-3.03C(3)(b) Scratch Course Boxes

Spread the scratch courses with the same type of spreader box used to spread micro-surfacings except use an adjustable steel strike-off device instead of a final strike-off device.

###### 37-3.03C(3)(c) Wheel Path Depression Boxes

Each wheel path depression box must have adjustable strike-off device between 5 and 6 feet wide to regulate depth. The wheel path depression box must also have devices such as hydraulic augers capable of:

1. Moving the mixed material from the rear to the front of the filling chamber
2. Guiding larger aggregate into the deeper section of the wheel path depression
3. Forcing the finer material towards the outer edges of the spreader box

###### 37-3.03C(4) Test Strips

If micro-surfacing placement will require more than 1 day, you must construct a test strip. The test strip must be:

1. From 300 to 450 feet long
2. The same as the full production micro-surfacing
3. On 1 of the application courses specified at an authorized location

4. At the same time of day or night the full production micro-surfacing is to be applied

If multiple application courses are specified, you may construct test strips over 2 days or nights.

The Engineer evaluates the test strip after traffic has used it for 12 hours. If the Engineer determines the mix design or placement procedure is unacceptable, make modifications and construct a new test strip for the Engineer's evaluation.

**37-3.03C(5) Placement**

**37-3.03C(5)(a) General**

Reserved

**37-3.03C(5)(b) Repair Wheel Path Depressions**

If repairing wheel path depressions is shown in plans, fill wheel path depressions and irregularities with micro-surfacing material before spreading micro-surfacing. If the depressions are less than 0.04 foot deep, fill with a scratch course. If the depressions are 0.04 foot deep or more, fill the depressions using a wheel path depression box.

Spread scratch courses by adjusting the steel strike-off of a scratch course box until it is directly in contact with the pavement surface.

Spread micro-surfacings with a wheel path depression box leaving a slight crown at the surface. Use multiple applications to fill depressions more than 0.12 foot deep. Do not apply more than 0.12 foot in a single application.

Allow traffic to compact each filled wheel path depression for a minimum of 12 hours before placing additional micro-surfacings.

**37-3.03C(5)(c) Micro-surfacing Pavement Surfaces**

The micro-surfacing spread rates must be within the ranges shown in the following table:

Micro-surfacing type	Application range (lb of dry aggregate/sq yd)
Type II	10–20
Type III <sup>a</sup>	20–32
Type III <sup>b</sup>	30–32

<sup>a</sup>Over asphalt concrete pavement

<sup>b</sup>Over concrete pavement and concrete bridge decks

Within 2 hours after placement, micro-surfacings must be set enough to allow traffic without pilot cars. Protect the micro-surfacings from damage until it has set and will not adhere or be picked up by vehicle tires. Micro-surfacings must not exhibit distress from traffic such as bleeding, raveling, separation or other distresses.

**37-3.03D Payment**

The payment quantity for micro-surfacing is the weight determined by combining the weights of the aggregate and micro-surfacing emulsion. The payment quantity for micro-surfacing does not include the weights of added water, mineral filler, and additives.

**37-3.04 RUBBERIZED AND MODIFIED SLURRY SEALS**

Reserved

**37-4 FOG SEALS AND FLUSH COATS**

**37-4.01 GENERAL**

**37-4.01A General**

**37-4.01A(1) Summary**

Section 37-4.01 includes general specifications for applying fog seals and flush coats.

### **37-4.01A(2) Definitions**

Reserved

### **37-4.01A(3) Submittals**

At least 15 days before use, submit:

1. Sample of asphaltic emulsion in two 1-quart plastic container with lined, sealed lid
2. Asphaltic emulsion information and test data as follows:
  - 2.1. Supplier
  - 2.2. Type/Grade of asphalt emulsion
  - 2.3. Copy of the specified test results for asphaltic emulsion

### **37-4.01B Materials**

Not Used

### **37-4.01C Construction**

#### **37-4.01C(1) General**

Reserved

#### **37-4.01C(2) Weather Conditions**

Only place a fog seal or flush coat if both the pavement and ambient temperatures are at least 50 degrees F and rising. Do not place a fog seal or flush coat within 24 hours of rain or within 24 hours of forecast rain or freezing temperatures.

#### **37-4.01D Payment**

Not Used

### **37-4.02 FOG SEALS**

#### **37-4.02A General**

##### **37-4.02A(1) Summary**

Section 37-4.02 includes specifications for applying fog seals.

Applying a fog seal includes applying a diluted slow-setting or quick setting asphaltic emulsion.

##### **37-4.02A(2) Definitions**

Reserved

##### **37-4.02A(3) Submittals**

Immediately after sampling, submit two 1-quart plastic container of asphaltic emulsion taken in the presence of the Engineer. Samples must be submitted in insulated shipping container.

##### **37-4.02A(4) Quality Assurance**

###### **37-4.02A(4)(a) General**

Reserved

###### **37-4.02A(4)(b) Quality Control**

###### **37-4.02A(4)(b)(i) General**

Reserved

###### **37-4.02A(4)(b)(ii) Asphaltic Emulsions**

Circulate asphaltic emulsions in the distributor truck before sampling. Take samples from the distributor truck at mid load or from a sampling tap or thief. Before taking samples, draw and dispose of 1 gallon. In the presence of the Engineer, take asphalt emulsion sample in two 1-quart plastic container with lined, sealed lid.

For asphaltic emulsions, the authorized laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

### Asphaltic Emulsion

Quality characteristic	Test Method	Minimum sampling and testing frequency	Sampling location
Saybolt Furoil Viscosity, at 25 °C (Saybolt Furl seconds)	AASHTO T 59	Minimum 1 per day per delivery truck	Distributor truck
Sieve Test (%)			
Storage stability, 1 day (%)			
Residue by distillation (%)			
Particle charge <sup>a</sup>			
Tests on Residue from Distillation Test:			
Penetration, 25 °C	AASHTO T 49	Minimum 1 per day per delivery truck	Distributor truck
Ductility	AASHTO T 51		
Solubility in trichloroethylene	AASHTO T 44		

<sup>a</sup>If the result of the particle charge is inconclusive, the asphaltic emulsion must be tested for pH under ASTM E70. Grade QS1h asphaltic emulsion must have a minimum pH of 7.3. Grade CQS1h asphaltic emulsion must have a maximum pH of 6.7.

#### 37-4.02A(4)(b)(iii) Asphaltic Emulsion Spread Rates

For fog seals, the authorized laboratory must perform sampling and testing at the specified frequency and location for the following quality characteristics:

#### Fog Seal Quality Control Requirements

Quality characteristic	Test method	Minimum sampling and testing frequency	Location of sampling
Asphaltic emulsion spread rate (gal/sq yd)	California Test 339	2 per day	Pavement surface

#### 37-4.02A(4)(c) Department Acceptance

Fog seal acceptance is based on:

1. Visual inspection for the following:
  - 1.1. Uniform surface texture throughout the work limits
  - 1.2. Flushing consisting of the occurrence of a film of asphaltic material on the surface
  - 1.4. Streaking consisting of alternating longitudinal bands of asphaltic emulsion approximately parallel with the lane line
2. The Department's sampling and testing for compliance with the requirements for the quality characteristics specified in section 94 for asphaltic emulsion
3. Department's sampling and testing for compliance with the requirements for fog seal shown in the following table:

#### Fog Seal Acceptance Criteria

Quality Characteristic	Test Method	Requirement
Asphaltic emulsion spread rate (gal/sq yd)	California Test 339	TV ± 10%

#### 37-4.02B Materials

You determine the grade of slow-setting or quick setting asphaltic emulsion to be used.

#### 37-4.02C Construction

Apply asphaltic emulsions for fog seals at a residual asphalt rate from 0.02 to 0.06 gal/sq yd.

If additional water is added to the asphaltic emulsions, the resultant mixture must not be more than 1 part asphaltic emulsion to 1 part water. You determine the dilution rate.

If the fog seals become tacky, sprinkle water as required.



If fog seals and chip seals are on the same project, the joint between the seal coats must be neat and uniform.

**37-4.02D Payment**

The Department does not adjust the unit price for an increase or decrease in the asphaltic emulsion quantity.

**37-4.03 FLUSH COATS**

**37-4.03A General**

**37-4.03A(1) Summary**

Section 37-4.03 includes specifications for applying flush coats.

Applying a flush coat includes applying a fog seal coat followed by sand.

**37-4.03A(2) Definitions**

Reserved

**37-4.03A(3) Submittals**

At least 15 days before use, submit:

1. Proposed target X values for sand gradation.
2. Gradation test results for sand

Submit quality control test results for sand gradation within 2 business days of sampling.

**37-4.03A(4) Quality Assurance**

**37-4.03A(4)(a) General**

Reserved

**37-4.03A(4)(b) Quality Control**

For sand, the authorized laboratory must perform sampling and testing at the specified frequency and location for the following quality characteristics:

**Sand Quality Control**

Quality characteristic	Test method	Minimum sampling and testing frequency	Location of sampling
Gradation (% passing by weight)	California Test 202	1 per day	See California Test 125

**37-4.03A(4)(c) Department Acceptance**

Flush coat acceptance is based on fog seal acceptance and the following:

1. Visual inspection for uniform application of sand.
2. Sand acceptance is based on the Department's sampling and testing for compliance with the requirements shown in the following table:

**Sand Gradation Acceptance Criteria**

Quality characteristic	Test method	Requirement
Gradation (% passing by weight)	California Test 202	
Sieve size:		
3/8"		100
No. 4		93–100
No. 8		61–99
No. 16		X ± 13
No. 30		X ± 12
No. 50		X ± 9
No.100		1–15
No. 200	0–10	

NOTE: "X" is the gradation that you propose to furnish for the specific sieve size.

**37-4.03B Material**

**37-4.03B(1) General**

Reserved

**37-4.03B(2) Sand**

Sand must be free from deleterious coatings, clay balls, roots, bark, sticks, rags, and other extraneous material.

Sand for a flush coat must comply with the gradations shown in the following table:

**Sand Gradation**

Quality characteristic	Test method	Requirement
Gradation (% passing by weight)	California Test 202	
Sieve size:		
3/8"		100
No. 4		93–100
No. 8		61–99
No. 16		X ± 13
No. 30		X ± 12
No. 50		X ± 9
No.100		1–15
No. 200	0–10	

NOTE: "X" is the gradation that you propose to furnish for the specific sieve size.

Fine aggregate sizes must be distributed such that the difference between the total percentage passing the No. 16 and No. 30 sieves is from 10 to 40, and the difference between the percentage passing the No. 30 and No. 50 sieves is from 10 to 40.

**37-4.03C Construction**

**37-4.03C(1) General**

During flush coat activities, close adjacent lanes to traffic. Do not track asphaltic emulsion on existing pavement surfaces.

Apply sand immediately after applying asphaltic emulsions.

Spread sand aggregate with a mechanical device that spreads sand at a uniform rate over the full width of a traffic lane in a single application. Spread sand at a rate from 2 to 6 lb/sq yd. You determine the application rates for sand and the Engineer authorizes the application rate.

**37-4.03C(2) Sweeping**

Sweep loose sand material remaining on the surface 24 hours after application.

### **37-4.03D Payment**

The Department does not adjust the unit price for an increase or decrease in the sand cover (seal) quantity.

## **37-5 PARKING AREA SEALS**

### **37-5.01 GENERAL**

#### **37-5.01A Summary**

Section 37-5 includes specifications for applying parking area seals. Sealing a parking area consists of spreading a mixture of asphaltic emulsion, aggregate, polymer, and water.

#### **37-5.01B Definitions**

Reserved

#### **37-5.01C Submittals**

At least 15 days before starting placement, submit a 20 lb sample of the aggregate to be used.

At least 10 days before starting placement, submit:

1. Name of the authorized laboratory to perform testing and mix design.
2. Laboratory report of test results and a proposed mix design. The report and mix design must include the specific materials to be used and show a comparison of test results and specifications. The mix design report must include the quantity of water allowed to be added at the job site. The authorized laboratory performing the tests must sign the original laboratory report and mix design.
3. Manufacturer's data for oil seal primer and polymer.

If the mix design consists of the same materials covered by a previous laboratory report, you may submit the previous laboratory report that must include material testing data performed within the previous 12 months for authorization.

If you request substitute materials, submit a new laboratory report and mix design at least 10 days before starting placement.

Submit a certificate of compliance for the parking area seal material.

Immediately after sampling, submit two 1-quart plastic containers of parking area seal taken in the presence of the Engineer. Samples must be submitted in insulated shipping containers.

#### **37-5.01D Quality Assurance**

##### **37-5.01D(1) General**

Reserved

##### **37-5.01D(2) Quality Control**

###### **37-5.01D(2)(a) General**

Reserved

###### **37-5.01D(2)(b) Asphaltic Emulsions**

For an asphaltic emulsion, the authorized laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

### Asphaltic Emulsion

Quality characteristic	Test Method	Minimum sampling and testing frequency	Sampling location
Saybolt Furol Viscosity, at 25 °C (Saybolt Furol seconds)	AASHTO T 59	Minimum 1 per day per delivery truck	Distributor truck
Sieve Test (%)			
Storage stability, 1 day (%)			
Residue by distillation (%)			
Particle charge <sup>a</sup>			
Tests on Residue from Distillation Test			
Penetration, 25 °C	AASHTO T 49	Minimum 1 per day per delivery truck	Distributor truck
Ductility	AASHTO T 51		
Solubility in trichloroethylene	AASHTO T 44		

<sup>a</sup>If the result of the particle char is inconclusive, the asphaltic emulsion must be tested for pH under ASTM E70. Grade QS1h asphaltic emulsion must have a minimum pH of 7.3. Grade CQS1h asphaltic emulsion must have a maximum pH of 6.7.

### 37-5.01D(2)(c) Sand

For sand, the authorized laboratory must perform sampling and testing at the specified frequency and location for the following quality characteristics:

#### Sand Quality Control

Quality characteristic	Test method	Minimum sampling and testing frequency	Location of sampling
Gradation (% passing by weight)	California Test 202	One per project	See California Test 125

### 37-5.01D(2)(d) Parking Area Seals

For a parking area seal, the authorized laboratory must perform quality control sampling and testing at the specified frequency for the following quality characteristics:

#### Parking Area Seal Requirements

Quality characteristic	Test method	Frequency
Mass per liter (kg)	ASTM D244	One per project
Cone penetration (mm)	California Test 413	
Nonvolatile (%)	ASTM D2042 <sup>a</sup>	
Nonvolatile soluble in trichloroethylene (%)		
Wet track abrasion (g/m <sup>2</sup> )	ASTM D3910	
Dried film color	--	
Viscosity (KU) <sup>b</sup>	ASTM D562	

<sup>a</sup>Weigh 10 g of homogenous material into a previously tarred, small can. Place in a constant temperature oven at 165 ± 5 °C for 90 ± 3 minutes. Cool, reweigh, and calculate nonvolatile components as a percent of the original weight.

<sup>b</sup>Krebs units

### 37-5.01D(3) Department Acceptance

Parking area seal acceptance is based on:

1. Visual inspection for:
  - 1.1. Uniform surface texture throughout the work limits
  - 1.2. Marks in the surface:
    - 1.2.1. Up to 4 marks in the completed parking area seal that are up to 1 inch wide and up to 6 inches long per 1,000 square feet of parking area seal placed.
    - 1.2.2. No marks in the completed parking area seal surface that are over 1 inch wide or 6 inches long.

- 1.2. Raveling consisting of the separation of the aggregate from the asphaltic emulsion
- 1.3. Bleeding consisting of the occurrence of a film of asphaltic material on the surface of the parking area seal
- 1.4. Delaminating of the parking area seal from the existing pavement
- 1.5. Rutting or wash-boarding
2. The Department's sampling and testing of aggregate for compliance with 100 percent passing no. 16 sieve under California Test 202
3. The Department's sampling and testing for compliance with the requirements shown in the following table:

**Parking Area Seal Acceptance Criteria**

Quality characteristic	Test method	Requirement
Mass per liter (min, kg)	ASTM D244	1.1
Cone penetration (mm)	California Test 413	340–700
Nonvolatile (min, %)	ASTM D2042 <sup>a</sup>	50
Nonvolatile soluble in trichloroethylene (%)		10–35
Wet track abrasion (max, g/m <sup>2</sup> )	ASTM D3910	380
Dried film color	--	Black
Viscosity (min, KU) <sup>b</sup>	ASTM D562	75

<sup>a</sup>Weigh 10 g of homogenous material into a previously tared, small ointment can. Place in a constant temperature oven at 165 ± 5 °C for 90 ± 3 minutes. Cool, reweigh, and calculate nonvolatile components as a percent of the original weight.

<sup>b</sup>Krebs units

### **37-5.02 MATERIALS**

#### **37-5.02A General**

Aggregate must be clean, hard, durable, uncoated, and free from organic and deleterious substances. One hundred percent of the aggregate must pass the no. 16 sieve.

Asphaltic emulsion must be either Grade SS1h or CSS1h, except the values for penetration at 25 degrees C for tests on residue from distillation must be from 20 to 60.

Polymer must be either neoprene, ethylene vinyl acetate, or a blend of butadiene and styrene.

Oil seal primer must be a quick-drying emulsion with admixtures. Oil seal primer must be manufactured to isolate the parking area seal from pavement with residual oils, petroleum grease, and spilled gasoline.

Crack sealant must comply with section 37-6.

Water must be potable and not separate from the emulsion before the material is placed.

#### **37-5.02B Mix Design**

The proposed mix design for a parking area seal must comply with the requirements shown in the following table:

### Parking Area Seal Mix Design Requirements

Quality characteristic	Test method	Requirement
Mass per liter (min, kg)	ASTM D244	1.1
Cone penetration (mm)	California Test 413	340–700
Nonvolatile (min, %)	ASTM D2042 <sup>a</sup>	50
Nonvolatile soluble in trichloroethylene (%)		10–35
Wet track abrasion (max, g/m <sup>2</sup> )	ASTM D3910	380
Dried film color	--	Black
Viscosity (min, KU) <sup>b</sup>	ASTM D562	75

<sup>a</sup>Weigh 10 g of homogenous material into a previously tarred, small ointment can. Place in a constant temperature oven at 165 ± 5 °C for 90 ± 3 minutes. Cool, reweigh, and calculate nonvolatile components as a percent of the original weight.

<sup>b</sup>Krebs units

A parking area seal must contain a minimum of 2 percent polymer by volume of undiluted asphaltic emulsion.

#### 37-5.02C Proportioning

Parking area seal ingredients must be mixed at a central plant. The plant must include mechanical or electronic controls that consistently proportion the ingredients. Mix an asphaltic emulsion with the other ingredients mechanically.

Store the parking area seal in a tank equipped with mixing or agitation devices. Keep stored materials thoroughly mixed. Protect stored materials from freezing conditions.

#### 37-5.03 CONSTRUCTION

##### 37-5.03A General

Request that the Engineer shut off the irrigation control system at least 5 days before placing the seal. Do not water plants adjacent to the seal at least 24 hours before and after the seal coat placement.

##### 37-5.03B Surface Preparations

If cracks in the existing pavement are from 1/4 to 1 inch wide, treat the cracks under section 37-6. Do not place the parking area seals until the Engineer determines that the crack treatments are cured.

If cracks in the existing pavement are greater than 1 inch wide, the Engineer orders the repair. This work is change order work.

After any crack treatment and before placing parking area seals, clean the pavement surface, including removal of oil and grease spots. Do not use solvents.

If cleaning the pavement with detergents, thoroughly rinse with water. Allow all water to dry before placing parking area seals.

You must seal oil and grease spots that remain after cleaning. Use an oil seal primer and comply with the manufacturer's instructions.

If the existing pavement has oil and grease spots that do not come clean and sealing is insufficient, the Engineer orders the repair of the pavement. This work is change order work.

Before placing the parking area seals, dampen the pavement surface using a distributor truck. Place the seal on the damp pavement but do not place it with standing water on the pavement.

##### 37-5.03C Placement

If adding water at the job site based on the manufacturer's instructions for consistency and spreadability, do not exceed 15 percent by volume of undiluted asphaltic emulsion.

Place the parking area seals in 1 or more application. The seals must be uniform and smooth, free of ridges or uncoated areas.

If placing in multiple applications, allow the last application to thoroughly dry before the subsequent application.

Do not allow traffic on the parking area seals for at least 24 hours after placement.

Do not stripe over the parking area seals until it is dry.

#### **37-5.04 PAYMENT**

The payment quantity for parking area seal is the weight determined by combining the weights of the aggregate and asphaltic emulsion. The payment quantity for parking area seal does not include the added water and set-control additive.

### **37-6 CRACK TREATMENTS**

#### **37-6.01 GENERAL**

##### **37-6.01A Summary**

Section 37-6 includes specifications for treating cracks in asphalt concrete pavement.

##### **37-6.01B Definitions**

Reserved

##### **37-6.01C Submittals**

If your selected crack treatment material is on the Authorized Material List for flexible pavement crack treatment material, submit a certificate of compliance including:

1. Manufacturer's name
2. Production location
3. Brand or trade name
4. Designation
5. Batch or lot number
6. Crack treatment material type
7. Contractor or subcontractor name
8. Contract number
9. Lot size
10. Shipment date
11. Manufacturer's signature

If your selected crack treatment material is not on the Authorized Material List for flexible pavement crack treatment material, submit a sample and test results from each batch or lot 20 days before use. Testing must be performed by an authorized laboratory and test results must show compliance with the specifications. Test reports must include the information specified for the certificate of compliance submittal. Each hot-applied crack treatment material sample must be a minimum of 3 lb and submitted in a silicone release container. Each cold-applied crack treatment material sample must be a minimum of 2 quarts and submitted in a plastic container.

At least 10 days before the start of work, submit sand gradation test results under California Test 202.

Submit the following with each delivery of crack treatment material to the job site:

1. Manufacturer's heating and application instructions
2. Manufacturer's SDS
3. Name of the manufacturer's recommended detackifying agent

##### **37-6.01D Quality Assurance**

###### **37-6.01D(1) General**

Hot-applied crack treatment material must be sampled at least once per project in the Engineer's presence. Collect two 3-pounds-minimum samples of crack treatment material from the dispensing wand into silicone release boxes.

Cold-applied crack treatment material must be sampled at least once per project in the Engineer's presence. Collect 2 samples of crack treatment material from the dispensing wand into 1-quart containers.

**37-6.01D(2) Quality Control**

Reserved

**37-6.01D(3) Department Acceptance**

Crack treatment acceptance is based on:

1. Visual inspection for uniform filling of cracks throughout the work limits including:
  - 1.2. Crack treatment is not more than a 1/4 inch below the specified level
  - 1.3. Sealant failures
  - 1.4. Crack re-opening
  - 1.5. Crack overbanding is less than 3 inches wide
2. The Department's sampling and testing for compliance with the requirements shown in the following table:

**Crack Treatment Acceptance Criteria**

Quality characteristic <sup>a</sup>	Test method <sup>b</sup>	Requirement				
		Type 1	Type 2	Type 3	Type 4	Type 5
Softening point (min, °C)	ASTM D36	102	96	90	84	84
Cone penetration at 77 °F (max)	ASTM D5329	35	40	50	70	90
Resilience at 77 °F, unaged (%)	ASTM D5329	20–60	25–65	30–70	35–75	40–80
Flexibility(°C) <sup>c</sup>	ASTM D3111	0	0	0	-11	-28
Tensile adhesion (min, %)	ASTM D5329	300	400	400	500	500
Specific gravity (max)	ASTM D70	1.25	1.25	1.25	1.25	1.25
Asphalt compatibility	ASTM D5329	Pass	Pass	Pass	Pass	Pass
Sieve test (% passing)	See note d	100	100	100	100	100

<sup>a</sup>Cold-applied crack treatment material residue collected under ASTM D6943, Method B and sampled under ASTM D140 must comply with the grade specified.

<sup>b</sup>Except for viscosity, cure each specimen at a temperature of 23 ± 2 °C and a relative humidity of 50 ± 10 percent for 24 ± 2 hours before testing.

<sup>c</sup>For the flexibility test, the specimen size must be 6.4 ± 0.2 mm thick by 25 ± 0.2 mm wide by 150 ± 0.5 mm long. The test mandrel diameter must be 6.4 ± 0.2 mm. The bend arc must be 180 degrees. The bend rate must be 2 ± 1 seconds. At least 4 of 5 test specimens must pass at the specified test temperature without fracture, crazing, or cracking.

<sup>d</sup>For hot-applied crack treatment, dilute with toluene and sieve through a no. 8 sieve. For cold-applied crack treatment, sieve the material as-received through a no. 8 sieve. If the manufacturer provides a statement that added components passed the no. 16 sieve before blending, this requirement is void.

**37-6.02 MATERIALS**

**37-6.02A General**

Reserved

**37-6.02B Crack Treatment Material**

A crack treatment material must comply with the requirements shown in the following table:



### Crack Treatment Material

Quality characteristic <sup>a</sup>	Test method <sup>b</sup>	Requirement				
		Type 1	Type 2	Type 3	Type 4	Type 5
Softening point (min, °C)	ASTM D36	102	96	90	84	84
Cone penetration at 77 °F (max)	ASTM D5329	35	40	50	70	90
Resilience at 77 °F, unaged (%)	ASTM D5329	20–60	25–65	30–70	35–75	40–80
Flexibility(°C) <sup>c</sup>	ASTM D3111	0	0	0	-11	-28
Tensile adhesion (min, %)	ASTM D5329	300	400	400	500	500
Specific gravity (max)	ASTM D70	1.25	1.25	1.25	1.25	1.25
Asphalt compatibility	ASTM D5329	Pass	Pass	Pass	Pass	Pass
Sieve test (% passing)	See note d	100	100	100	100	100

<sup>a</sup>Cold-applied crack treatment material residue collected under ASTM D6943, Method B and sampled under ASTM D140 must comply with the grade specifications.

<sup>b</sup>Except for viscosity, cure each specimen at a temperature of 23 ± 2 °C and a relative humidity of 50 ± 10 percent for 24 ± 2 hours before testing.

<sup>c</sup>For the flexibility test, the specimen size must be 6.4 ± 0.2 mm thick by 25 ± 0.2 mm wide by 150 ± 0.5 mm long. The test mandrel diameter must be 6.4 ± 0.2 mm. The bend arc must be 180 degrees. The bend rate must be 2 ± 1 seconds. At least 4 of 5 test specimens must pass at the specified test temperature without fracture, crazing, or cracking.

<sup>d</sup>For hot-applied crack treatment, dilute with toluene and sieve through a no. 8 sieve. For cold-applied crack treatment, sieve the material as-received through a no. 8 sieve. If the manufacturer provides a statement that added components passed the no. 16 sieve before blending, this requirement is void.

A crack treatment material must be delivered to the job site with the information listed below. If crack treatment material is delivered to the job site in containers, each container must be marked with the following information.

1. Manufacturer's name
2. Production location
3. Brand or trade name
4. Designation
5. Crack treatment trade name
6. Batch or lot number
7. Maximum heating temperature
8. Expiration date for cold application only

Hot-applied crack treatment must be delivered to the job site premixed in cardboard containers with meltable inclusion liners or in a fully meltable package.

Cold-applied crack treatment must have a minimum shelf life of 3 months from the date of manufacture.

#### 37-6.02C Sand

Sand applied to tacky crack treatment material must be clean, free of clay, and comply with the gradation shown in the following table:

#### Sand Gradation

Quality characteristic	Test method	Requirement
Gradation (% passing by weight)	California Test 202	
Sieve size:		
No. 4		100
No. 50		0–30
No. 200		0–5

#### 37-6.03 CONSTRUCTION

Treat cracks from 1/4 to 1 inch in width for the entire length of the crack. Fill or repair cracks wider than 1 inch as ordered. Filling cracks wider than 1 inch is change order work.



**Add to the table in the 4th paragraph of section 39-2.01A(1):**

01-15-16

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**Add to item 8 in the 4th paragraph of section 39-2.01A(3)(b)(i):**

07-15-16

, except lime supplier and source

**Replace the headings and paragraphs of section 39-2.01A(3)(i) with:**

01-15-16

**39-2.01A(3)(i) Reserved**

**Replace the 2nd sentence in the 3rd paragraph of section 39-2.01A(4)(b) with:**

01-15-16

Submit 3 parts and keep 1 part.

**Add between *single* and *test* in the 7th paragraph of section 39-2.01A(4)(i)(i):**

07-15-16

aggregate or HMA

**Replace the 1st paragraph of section 39-2.01B(2)(b) with:**

07-15-16

If the proposed JMF indicates that the aggregate is being treated with dry lime or lime slurry with marination, or the HMA with liquid antistrip, then testing the untreated aggregate under AASHTO T 283 and AASHTO T 324 is not required.

If HMA treatment is required or being used by the Contractor, determine the plasticity index of the aggregate blend under California Test 204.

**Add between *aggregate* and *with dry lime* in the 3rd and 4th paragraphs of section 39-2.01B(2)(b):**

07-15-16

blend

**Replace the 9th through 11th paragraphs of section 39-2.01B(8)(a) with:**

07-15-16

HMA must be produced at the temperatures shown in the following table:

**HMA Production Temperatures**

HMA compaction	Temperature (°F)
HMA	
Density based Method	≤ 325 305–325
HMA with WMA technology	
Density based Method	240–325 260–325

**Delete the 1st paragraph of section 39-2.01B(11).**

**Add after the 2nd paragraph of section 39-2.01B(11):**

For miscellaneous areas and dikes:

1. Choose the aggregate gradation from:
  - 1.1. 3/8-inch Type A HMA aggregate gradation
  - 1.2. 1/2-inch Type A HMA aggregate gradation
  - 1.3. 1/2-inch dike mix aggregate gradation
2. Choose asphalt binder Grade PG 64-10, PG 64-16 or PG 70-10.
3. Minimum asphalt binder content must be:
  - 3.1. 6.40 percent for 3/8-inch Type A HMA aggregate gradation
  - 3.2. 5.70 percent for 1/2-inch Type A HMA aggregate gradation
  - 3.3. 6.40 percent for 1/2-inch dike mix aggregate gradation

If you request and the Engineer authorizes, you may reduce the minimum asphalt binder content.

Aggregate gradation for 1/2-inch dike mix must be within the TV limits for the specified sieve size shown in the following table:

**Aggregate Gradation for 1/2-inch Dike Mix  
(Percentage Passing)**

Sieve size	Target value limit	Allowable tolerance
3/4"	100	--
1/2"	90–95	TV ± 5
No. 4	70–75	TV ± 5
No. 8	23–25	TV ± 5
No. 50	15–35	TV ± 5
No. 200	7.0–13.0	TV ± 2.0

**Replace item 4 in the 2nd paragraph of section 39-2.01C(1) with:**

4. For method compaction:
  - 4.1. The temperature of the HMA and the HMA produced with WMA water injection technology in the windrow does not fall below 260 degrees F
  - 4.2. The temperature of the HMA produced using WMA additive technology in the windrow does not fall below 250 degrees F

**Delete item 3 in the 8th paragraph of section 39-2.01C(1).**

**Replace 39-2.01A(3)(m)(iv) in the 6th paragraph of section 39-2.01C(3)(e) with:**

36-3.01C(3)

**Replace 2.06 in the 4th paragraph of section 39-2.01C(3)(f) with:**

2.05

**Add to the end of section 39-2.01C(15)(b):**

The compacted lift thickness must not exceed 0.25 foot.

07-15-16

**Add between *rectangles* and *with* in the 4th paragraph of section 39-2.01C(16):**

, half the lane width,

04-15-16

**Add between *to* and *the* in item 1 of the 4th paragraph of section 39-2.01C(16):**

and along

04-15-16

**Delete *coat* in the 5th paragraph of section 39-2.01C(16).**

07-15-16

**Replace 37 in the 5th paragraph of section 39-2.01C(16) with:**

37-4.02

07-15-16

**Replace section 39-2.02A(3)(b) with:**

The JMF must be based on the superpave HMA mix design as described in *MS-2 Asphalt Mix Design Methods* by the Asphalt Institute.

01-15-16

**Add between the 1st and 2nd paragraphs of section 39-2.02C:**

If the ambient air temperature is below 60 degrees F, cover the loads in trucks with tarpaulins. If the time for HMA discharge to truck at the HMA plant until transfer to paver's hopper is 90 minutes or greater and if the ambient air temperature is below 70 degrees F, cover the loads in trucks with tarpaulins, unless the time from discharging to the truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or the pavement surface.

07-15-16

**Replace the table in the 2nd paragraph of section 39-2.02C with:**

07-15-16

**Minimum Ambient Air and Surface Temperatures**

Lift thickness (feet)	Ambient air (°F)		Surface (°F)	
	Unmodified asphalt binder	Modified asphalt binder	Unmodified asphalt binder	Modified asphalt binder
Type A HMA and Type A HMA produced with WMA water injection technology				
<0.15	55	50	60	55
≥0.15	45	45	50	50
Type A HMA produced with WMA additive technology				
<0.15	45	45	50	45
≥0.15	40	40	40	40

**Delete the 3rd paragraph of section 39-2.02C.**

**Add between *HMA* and *placed* in the 1st sentence of the 4th paragraph of section 39-2.02C:**

07-15-16

and Type A HMA produced with WMA water injection technology

**Add between the 4th and the 5th paragraphs of section 39-2.02C:**

07-15-16

For Type A HMA produced with WMA additive technology placed under method compaction, if the asphalt binder is:

1. Unmodified, complete:
  - 1.1 1st coverage of breakdown compaction before the surface temperature drops below 240 degrees F
  - 1.2 Breakdown and intermediate compaction before the surface temperature drops below 190 degrees F
  - 1.3 Finish compaction before the surface temperature drops below 140 degrees F
  - 1.4 You may continue static rolling below 140 degrees F to remove roller marks.
2. Modified, complete:
  - 2.1 1st coverage of breakdown compaction before the surface temperature drops below 230 degrees F
  - 2.2 Breakdown and intermediate compaction before the surface temperature drops below 170 degrees F
  - 2.3 Finish compaction before the surface temperature drops below 130 degrees F
  - 2.4 You may continue static rolling below 130 degrees F to remove roller marks.

**Replace the 2nd paragraph of section 39-2.03A(3)(b) with:**

01-15-16

The JMF must be based on the superpave HMA mix design as described in *MS-2 Asphalt Mix Design Methods* by the Asphalt Institute.

**Replace the requirement in the row for *Voids in mineral aggregate on plant produced HMA* in the 2nd table in section 39-2.03A(4)(e)(i) with:**

01-15-16

18.0-23.0

**Add before the 1st paragraph of section 39-2.03A(4)(e)(ii)(C):**

04-15-16

CRM used must be on the Authorized Materials List for Crumb Rubber Modifier.

CRM must be a ground or granulated combination of scrap tire crumb rubber and high natural scrap tire crumb rubber, CRM must be 75.0 ± 2.0 percent scrap tire crumb rubber and 25.0 ± 2.0 percent high natural scrap tire crumb rubber by total weight of CRM. Scrap tire crumb rubber and high natural scrap tire crumb rubber must be derived from waste tires described in Pub Res Code § 42703.

**Replace the row for *Hamburg wheel track* in the table in section 39-2.03B(2) with:**

01-15-16

Hamburg wheel track (min, number of passes at the inflection point)	AASHTO T 324 (Modified) <sup>d</sup>	
Binder grade:		
PG 58		10,000
PG 64		12,500
PG 70		15,000

**Replace *RHMA-G* in the 3rd and 5th paragraphs of section 39-2.03C with:**

07-15-16

RHMA-G and RHMA-G produced with WMA water injection technology

**Add between the 5th and 6th paragraphs of section 39-2.03C:**

07-15-16

For RHMA-G produced with WMA additive technology placed under method compaction:

1. Complete the 1st coverage of breakdown compaction before the surface temperature drops below 260 degrees F
2. Complete breakdown and intermediate compaction before the surface temperature drops below 230 degrees F
3. Complete finish compaction before the surface temperature drops below 180 degrees F
4. You may continue static rolling below 140 degrees F to remove roller marks

**Replace the 6th and 7th paragraphs of section 39-2.04C with:**

07-15-16

For HMA-O and HMA-O produced with WMA water injection technology:

1. With unmodified asphalt binder:
  - 1.1. Spread and compact only if the atmospheric temperature is at least 55 degrees F and the surface temperature is at least 60 degrees F.
  - 1.2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 240 degrees F.
  - 1.3. Complete all compaction before the surface temperature drops below 200 degrees F.
2. With modified asphalt binder, except asphalt rubber binder:
  - 2.1. Spread and compact only if the atmospheric temperature is at least 50 degrees F and the surface temperature is at least 50 degrees F.
  - 2.2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 240 degrees F.
  - 2.3. Complete all compaction before the surface temperature drops below 180 degrees F.

For HMA-O produced with WMA additive technology:

1. With unmodified asphalt binder:
  - 1.1. Spread and compact only if the atmospheric temperature is at least 45 degrees F and the surface temperature is at least 50 degrees F.
  - 1.2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 230 degrees F.
  - 1.3. Complete all compaction before the surface temperature drops below 190 degrees F.
2. With modified asphalt binder, except asphalt rubber binder:
  - 2.1. Spread and compact only if the atmospheric temperature is at least 40 degrees F and the surface temperature is at least 40 degrees F.
  - 2.2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 230 degrees F.

- 2.3. Complete all compaction before the surface temperature drops below 170 degrees F.

**Replace *RHMA-O* and *RHMA-O-HB* in the 8th paragraph of section 39-2.04C with:**

07-15-16

RHMA-O and RHMA-O produced with WMA water injection technology, and RHMA-O-HB and RHMA-O-HB produced with WMA water injection technology

**Add between the 8th and 9th paragraphs of section 39-2.04C:**

07-15-16

For RHMA-O produced with WMA additive technology and RHMA-O-HB produced with WMA additives technology:

1. Spread and compact if the ambient air temperature is at least 45 degrees F and the surface temperature is at least 50 degrees F
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 270 degrees F
3. Complete all compaction before the surface temperature drops below 240 degrees F

**Add to the 2nd paragraph of section 39-2.05A(3)(b):**

01-15-16

The material transfer vehicle must receive HMA directly from the truck.

**Replace *Table 6.1* at each occurrence in the table in section 39-2.05B(2) with:**

01-15-16

Table 8.1

**Replace *SP-2 Asphalt Mixture* in the 1st footnote in the table in the 2nd paragraph of section 39-2.05B(2)(b) with:**

01-15-16

*MS-2 Asphalt Mix Design Methods*

**Replace *Manual Series No. 2 (MS-2)* in the 1st footnote in the table in the 2nd paragraph of section 39-2.05B(2)(b) with:**

01-15-16

*MS-2 Asphalt Mix Design Methods*

**Replace 39-3.05 in the 1st paragraph of section 39-3.04A with:**

01-15-16

39-3.04

**Add to the end of section 39-3.04A:**

07-15-16

Schedule cold planing activities such that the pavement is cold planed, the HMA is placed, and the area is opened to traffic during the same work shift.

**Delete the 2nd sentence of the 1st paragraph in section 39-3.04C(4).**

07-15-16





**Delete *business* in item 6 in the list in the 8th paragraph of section 49-1.01D(4).**

07-15-16

**Add to the list in 9th paragraph of section 49-1.01D(4):**

07-15-16

3. Cut pile to the specified cut-off elevation after bearing acceptance criteria is provided by the Department

**Delete the 3rd paragraph of section 49-1.03.**

04-15-16

**Delete the 2nd paragraph of section 49-1.04.**

04-15-16

**Delete the 4th paragraph of section 49-2.01C(5).**

01-15-16

**Replace item 3 in the list in the 2nd paragraph of section 49-3.01A with:**

07-15-16

3. CISS concrete piles

**Add between *undisturbed material* and *in a dry* in the 1st paragraph of section 49-3.01C:**

07-15-16

, casing, or steel shell

**Replace the 2nd and 3rd paragraphs of section 49-3.01C with:**

07-15-16

Place and secure reinforcement. Securely block the reinforcement to provide the minimum clearance shown between the reinforcing steel cage and the sides of the drilled hole, casing, or steel shell.

Steel shells, casings, and drilled holes must be clean and free of debris before reinforcement and concrete are placed.

**Replace *dewatered* in the 4th paragraphs of section 49-3.01C with:**

07-15-16

drilled

**Add to section 49-3.02A(1):**

07-15-16

Permanent steel casing and driven steel shell must comply with section 49-2.02.

**Replace the paragraph of section 49-3.02A(2) with:**

07-15-16

**dry hole:** A drilled hole that requires no work to keep it free of water.

**dewatered hole:** A drilled hole that:

1. Accumulates no more than 12 inches of water at the bottom during a 1 hour period without any pumping from the hole.

2. Has no more than 3 inches of water at the bottom immediately before placing concrete.
3. Does not require temporary casing to control the groundwater.

**Replace item 8 in the list in the 1st paragraph of section 49-3.02A(3)(b) with:**

07-15-16

8. Drilling plan and sequence
9. Concrete sequence and placement plan
10. If inspection pipes are required, methods for ensuring the inspection pipes remain straight, undamaged, and properly aligned during concrete placement

**Replace 1 business day in the paragraph of section 49-3.02A(3)(d) with:**

07-15-16

2 business days

**Add to section 49-3.02A(3)(d):**

07-15-16

The log must:

1. Show the pile location, tip elevation, cutoff elevation, dates of excavation and concrete placement, total quantity of concrete placed, length and tip elevation of any casing, and details of any hole stabilization method and materials used.
2. Include an 8-1/2 by 11 inch graph of concrete placed versus depth of hole filled as follows:
  - 2.1. Plot the graph continuously throughout concrete placement. Plot the depth of drilled hole filled vertically with the pile tip at the bottom and the quantity of concrete placed horizontally.
  - 2.2. Take readings at each 5 feet of pile depth, and indicate the time of the reading on the graph.

**Add after the sentence in the paragraph of section 49-3.02A(3)(e):**

07-15-16

Allow 10 days for the review.

**Replace the 3rd sentence in the paragraph of section 49-3.02A(3)(f) with:**

07-15-16

Allow 10 days for the review and analysis of this report.

**Add after *rejected pile* in the 1st sentence in the 1st paragraph of section 49-3.02A(3)(g):**

07-15-16

to be mitigated

**Delete the 2nd paragraph of section 49-3.02A(3)(g).**

07-15-16

**Replace item 3 in the list in the 3rd paragraph of section 49-3.02A(3)(g) with:**

07-15-16

3. Step by step description of the mitigation work to be performed, including drawings if necessary. If the *ADSC Standard Mitigation Plan* is an acceptable mitigation method, include the most recent version. For the most recent version of the *ADSC Standard Mitigation Plan*, go to:  
<http://www.dot.ca.gov/hq/esc/geotech/ft/adscmitplan.htm>

**Replace the 2nd sentence in the paragraph of section 49-3.02A(3)(i) with:**

07-15-16

Allow 10 days for the review.

**Add to section 49-3.02A(3):**

07-15-16

**49-3.02A(3)(j) Certifications**

If synthetic slurry is used, submit as an informational submittal the names and certifications of your employees who are trained and certified by the synthetic slurry manufacturer.

**Add after *excavated hole* in the 1st sentence in the 3rd paragraph of section 49-3.02A(4)(c):**

07-15-16

lined with plastic

**Replace the 1st paragraph of section 49-3.02A(4)(d)(i) with:**

07-15-16

Section 49-3.02A(4)(d) applies to CIDH concrete piles except for piles (1) less than 24 inches in diameter or (2) constructed in dry or dewatered holes.

**Replace *gamma-gamma logging* in the 2nd paragraph of section 49-3.02A(4)(d)(i) with:**

07-15-16

GGL

**Replace the 1st sentence in the 3rd paragraph of section 49-3.02A(4)(d)(i) with:**

07-15-16

After notification by the Engineer of pile acceptance, fill the inspection pipes and cored holes with grout.

**Replace *gamma-gamma logging* in section 49-3.02A(4)(d)(ii) with:**

07-15-16

GGL

**Replace the 3rd and 4th paragraphs of section 49-3.02A(4)(d)(iii) with:**

07-15-16

The Department may perform CSL to determine the extent of the anomalies identified by GGL and to further evaluate a rejected pile for the presence of anomalies not identified by GGL. The pile acceptance test report will indicate if the Department intends to perform CSL and when the testing will be performed. Allow the Department 20 additional days for a total of 50 days to perform CSL and to provide supplemental results.

If authorized, you may perform testing on the rejected pile.

**Delete the 8th paragraph of section 49-3.02A(4)(d)(iii).**

07-15-16

**Add to the end of section 49-3.02A(4)(d)(iii):**

07-15-16

If the Engineer determines it is not feasible to repair the rejected pile, submit a mitigation plan for replacement or supplementation of the rejected pile.

**Add to section 49-3.02A(4):**

07-15-16

**49-3.02A(4)(e) Certifications**

If synthetic slurry is used, your employees who will be providing technical assistance in the slurry activities must be trained and certified by the synthetic slurry manufacturer to show their competency to perform inspection of slurry operations.

**Replace section 49-3.02B(4) with:**

07-15-16

**49-3.02B(4) Reserved**

**Replace *near* in the 3rd, 4th, and 5th paragraphs of section 49-3.02B(6)(b) with:**

07-15-16

within 2 feet of

**Replace *twice per shift* in item 2 in the 3rd paragraph of section 49-3.02B(6)(b) with:**

07-15-16

every 4 hours

**Delete the 7th and 8th paragraphs of section 49-3.02B(6)(b).**

07-15-16

**Delete the 3rd paragraph of section 49-3.02B(6)(c).**

07-15-16

**Replace *near* in item 2 in the 4th paragraph of section 49-3.02B(6)(c) with:**

07-15-16

within 2 feet of

**Replace item 5 in the 4th paragraph of section 49-3.02B(6)(c) with:**

07-15-16

5. After final cleaning and immediately before placing concrete.

**Replace section 49-3.02B(9) with:**

07-15-16

**49-3.02B(9) Inspection Pipes**

Inspection pipes must be schedule 40 PVC pipe complying with ASTM D1785 with a nominal pipe size of 2 inches.

Watertight PVC couplers complying with ASTM D2466 are allowed to facilitate pipe lengths in excess of those commercially available.

**Add to the beginning of section 49-3.02C(1):**

07-15-16

Unless otherwise authorized, drilling the hole and placing reinforcement and concrete in the hole must be performed in a continuous operation.

**Replace the 5th paragraph of section 49-3.02C(2) with:**

07-15-16

If slurry is used during excavation, maintain the slurry level at a height required to maintain a stable hole, but not less than 10 feet above the piezometric head.

**Replace the 1st sentence in the 9th paragraph of section 49-3.02C(2) with:**

07-15-16

Remove water that has infiltrated the dewatered hole before placing concrete, as required for dewatered hole.

**Replace the 1st sentence in the 10th paragraph of section 49-3.02C(2) with:**

07-15-16

If authorized, to control caving or water seepage, you may enlarge portions of the hole, backfill the hole with slurry cement backfill, concrete, or other material, and redrill the hole to the diameter shown.

**Replace the 4th paragraph of section 49-3.02C(3) with:**

07-15-16

Remove the temporary casing during concrete placement. Maintain the concrete in the casing at a level required to maintain a stable hole, but not less than 5 feet above the bottom of the casing, to prevent displacement of the concrete by material from outside the casing.

**Replace the 5th paragraph of section 49-3.02C(4) with:**

07-15-16

For a single CIDH concrete pile supporting a column:

1. If the pile and the column share the same reinforcing cage diameter, this cage must be accurately placed as shown
2. If the pile reinforcing cage is larger in diameter than the column cage:
  - 2.1. Maintain a clear horizontal distance of at least 3.5 inches between the two cages, if the concrete is placed under dry conditions
  - 2.2. Maintain a clear horizontal distance of at least 5 inches between the two cages if the concrete is placed under slurry
  - 2.3. The offset between the centerlines of the two cages must not exceed 6 inches

**Replace the paragraphs in section 49-3.02C(5) with:**

07-15-16

For acceptance testing, install and test vertical inspection pipes as follows:

1. Log the location of the inspection pipe couplers with respect to the plane of pile cutoff.
2. Cap each inspection pipe at the bottom. Extend the pipe from 3 feet above the pile cutoff to the bottom of the reinforcing cage. Provide a temporary top cap or similar means to keep the pipes clean before testing. If pile cutoff is below the ground surface or working platform, extend inspection pipes to 3 feet above the ground surface or working platform.
3. If any changes are made to the pile tip, extend the inspection pipes to the bottom of the reinforcing cage.
4. Install inspection pipes in a straight alignment and parallel to the main reinforcement. Securely fasten inspection pipes in place and provide protective measures to prevent misalignment or damage to the inspection pipes during installation of the reinforcement and placement of concrete in the hole. Construct CIDH concrete piles such that the relative distance of inspection pipes to vertical steel reinforcement remains constant.
5. After concrete placement is complete, fill inspection pipes with water to prevent debonding of the pipe.
6. Provide safe access to the tops of the inspection pipes.

7. After placing concrete and before requesting acceptance testing, test each inspection pipe in the Engineer's presence by passing a rigid cylinder through the length of pipe. The rigid cylinder must be 1-1/4-inch diameter by 4.5-foot long, weigh 12 pounds or less, and be able to freely pass down through the entire length of the pipe under its own weight and without the application of force.
8. When performing acceptance testing, inspection pipes must provide a 2-inch-diameter clear opening and be completely clean, unobstructed, and either dry or filled with water as authorized.
9. After acceptance testing is complete, completely fill the inspection pipes with water.

If the rigid cylinder fails to pass through the inspection pipe:

1. Completely fill the inspection pipes in the pile with water immediately.
2. Core a nominal 2-inch-diameter hole through the concrete for the entire length of the pile for each inspection pipe that does not pass the rigid cylinder. Coring must not damage the pile reinforcement.
3. Locate cored holes as close as possible to the inspection pipes they are replacing and no more than 5 inches clear from the reinforcement.

Core holes using a double wall core barrel system with a split tube type inner barrel. Coring with a solid type inner barrel is not allowed.

Coring methods and equipment must provide intact cores for the entire length of the pile.

Photograph and store concrete cores as specified for rock cores in section 49-1.01D(5).

The coring operation must be logged by an engineering geologist or civil engineer licensed in the State and experienced in core logging. Coring logs must comply with the Department's *Soil and Rock Logging, Classification, and Presentation Manual* for rock cores. Coring logs must include core recovery, rock quality designation of the concrete, locations of breaks, and complete descriptions of inclusions and voids encountered during coring.

The Department evaluates the portion of the pile represented by the cored hole based on the submitted coring logs and concrete cores. If the Department determines a pile is anomalous based on the coring logs and concrete cores, the pile is rejected.

**Replace item 2 in the list in the 2nd paragraph of section 49-3.02C(7) with:**

07-15-16

2. Extend at least 5 feet below the construction joint. If placing casing into rock or a dry hole, the casing must extend at least 2 feet below the construction joint.

**Add to the beginning of section 49-3.02C(9):**

07-15-16

**49-3.02C(9)(a) General**

**Replace the 2nd sentence of the 3rd paragraph of section 49-3.02C(9) with:**

04-15-16

Do not vibrate the concrete.

**Add after *concrete pump* in the 8th paragraph of section 49-3.02C(9):**

07-15-16

and slurry pump

**Replace item 3 in the list in the 11th paragraph of section 49-3.02C(9) with:**

07-15-16

3. Maintain the slurry level at a height required to maintain a stable hole, but not less than 10 feet above the piezometric head.

**Replace the 13th paragraph of section 49-3.02C(9) with:**

07-15-16

Maintain a log of concrete placement for each drilled hole.

**Replace 14th and 15th paragraphs of section 49-3.02C(9) with:**

07-15-16

If a temporary casing is used, maintain concrete placed under slurry at a level required to maintain a stable hole, but not less than 5 feet above the bottom of the casing. The withdrawal of the casing must not cause contamination of the concrete with slurry.

The equivalent hydrostatic pressure inside the casing must be greater than the hydrostatic pressure on the outside of the casing to prevent intrusion of water, slurry, or soil into the column of freshly placed concrete.

Remove scum, laitance, and slurry-contaminated concrete from the top of the pile.

**Add to section 49-3.02C(9):**

07-15-16

**49-3.02C(9)(b) Mineral Slurry**

Remove any caked slurry on the sides or bottom of hole before placing reinforcement.

If concrete is not placed immediately after placing reinforcement, the reinforcement must be removed and cleaned of slurry, the sides of the drilled hole must be cleaned of caked slurry, and the reinforcement again placed in the hole for concrete placement.

**49-3.02C(9)(c) Synthetic Slurry**

A manufacturer's representative must:

1. Provide technical assistance for the use of their material
2. Be at the job site before introduction of the synthetic slurry into the drilled hole
3. Remain at the job site until released by the Engineer

After the manufacturer's representative has been released by the Engineer, your employee certified by the manufacturer must be present during the construction of the pile under slurry.

**Replace the heading of section 49-3.03 with:**

07-15-16

**CAST-IN-STEEL SHELL CONCRETE PILING**

**Replace the 1st paragraph of section 49-3.03A(1) with:**

07-15-16

Section 49-3.03 includes specifications for constructing CISS concrete piles consisting of driven open-ended or closed-ended steel shells filled with reinforcement and concrete.

**Add to the end of section 49-3.03A(1):**

07-15-16

CISS concrete piles include Class 90 Alternative V and Class 140 Alternative V piles.

**Add to section 49-3.03A(3):**

01-15-16

Submit a Pile and Driving Data Form under section 49-2.01A(3)(a) if specified in the special provisions.







## 51 CONCRETE STRUCTURES

07-15-16

### Add to the list in the 2nd paragraph of section 51-1.01A:

- 8. Pile extensions
- 9. Drainage inlets

04-15-16

07-15-16

### Add to the list in the 6th paragraph of section 51-1.01A:

- 7. Drainage inlets

07-15-16

### Add to section 51-1.02I:

Metal frames, covers, grates, and other miscellaneous iron and steel used with drainage inlets must comply with section 75-2.

07-15-16

### Add to section 51-1.03B:

You may use PC drainage inlets as an alternative to CIP drainage inlets.

07-15-16

### Add between the 10th and 11th paragraphs of section 51-1.03C(2)(a):

For drainage inlets, extend the outside forms at least 12 inches below the top of the inlet. You may place concrete against excavated earth below this depth except:

07-15-16

1. You must use full-depth outside forms or other protection when work activities or unstable earth may cause hazardous conditions or contamination of the concrete.
2. You must increase the wall thickness 2 inches if placing concrete against the excavated surface. The interior dimensions must be as shown.

### Add to section 51-1.03C(2)(b):

For drainage inlets, remove exterior forms to at least 12 inches below the final ground surface. Exterior forms below this depth may remain if their total thickness is not more than 1 inch.

07-15-16

### Add to the list in the 2nd paragraph of section 51-1.03F(2):

- 4. Interior and top surfaces of drainage inlets

07-15-16

### Add to section 51-1.04:

The payment quantity for structural concrete, drainage inlet is the volume determined from the dimensions shown for CIP drainage inlets.

07-15-16

### Add to section 51-4.01C(1):

For PC drainage inlets, submit field repair procedures and a patching material test sample before repairs are made. Allow 10 days for the Engineer's review.

07-15-16

**Add to section 51-4.01C(2)(a):**

07-15-16

For drainage inlets with oval or circular cross sections, submit shop drawings with calculations. Shop drawings and calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State. Allow 15 days for the Engineer's review.

**Add to section 51-4.01D(3):**

07-15-16

The Engineer may reject PC drainage inlets exhibiting any of the following:

1. Cracks more than 1/32 inch wide
2. Nonrepairable honeycombed or spalled areas of more than 6 square inches
3. Noncompliance with reinforcement tolerances or cross sectional area shown
4. Wall, inlet floor, or lid less than minimum thickness
5. Internal dimensions less than dimensions shown by 1 percent or 1/2 inch, whichever is greater
6. Defects affecting performance or structural integrity

**Add to section 51-4.02C:**

07-15-16

Materials for PC drainage inlets must comply with the following:

1. Preformed flexible joint sealant must be butyl-rubber complying with ASTM C990
2. Resilient connectors must comply with ASTM C923
3. Sand bedding must comply with section 19-3.02F(2)
4. Bonding agents must comply with ASTM C1059/C1059, Type II

**Add to section 51-4.02D:**

07-15-16

**51-4.02D(8) Drainage Inlets**

PC units for drainage inlets must be rectangular, round, or oval in cross section, or any combination. Transitions from a rectangular grate opening to a round or oval basin must be made in not less than 8 inches. Provide means for field adjustment to meet final grade, paving, or surfacing.

If oval or circular shape cross-sections are furnished, they must comply with *AASHTO LRFD Bridge Design Specifications, Sixth Edition with California Amendments*.

Wall and slab thicknesses may be less than the dimensions shown by at most 5 percent or 3/16 inch, whichever is greater.

Reinforcement placement must not vary more than 1/2 inch from the positions shown.

**Add to section 51-4.03:**

07-15-16

**51-4.03H Drainage Inlets**

Repair PC drainage inlet sections to correct damage from handling or manufacturing imperfections before installation.

Center pipes in openings to provide a uniform gap. Seal gaps between the pipe and the inlet opening with nonshrink grout under the grout manufacturer's instructions. For systems designated as watertight, seal these gaps with resilient connectors.

Match fit keyed joints to ensure uniform alignment of walls and lids. Keys are not required at the inlet floor level if the floor is precast integrally with the inlet wall. Seal keyed joint locations with preformed butyl rubber joint sealant. You may seal the upper lid and wall joint with nonshrink grout.





### Nondestructive Testing for Steel Standards and Poles

Weld location	Weld type	Minimum required NDT
Circumferential splices around the perimeter of tubular sections, poles, and arms	CJP groove weld with backing ring	100% UT or RT
Longitudinal seam	CJP or PJP groove weld	Random 25% MT
Longitudinal seam within 6 inches of a circumferential splice	CJP groove weld	100% UT or RT
Welds attaching base plates, flange plates, pole plates, or mast arm plates to poles or arm tubes	CJP groove weld with backing ring and reinforcing fillet	$t \geq 5/16$ inch: 100% UT and 100% MT $t < 5/16$ inch: 100% MT after root weld pass and final weld pass
	External (top) fillet weld for socket-type connections	100% MT
Hand holes and other appurtenances	Fillet and PJP welds	MT full length on random 25% of all standards and poles

NOTE:  $t$  = pole or arm thickness

### Nondestructive Testing for Overhead Sign Structures

Weld location	Weld type	Minimum required NDT
Base plate to post	CJP groove weld with backing ring and reinforcing fillet	100% UT and 100% MT
Base plate to gusset plate	CJP groove weld	100% UT
Circumferential splices of pipe or tubular sections	CJP groove weld with backing ring	100% UT or RT
Split post filler plate welds	CJP groove weld with backing bar	100% UT or RT
Longitudinal seam weld for pipe posts	CJP groove weld	t < 1/4 inch: 100% MT t ≥ 1/4 inch: 100% UT or RT
	PJP groove weld	Random 25% RT
Chord angle splice weld	CJP groove weld with backing bar	100% UT or RT
Truss vertical, diagonal, and wind angles to chord angles	Fillet weld	Random 25% MT
Upper junction plate to chord (cantilever type truss)	Fillet weld	Random 25% MT
Bolted field splice plates (tubular frame type)	CJP groove weld	100% UT and 100% MT
Cross beam connection plates (lightweight extinguishable message sign)	Fillet weld	Random 25% MT
Arm connection angles (lightweight extinguishable message sign)	Fillet weld	100% MT
Mast arm to arm plate (lightweight extinguishable message sign)	CJP groove weld with backing ring	t ≥ 5/16 inch: 100% UT and 100% MT t < 5/16 inch: 100% MT after root weld pass and final weld pass
Post angle to post (lightweight extinguishable message sign)	Fillet weld	100% MT
Hand holes and other appurtenances	Fillet and PJP welds	MT full length on random 25% of all sign structures

NOTE: t = pole or arm thickness

#### 56-1.01D(2)(b)(ii) Ultrasonic Testing

For UT of welded joints with any members less than 5/16 inch thick or tubular sections less than 13 inches in diameter, the acceptance and repair criteria must comply with Clause 6.13.3.1 of AWS D1.1.

For UT of other welded joints, the acceptance and repair criteria must comply with Table 6.3 of AWS D1.1 for cyclically loaded nontubular connections.

After galvanization, perform additional inspection for toe cracks along the full length of all CJP groove welds at tube-to-transverse plate connections using UT.

When performing UT, use an authorized procedure under AWS D1.1, Annex S.

#### 56-1.01D(2)(b)(iii) Radiographic Testing

The acceptance criteria for radiographic or real time image testing must comply with AWS D1.1 for tensile stress welds.

#### 56-1.01D(2)(b)(iv) Longitudinal Seam Welds

The Engineer selects the random locations for NDT.

Grind the cover pass smooth at the locations to be tested.



If repairs are required in a portion of a tested weld, perform NDT on the repaired portion and on 25 percent of the untested portions of the weld. If more repairs are required, perform NDT on the entire weld.

**56-1.01D(3) Department Acceptance**

Reserved

**Replace section 56-2.01D(2)(b) with:**

Reserved

07-15-16

**Replace the 2nd sentence of the 1st paragraph of section 56-2.02F with:**

Manufactured pipe posts must comply with one of the following:

07-15-16

**Add to the list in the 1st paragraph of section 56-2.02F:**

4. ASTM A1085, Grade A

07-15-16

**Replace the 2nd paragraph of section 56-2.02F with:**

You may fabricate pipe posts from structural steel complying with ASTM A36/A36M, ASTM A709/A709M, Grade 36, or ASTM A572/A572M, Grades 42 or 50.

07-15-16

**Delete the last sentence in the 1st paragraph of section 56-2.02K(2).**

07-15-16

**Delete the 3rd paragraph of section 56-2.02K(2).**

07-15-16

**Replace the 2nd paragraph of section 56-2.02K(4) with:**

Safety cable at walkways must not be kinked, knotted, deformed, frayed, or spliced.

07-15-16

**Replace the 1st sentence of the paragraph in section 56-2.02K(5) with:**

The edges of handholes and other large post and arm openings must be ground smooth.

07-15-16

**Replace the heading of section 56-3 with:**

**56-3 STANDARDS, POLES, PEDESTALS, AND POSTS**

07-15-16

**Replace the paragraph in section 56-3.01A with:**

Section 56-3 includes general specifications for fabricating and installing standards, poles, pedestals, and posts.

07-15-16

**Replace section 56-3.01B(2)(b) with:**

07-15-16

Standards with handholes must comply with the following:

1. Include a UL-listed lug and 3/16-inch or larger brass or bronze bolt for attaching the bonding jumper for non-slip-base standards.
2. Attach a UL-listed lug to the bottom slip base plate with a 3/16-inch or larger brass or bronze bolt for attaching the bonding jumper for slip-base standards.

**Replace the 1st sentence of the 3rd paragraph of section 56-3.01C(2)(a) with:**

07-15-16

After each standard, pole, pedestal, and post is properly positioned, place mortar under the base plate.

**Replace the 2nd sentence of the 4th paragraph of section 56-3.01C(2)(a) with:**

07-15-16

The top of the foundation at curbs or sidewalks must be finished to curb or sidewalk grade.

**Replace the 10th paragraph of section 56-3.01C(2)(a) with:**

07-15-16

Except when located on a structure, construct foundations monolithically.

**Replace the 13th paragraph of section 56-3.01C(2)(a) with:**

07-15-16

Do not erect standards, poles, pedestals, or posts until the concrete foundation has cured for at least 7 days.

**Replace the 14th paragraph in section 56-3.01C(2)(a) with:**

07-15-16

The Engineer selects either the plumbing or raking technique for standards, poles, pedestals, and posts. Plumb or rake by adjusting the leveling nuts before tightening nuts. Do not use shims or similar devices. After final adjustments of both top nuts and leveling nuts on anchorage assemblies have been made and each standard, pole, pedestal, and post on the structure is properly positioned, tighten nuts as follows:

1. Tighten leveling nuts and top nuts, following a crisscross pattern, until bearing surfaces of all nuts, washers, and base plates are in firm contact.
2. Use an indelible marker to mark the top nuts and base plate with lines showing relative alignment of the nut to the base plate.
3. Tighten top nuts following a crisscross pattern:
  - 3.1. Additional 1/6 turn for anchor bolts greater than 1-1/2 inches in diameter.
  - 3.2. Additional 1/3 turn for other anchor bolts.
  - 3.3. Tightening tolerance for all top nuts is  $\pm 1/8$  turn.

**Replace the 1st sentence of the 4th paragraph of section 56-3.01C(2)(b) with:**

07-15-16

If shown, use sleeve nuts on Type 1 standards.

**Add to section 56-3.01C(2)(b):**

07-15-16

Spiral reinforcement must be continuous above the bottom of the anchor bolts. The top termination must be either:

1. 1'-6" lap beyond the end of pitch with a 90-degree hook extending to the opposite side of the cage, or
2. 1'-6" lap beyond the end of pitch with 2 evenly spaced authorized mechanical couplers

**Replace the 1st sentence of the paragraph in section 56-3.02A(4)(b) with:**

07-15-16

For cast slip bases for standards and poles with shaft lengths of 15 feet or more, perform RT on 1 casting from each lot of a maximum of 50 castings under ASTM E94.

**Replace the 2nd paragraph of section 56-3.02B(1) with:**

07-15-16

Material for push button posts, pedestrian barricades, and guard posts must comply with ASTM A53/A53M or ASTM A500/A500M.

**Add to section 56-3.02B(1):**

07-15-16

Steel pipe standards and mast arms must be hot dip galvanized after manufacturing. Remove spikes from galvanized surfaces.

**Replace the 2nd paragraph of section 56-3.02B(2) with:**

07-15-16

HS anchor bolts, nuts, and washers must comply with section 55-1.02D(1) and the following:

1. Bolt threads must be rolled
2. Hardness of HS anchor bolts must not exceed 34 HRC when tested under ASTM F606
3. Galvanization must be by mechanical deposition
4. Nuts must be heavy-hex type
5. Each lot of nuts must be proof load tested

**Replace the 2nd sentence of the 9th paragraph of section 56-3.02B(2) with:**

07-15-16

During manufacturing, properly locate the position of the luminaire arm on the arm plate to avoid interference with the cap screw heads.

**Add to section 56-3.02B(3)(a):**

07-15-16

Steel having a nominal thickness greater than 2 inches that is used for tube-to-transverse plate connections must have a minimum CVN impact value of 20 ft-lb at 20 degrees F when tested under ASTM E23.

**Add to section 56-3.02B(3)(c):**

07-15-16

The length of telescopic slip-fit splices must be at least 1.5 times the inside diameter of the exposed end of the female section.

For welds connecting reinforced handholes or box-type pole plate connections to a tubular member, the start and stop points must be at points located on a longitudinal axis of symmetry of the tube coinciding with the axis of symmetry of the hand hole or pole plate.





### **64-3.02C Concrete Backfill**

Concrete for concrete backfill for slotted plastic pipe must comply with the specifications for minor concrete. You may use RSC instead of minor concrete for concrete backfill.

If RSC is used for concrete backfill, the RSC must:

1. Contain at least 590 pounds of cementitious material per cubic yard
2. Comply with section 90-3.02A, except section 90-1 does not apply
3. Comply with section 90-2

### **64-3.02D Heel-Resistant Grates**

Heel-resistant grate must:

1. Be designed to carry traffic loadings
2. Comply with ADA requirements
3. Be constructed of steel or cast iron
4. Be provided by the same manufacturer of the slotted plastic pipe
5. Comply with the manufacturer's instructions

### **64-3.02E Bar Reinforcement**

Bar reinforcement must comply with ASTM A615/A615M, Grade 60 or ASTM A706/A706M, Grade 60.

### **64-3.02F Miscellaneous Metal**

Ductile iron, nuts, bolts, and washers must comply with section 75.

### **64-3.02G Grout**

Grout must be non-shrink grout complying with ASTM C1107/C1107M.

### **64-3.02H Curing Compound**

Non-pigmented curing compound must comply with ASTM C309, Type 1, Class B.

### **64-3.02I End Caps**

End cap must:

1. Be provided by the same manufacturer of the slotted plastic pipe
2. Prevent concrete backfill from entering the pipe

## **64-3.03 CONSTRUCTION**

### **64-3.03A General**

Cover the grate slots with heavy-duty tape or other authorized covering during paving and concrete backfilling activities to prevent material from entering the slots.

### **64-3.03B Preparation**

Pave adjacent traffic lanes before installing slotted plastic pipes.

Excavation must comply with section 19-3.

### **64-3.03C Installation**

Lay and join slotted plastic pipes under the pipe manufacturer's instructions.

Lay pipes to line and grade with sections closely jointed and adequately secured to prevent separation during placement of the concrete backfill. If the pipes do not have a positive interlocking mechanism like a slot and tongue connection, secure the sections together with nuts, bolts, and washers before backfilling.

The top of slotted plastic pipes must not extend above the completed surface. Position the pipes so that the concrete backfill is flush with the surrounding grade and above the top of the grate from 1/8 to 1/4 inch.

Place channels with the male and female ends facing each other.



Replace the 2nd heading in section 71-5.03 with:

01-15-16

**71-5.03B Frames, Covers, Grates, and Manholes**

AA

**DIVISION VIII MISCELLANEOUS CONSTRUCTION  
72 SLOPE PROTECTION**

07-15-16

Replace the 1st and 2nd paragraphs of section 72-2.02B with:

07-15-16

For method A and B placement and the class of RSP described, comply with the rock gradation shown in the following table:

Nominal RSP class by median particle diameter <sup>b</sup>		Nominal median particle weight $W_{50}^{c,d}$	Rock Gradation		d <sub>50</sub> <sup>c</sup> (inches)		d <sub>100</sub> <sup>c</sup> (inches)	Placement
Class <sup>a</sup>	Diameter (inches)		Min	Max	Min	Max		
I	6	20 lb	3.7	5.2	5.7	6.9	12.0	B
II	9	60 lb	5.5	7.8	8.5	10.5	18.0	B
III	12	150 lb	7.3	10.5	11.5	14.0	24.0	B
IV	15	300 lb	9.2	13.0	14.5	17.5	30.0	B
V	18	1/4 ton	11.0	15.5	17.0	20.5	36.0	B
VI	21	3/8 ton	13.0	18.5	20.0	24.0	42.0	A or B
VII	24	1/2 ton	14.5	21.0	23.0	27.5	48.0	A or B
VIII	30	1 ton	18.5	26.0	28.5	34.5	48.0	A or B
IX	36	2 ton	22.0	31.5	34.0	41.5	52.8	A
X	42	3 ton	25.5	36.5	40.0	48.5	60.5	A
XI	46	4 ton	28.0	39.4	43.7	53.1	66.6	A

<sup>a</sup>For RSP Classes I–VIII, use Class 8 RSP fabric. For RSP Classes IX–XI, use Class 10 RSP fabric.

<sup>b</sup>Intermediate or B dimension (i.e., width) where A dimension is length and C dimension is thickness.

<sup>c</sup>d%, where % denotes the percentage of the total weight of the graded material.

<sup>d</sup>Values shown are based on the minimum and maximum particle diameters shown and an average specific gravity of 2.65. Weight will vary based on specific gravity of rock available for the project.

Replace the table in section 72-2.02C with:

07-15-16

**Fabric Class**

Class	Largest rock gradation class used in slope protection
8	Classes I–VIII
10	Classes IX–XI





## **80 FENCES**

07-15-16

**Replace section 80-4 with:**

07-15-16

### **80-4 WILDLIFE EXCLUSION FENCES**

#### **80-4.01 GENERAL**

##### **80-4.01A General**

Section 80-4 includes specifications for constructing wildlife exclusion fences.

Constructing a wildlife exclusion fence includes the installation of any signs specified in the special provisions.

##### **80-4.01B Materials**

Each T post must:

1. Comply with ASTM A702
2. Be metal and have an anchor plate
3. Be painted black or galvanized

##### **80-4.01C Construction**

Not Used

##### **80-4.01D Payment**

Not Used

#### **80-4.02 DESERT TORTOISE FENCES**

##### **80-4.02A General**

Section 80-4.02 includes specifications for constructing desert tortoise fences.

##### **80-4.02B Materials**

##### **80-4.02B(1) Permanent Desert Tortoise Fences**

##### **80-4.02B(1)(a) General**

Each wire tie and hog ring for a permanent desert tortoise fence must comply with section 80-2.02F.

Each hold down pin must:

1. Be U-shaped, with 2 minimum 6-inch long legs
2. Have pointed ends
3. Be at least 11-gauge wire
4. Be galvanized
5. Be commercial quality

##### **80-4.02B(1)(b) Hardware Cloth**

The hardware cloth must:

1. Comply with ASTM A740
2. Be welded or woven galvanized steel wire fabric
3. Be made of at least 14-gauge wire
4. Be 36 inches wide

##### **80-4.02B(1)(c) Barbless Wire**

The barbless wire must:

1. Comply with ASTM A641/A641M
2. Be at least 14-gauge wire
3. Have a Class 1 zinc coating

#### **80-4.02B(1)(d) Posts**

Each post must:

1. Comply with ASTM F1083
2. Be standard weight, schedule 40 steel pipe with a nominal pipe size of 1 inch
3. Be galvanized steel fence post conforming to ASTM A702

#### **80-4.02B(2) Temporary Desert Tortoise Fences**

The materials for a temporary desert tortoise fence must comply with section 80-4.02B(1), except the hardware cloth must be made of at least 16-gauge wire.

#### **80-4.02C Construction**

##### **80-4.02C(1) General**

Extend the hardware cloth a minimum of 24 inches above the ground.

Plumb the posts and pull the hardware cloth taut. Correct any alignment issues.

##### **80-4.02C(2) Permanent Desert Tortoise Fences**

Excavate the ground to form a trench before installing the posts and hardware cloth. Embed the posts at maximum 5-foot intervals into the ground. If T posts are used, use 5-foot lengths and embed the posts to match the above-ground height shown for the posts.

Securely fasten the hardware cloth to the posts with wire ties and to barbless wire with hog rings as shown. Pass the wire ties through the hardware cloth. Encircle the posts and barbless wire with the ties and tie them by twisting a minimum of 3 complete turns.

Bend the twisted ends of the ties down to prevent possible snagging. Close hog rings with their ends overlapping.

Bury the hardware cloth a minimum of 12 inches into the ground. Install the cloth in 1 continuous piece. You may cut the cloth into shorter segments if authorized.

Overlap the hardware cloth segments at posts, with a minimum overlap of 6 inches centered at a post. Wire tie the overlapped cloth to posts as shown. Prevent fraying by threading barbless wire along the vertical edges of the hardware cloth on either side of the post or use 3 equally spaced hog rings (6 hog rings per location) along each wire cloth edge.

Where bedrock or caliche substrate is encountered, use the bent hardware cloth detail if authorized. Transitions from buried-to-bent or bent-to-buried configuration must occur at a post location with a minimum 6-inch overlap of the hardware cloth as shown. The maximum spacing for hold down pins is 24 inches on center. Anchor in place with hold down pins the beginning and end corners of the hardware cloth placed on the ground.

Backfill the removed earth material into the trench created to install the hardware cloth and posts. Use an 8 lb or heavier hand tamper to compact the backfill around the posts and hardware cloth. Install a post at each corner of the cloth segments.

If a gate must be installed, attach the hardware cloth to the gate frame such that there is contact along the entire length of the gate between the finished ground surface and the lower edge of the cloth. Install the gate under section 80-10.

##### **80-4.02C(3) Temporary Desert Tortoise Fences**

Fold the horizontal edge of the hardware cloth at a 90° angle toward the tortoise habitat area. Ensure the clearance to the ground at the bend is from 0 to 2 inches.

Where the hardware cloth overlaps, secure the bend piece with one of the following:

1. Barbless wire threaded along the width of the cloth
2. Minimum of 4 hog rings equally spaced along the edge

Fasten the bent piece to the ground with hold down pins pushed completely into the ground.



**Add to the end of section 84-8.03A:**

07-15-16

The noise level created by the combined grinding activities must not exceed 86 dBA when measured at a distance of 50 feet at right angles to the direction of travel.

Break rumble strips before and after intersections, driveways, railroad crossings, freeway gore areas, and freeway ramps. Place breaks and break distances as shown. You may adjust breaks and the break distances as needed at low-volume driveways or other locations if authorized.

**Delete *new* in the 1st paragraph of section 84-8.03B.**

07-15-16

**Add to the end of section 84-8.03B:**

07-15-16

Remove grinding residue under section 13-4.03E(7).

**Replace the 1st paragraph of section 84-8.03C with:**

07-15-16

Construct rumble strips in the top layer of HMA and asphalt concrete surfacing by the ground-in method.

**Add between the 2nd and 3rd paragraphs of section 84-8.03C:**

07-15-16

Dispose of the removed material.

**Delete the 2nd paragraph of section 84-8.03C.**

07-15-16

**Replace 37-2 in the 3rd paragraph of section 84-8.03C with:**

07-15-16

37-4.02

**Replace section 84-8.04 with:**

07-15-16

The payment quantity for any type of rumble strip is the length measured by the station along the length of the rumble strip without deductions for gaps between indentations.

**Replace the 2nd paragraph of section 84-9.03B with:**

04-15-16

Completely remove traffic stripes and pavement markings, including any paint in the gaps, by methods that do not remove pavement to a depth of more than 1/8 inch.

**Add between the 2nd and 3rd paragraphs of section 84-9.03B:**

04-15-16

Submit your proposed method for removing traffic stripes and pavement markings at least 7 days before starting the removal work. Allow 2 business days for the review.

Remove pavement marking such that the old message cannot be identified. Make any area removed by grinding rectangular. Water must not puddle in the ground areas. Fog seal ground areas on asphalt concrete pavement.

Delete *materially* in the 1st paragraph of section 84-9.03D.

AA

## DIVISION X ELECTRICAL WORK

Replace section 86 with:

### 86 GENERAL

04-15-16

#### 86-1.01 GENERAL

##### 86-1.01A Summary

Section 86 includes general specifications for furnishing electrical equipment and materials.

Electrical equipment and materials must comply with part 4 of the *California MUTCD* and 8 CA Code of Regs, chapter 4, subchapter 5, "Electrical Safety Orders."

Galvanized equipment and materials must comply with section 75-1.02B.

##### 86-1.01B Definitions

**accessible pedestrian signal:** Accessible pedestrian signal as defined in the *California MUTCD*.

**accessible walk indication:** Activated audible and vibrotactile action during the walk interval.

**actuation:** Actuation as defined in the *California MUTCD*.

**ambient sound level:** Background sound level in dB at a given location.

**ambient sound sensing microphone:** Microphone that measures the ambient sound level in dB and automatically adjusts the accessible pedestrian signal speaker's volume.

**audible speech walk message:** Audible prerecorded message that communicates to pedestrians which street has the walk interval.

**channel:** Discrete information path.

**CALiPER:** Commercially Available LED Product Evaluation and Reporting. A U.S. Department of Energy program that individually tests and provides unbiased information on the performance of commercially available LED luminaires and lights.

**controller assembly:** Assembly for controlling a system's operations, consisting of a controller unit and auxiliary equipment housed in a waterproof cabinet.

**controller unit:** Part of the controller assembly performing the basic timing and logic functions.

**correlated color temperature:** Absolute temperature in kelvin of a blackbody whose chromaticity most nearly resembles that of the light source.

**detector:** Detector as defined in the *California MUTCD*.

**electrolier:** Assembly of a lighting standard and luminaire.

**flasher:** Device for opening and closing signal circuits at a repetitive rate.

**flashing beacon control assembly:** Assembly of switches, circuit breakers, terminal blocks, flasher, wiring, and other necessary electrical components housed in a single enclosure for operating a beacon.

**house side lumens:** Lumens from a luminaire directed to light up areas between the fixture and the pole, such as sidewalks at intersection or areas off the shoulders on freeways.

**illuminance gradient:** Ratio of the minimum illuminance on a 1-foot square of sign panel to that on an adjacent 1-foot square of sign panel.

**inductive loop detector:** Detector capable of being actuated by an inductance change caused by a vehicle passing or standing over the loop. An inductive loop detector includes a loop or group of loops installed in the roadway and a lead-in cable installed and connected inside a controller cabinet.

**junction temperature:** Temperature of the electronic junction of the LED device. The junction temperature is critical in determining photometric performance, estimating operational life, and preventing catastrophic failure of the LED.

**L70:** Extrapolated life in hours of the luminaire when the luminous output depreciates 30 percent from the initial values.

**lighting standard:** Pole and mast arm supporting the luminaire.

**LM-79:** Test method from the Illumination Engineering Society of North America specifying the test conditions, measurements, and report format for testing solid state lighting devices, including LED luminaires.

**LM-80:** Test method from the Illumination Engineering Society of North America specifying the test conditions, measurements, and report format for testing and estimating the long-term performance of LEDs for general lighting purposes.

**luminaire:** Assembly that houses the light source and controls the light emitted from the light source.

**National Voluntary Laboratory Accreditation Program:** U.S. Department of Energy program that accredits independent testing laboratories.

**powder coating:** Coating applied electrostatically using exterior-grade, UV-stable, polymer powder.

**power factor:** Ratio of the real power component to the complex power component.

**pretimed controller assembly:** Assembly operating traffic signals under a predetermined cycle length.

**programming mechanism:** Device to program the accessible pedestrian signal operation.

**pull box:** Box with a cover that is installed in an accessible place in a conduit run to facilitate the pulling in of wires or cables.

**push button information message:** Push button information message as defined in the *California MUTCD*.

**push button locator tone:** Push button locator tone as defined in the *California MUTCD*.

**signal face:** Signal face as defined in the *California MUTCD*.

**signal head:** Signal head as defined in the *California MUTCD*.

**signal indication:** Signal indication as defined in the *California MUTCD*.

**signal section:** Signal section as defined in the *California MUTCD*.

**signal standard:** Pole with or without mast arms carrying 1 or more signal faces.

**street side lumens:** Lumens from a luminaire directed to light up areas between the fixture and the roadway, such as traveled ways and freeway lanes.

**surge protection device:** Subsystem or component that protects equipment against short-duration voltage transients in power line.

**total harmonic distortion:** Ratio of the rms value of the sum of the squared individual harmonic amplitudes to the rms value of the fundamental frequency of a complex waveform.

**traffic-actuated controller assembly:** Assembly for operating traffic signals under the varying demands of traffic as registered by detector actuation.

**traffic phase:** Traffic phase as defined in the *California MUTCD*.

**vehicle:** Vehicle as defined in the *California Vehicle Code*.

**vibrotactile pedestrian device:** Vibrotactile pedestrian device as defined in the *California MUTCD*.

### **86-1.01C Submittals**

#### **86-1.01C(1) General**

Within 15 days after Contract approval, submit a list of equipment and materials you propose to install.

Submit the list before shipping equipment and materials to the job site. The list must include:

1. Manufacturer's name
2. Make and model number
3. Month and year of manufacture
4. Lot and serial numbers
5. Contract number
6. Your contact information

Submit confirmation of the vendor's acceptance of the order for the electrical equipment and materials as an informational submittal.

Submit 3 sets of computer-generated, schematic wiring diagrams for each cabinet.

Diagrams, plans, and drawings must be prepared using graphic symbols in IEEE 315, "Graphic Symbols for Electrical and Electronic Diagrams."

Submit a schedule of values within 15 days after Contract approval.

Do not include costs for the traffic control system in the schedule of values.

Submit a manufacturer's maintenance manual or combined maintenance and operation manual as an informational submittal. The manual must have a master item index that includes:

1. Specifications
2. Design characteristics
3. General operation theory
4. Function of all controls
5. Troubleshooting procedure
6. Parts list, descriptions, stock numbers, and settings
7. Block circuit diagram
8. Layout of components
9. Schematic diagrams

#### **86-1.01C(2) Pull Boxes**

Submit the manufacturer's installation instructions for pull boxes, including:

1. Quantity and size of entries that can be made without degrading the strength of the pull box below the load rating
2. Locations where side entries can be made
3. Acceptable method for creating the entry

Submit load-rating test reports for pull boxes from a NRTL.

#### **86-1.01C(3) LED Luminaires**

Submit for an LED luminaire:

1. Maximum power in watts
2. Maximum designed junction temperature
3. Heat sink area in square inches



4. Designed junction-to-ambient thermal resistance calculation with thermal resistance components clearly defined
5. L70 in hours when extrapolated for the average nighttime operating temperature
6. Life expectancy based on the junction temperature
7. Manufacturer's data sheet for the power supply, including the rated life

Submit the manufacturer's QC test data for LED luminaires as an informational submittal.

**86-1.01C(4) Low-Pressure Sodium Luminaires**

Submit the manufacturer's QC test data for low-pressure sodium luminaires as an informational submittal.

**86-1.01C(5) Service Equipment Enclosures**

Submit shop drawings for a service equipment enclosure to METS.

**86-1.01C(6) Signal Heads**

Submit a certificate of compliance and the manufacturer's QC test data for signal heads as an informational submittal.

**86-1.01C(7) LED Signal Modules**

Submit the manufacturer's QC test data for LED signal modules as an informational submittal.

**86-1.01C(8) Visors**

Submit a certificate of compliance and the manufacturer's QC test data for visors as an informational submittal.

**86-1.01C(9) LED Countdown Pedestrian Signal Face Modules**

Submit the manufacturer's QC test data for LED countdown pedestrian signal face modules as an informational submittal.

**86-1.01C(10) Accessible Pedestrian Signals**

Submit the manufacturer's QC test data for accessible pedestrian signals as an informational submittal.

**86-1.01D Quality Assurance**

**86-1.01D(1) General**

Electrical equipment must comply with one or more of the following standards:

1. ANSI
2. ASTM
3. EIA/ECIA
4. NEMA
5. NETA
6. UL/NRTL
7. TIA

Materials must comply with:

1. FCC rules
2. ITE standards
3. NEC
4. California Electrical Code

**86-1.01D(2) Source Quality Control**

Service equipment enclosures and cabinets must be inspected and tested at the source.

**86-1.01D(3) Department Acceptance**

Deliver material and equipment for testing to METS.

Allow 30 days for testing. The Department notifies you when testing is complete.

If the Department accepts the material or equipment, you must pick it up from the test site and deliver it to the job site.

If the Department rejects material or equipment, remove it within 5 business days after you are notified it is rejected. If it is not removed within that period, the Department may remove it and ship it to you and deduct the costs of labor, material and shipping.

Resubmit a new sample and allow 30 days for retesting. The retesting period starts when the replacement material or equipment is delivered to METS.

## **86-1.02 MATERIALS**

### **86-1.02A General**

Anchor bolts, anchor bars or studs, and nuts and washers must comply with section 75-1.02.

Bolt threads must accept galvanized standard nuts without requiring tools or causing removal of protective coatings.

### **86-1.02B Conduit and Accessories**

#### **86-1.02B(1) General**

Conduit and fittings must comply with the requirements shown in the following table:

<b>Conduit and Fitting Requirements</b>	
Type	Requirement
1	Must be hot-dip galvanized rigid steel complying with UL 6 and ANSI C80.1. The zinc coating must comply with copper sulfate test requirements in UL 6. Fittings must be electrogalvanized and certified under UL 514B.
2	Must comply with requirements for Type 1 conduit and be coated with PVC or polyethylene. The exterior thermoplastic coating must have a minimum thickness of 35 mils. The internal coating must have a minimum thickness of 2 mils. Coated conduit must comply with NEMA RN 1, or NRTL PVC-001.
3	Must be Type A, extruded, rigid PVC conduit complying with UL 651 or must be HDPE conduit complying with UL 651A.
4	Must have an inner, flexible metal core covered by a waterproof, nonmetallic, sunlight-resistant jacket, and must be UL listed for use as a grounding conductor. Fittings must be certified under UL 514B.
5	Must be intermediate steel complying with UL 1242 and ANSI C80.6. The zinc coating must comply with copper sulfate test requirements specified in UL 1242. Fittings must be electrogalvanized and certified under UL 514B.

Bonding bushings installed on metal conduit must be insulated and either a galvanized or zinc-alloy type.

#### **86-1.02B(2) Structures Accessories**

Steel hangers, steel brackets, and other fittings used to support conduit in or on a wall or bridge superstructure must comply with section 75-3.

Precast concrete cradles for conduit must be made of minor concrete and commercial-quality welded wire fabric. The minor concrete must contain a minimum of 590 lb of cementitious material per cubic yard. The cradles must be moist cured for a minimum of 3 days.

### **86-1.02C Pull Boxes**

#### **86-1.02C(1) General**

Pull box cover must have a marking on the top that is:

1. Clearly defined
2. Uniform in depth
3. Parallel to either side
4. 1 to 3 inches in height

Cover marking must be:

1. *SERVICE* for service circuits between a service point and service disconnect
2. *SERVICE IRRIGATION* for circuits from a service equipment enclosure to an irrigation controller
3. *SERVICE BOOSTER PUMP* for circuits from a service equipment enclosure to the booster pump
4. *TDC POWER* for circuits from a service equipment enclosure to telephone demarcation cabinet
5. *LIGHTING* for a lighting system
6. *SIGN ILLUMINATION* for a sign illumination system
7. *SIGNAL AND LIGHTING* for a signal and lighting system
8. *RAMP METER* for a ramp metering system
9. *TMS* for a traffic monitoring station
10. *FLASHING BEACON* for a flashing beacon system
11. *CMS* for a changeable message sign system
12. *INTERCONNECT* for an interconnect conduit and cable system

The load rating must be stenciled on the inside and outside of the pull box and the cover.

If a transformer or other device must be placed in the pull box, include recesses for a hanger.

The hardware must be stainless steel with 18 percent chromium and 8 percent nickel content.

#### **86-1.02C(2) Nontraffic Pull Boxes**

A nontraffic pull box and cover must comply with ANSI/SCTE 77, "Specification for Underground Enclosure Integrity," for Tier 22 load rating and must be gray or brown.

Each new pull box must have a cover with an electronic marker cast inside.

A pull box extension must be made of the same material as the pull box. The extension may be another pull box if the bottom edge of the pull box fits into the opening for the cover.

The bolts, nuts, and washers must be a captive design and galvanized. Captive bolts for securing the cover of nontraffic pull boxes must be capable of withstanding a torque from 55 to 60 ft-lb and a minimum pull-out strength of 750 lb.

#### **86-1.02C(3) Traffic Pull Boxes**

A traffic pull box and cover must comply with ASTM C857 for HS20-44 loading.

The frame must be anchored to the box with 2-1/4-inch-long concrete anchors with a 1/4 inch diameter. A no. 3-1/2(T) pull box must have 4 concrete anchors, one placed in each corner. No. 5(T) and no. 6(T) pull boxes must have 6 concrete anchors, one placed in each corner and one near the middle of each of the longer sides.

Nuts must be vibration-resistant, zinc-plated, carbon steel and have a wedge ramp at the root of the thread.

Before galvanizing a steel or cast iron cover, the manufacturer must apply the cover marking by one of the following methods:

1. Use a cast iron strip at least 1/4 inch thick with letters raised a minimum of 1/16 inch. Fasten the strip to the cover with 1/4-inch, flathead, stainless steel machine bolts and nuts. Peen the bolts after tightening.
2. Use a sheet steel strip at least 0.027 inch thick with letters raised a minimum of 1/16 inch. Fasten the strip to the cover by spot welding, tack welding, or brazing with 1/4-inch stainless steel rivets or 1/4-inch, roundhead, stainless steel machine bolts and nuts. Peen the bolts after tightening.

The steel cover must be countersunk approximately 1/4 inch to accommodate the bolt head. When tightened, the bolt head must be no more than 1/8 inch above the top of the cover.

#### **86-1.02C(4) Reserved**

#### **86-1.02D Tapes**

#### **86-1.02D(1) General**

Reserved

**86-1.02D(2) Pull Tape**

Pull tape must be a flat, woven, lubricated, soft-fiber, polyester tape with a minimum tensile strength of 1,800 lb. The tape must have sequential measurement markings every 3 feet.

**86-1.02D(3) Reserved****86-1.02E Reserved****86-1.02F Conductors and Cables****86-1.02F(1) Conductors****86-1.02F(1)(a) General**

Reserved

**86-1.02F(1)(b) Reserved****86-1.02F(1)(c) Copper Conductors****86-1.02F(1)(c)(i) General**

Copper wire must comply with ASTM B3 and B8.

Conductor must be clearly and permanently marked the entire length of its outer surface with:

1. Manufacturer's name or trademark
2. Insulation-type letter designation
3. Conductor size
4. Voltage
5. Temperature rating
6. Number of conductors for a cable

The minimum insulation thickness and color code requirements must comply with NEC.

A conductor must be UL listed or NRTL certified and rated for 600 V(ac).

Insulation for no. 14 to no. 4 conductors must be one of the following:

1. Type TW PVC under ASTM D2219
2. Type THW PVC
3. Type USE, RHH, or RHW cross-linked polyethylene

The insulation for no. 2 and larger conductors must be one of the above or THWN.

Conductors must be identified as shown in the following table:

### Conductor Identification

Circuit	Signal phase or function	Identification			Size
		Insulation color <sup>d</sup>		Band symbols	
		Base	Stripe <sup>a</sup>		
Signals (vehicle) <sup>a, b</sup>	2, 6	Red, yel, brn	Blk	2, 6	14
	4, 8	Red, yel, brn	Ora	4, 8	14
	1, 5	Red, yel, brn	None	1, 5	14
	3, 7	Red, yel, brn	Pur	3, 7	14
	Ramp meter 1	Red, yel, brn	None	NBR	14
	Ramp meter 2	Red, yel, brn	Blk	NBR	14
Pedestrian signals	2p, 6p	Red, brn	Blk	2p, 6p	14
	4p, 8p	Red, brn	Ora	4p, 8p	14
	1p, 5p	Red, brn	None	1p, 5p	14
	3p, 7p	Red, brn	Pur	3p, 7p	14
Pedestrian push buttons	2p, 6p	Blu	Blk	P-2, P-6	14
	4p, 8p	Blu	Ora	P-4, P-8	14
	1p, 5p	Blu	None	P-1, P-5	14
	3p, 7p	Blu	Pur	P-3, P-7	14
Traffic signal controller cabinet	Ungrounded circuit conductor	Blk	None	CON-1	6
	Grounded circuit conductor	Wht	None	CON-2	6
Highway lighting pull box to luminaire	Ungrounded - line 1	Blk	None	NBR	14
	Ungrounded - line 2	Red	None	NBR	14
	Grounded	Wht	None	NBR	14
Multiple highway lighting	Ungrounded - line 1	Blk	None	ML1	10
	Ungrounded - line 2	Red	None	ML2	10
Lighting control	Ungrounded - PEU	Blk	None	C1	14
	Switching leg from PEU unit or SM transformer	Red	None	C2	14
Service	Ungrounded - line 1 (signals)	Blk	None	NBR	6
	Ungrounded - line 2 (lighting)	Red	None	NBR	8
Sign lighting	Ungrounded - line 1	Blk	None	SL-1	10
	Ungrounded - line 2	Red	None	SL-2	10
Flashing beacons	Ungrounded between flasher and beacons	Red or yel	None	F-Loc. <sup>c</sup>	14
Grounded circuit conductor	Pedestrian push buttons	Wht	Blk	NBR	14
	Signals and multiple lighting	Wht	None	NBR	10
	Flashing beacons and sign lighting	Wht	None	NBR	12
	Lighting control	Wht	None	C-3	14
	Service	Wht	None	NBR	14
Railroad preemption		Blk	None	R	14
Spares		Blk	None	NBR	14

NBR = No band required      PEU=Photoelectric unit

<sup>a</sup>On overlaps, the insulation is striped for the 1st phase in the designation, e.g., phase (2+3) conductor is striped as for phase 2.

<sup>b</sup>Band for overlap and special phases as required

<sup>c</sup>Flashing beacons having separate service do not require banding.

<sup>d</sup>Color Code: Yel-Yellow, Brn-Brown, Blu-Blue, Blk-Black, Wht-White, Ora-Orange, Pur-Purple

The insulation color must be homogeneous throughout the full depth of the insulation. The identification stripe must be continuous throughout the length of the conductor.

**86-1.02F(1)(c)(ii) Bonding Jumpers and Equipment Grounding Conductors**

A bonding jumper must be copper wire or copper braid of the same cross-sectional area as a no. 8 conductor or larger.

An equipment grounding conductor may be bare or insulated.

**86-1.02F(1)(c)(iii) Inductive Loop Conductors**

Inductive loop conductor must comply with the requirements shown in the following table:

**Conductor Requirements for Inductive Loop Detectors**

Loop wire	Requirement
Type 1	Type RHW-USE neoprene-jacketed or Type USE cross-linked polyethylene, insulated, no. 12, stranded copper wire with a minimum 40-mils insulation thickness at any point.
Type 2	Type THWN or Type XHHW, no. 14, stranded copper wire in a plastic tubing. The plastic tubing must be polyethylene or vinyl rated for use at 105 °C and resistant to oil and gasoline. The outside diameter of the tubing must be at most 0.27 inch with a wall thickness of at least 0.028 inch.

**86-1.02F(1)(d) Reserved**

Reserved

**86-1.02F(2) Cables**

**86-1.02F(2)(a) General**

Reserved

**86-1.02F(2)(b) Reserved**

Reserved

**86-1.02F(2)(c) Reserved**

**86-1.02F(2)(d) Copper Cables**

**86-1.02F(2)(d)(i) General**

The conductor wire size for a detector lead-in cable must comply with the requirements of ASTM B286.

Cable, except a detector lead-in cable, must be clearly and permanently marked the entire length of its outer surface with:

1. Manufacturer's name or trademark
2. Insulation-type letter designation
3. Conductor size
4. Voltage
5. Temperature rating
6. Number of conductors for a cable

**86-1.02F(2)(d)(ii) Conductors Signal Cables**

A conductors signal cable must have a black polyethylene jacket with an inner polyester binder sheath. The cable jacket must be rated for 600 V(ac) and 75 degrees C. Filler material, if used, must be polyethylene.

The individual conductors in the cable must be solid copper complying with ASTM B286 with Type THWN insulation. The minimum thickness of insulation must comply with NEC for conductor sizes no. 14 to no.10. The minimum thickness of the nylon jacket must be 4 mils.

Cable must comply with the requirements shown in the following table:

Cable type <sup>a</sup>	Conductor quantity and type	Cable jacket thickness (mils)		Maximum nominal outside diameter (inch)	Conductor color code
		Average	Minimum		
3CSC	3 no. 14	44	36	0.40	Blue/black, blue/orange, white/black stripe
5CSC	5 no. 14	44	36	0.50	Red, yellow, brown, black, white
9CSC	8 no. 14 1 no. 12	60	48	0.65	No. 12 - white, no. 14 - red, yellow, brown, black, and red/black, yellow/black, brown/black, white/black stripe
12CSC	11 no. 14 1 no. 12	60	48	0.80	No. 12 - white, no. 14 - red, yellow, brown, red/black stripe, yellow/black stripe, brown/black stripe, black/red stripe, black/white stripe, black, red/white stripe, brown/white stripe
28CSC	27 no. 14 1 no. 10	80	64	0.90	No. 10 - white no. 14 - red/black stripe, yellow/black stripe, brown/black stripe, red/orange stripe, yellow/orange stripe, brown/orange stripe, red/silver stripe, yellow/silver stripe, brown/silver stripe, red/purple stripe, yellow/purple stripe, brown/purple stripe, red/2 black stripes, brown/2 black stripes, red/2 orange stripes, brown/2 orange stripes, red/2 silver stripes, brown/2 silver stripes, red/2 purple stripes, brown/2 purple stripes, blue/black stripe, blue/orange stripe, blue/silver stripe, blue/purple stripe, white/black stripe, black/red stripe, black

**86-1.02F(2)(d)(iii) Detector Lead-in Cables**

Conductors for a loop detector lead-in cable must be two no. 16, 19-by-29, stranded, tinned copper wires with calculated cross-sectional areas complying with ASTM B286, table 1 and must comply with the requirements shown in the following table:

### Conductor Requirements for Loop Detector Lead-In Cables

Lead-in cable	Requirement
Type B	Insulated with 20 mils of high-density polyethylene. Conductors must be twisted together with at least 2 turns per foot, and the twisted pair must be protected with a copper or aluminum polyester shield. A minimum no. 20 copper drain wire must be connected to the equipment ground within the cabinet. Cable must have a high-density polyethylene or high-density polypropylene outer jacket with a nominal thickness of 32 mils. Include an amorphous, interior, moisture penetration barrier of nonhydroscopic polyethylene or polypropylene fillers.
Type C	Comply with International Municipal Signal Association Specification no. 50-2. A minimum no. 20 copper drain wire must be connected to the equipment ground within the cabinet.

**86-1.02F(2)(d)(iv) Reserved**

**86-1.02F(2)(d)(v) Signal Interconnect Cables**

A signal interconnect cable must be a 6-pair type with stranded, tinned, copper no. 20 conductors. The insulation for each conductor must be color-coded polypropylene with a minimum 13-mils nominal thickness. The conductors must be in color-coded, twisted pairs. Each pair must be wrapped with an aluminum polyester shield and have a no. 22 or larger, stranded, tinned, copper drain wire inside the shielded pair.

The cable jacket must be black HDPE rated for a minimum of 300 V(ac) and 60 degrees C. The jacket must have a minimum nominal wall thickness of 40 mils.

**86-1.02F(2)(e) Reserved**

**86-1.02G Equipment Identification Characters**

Equipment identification characters must be 2-1/2 inch, series D lettering, except on wood poles, they must be 3-inch lettering.

The characters must be self-adhesive reflective labels or paint, except on wood poles, they must be embossed on aluminum.

**86-1.02H Splicing Materials**

Splicing materials include:

1. Connectors
2. Electrical insulating coating
3. PVC electrical tape
4. Butyl rubber stretchable tape
5. PVC pressure-sensitive adhesive tape
6. Heat shrink tubing

Connectors must be C-shaped compression or butt type.

Electrical insulating coating must be a fast drying sealant with low nontoxic fumes.

PVC electrical tape must have a minimum thickness of 80 mils.

Butyl rubber stretchable tape with liner must have a minimum thickness of 120 mils.

PVC pressure-sensitive adhesive electrical tape must have a minimum thickness of 6 mils.

Electrical tapes must be self-fusing, oil- and flame-resistant, synthetic rubber and be UL listed or NRTL certified.

Heat-shrink tubing must be made of irradiated polyolefin tubing with a minimum wall thickness of 40 mils before contraction and an adhesive mastic inner wall. When heated, the inner wall must melt and fill the crevices and interstices of the covered splice area and the outer wall must shrink to form a waterproof insulation.



Heat-shrink tubing must comply with the requirements for extruded, insulating tubing at 600 V(ac) specified in UL Standard 468D and ANSI C119.1 and the requirements shown in the following table:

**Heat-Shrink Tubing Requirements**

Quality characteristic	Requirement
Shrinkage ratio of supplied diameter <sup>a</sup> (max, %)	33
Dielectric strength (min, kV/in)	350
Resistivity (min, Ω/in)	25 x 10 <sup>13</sup>
Tensile strength (min, psi)	2,000
Operating temperature (°C)	-40–90 (135 °C in emergency)
Water absorption (max, %)	0.5

<sup>a</sup>When heated to 125 °C and allowed to cool to 25 °C

**86-1.02I Connectors and Terminals**

A connector and terminal must comply with SAE-AS7928 and be a crimp type, rated for 600 V(ac) and either UL listed or NRTL certified.

**86-1.02J Standards, Poles, Pedestals, and Posts**

Standards for signals, lighting, and flashing beacons, poles for closed circuit television, pedestals for cabinets, posts for extinguishable message sign and posts for pedestrian push button assemblies must comply with section 56-3.

**86-1.02K Luminaires**

**86-1.02K(1) General**

Luminaire must be either LED or low-pressure-sodium type.

**86-1.02K(2) LED Luminaires**

LED luminaire must be on the Authorized Material List for LED luminaires and must:

1. Be self-contained, not requiring assembly.
2. Comply with UL 1598 for luminaires in wet locations.
3. Have a power supply with:
  - 3.1. ANSI/IEC rating of at least IP65.
  - 3.2. 2 leads to accept standard 0-10 V(dc).
  - 3.3. Dimming control compatible with IEC 60929, Annex E. If the control leads are open or the analog control signal is lost, the circuit must default to 100-percent power.
  - 3.4. Case temperature self rise of 77 degrees F or less above ambient temperature in free air with no additional heat sinks.
4. Weigh no more than 35 lb.
5. Have a minimum operating life of 63,000 hours when operated for an average time of 11.5 hours at an average temperature of 70 degrees F.
6. Be designed to operate over a temperature range from -40 to 130 degrees F.
7. Be operationally compatible with photoelectric controls.
8. Have a correlated color temperature range from 3,500 to 6,500 K and a color rendering index of 65 or greater.
9. Have a maximum-effective projected area of 1.4 sq ft when viewed from either side or end.
10. Have a housing color that matches a color no. 26152 to 26440, 36231 to 36375, or 36440 of FED-STD-595.
11. Have an ANSI C136.41-compliant, locking-type, photocontrol receptacle with dimming connections and a watertight shorting cap.
12. Comply with LM-79, LM-80 and California Test 611.

The individual LEDs must be connected such that a catastrophic loss or a failure of 1 LED does not result in the loss of more than 20 percent of the luminous output of the luminaire.

The luminaire must be permanently marked inside the unit and outside of its packaging box. Marking consists of:

1. Manufacturer's name or trademark

2. Month and year of manufacture
3. Model, serial, and lot numbers
4. Rated voltage, wattage, and power in VA

An LED luminaire's onboard circuitry must include a surge protection device to withstand high-repetition noise transients caused by utility line switching, nearby lightning strikes, and other interferences. The device must protect the luminaire from damage and failure due to transient voltages and currents as defined in Tables 1 and 4 of ANSI/IEEE C64.41.2 for location category C-High. The surge protection device must comply with UL 1449 and ANSI/IEEE C62.45 based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High.

An LED luminaire and its associated onboard circuitry must comply with the Class A emission limits under 47 CFR 15(B) for the emission of electronic noise.

The fluctuations of line voltage must have no visible effect on the luminous output.

The operating voltage may range from 120 to 480 V(ac), 60 ± 3 Hz. Luminaire must operate over the entire voltage range or the voltage range must be selected from one of the following:

1. Luminaire must operate over a voltage range from 95 to 277 V(ac). The operating voltages for this option are 120 V(ac) and 240 V(ac).
2. Luminaire must operate over a voltage range from 347 to 480 V(ac). The operating voltage for this option is 480 V(ac).

LED luminaire must have a power factor of 0.90 or greater. The total harmonic distortion, current, and voltage induced into a power line by a luminaire must not exceed 20 percent. The L70 of the luminaire must be the minimum operating life or greater. Illuminance measurements must be calibrated to standard photopic calibrations.

The maximum power consumption and maintained illuminance of the LED luminaires must comply with the isofootcandle curves as shown.

LED luminaire must not allow more than 10 percent of the rated lumens to project above 80 degrees from vertical and 2.5 percent of the rated lumens to project above 90 degrees from vertical.

Luminaire must have passive thermal management with enough capacity to ensure proper heat dissipation and functioning of the luminaire over its minimum operating life. The maximum junction temperature for the minimum operating life must not exceed 221 degrees F.

The junction-to-ambient thermal resistance must be 95 degrees F per watt or less. The use of fans or other mechanical devices is not allowed for cooling the luminaire. The heat sink must be made of aluminum or other material of equal or lower thermal resistance. The luminaire must contain circuitry that automatically reduces the power to the LEDs so the maximum junction temperature is not exceeded when the ambient temperature is 100 degrees F or greater.

The luminaire's housing must be fabricated from materials designed to withstand a 3,000-hour salt spray test under ASTM B117. All aluminum used in housings and brackets must be made of a marine-grade alloy with less than 0.2 percent copper. All exposed aluminum must be anodized. A chromate conversion undercoating must be used underneath a thermoplastic polyester powder coat.

The housing must be designed to prevent the buildup of water on its top surface. Exposed heat sink fins must be oriented to allow water to run off the luminaire and carry dust and other accumulated debris away from the unit. The optical assembly of the luminaire must be protected against dust and moisture intrusion to at least an UL 60529 rating of IP66. The power supply enclosure must be protected to at least an UL 60529 rating of IP43.

The housing must have a slip fitter capable of being mounted on a 2-inch-diameter pipe tenon. Slip fitter must:

1. Fit on mast arms with outside diameters from 1-5/8 to 2-3/8 inches
2. Be adjustable to a minimum of ±5 degrees from the axis of the tenon in a minimum of 5 steps: +5, +2.5, 0, -2.5, -5
3. Have clamping brackets that:

- 3.1. Are made of corrosion-resistant materials or treated to prevent galvanic reactions
- 3.2. Do not bottom out on the housing bosses when adjusted within the designed angular range
- 3.3. Do not permanently set in excess of 1/32 inch when tightened

Each refractor or lens must be made of UV-inhibiting high-impact plastic, such as acrylic or polycarbonate, or heat- and impact-resistant glass. The refractor or lens must be resistant to scratching. Polymeric materials, except for the lenses of enclosures containing either the power supply or electronic components of the luminaire, must be made of UL94 V-0 flame-retardant materials.

An LED luminaire and its internal components must be able to withstand mechanical shock and vibration.

If the components are mounted on a down-opening door, the door must be hinged and secured to the luminaire's housing separately from the refractor or flat lens frame. The door must be secured to the housing to prevent accidental opening. A safety cable must mechanically connect the door to the housing.

An LED luminaire must have a barrier-type terminal block secured to the housing to connect field wires. The terminal screws must be captive and equipped with wire grips for conductors up to no. 6.

The conductors and terminals must be identified and marked.

### **86-1.02K(3) Low-Pressure Sodium luminaires**

A low-pressure sodium luminaire must be an enclosed cutoff or semi-cutoff type and be self-contained, not requiring assembly.

The housing must be either (1) a minimum 1/16-inch-thick, corrosion-resistant, die-cast aluminum sheet and plate with concealed continuous welds or (2) a minimum 3/32-inch-thick, acrylonitrile-butadiene-styrene sheet material on a cast aluminum frame. The housing must provide mounting for all electrical components and a slip fitter. The housing must be divided into optical and power compartments that are individually accessible for service and maintenance.

The painted exterior surface of the luminaire must be finished with a fused coating of electrostatically applied polyester powder paint or other UV-inhibiting film. The color must be aluminum gray.

A sealing ring must be installed in the pipe tenon opening to prevent the entry of water and insects into the power and optical compartments. The ring must be made of high-temperature neoprene or equal material.

The power unit assembly must be accessible through a weather-tight, hinged cover secured to the housing with spring latches or captive screws.

The luminaire's hardware must be stainless steel or cadmium plated. Removable components must be secured with machine screws or bolts instead of sheet metal screws.

A semi-cutoff luminaire or a molded refractor-style cutoff luminaire must include a refractor. Other cutoff luminaires must include a flat lens. The refractor assembly and flat lens assembly must be designed to rigidly maintain their shape and be hinged and secured to the housing with spring latches.

The refractor must be either a 1-piece injection-molded polycarbonate with a minimum thickness of 3/32 inch or a 1-piece injection-molded acrylic with a minimum thickness of 1/8 inch. Alternate methods of manufacturing the refractor may be authorized provided minimum specified thicknesses are maintained.

The flat lens must be a 1-piece polycarbonate with a minimum thickness of 3/32 inch, mounted to a metal frame.

The lamp socket must be made of high-temperature, flame-retardant, thermoset material with self-wiping contacts or an equal. The socket must be rated for 660 W and 1,000 V(ac). The position of the socket and support must maintain the lamp in the correct relationship with the reflector and refractor for the designed light distribution pattern. The reflector may be an integral part of the housing.

The luminaire must comply with the isofotcandle curves as shown.

Low-pressure sodium lamp must:

1. Be a 180 W, single-ended, bayonet-base, tubular, gas-discharge lamp

2. Maintain a minimum of 93 percent of its initial lumens over its rated life
3. Reach 80 percent of its light output within 10 minutes
4. Restrike within 1 minute after a power outage or voltage drop at the lamp socket
5. Have ANSI L74/E designation

The lamp operating position must be at  $\pm 20$  degrees from the horizontal.

Lamp must comply with the minimum performance requirements shown in the following table:

<b>Minimum Performance Requirements</b>	
Quality characteristic	Requirement
Initial lumens (lm)	33,000
Rated average life at 10 h/start (h)	18,000

The low-pressure sodium lamp ballast must be an autotransformer or high-reactance type. The power factor must be not less than 90 percent when the ballast is operated at the nominal line voltage with a nominally-rated reference lamp. The lamp wattage regulation spread must not vary by more than  $\pm 6$  percent for  $\pm 10$  percent input voltage variation from nominal through life.

At the line voltage, the ballast must have a lamp current crest factor not exceeding 1.8 and ballast loss not exceeding 24 percent for a 180 W ballast.

The ballast must include a multi-circuit connector for quick disconnection.

**86-1.02K(4) Reserved**

**86-1.02L Reserved**

**86-1.02M Photoelectric Controls**

Photoelectric control types are as shown in the following table:

<b>Photoelectric Control Types</b>	
Control type	Description
I	Pole-mounted photoelectric unit. Test switch housed in an enclosure.
II	Pole-mounted photoelectric unit. Contactor and test switch located in a service equipment enclosure.
III	Pole-mounted photoelectric unit. Contactor and a test switch housed in an enclosure.
IV	A photoelectric unit that plugs into a NEMA twist-lock receptacle, integral with the luminaire.
V	A photoelectric unit, contactor, and test switch located in a service equipment enclosure.

The pole-mounted adaptor for Type I, II, and III photoelectric controls must include a terminal block and cable supports or clamps to support the wires.

The enclosure for Type I and III photoelectric controls must be a NEMA 3R type. The enclosure must have a factory-applied, rust-resistant prime coat and finish coat. The enclosure must be hot-dip galvanized or painted to match the color of the lighting standard.

Photoelectric unit must:

1. Have a screen to prevent artificial light from causing cycling.
2. Have a rating of 60 Hz, 105-130 V(ac), 210-240 V(ac), or 105-240 V(ac).
3. Operate at a temperature range from -20 to 55 degrees C.
4. Consume less than 10 W.
5. Be a 3-prong, twist-lock type with a NEMA IP 65 rating, ANSI C136.10-compliant
6. Have a fail-on state
7. Fit into a NEMA-type receptacle
8. Turn on from 1 to 5 footcandles and turn off from 1.5 to 5 times the turn-on level. Measurements must be made by procedures in *EEI-NEMA Standards for Physical and Electrical Interchangeability of Light-Sensitive Control Devices Used in the Control of Roadway Lighting*.

Type I, II, III, and V photoelectric controls must have a test switch to allow manual operation of the lighting circuit. Switch must be:

1. Single-hole mounting, toggle type
2. Single pole and single throw
3. Labeled *Auto-Test* on a nameplate

Photoelectric control's contactor must be:

1. Normally open
2. Mechanical-armature type with contacts of fine silver, silver alloy, or equal or better material
3. Installed to provide a minimum space of 2-1/2 inches between the contactor terminals and the enclosure's sides

The terminal blocks must be rated at 25 A, 600 V(ac), molded from phenolic or nylon material, and be the barrier type with plated-brass screw terminals and integral marking strips.

#### **86-1.02N Fused Splice Connectors**

The fused splice connector for 240 and 480 V(ac) circuits must simultaneously disconnect both ungrounded conductors. The connector must not have exposed metal parts except for the head of the stainless steel assembly screw. The head of the assembly screw must be recessed a minimum of 1/32 inch below the top of the plastic boss that surrounds the head.

The connector must protect the fuse from water or weather damage. Contact between the fuse and fuse holder must be spring loaded.

Fuses must:

1. Be standard, midget, ferrule type
2. Have a nontime-delay feature
3. Be 3/32 by 1-1/2 inches

#### **86-1.02O Grounding Electrodes**

Grounding electrode must be:

1. 1 piece
2. Minimum 10-foot length of one of the following:
  - 2.1. Galvanized steel rod or pipe not less than 3/4 inch in diameter
  - 2.2. Copper clad steel rod not less than 5/8 inch in diameter

#### **86-1.02P Enclosures**

##### **86-1.02P(1) General**

The enclosures must be rated NEMA 3R and include a dead front panel and a hasp with a 7/16-inch-diameter hole for a padlock.

The enclosure's machine screws and bolts must not protrude outside the cabinet wall.

The fasteners on the exterior of an enclosure must be vandal resistant and not be removable. The exterior screws, nuts, bolts, and washers must be stainless steel.

##### **86-1.02P(2) Service Equipment Enclosures**

A service equipment enclosure must be factory wired and manufactured from steel and galvanized or have factory-applied, rust-resistant prime and finish coats, except Types II and III.

Type II and III service equipment enclosures must:

1. Be made of 0.125-inch minimum thickness 5052-H32 aluminum sheet complying with ASTM B209.
2. Be manufactured using gas metal arc welding with bare aluminum welding electrodes. The electrodes must comply with AWS A5.10 Class ER5356.

3. Be manufactured using welding procedures, welders, and welding operators that comply with the requirements for welding procedures, welders, and welding operators in AWS B2.1, "Specification for Welding Procedure and Performance Qualification."
4. Have full-seal weld exterior seams.
5. Exterior welds must be ground smooth and edges filed to a radius of at least 0.03 inch.
6. Have a surface finish that complies with MIL-A-8625 for a Type II, Class I coating, except the anodic coating must have a minimum thickness of 0.0007 inch and a minimum coating weight of 0.001 oz/sq in.

If a Type III enclosure houses a transformer of more than 1 kVA, the enclosure must have effective screened ventilation louvers of no less than 50 sq. in for each louver. The framed screen must be stainless no. 304 with a no. 10 size mesh and secured with at least 4 bolts.

The dead front panel on a Type III service equipment enclosure must have a continuous stainless steel or aluminum piano hinge. The panel must be secured with a latch or captive screws. No live part must be mounted on the panel.

The enclosure must be watertight and marked as specified in NEC to warn of potential electric-arc flash hazards.

Internal conductors for the photoelectric control unit must be 600 V(ac), 14 AWG (THHN) stranded machine tool wire. Where subject to flexing, 19 stranded wire must be used.

The meter area must be have a sealable, lockable, weather-tight cover that can be removed without the use of tools.

For Type III-A, III-B, and III-C enclosures, the meter socket must be a 5-clip type, and the landing lug must be suitable for multiple conductors.

For a Type III-D enclosure, the meter socket must be a 7-clip type, and the landing lug must be suitable for multiple conductors. The pedestal must comply with the Electric Utility Service Equipment Requirements Committee drawing no. 308 or 309.

Landing lugs must be (1) sized for the incoming service utility conductors, (2) compatible with either copper or aluminum conductors, and (3) made of copper or tin-plated aluminum. Live parts of the electrical equipment must be guarded against accidental contact.

The main and neutral busses of the enclosure must be made of tin-plated copper, be rated for 125 A, and be suitable for copper or aluminum conductors.

Each service equipment enclosure must have up to 2 main circuit breakers that will simultaneously disconnect ungrounded service-entrance conductors.

Circuit breaker for a service equipment enclosure must:

1. Be quick-break on either automatic or manual operation
2. Be trip indicating
3. Be internal-trip type
4. Be UL listed or NRTL certified and comply with UL 489 or equal
5. Be clearly marked with the frame size
6. Have an operating mechanism that is enclosed and trip-free from the operating handle on overload
7. Have the trip rating clearly marked on the operating handle
8. Have an interior made of copper

Circuit breakers used as disconnects must have a minimum interrupting capacity of 10,000 A, rms.

The interior of the enclosure must accept plug-in circuit breakers. A minimum of 6 standard single-pole circuit breakers, 3/4" nominal, must be provided for branch circuits.

Identify each circuit breaker and component by description using an engraved phenolic nameplate attached with stainless steel rivets or screws.

Nameplate must be installed:

1. Adjacent to the breaker on the dead front panel. The characters must be a minimum of 1/8 inch high.
2. Adjacent to the component on the back panel. The characters must be a minimum of 1/8 inch high.
3. At the top exterior of the door panel. The nameplate must include the system number, voltage, and number of phases engraved in minimum 3/16-inch-high characters.

A plastic-laminated wiring diagram must be attached inside the enclosure with brass eyelets by a UL-listed or NRTL-certified method.

#### **86-1.02P(3) Lighting and Sign Illumination Enclosures**

A lighting and sign illumination enclosure must be manufactured from steel and either galvanized, cadmium plated, or powder coated.

#### **86-1.02Q Cabinets**

##### **86-1.02Q(1) General**

Cabinets must be factory wired except for battery backup system cabinets.

The fasteners on the exterior of a cabinet, except for battery backup system cabinets, must be removable and vandal resistant. The exterior screws, nuts, bolts, and washers must be stainless steel.

Terminal blocks, circuit breakers, and a power supply must be UL approved.

##### **86-1.02Q(2) Department-Furnished Controller Cabinets**

A Department-furnished controller assembly consists of a Model 170E or 2070E controller unit, a wired controller cabinet, and all auxiliary equipment required to operate the system. The Department does not furnish anchor bolts.

##### **86-1.02Q(3) Controller Cabinets**

The controller cabinet must be a Model 334L, comply with TEES, and be on the Authorized Material List for traffic signal control equipment. The cabinet must have 3 drawer shelves. Each shelf must be attached to the tops of 2 supporting angles with 4 screws.

##### **86-1.02Q(4) Telephone Demarcation Cabinets**

###### **86-1.02Q(4)(a) General**

The doors of a telephone demarcation cabinet must be attached using continuous stainless steel piano hinges.

###### **86-1.02Q(4)(b) Type A Telephone Demarcation Cabinets**

Reserved

###### **86-1.02Q(4)(c) Type B Telephone Demarcation Cabinets**

A Type B telephone demarcation cabinet consists of a mounting panel, outlets, circuit breaker, fan, dead front plates, and fuse.

The mounting panel must be made of 3/4-inch-thick ACX-grade plywood.

The mounting panel must be fastened to the cabinet with nuts, lock washers, and flat washers to 10 welded studs.

The cabinet must be made of 0.125-inch-thick anodized aluminum.

The cabinet door must be hung and secured with drawn latches, lockable with a padlock. The padlock latches must each have a minimum 7/16-inch-diameter hole.

Ventilation louvers must be located on the door.

The fan must be located in a ventilator housing and be controlled thermostatically. The thermostat control must have a range from 80 to 130 degrees F.

The thermostat and fan circuit must be protected with a fuse rated for 175 percent of the motor capacity. The fan capacity must be a minimum 25 cfm.

## **86-1.02Q(4)(d) Type C Telephone Demarcation Cabinets**

Reserved

## **86-1.02Q(5) Battery Backup System Cabinets**

The cabinet for a battery backup system must comply with TEES and be on the Authorized Material List for traffic signal control equipment.

## **86-1.02R Signal Heads**

### **86-1.02R(1) General**

A signal head consists of a signal mounting assembly, backplate, and signal face.

The head must have a terminal block attached to the back of one housing. The terminal block must have enough positions to accommodate all indications. Each position must be permanently labeled for the indications used.

The metal signal heads must not fracture or deflect more than half the lens diameter when tested under California Test 666.

The plastic signal heads must not fracture or deflect when tested under California Test 605.

The deflection must not be more than 10 degrees in either the vertical or horizontal plane after the wind load has been removed from the front of the signal face or more than 6 degrees in either the vertical or horizontal plane after the wind load has been removed from the back of the signal face.

### **86-1.02R(2) Signal Mounting Assemblies**

Signal mounting assembly must include:

1. 1-1/2-inch-diameter steel pipe or galvanized conduit
2. Pipe fitting made of ductile iron, galvanized steel, bronze, or aluminum alloy, Type AC-84B, no. 380
3. Mast arm and post-top slip fitters and terminal compartments made of cast bronze or hot-dip galvanized ductile iron

The horizontal distance between the vertical centerlines of the terminal compartment or slip fitter and of each signal face must not exceed 11 inches except where required for proper signal face alignment or to allow programming of programmed visibility signal sections.

The mounting assembly must be watertight and free of sharp edges or protrusions that might damage conductor insulation. The assembly must have positive-locking serrated fittings that prevent signal faces from rotating when the fittings are mated with similar fittings on the faces.

Each terminal compartment must be fitted with a terminal block having a minimum of 12 positions, each with 2 screw-type terminals. Each terminal must accommodate at least five no. 14 conductors. The terminal compartment must have a cover for easy access to the terminal block.

### **86-1.02R(3) Backplates**

The backplate material must be a homogeneous black color with a lusterless finish.

A metal backplate must be made of a minimum 1/16-inch-thick 3001-14 aluminum.

A plastic backplate must have a minimum thickness of 1/16 inch and be formed from sheet plastic or assembled from extruded, molded, or cast plastic sections. Sections must be factory joined using one of the following:

1. Appropriate solvent cement.
2. Aluminum rivets and washers painted or permanently colored to match the backplate.
3. No. 10 machine screws with flat washers, lock washers, and nuts painted to match the backplate.

Each plastic backplate must be secured to the plastic signal face such that it resists removal or permanent deformation.

### **86-1.02R(4) Signal Faces**

Signal face consists of signal sections with signal housings, LED modules, and visors.



Signal face must:

1. Be adjustable and allow for 360-degree rotation about the vertical axis
2. Comply with ITE publications ST-052-E, *Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement* and ST-054, *Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement*
3. Be sealed with a neoprene gasket at the top opening

A metal signal face must have a metal backplate and visor.

A plastic signal face must have a plastic backplate and visor.

If a signal face is supported by a Type MAS slip fitter, spacers are required between the 2 sections. The spacers must be made of the same material as the housing. The vertical dimension of the spacers must allow proper seating of the serrations between the slip fitter and the 2 sections. The 2 sections must be joined with at least two no. 10 minimum machine screws through holes near the front of the housing and the spacers and matching holes in a reinforcing plate installed in the housing.

### **86-1.02R(4)(a) Signal Sections**

#### **86-1.02R(4)(a)(i) General**

Signal section must have:

1. Opening at the top and bottom for a 1-1/2-inch pipe
2. Maximum height of 10-1/4 inches for an 8-inch section and 14-3/4 inches for a 12-inch section
3. Hinge pins, door-latching devices, and other exposed hardware manufactured of Type 304/304L or 305 stainless steel
4. Interior screws and fittings manufactured of stainless steel or steel with a corrosion-resistant plating or coating
5. Gaskets made of a material that is not degraded if installed in a section with metal or plastic housing

Sections must be capable of being joined together to form a signal face in any combination. This interchangeability is not required between metal and plastic sections.

Each section must be joined to an adjacent section by one of the following:

1. Minimum of 3 machine screws for 8-inch sections and 4 machine screws for 12-inch sections, installed through holes near the front and back of the housing. Each screw must be a no. 10 and have a nut, flat washer, and lock washer.
2. 2 machine screws, each with a nut, flat washer, and lock washer, installed through holes near the front of the housing and a fastener through the 1-1/2-inch pipe opening. The fastener must have 2 large, flat washers to distribute the load around the pipe's opening and 3 carriage bolts, each with a nut and lock washer. The minimum screw size must be no. 10, and the carriage bolt size must be 1/4 inch.

The holes for the machine screws must be either cast or drilled during signal section fabrication. Each hole must be surrounded by a minimum 1/8-inch-wide boss to allow contact between signal sections about the axis of the hole.

A serrated nylon washer must be inserted between each plastic signal section and the metal mounting assembly. Each serrated nylon washer must be from 3/16 to 1/4 inch thick. The serrations must match those on the signal section and the mounting assembly.

#### **86-1.02R(4)(a)(ii) Programmed Visibility Signal Sections**

Programmed visibility signal section must have:

1. Nominal 12-inch-diameter circular or arrow indication
2. Cap visor
3. Adjustable connection that:
  - 3.1. Provides incremental tilting from 0 to 10 degrees above or below the horizontal
  - 3.2. Maintains a common vertical axis through couplers and mountings

The terminal connection must allow external adjustment about the mounting axis in 5-degree increments.

The visibility of each signal section must be capable of adjustment or programming within the section.

The adjustment for the section must be preset at 4 degrees below the horizontal.

**86-1.02R(4)(a)(iii) Signal Housings**

The signal housing must:

1. Be die-cast aluminum, permanent mold-cast aluminum, or if specified, structural plastic
2. Comply with ITE publications ST-052-E, *Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement* and ST-054, *Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement* if made of die-cast or permanent mold-cast aluminum
3. Have a 1-piece, hinged, square-shaped door that is:
  - 3.1. Designed to allow access for replacement of modules without the use of tools
  - 3.2. Secured such that it remains closed during loading tests
4. Have a watertight module or lens mounted in the door
5. Have a terminal block attached to the back, with the terminals permanently labeled for conductors to facilitate field wiring

Each housing must have reinforcement plates. Reinforcement plates must be either sheet aluminum, galvanized steel, or cast aluminum. Each plate must have a minimum thickness of 0.11 inch and a hole concentric with a 1-1/2-inch pipe-mounting hole in the housing. Reinforcement plates must be placed as specified in the following table:

**Reinforcement Plate Placement**

Material	Placement
Sheet aluminum	Inside and outside of housing
Galvanized steel	Inside of housing
Cast aluminum	Outside of housing

Reinforcement plates placed outside of the housing must be finished to match the signal housing color and be designed to allow a proper serrated coupling between the signal face and the mounting hardware. A minimum of three no. 10 machine screws must be installed through holes in each plate and matching holes in the housing. Each screw must have a round or binder head, a nut, and a lock washer.

A metal housing must have a metal visor.

Plastic housing must:

1. Be molded in a single piece or fabricated from 2 or more pieces joined into a single piece
2. Be a black color throughout, including the door, matching color no. 17038, 27038, or 37038 of FED-STD-595
3. Have UV stability
4. Be self-extinguishing

If reinforcing webs are used to connect the back of the housing to the top, bottom, and sides of the adjacent housing, reinforcement plates are not required.

The exterior of the housing must be painted as specified in sections 78-4.08 and 59.

**86-1.02R(4)(b) LED Signal Modules**

An LED signal module must be on the Authorized Material List for LED traffic signal modules.

An LED signal module must comply with ITE publications ST-052-E, *Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement* and ST-054, *Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement*, except:

1. Maximum module weight must be 4 lb
2. Module must be a sealed unit with:

- 2.1. 2 color-coded conductors for the power connection except lane control modules must use 3 color-coded conductors
- 2.2. Printed circuit board that complies with TEES, chapter 1, section 6
- 2.3. Lens that is:
  - 2.3.1. Convex or flat with a smooth outer surface
  - 2.3.2. Made of UV-stabilized plastic or glass
- 2.4. 1-piece EPDM gasket
3. Module must include 3-foot-long conductors with attached quick-disconnect terminals
4. Identification must include:
  - 4.1. Month and year of manufacture
  - 4.2. 1-inch-diameter symbol of the module type with the module color written adjacent to the symbol in 0.50-inch-high letters
5. LED must be the ultra-bright type rated for 100,000 hours of continuous operation
6. Module must have an integral power supply

Individual LEDs must be wired such that a loss or failure of 1 LED will not result in a loss of more than 5 percent of the module's light output. Failure of an individual LED in a string must not result in a loss of an entire string or other indication.

The symbol for a 12-inch U-turn section must be a 15/16-inch-wide inverted *U* with an arrow on the left end.

A lane control section must be a combination module with a red *X* and green arrow. The conductor function and color code must be as shown in the following table:

**Conductor Function and Color Code**

Function	Color
Neutral	White
Red <i>X</i>	Red
Green arrow	Brown

The minimum power consumption for an LED signal module must be 5 W.

The maximum power consumption for an LED signal module must be as shown in the following table:

**Maximum Power Consumption**

LED signal module type	Power consumption (W)					
	Red		Yellow		Green	
	25 °C	74 °C	25 °C	74 °C	25 °C	74 °C
8-inch circular	8	13	13	16	12	12
12-inch circular	11	17	22	25	15	15
12-inch arrow	9	12	10	12	11	11
12-inch U-turn	9	12	10	12	11	11
Bicycle	11	17	22	25	15	15
Programmed visibility	11	17	22	25	15	15
Lane control ( <i>X</i> )	9	12	--	--	--	--
Lane control ( <i>Arrow</i> )	--	--	--	--	11	11

Red and green LED signal modules operating over a temperature range from -40 to 74 degrees C and yellow LED signal modules operating at 25 degrees C must maintain the minimum illumination values for 48 months as shown in the following tables:

**Minimum Maintained Intensities for Circular Indications**

Angle (v,h)	Intensities (cd)					
	8-inch			12-inch		
	Red	Yellow	Green	Red	Yellow	Green
2.5, ±2.5	133	267	267	339	678	678
2.5, ±7.5	97	194	194	251	501	501
2.5, ±12.5	57	113	113	141	283	283
2.5, ±17.5	25	48	48	77	154	154
7.5, ±2.5	101	202	202	226	452	452
7.5, ±7.5	89	178	178	202	404	404
7.5, ±12.5	65	129	129	145	291	291
7.5, ±17.5	41	81	81	89	178	178
7.5, ±22.5	18	37	37	38	77	77
7.5, ±27.5	10	20	20	16	32	32
12.5, ±2.5	37	73	73	50	101	101
12.5, ±7.5	32	65	65	48	97	97
12.5, ±12.5	28	57	57	44	89	89
12.5, ±17.5	20	41	41	34	69	69
12.5, ±22.5	12	25	25	22	44	44
12.5, ±27.5	9	16	16	16	32	32
17.5, ±2.5	16	32	32	22	44	44
17.5, ±7.5	14	28	28	22	44	44
17.5, ±12.5	10	20	20	22	44	44
17.5, ±17.5	9	16	16	22	44	44
17.5, ±22.5	6	12	12	20	41	41
17.5, ±27.5	4	9	9	16	32	32

**Minimum Maintained Luminance for Indications**

Indication type	Luminance (fL)		
	Red	Yellow	Green
Arrow	1,610	3,210	3,210
U-turn	1,610	3,210	3,210
Bicycle	1,610	1,610	1,610
Lane control (X)	1,610	--	--
Lane control (Arrow)	--	--	1,610

**Minimum Maintained Luminance for Programmed Visibility Indications**

Indication type	Luminance (cd)		
	Red	Yellow	Green
PV at angle v=2.5, h=±2.5	314	314	314

Conductors must be prewired to the terminal block.

**86-1.02R(4)(c) Visors and Directional Louvers**

The visor must be a tunnel type.

The visor must have a downward tilt from 3 to 7 degrees with a minimum length of 9-1/2 inches for nominal 12-inch round lenses and 7 inches for nominal 8-inch round lenses.

A metal visor must be formed from minimum 0.050-inch-thick aluminum alloy sheet.

A plastic visor must be either formed from sheet plastic or blow-molded. The plastic must be a black homogeneous color with a lusterless finish. A visor must withstand a wind load applied to its side for 24

hours without permanent deformation or removal from its door when tested under California Test 605 for plastic visors and California Test 666 for metal visors.

If directional louvers are used, the louvers must fit into full-circular signal visors. Louvers must consist of one of the following:

1. Outside cylinder constructed of sheet steel with a minimum nominal thickness of 0.030 inch and vanes constructed of sheet steel with a minimum nominal thickness of 0.016 inch.
2. Outside cylinder and vanes constructed of 5052-H32 aluminum alloy of equal thickness.

### **86-1.02S Pedestrian Signal Heads**

#### **86-1.02S(1) General**

A pedestrian signal head consists of a pedestrian signal mounting assembly and a pedestrian signal face comprising of a pedestrian signal housing, an LED countdown pedestrian signal face module, and a front screen.

#### **86-1.02S(2) Pedestrian Signal Mounting Assemblies**

A pedestrian signal mounting assembly must comply with the specifications for a signal mounting assembly in section 86-1.02R, except mast arm slip fitters are not required.

#### **86-1.02S(3) Pedestrian Signal Faces**

##### **86-1.02S(3)(a) General**

Each pedestrian signal face must include a light-duty terminal block rated at 5 A and have 12 positions with no. 6-by-1/8-inch binder head screws. Each position must have 1 screw-type terminal.

The wiring and terminal block must comply with ITE publication ST-055-E, *Pedestrian Traffic Control Signal Indicators: Light Emitting Diode (LED) Signal Modules*.

##### **86-1.02S(3)(b) Pedestrian Signal Housings**

Pedestrian signal housing must comply with the specifications for a signal housing in 86-1.02R(4)(a)(iii), except the maximum overall dimensions must be 18-1/2 inches wide, 19 inches high, and 11-1/2 inches deep and without:

1. Visor
2. Watertight module or lens mounted in the door
3. Reinforcement plates

The housing must have a terminal block attached to the back. The terminal block must have enough positions to accommodate all indications. Each position must be permanently labeled for the indications used.

##### **86-1.02S(3)(c) LED Countdown Pedestrian Signal Face Modules**

An LED countdown PSF module must comply with ITE publication ST-055-E, *Pedestrian Traffic Control Signal Indicators: Light Emitting Diode (LED) Signal Modules*, except the material must comply with ASTM D3935 and the module must have:

1. Ultra-bright-type LED rated for 100,000 hours of continuous operation.
2. Lot number and month and year of manufacture permanently marked on the back of the module
3. Prominent and permanent vertical markings for accurate indexing and orientation within the pedestrian signal housing if a specific mounting orientation is required. Markings must be a minimum of 1 inch in height and include an up arrow and the word *up* or *top*.
4. Circuit board complying with TEES, chapter 1, section 6.

Individual LEDs must be wired such that a loss or failure of 1 LED will not result in a loss of more than 5 percent of the module's light output. Failure of an individual LED in a string must not result in a loss of an entire string or other indication.

Each symbol must be at least 9 inches high and 5-1/4 inches wide. The 2-digit countdown timer, *Upraised Hand*, and *Walking Person* indications must be electronically isolated from each other. The 3 indications must not share a power supply or interconnect circuitry.

The module must operate over the specified ambient temperature and voltage range and be readable both day and night at distances up to the full width of the area to be crossed. Upon initial testing at 25 degrees C, the module must have at least the luminance values shown in the following table:

PSF module symbol	Luminance
Upraised hand and 2-digit countdown timer (fL)	1,094
Walking person (fL)	1,547

The module must not exceed the power consumption requirements shown in the following table:

PSF module display	At 24 °C	At 74 °C
<i>Upraised Hand</i>	10.0 W	12.0 W
<i>Walking Person</i>	9.0 W	12.0 W
2-digit countdown timer	6.0 W	8.0 W

**86-1.02S(3)(d) Front Screen**

Pedestrian signal face must have a front screen that is one of the following types:

1. 3/8-inch-thick aluminum honeycomb screen with 0.2-inch-wide cells or a 1/2-inch-thick plastic screen with 3/8-inch-wide squares with 1/16-inch wall thickness that:
  - 1.1. Is installed so it tilts downward at an angle of  $15 \pm 2$  degrees from the top and completely covers the message plate.
  - 1.2. Includes a clear front cover made of either a minimum 1/8-inch-thick acrylic plastic sheet or a minimum 1/16-inch-thick polycarbonate plastic.
  - 1.3. Is held firmly in place, including the cover, with stainless steel or aluminum clips or stainless steel metal screws.
2. Polycarbonate screen that:
  - 2.1. Has a nominal thickness of 1/32 inch.
  - 2.2. Is a 1-1/2-inch-deep eggcrate or Z-crate type.
  - 2.3. Is mounted in a frame constructed of aluminum alloy or polycarbonate with a minimum thickness of 0.040 inch.
  - 2.4. Is held in place with stainless steel screws.

The screen and frame of a pedestrian signal face must be made of either (1) plastic that is a flat black color or (2) anodized aluminum that is a flat black color or finished with lusterless, black, exterior-grade latex paint formulated for application to metal surfaces.

**86-1.02T Accessible Pedestrian Signals**

Accessible pedestrian signal must comply with the *California MUTCD*, chapter 4E, and have:

1. Audible speech message that plays when the push button is actuated. The message must include the name of the street to be crossed. The accessible pedestrian signal must have at least 5 audible message options.
2. Push button locator tone that clicks or beeps.
3. Feature that activates the pedestrian phase during a failure of the audible message, locator tone, or vibrotactile device.

An accessible pedestrian signal must function with the Department-furnished Model 170E/2070E controller assembly.

No part of the accessible pedestrian signal must be installed inside the controller cabinet. Power for the accessible pedestrian signal must be from the pedestrian signal housing terminal block.

The housing for the signal assembly must be made of corrosion-resistant material. Theft-proof bolts used for mounting the housing to the standard must be stainless steel with a content of 17 percent chromium and 8 percent nickel. The housing must be shaped to fit the pole's curvature.

The color of a metallic housing must match color no. 33538 of FED-STD-595.

The color of a plastic housing must match color no. 17038, 27038, or 37038 of FED-STD-595.

Accessible pedestrian signal must:

1. Have electronic switches, a potentiometer, or an access port for a device for controlling and programming the volume level and messaging
2. Be weatherproof and shockproof

Enclosure for the accessible pedestrian signal must:

1. Weigh less than 7 lb
2. Measure less than 16 by 6 by 5 inches
3. Have a wiring hole with a diameter not exceeding 1-1/8 inches
5. Have a switch for a push button
6. Have a vibrotactile device on the push button or on the arrow
7. Have an internal weatherproof speaker and microphone that senses the ambient sound level

The separation between adjacent holes used for conductors and mounting must be at least twice the diameter of the larger hole.

The speaker grills must be located on the surface of the enclosure. The speakers must not interfere with the housing or its mounting hardware.

The conductor cable between the accessible pedestrian signal assembly and the pedestrian signal head must be a 9 no. 20 conductor cable complying with MIL-W-16878D.

#### **86-1.02U Push Button Assemblies**

The housing for a push button assembly must be made of die-cast aluminum, permanent mold-cast aluminum, or UV-stabilized self-extinguishing structural plastic. The plastic housing must have a color throughout that matches color no. 17038, 27038, or 37038 of FED-STD-595.

If the push button is to be attached to a pole, the housing must be shaped to fit the pole's curvature.

The assembly must be waterproof and shockproof.

The push button's switch must be a single-pole, double-throw switching unit with screw-type terminals rated 15 A at 125 V(ac).

Switch for the push button must have:

1. Plunger actuator and a U frame to allow recessed mounting in the push button housing
2. Operating force of 3.5 lb
3. Maximum pretravel of 5/64 inch
4. Minimum overtravel of 1/32 inch
5. Differential travel from 0.002 to 0.04 inch
6. Minimum 2-inch diameter actuator

#### **86-1.02V Reserved**

#### **86-1.02W Loop Detector Sealants**

##### **86-1.02W(1) General**

Sealant for filling loop detector slots must be one of the following:

1. Asphaltic emulsion
2. Elastomeric sealant
3. Epoxy sealant for inductive loops
4. Hot-melt rubberized asphalt

##### **86-1.02W(2) Asphaltic Emulsion Sealant**

Asphaltic emulsion sealant must comply with the State Specification 8040-41A-15.

### 86-1.02W(3) Elastomeric Sealant

Elastomeric sealant must be a polyurethane material that cures only in the presence of moisture if used within the stated shelf life. The sealant must be suitable for use in both asphalt concrete and concrete pavement.

The cured elastomeric sealant must comply with the requirements shown in the following table:

**Cured Elastomeric Sealant Requirements**

Quality characteristic	Test method	Requirement
Hardness	ASTM D2240 <sup>a</sup>	65–85
Tensile strength (min, MPa)	ASTM D412 <sup>b</sup>	3.45
Elongation (min, %)		400
Flex at -40 °C <sup>c</sup>	--	No cracks
Weathering resistance	ASTM D822 <sup>d</sup>	Slight chalking
Salt spray resistance:	ASTM B117 <sup>e</sup>	
Tensile strength (min, MPa)		3.45
Elongation (min, %)		400
Dielectric constant (%)	ASTM D150 <sup>f</sup>	<25

<sup>a</sup>Indentation at 25 °C and 50% relative humidity (Rex. Type A, Model 1700 only)

<sup>b</sup>Die C pulled at 508 mm/minute

<sup>c</sup>0.6-mm free film bend (180°) over 13-mm mandrel

<sup>d</sup>Weatherometer 350 h, cured 7 days at 25 °C and 50% relative humidity

<sup>e</sup>28 days at 38 °C with 5% NaCl, Die C, and pulled at 508 mm/minute)

<sup>f</sup>Change over a temperature range from -30 to 50 °C

### 86-1.02W(4) Hot-Melt Rubberized Asphalt Sealant

Hot-melt rubberized asphalt sealant must:

1. Be in solid form at room temperature and fluid at an application temperature range from 190 to 205 degrees C
2. Not produce toxic fumes
3. Be suitable for use in both asphalt concrete and concrete pavement
4. Be packaged in containers clearly marked *Detector Loop Sealant* with the manufacturer's batch and lot number.

The cured hot-melt rubberized asphalt sealant must comply with the requirements shown in the following table:

**Cured Hot-Melt Rubberized Asphalt Sealant Requirements**

Quality characteristic	Test method	Requirement
Cone penetration (max, 1/10 mm)	ASTM D5329, sec. 6 <sup>a</sup>	35
Flow (max, mm)	ASTM D5329, sec. 8 <sup>b</sup>	5
Resilience (min, %)	ASTM D5329, sec. 12 <sup>c</sup>	25
Softening point (min, °C)	ASTM D36	82
Ductility (min, cm)	ASTM D113 <sup>d</sup>	30
Flash point, Cleveland Open Cup (min, °C)	ASTM D92	288
Viscosity (Pa·s)	ASTM D4402 <sup>e</sup>	2.5–3.5

<sup>a</sup>At 25 °C, 150 g, 5 s

<sup>b</sup>At 60 °C

<sup>c</sup>At 25 °C

<sup>d</sup>At 25 °C, 5 cm/minute

<sup>e</sup>Brookfield Thermosel, no. 27 spindle, 20 rpm, 190 °C

### 86-1.02X Reserved

### 86-1.02Y Transformers

A transformer must be single-phase and may be a nonsubmersible or submersible type.



A transformer must be a dry type designed for operation on a 60 Hz supply. The transformer must have a decal showing a connection diagram. The diagram must show either color coding or wire tagging with primary (H1, H2) or secondary (X1, X2) markers and the primary and secondary voltage and volt-ampere rating. A transformer must comply with the electrical requirements shown in the following table:

**Transformer Electrical Requirements**

Quality characteristic	Requirement
Rating (V(ac))	120/480, 120/240, 240/480, or 480/120
Efficiency (%)	> 95
Secondary voltage regulation and tolerance from half load to full load (%)	±3

Secondary 240 and 480 V(ac) windings must be center tapped.

The transformer must withstand the application of 2,200 V(ac) from core to coils and from coil to coil for a 1-minute period when tested immediately after operation of the transformer at full load for 24 hours.

The external leads for the secondary connections must be no. 10 Type USE rated for 600 V(ac).

The transformer's leads must extend a minimum of 12 inches from the case.

The transformer's insulation must be NEMA 185 C or better.

Each transformer must:

1. Include metal half-shell coil protection.
2. Have moisture-resistant, synthetic-varnish-impregnated windings.
3. Be waterproof and suitable for outdoor operation.

Each submersible transformer must:

1. Include a handle and a hanger.
2. Be securely encased in a rugged, corrosion-resistant, watertight case.
3. Have leads that extend out through 1 or more sealed hubs.
4. Be manufactured to withstand a 5-day test with 12-hour on and off periods submerged in 2 feet of salt water that is 2 percent salt by weight. The operating periods must be at full load.

**86-1.02Z Batteries**

Battery must:

1. Be deep-cycle, sealed, prismatic, lead-calcium-based, absorbed-glass-mat, valve-regulated, lead-acid type
2. Be rated for 12 V
3. Be rated for a temperature range from -25 to 60 degrees C
4. Be group size 24
5. Be commercially available and stocked locally
6. Be marked with a date code, maximum recharge data, and recharge cycles
7. Be new and fully charged when furnished
8. Be free from damage or deformities
9. Have a carrying handle
10. Have 2 top-mounted, threaded-stud posts that include all washers and nuts
11. Include insulating rubber covers for protecting the lugs, posts, and wiring: red for the positive terminal and black for the negative terminal

If a battery is used for a battery backup system, it must accommodate 3/8-inch ring lugs of a Department-furnished battery harness.

**86-1.03 CONSTRUCTION**

Not Used

**86-1.04 PAYMENT**

Not Used

Replace section 87 with:

04-15-16

**87 ELECTRICAL SYSTEMS**

04-15-16

**87-1 GENERAL**

**87-1.01 GENERAL**

**87-1.01A Summary**

Section 87 includes general specifications for constructing and installing electrical systems.

The Department deducts the cost for maintenance performed by the Department on new or portions of existing systems modified under the Contract.

**87-1.01B Definitions**

Reserved

**87-1.01C Submittals**

Reserved

**87-1.01D Quality Assurance**

**87-1.01D(1) General**

Reserved

**87-1.01D(2) Quality Control**

Before shipping the material to the job site, submit to METS test samples of:

1. Accessible pedestrian signals
2. LED countdown pedestrian signal face modules
3. LED signal modules
4. LED luminaires

Submit a sample size as shown in the following table:

**Electrical Material Sampling**

Contract quantity	Test sample size
1–8	1
9–15	2
16–25	3
26–90	5
91–150	8
151–280	13
281–500	20
501–1200	32

Before starting operation of an electrical system, perform a conductor test in the presence of the Engineer.

Conductor test consists of testing each conductor and the conductors in cables for:

1. Continuity.
2. Grounds.
3. Insulation resistance at 500 V(dc) between the circuit and ground. The insulation resistance must be a minimum of 10 MΩ on circuits, except it must be a minimum of 100 MΩ for inductive loop detector circuits.

Start the operational test of the system on any day except Friday or the day before a holiday. The operational test for signals must start from 9:00 a.m. to 2:00 p.m. Notify the Engineer 48 hours before starting the test.

An operational test consists of a minimum of 5 business days of continuous, satisfactory operation of the system. If the system fails, correct the problem and retest the system. A shutdown of the system caused by traffic, a power interruption, or unsatisfactory performance of Department-furnished materials does not constitute discontinuity of the test.

### **87-1.02 MATERIALS**

Not Used

### **87-1.03 CONSTRUCTION**

#### **87-1.03A General**

The Engineer determines the final locations of electrical systems.

Verify the locations of electrical systems and the depths of existing detectors, conduits, and pull boxes.

Notify the Engineer before performing work on the existing system.

You may shut down the system for alteration or removal.

Where an existing Department underground facility is shown within 10 feet of any excavation, locate and field mark the facility before performing work that could damage or interfere with the existing facility.

If an existing facility is within 2 feet of an excavation, determine the exact location of the facility by excavating with hand tools before using any power-operated or power-driven excavating or boring equipment. A vacuum excavator may be used if authorized.

Notify the Engineer immediately if an existing facility is damaged by your activities.

If existing underground conduit is to be incorporated into a new system, clean it with a mandrel or cylindrical wire brush and blow it clean with compressed air.

Limit the shutdown of traffic signal systems to normal working hours. Notify the local traffic enforcement agency before shutting down the signal.

Place temporary W3-1 and R1-1 signs in each direction to direct traffic through the intersection during shutdown of the signal. Place two R1-1 signs for 2-lane approaches. The signs must comply with part 2 of the *California MUTCD*.

Cover signal faces when the system is shut down overnight. Cover temporary W3-1 and R1-1 signs when the system is turned on.

If you work on an existing lighting system and the roadway is to remain open to traffic, ensure the system is in operation by nightfall.

Replace detectors you damage within 72 hours, or the Department replaces them and deducts the cost.

Work performed on an existing system not described is change order work.

Do not use electrical power from existing highway facilities unless authorized.

Maintain a minimum 48-inch clearance for a pedestrian pathway when placing equipment.

Except for service installation or work on service equipment enclosures, do not work above ground until all materials are on hand to complete the electrical work at each location.

Bond all metal components to form a continuous grounded system as specified in NEC.

Ground metallic equipment mounted less than 8 feet above the ground surface on a wood pole.

If you damage any portion of a concrete curb, sidewalk, curb ramp, driveway, or gutter depression, replace the entire section between contraction or expansion joints under section 73.

Apply equipment identification characters.

Orient louvers, visors, and signal faces such that they are clearly visible to approaching traffic from the direction being controlled.

Test loops and the detector lead-in cable circuit for continuity, ground, and insulation resistance at the controller cabinet before connecting detector lead-in cable to the terminal block.

Perform an operational test of the systems.

Before starting the operational test for systems that impact traffic, the system must be ready for operation, and all signs, pavement delineation, and pavement markings must be in place at that location.

### **87-1.03B Conduit Installation**

#### **87-1.03B(1) General**

The installation of conduit includes installing caps, bushings, and pull tape and terminating the conduit in pull boxes, foundations, poles, or a structure.

Limit the number of bends in a conduit run to no more than 360 degrees between pull points.

Use conduit to enclose conductors except where they are installed overhead or inside standards or posts.

You may use a larger size conduit than specified for the entire length between termination points. Do not use a reducing coupling.

Extend an existing conduit using the same material. Terminate conduits of different materials in a pull box.

Install 2 conduits between a controller cabinet and the adjacent pull box.

Use a minimum trade size of conduit of:

1. 1-1/2 inches from an electrolier to the adjacent pull box
2. 1 inch from a pedestrian push button post to the adjacent pull box
3. 2 inches from a signal standard to the adjacent pull box
4. 3 inches from a controller cabinet to the adjacent pull box
5. 2 inches from an overhead sign to the adjacent pull box
6. 2 inches from a service equipment enclosure to the adjacent pull box
7. 1-1/2 inches if unspecified

Use Type 1 conduit:

1. On all exposed surfaces
2. In concrete structures
3. Between a structure and the nearest pull box

Ream the ends of shop-cut and field-cut conduit to remove burrs and rough edges. Make the cuts square and true. Do not use slip joints and running threads to couple conduit. If a standard coupling cannot be used for metal-type conduit, use a threaded union coupling. Tighten the couplings for metal conduit to maintain a good electrical connection.

Cap the ends of conduit to prevent debris from entering before installing the conductors or cables. Use a plastic cap for Type 1, 2, and 5 conduits and a standard pipe cap for all other types of conduit.

For Type 1, 2, and 5 conduits, use threaded bushings and bond them using a jumper. For other types of conduit, use nonmetallic bushings.

Do not install new conduit through foundations.

Cut Type 2 conduit with pipe cutters; do not use hacksaws. Use standard conduit-threading dies for threading conduit. Tighten conduit into couplings or fittings using strap wrenches or approved groove joint pliers.

Cut Type 3 conduit with tools that do not deform the conduit. Use a solvent weld for connections.

Protect shop-cut threads from corrosion under the standards shown in the following table:

Conduit	Standard
Types 1 and 2	ANSI C80.1
Type 5	ANSI C80.6

Apply 2 coats of unthinned, organic zinc-rich primer to metal conduit before painting. Use a primer on the Authorized Material List for organic zinc-rich primers. Do not use aerosol cans. Do not remove shop-installed conduit couplings.

For conduits, paint:

1. All exposed threads
2. Field-cut threads, before installing conduit couplings to metal conduit
3. Damaged surfaces on metal conduit

If a Type 2 conduit or conduit coupling coating is damaged:

1. Clean the conduit or fitting and paint it with 1 coat of rubber-resin-based adhesive under the manufacturer's instructions
2. Wrap the damaged coating with at least 1 layer of 2-inch-wide, 20 mils-minimum-thickness, PVC tape under ASTM D1000 with a minimum tape overlap of 1/2 inch

You may repair damaged spots of 1/4 inch or less in diameter in the thermoplastic coating by painting with a brushing-type compound supplied by the conduit manufacturer.

If factory bends are not used, bend the conduit to a radius no less than 6 times its inside diameter without crimping or flattening it. Comply with the bending requirements shown in the following table:

Type	Requirement
1	Use equipment and methods under the conduit manufacturer's instructions.
2	Use a standard bending tool designed for use on thermoplastic-coated conduit. The conduit must be free of burrs and pits.
3	Use equipment and methods under the conduit manufacturer's instructions. Do not expose the conduit to a direct flame.
5	Use equipment and methods under the conduit manufacturer's instructions.

Install pull tape with at least 2 feet of slack in each end of the conduit that will remain empty. Attach the tape's ends to the conduit.

Install conduit terminating in a standard or pedestal from 2 to 3 inches above the foundation. Slope the conduit toward the handhole opening.

Terminate conduit installed through the bottom of a nonmetallic pull box 2 inches above the bottom and 2 inches from the wall closest to the direction of the run.

### **87-1.03B(2) Conduit Installation for Structures**

#### **87-1.03B(2)(a) General**

Paint exposed Type 1 conduit the same color as the structure.

Install galvanized steel hangers, steel brackets, and other fittings to support conduit in or on a wall or bridge.

### **87-1.03B(2)(b) New Structures**

Seal and make watertight the conduits which lead to soffits, wall-mounted luminaires, other lights, and fixtures located below the pull box grade.

If you place a conduit through the side of a nonmetallic pull box, terminate the conduit 2 inches from the wall and 2 inches above the bottom. Slope the conduit toward the top of the box to facilitate pulling conductors.

For ease of installation and if authorized, you may use Type 4 conduit instead of Type 1 conduit for the final 2 feet of conduit entering a pull box in a reinforced concrete structure.

Install an expansion fitting where a conduit crosses an expansion joint in a structure. Each expansion fitting for metal conduit must include a copper bonding jumper having the ampacity as specified in NEC.

Install an expansion-deflection fitting for an expansion joint with a 1-1/2-inch movement rating. The fitting must be watertight and include a molded neoprene sleeve, a bonding jumper, and 2 silicon bronze or zinc-plated iron hubs.

For an expansion joint with a movement rating greater than 1-1/2 inches, install the expansion-deflection fitting as shown.

For conduit installed inside of bridge structures, you must:

1. Install precast concrete cradles made of minor concrete and commercial-quality welded wire fabric. The minor concrete must contain a minimum of 590 lb of cementitious material per cubic yard. The cradles must be moist cured for a minimum of 3 days.
2. Bond precast concrete cradles to a wall or bridge superstructure with one of the following:
  - 2.1. Epoxy adhesive for bonding freshly-mixed concrete to hardened concrete.
  - 2.2. Rapid-set epoxy adhesive for pavement markers.
  - 2.3. Standard-set epoxy adhesive for pavement markers.
3. Use a pipe sleeve or form an opening for a conduit through a bridge superstructure. The sleeve or opening through a prestressed member or conventionally reinforced precast member must be:
  - 3.1. Oriented transverse to the member.
  - 3.2. Located through the web.
  - 3.3. No more than 4 inches in size.
4. Wrap the conduit with 2 layers of asphalt felt building paper and securely tape or wire the paper in place for a conduit passing through a bridge abutment wall. Fill the space around the conduit with mortar under section 51-1, except the proportion of cementitious material to sand must be 1 to 3. Fill the space around the conduits after prestressing is completed.

Thread and cap a conduit installed for future use in structures. Mark the location of the conduit's end in a structure, curb, or wall directly above the conduit with a Y that is 3 inches tall.

### **87-1.03B(2)(c) Existing Structures**

Run surface-mounted conduit straight and true, horizontal or vertical on the wall, and parallel to walls on ceilings or similar surfaces. Support the conduit at a maximum of 5-foot intervals where needed to prevent vibration or deflection. Support the conduit using galvanized, malleable-iron, conduit clamps, and clamp backs secured with expansion anchorage devices complying with section 75-3.02C. Use the largest diameter of galvanized, threaded studs that will pass through the mounting hole in the conduit clamp.

### **87-1.03B(3) Conduit Installation Underground**

#### **87-1.03B(3)(a) General**

Install conduit to a depth of:

1. 14 inches for the trench-in-pavement method
2. 18 inches, minimum, under sidewalk and curbed paved median areas
3. 42 inches, minimum, below the bottom of the rail of railroad tracks

4. 30 inches, minimum, everywhere else below grade

Place conduit couplings at a minimum of 6 inches from the face of a foundation.

Place a minimum of 2 inches of sand bedding in a trench before installing Type 2 or Type 3 conduit and 4 inches of sand bedding over the conduit before placing additional backfill material.

If installing conduit within the limits of hazardous locations as specified in NEC for Class I, division 1, install and seal Type 1 or Type 2 conduit with explosion-proof sealing fittings.

#### **87-1.03B(3)(b) Conduit Installation under Paved Surfaces**

You may lay conduit on existing pavement within a new curbed median constructed on top.

Install conduit under existing pavement by the jacking or drilling methods. You may use the trench-in-pavement method for either of the following conditions:

1. If conduit is to be installed behind the curb under the sidewalk
2. If the delay to vehicles will be less than 5 minutes

Do not use the trench-in-pavement method for conduit installations under freeway lanes or freeway-to-freeway connector ramps.

#### **87-1.03B(3)(c) Reserved**

#### **87-1.03B(3)(d) Conduit Installation under Railroad Tracks**

Install Type 1 or Type 2 conduit with a minimum diameter of 1-1/2 inches under railroad tracks. If you use the jacking or drilling method to install the conduit, construct the jacking pit a minimum of 13 feet from the tracks' centerline at the near side of the pit. Cover the jacking pit with planking if left overnight.

#### **87-1.03B(4) Reserved**

#### **87-1.03B(5) Conduit Installation by the Jacking or Drilling Method**

Keep the jacking or drilling pit 2 feet away from the pavement's edge. Do not weaken the pavement or soften the subgrade with excessive use of water.

If an obstruction is encountered, obtain authorization to cut small holes in the pavement to locate or remove the obstruction.

You may install Type 2 or Type 3 conduit under the pavement if a hole larger than the conduit's diameter is predrilled. The predrilled hole must be less than one and half the conduit's diameter.

Remove the conduit used for drilling or jacking and install new conduit for the completed work.

#### **87-1.03B(6) Conduit Installation by the Trenching-In-Pavement Method**

Install conduit by the trenching-in-pavement method using a trench approximately 2 inches wider than the conduit's outside diameter but not exceeding 6 inches in width.

Where additional pavement is to be placed, you must complete the trenching before the final pavement layer is applied.

If the conduit shown is to be installed under the sidewalk, you may install it in the street within 3 feet of and parallel to the face of the curb. Install pull boxes behind the curb.

Cut the trench using a rock-cutting excavator. Minimize the shatter outside the removal area of the trench.

Dig the trench by hand to the required depth at pull boxes.

Place conduit in the trench.

Backfill the trench with minor concrete to the pavement's surface by the end of each work day. If the trench is in asphalt concrete pavement and no additional pavement is to be placed, backfill the top 0.10 foot of the trench with minor HMA within 3 days after trenching.

### **87-1.03C Installation of Pull Boxes**

#### **87-1.03C(1) General**

Install pull boxes no more than 200 feet apart.

You may install larger pull boxes than specified or shown and additional pull boxes to facilitate the work except in structures.

Install a pull box on a bed of crushed rock and grout it before installing conductors. The grout must be from 0.5 to 1 inch thick and sloped toward the drain hole. Place a layer of roofing paper between the grout and the crushed rock sump. Make a 1-inch drain hole through the grout at the center of the pull box.

Set the pull box such that the top is 1-1/4 inches above the surrounding grade in unpaved areas and leveled with the finished grade in sidewalks and other paved areas.

Place the cover on the box when not working in it.

Grout around conduits that are installed through the sides of the pull box.

Bond and ground the metallic conduit before installing conductors and cables in the conduit.

Bond metallic conduits in a nonmetallic pull box using bonding bushings and bonding jumpers.

Do not install pull boxes in concrete pads, curb ramps, or driveways.

Reconstruct the sump of a pull box if disturbed by your activities. If the sump was grouted, remove and replace the grout.

#### **87-1.03C(2) Nontraffic Pull Boxes**

If you bury a nontraffic pull box, set the box such that the top is 6 to 8 inches below the surrounding grade. Place a 20-mil-thick plastic sheet made of HDPE or PVC virgin compounds to prevent water from entering the box.

Place mortar between a nontraffic pull box and a pull box extension.

Where a nontraffic pull box is in the vicinity of curb in an unpaved area, place the box adjacent to the back of the curb if practical.

Where a nontraffic pull box is adjacent to a post or standard, place the box within 5 feet upstream from traffic if practical.

If you replace the cover on a nontraffic pull box, anchor it to the box.

#### **87-1.03C(3) Traffic Pull Boxes**

Place minor concrete around and under a traffic pull box.

Bolt the steel cover to the box when not working in it.

Bond the steel cover to the conduit with a jumper and bolt it down after installing the conductors and cables.

#### **87-1.03C(4) Structure Pull Boxes**

Bond metallic conduit in a metal pull box in a structure using locknuts, inside and outside of the box, bonding bushings, and bonding jumpers connected to bonding wire running in the conduit system.

#### **87-1.03D Reserved**

### **87-1.03E Excavating and Backfilling for Electrical Systems**

#### **87-1.03E(1) General**

Notify the Engineer at least 72 hours before starting excavation activities.

Dispose of surplus excavated material.

Restrict closures for excavation on a street or highway to 1 lane at a time unless otherwise specified.



### **87-1.03E(2) Trenching**

Dig a trench for the electrical conduits or direct burial cables. Do not excavate until the conduit or direct burial cable will be installed.

Place excavated material in a location that will not interfere with traffic or surface drainage.

After placing the conduit or direct burial cable, backfill the trench with the excavated material. Compact the backfill placed outside the hinge point of slopes and not under pavement to a minimum relative compaction of 90 percent.

Compact the backfill placed within the hinge points and in areas where pavement is to be constructed to a minimum relative compaction of 95 percent.

Restore the sidewalks, pavement, and landscaping at a location before starting excavation at another location.

### **87-1.03E(3) Concrete Pads, Foundations, and Pedestals**

Construct foundations for standards, poles, metal pedestals, and posts under section 56-3.

Construct concrete pads, foundations, and pedestals for controller cabinets, telephone demarcation cabinets, and service equipment enclosures on firm ground.

Install anchor bolts using a template to provide proper spacing and alignment. Moisten the forms and ground before placing the concrete. Keep the forms in place until the concrete sets for at least 24 hours to prevent damage to the surface.

Use minor concrete for pads, foundations, and pedestals.

In unpaved areas, place the top of the foundation 6 inches above the surrounding grade, except place the top:

1. 1 foot 6 inches above the grade for Type M and 336L cabinets
2. 1 foot 8 inches above the grade for Type C telephone demarcation cabinets
3. 2 inches above the grade for Type G and Type A cabinets and Type III service equipment enclosures

The pad must be 2 inches above the surrounding grade.

In and adjacent to the sidewalk and other paved areas, place the top of the foundation 4 inches above the surrounding grade, except place the top:

1. 1 foot 6 inches above the grade for Type M and 336L cabinets
2. 1 foot 8 inches above the grade for Type C telephone demarcation cabinets
3. Level with the finished grade for Type G and Type A cabinets and Type III service equipment enclosures

The pad must be level with the finished grade.

Apply an ordinary surface finish under section 51-1.03F.

Allow the foundation to cure for at least 7 days before installing any equipment.

### **87-1.03F Conductors and Cable Installations**

#### **87-1.03F(1) General**

The installation of conductors and cables includes splicing conductors and attaching the terminals and connectors to the conductors.

Clean the conduit and pull all conductors and cables as a unit.

If new conductors or cables are to be added in an existing conduit:

1. Remove the content
2. Clean the conduit
3. Pull both old and new conductors and cables as a unit

Wrap conductors and secure cables to the end of the conduit in a pull box.

Seal the ends of conduits with a sealing compound after installing conductors or cables.

Neatly arrange conductors and cables inside pull boxes and cabinets. Tie the conductors and cables together with self-clinching nylon cable ties or enclose them in a plastic tubing or raceway.

Identify conductors and cables by direct labeling, tags, or bands fastened in such a way that they will not move. Use mechanical methods for labeling.

Provide band symbol identification on each conductor or each group of conductors comprising a signal phase in each pull box and near the end of terminated conductors.

Tape the ends of unused conductors and cables in pull boxes to form a watertight seal.

Do not connect the push-button or accessible pedestrian signal neutral conductor to the signal neutral conductor.

### **87-1.03F(2) Cables**

#### **87-1.03F(2)(a) General**

Reserved

#### **87-1.03F(2)(b) Reserved**

#### **87-1.03F(2)(c) Copper Cables**

##### **87-1.03F(2)(c)(i) General**

Reserved

##### **87-1.03F(2)(c)(ii) Detector Lead-in Cables**

Install a Type B or C detector lead-in cable in conduit.

Waterproof the ends of the lead-in cable before installing it in the conduit to prevent moisture from entering the cable.

Splice loop conductors for each direction of travel for the same phase, terminating in the same pull box, to a separate lead-in cable running from the pull box adjacent to the loop detector to a sensor unit mounted in the controller cabinet. Install the lead-in cable without splices except at the pull box.

Verify in the presence of the Engineer that the loops are operational before making the final splices between loop conductors and the lead-in cable.

Identify and tag each lead-in cable with the detector designation at the cabinet and pull box adjacent to the loops.

##### **87-1.03F(2)(c)(iii) Conductors Signal Cables**

Do not splice signal cables except for a 28-conductor cable.

Provide identification at the ends of terminated conductors in a cable as shown.

Provide identification for each cable in each pull box showing the signal standard to which it is connected except for the 28-conductor cable.

Connect conductors in a 12-conductor cable as shown in the following table:

### 12CSC Color Code and Functional Connection

Color code	Termination	Phase
Red	Red signal	2, 4, 6, or 8
Yellow	Yellow signal	2, 4, 6, or 8
Brown	Green signal	2, 4, 6, or 8
Red/black stripe	Red signal	1, 3, 5, or 7
Yellow/black stripe	Yellow signal	1, 3, 5, or 7
Brown/black stripe	Green signal	1, 3, 5, or 7
Black/red stripe	Spare or as required for red or <i>DONT WALK</i>	--
Black/white stripe	Spare or as required for yellow	--
Black	Spare or as required for green or <i>WALK</i>	--
Red/white stripe	Pedestrian signal <i>DONT WALK</i>	--
Brown/white stripe	Pedestrian signal <i>WALK</i>	--
White	Terminal block	Neutral

Provide identification for each 28-conductor cable C1 or C2 in each pull box. The cable labeled C1 must be used for signal phases 1, 2, 3, and 4. The cable labeled C2 must be used for signal phases 5, 6, 7, and 8.

Connect conductors in a 28-conductor cable as shown in the following table:

### 28CSC Color Code and Functional Connection

Color code	Termination	Phase
Red/black stripe	Red signal	2 or 6
Yellow/black stripe	Yellow signal	2 or 6
Brown/black stripe	Green signal	2 or 6
Red/orange stripe	Red signal	4 or 8
Yellow/orange stripe	Yellow signal	4 or 8
Brown/orange stripe	Green signal	4 or 8
Red/silver stripe	Red signal	1 or 5
Yellow/silver stripe	Yellow signal	1 or 5
Brown/silver stripe	Green signal	1 or 5
Red/purple stripe	Red signal	3 or 7
Yellow/purple stripe	Yellow signal	3 or 7
Brown/purple stripe	Green signal	3 or 7
Red/2 black stripes	Pedestrian signal <i>DONT WALK</i>	2 or 6
Brown/2 black stripes	Pedestrian signal <i>WALK</i>	2 or 6
Red/2 orange stripes	Pedestrian signal <i>DONT WALK</i>	4 or 8
Brown/2 orange stripes	Pedestrian signal <i>WALK</i>	4 or 8
Red/2 silver stripes	Overlap A, C	OLA <sup>a</sup> , OLC <sup>a</sup>
Brown/2 silver stripes	Overlap A, C	OLA <sup>c</sup> , OLC <sup>c</sup>
Red/2 purple stripes	Overlap B, D	OLB <sup>a</sup> , OLD <sup>a</sup>
Brown/2 purple stripes	Overlap B, D	OLB <sup>c</sup> , OLD <sup>c</sup>
Blue/black stripe	Pedestrian push button	2 or 6
Blue/orange stripe	Pedestrian push button	4 or 8
Blue/silver stripe	Overlap A, C	OLA <sup>b</sup> , OLC <sup>b</sup>
Blue/purple stripe	Overlap B, D	OLB <sup>b</sup> , OLD <sup>b</sup>
White/black stripe	Pedestrian push button common	--
Black/red stripe	Railroad preemption	--
Black	Spare	--
White	Terminal block	Neutral

OL = Overlap; A, B, C, and D = Overlapping phase designation

<sup>a</sup>For red phase designation

<sup>b</sup>For yellow phase designation

<sup>c</sup>For green phase designation

Use the neutral conductor only with the phases associated with that cable. Do not intermix neutral conductors from different cables except at the signal controller.

#### **87-1.03F(2)(c)(iv) Signal Interconnect Cable**

For a signal interconnect cable, provide a minimum of 6 feet of slack inside each controller cabinet.

Do not splice the cable unless authorized.

If splices are authorized, insulate the conductor splices with heat-shrink tubing and overlap the insulation at least 0.6 inch. Cover the splice area of the cable with heat-shrink tubing and overlap the cable jacket at least 1-1/2 inches. Provide a minimum of 3 feet of slack at each splice.

#### **87-1.03F(3) Conductors**

##### **87-1.03F(3)(a) General**

Do not run conductors to a terminal block on a standard unless they are to be connected to a signal head mounted on that standard.

Provide 3 spare conductors in all conduits containing ramp metering and traffic signal conductors.

Install a separate conductor for each terminal of a push button assembly and accessible pedestrian signal.

Provide conductor slack to comply with the requirements shown in the following table:

Location	Slack (feet)
Signal standard	1
Lighting standard	1
Signal and lighting standard	1
Pull box	3
Splice	3
Standards with slip base	0

**87-1.03F(3)(b) Reserved**

**87-1.03F(3)(c) Copper Conductors**

**87-1.03F(3)(c)(i) General**

Install a minimum no. 8, insulated, grounding copper conductor in conduit and connect it to all-metal components.

Where conductors from different service points occupy the same conduit or standard, enclose the conductors from one of the services in flexible or rigid metal conduit.

**87-1.03F(3)(c)(ii) Inductive Loop Conductors**

Install a Type 1 or 2 inductive loop conductor except use Type 2 for Type E loop detectors.

Install the conductor without splices except at the pull box.

**87-1.03F(4) Manual Installation Method**

Use an inert lubricant for placing conductors and cables in conduit.

Pull the conductors and cables into the conduit by hand using pull tape.

**87-1.03G Equipment Identification Characters**

The Engineer provides you with a list of the equipment identification characters.

Stencil the characters or apply the reflective self-adhesive labels to a clean surface.

Treat the edges of self-adhesive characters with an edge sealant.

Place the characters on the side facing traffic on:

1. Front doors of cabinets and service equipment enclosures.
2. Wood poles, fastened with 1-1/4-inch aluminum nails, for pole mounted enclosures
3. Adjacent bent or abutment at approximately the same station as an illuminated sign or soffit luminaire
4. Underside of the structure adjacent to the illuminated sign or soffit luminaire if no bent or abutment exists nearby
5. Posts of overhead signs
6. Standards

Before placing new characters on existing or relocated equipment, remove the existing characters.

**87-1.03H Conductor and Cables Splices**

**87-1.03H(1) General**

You may splice:

1. Grounded conductors in a pull box
2. Accessible pedestrian signal and push bottom conductors in a pull box
3. Ungrounded signal conductors in a pull box if signals are modified

4. Ungrounded signal conductors to a terminal compartment or a signal head on a standard with conductors of the same phase in the pull box adjacent to the standard
5. Ungrounded lighting circuit conductors in a pull box if lighting circuits are modified

Solder all splices using the hot iron, pouring, or dipping method. Do not perform open-flame soldering.

#### **87-1.03H(2) Splice Insulation Methods**

Insulate splices in a multiconductor cable to form a watertight joint and to prevent moisture absorption by the cable.

Use heat-shrink tubing or Method B to insulate a splice.

Use heat-shrink tubing as follows:

1. Cover the splice area completely with an electrical insulating coating and allow it to dry.
2. Place mastic around each conductor before placing them inside the tubing. Use the type of mastic specified in the tubing manufacturer's instructions.
3. Heat the area under the manufacturer's instructions. Do not perform open-flame heating. After contraction, each end of the heat-shrink tubing or the open end of the tubing's end cap must overlap the conductor insulation at least 1-1/2 inches.
4. Cover the entire splice with an electrical insulating coating and allow it to dry.

Use Method B as follows:

1. Cover the splice area completely with an electrical insulating coating and allow it to dry.
2. Apply 3 layers of half-lapped, 80-mils, PVC tape.
3. Apply 2 layers of 120-mils, butyl-rubber, stretchable tape with liner.
4. Apply 3 layers of half-lapped, 6-mils, PVC, pressure-sensitive, adhesive tape.
5. Cover the entire splice with an electrical insulating coating and allow it to dry.

#### **87-1.03I Connectors and Terminals**

Apply connectors and terminals to cables and conductors using a crimping compression tool under the manufacturer's instructions. The tool must prevent opening of the handles until the crimp is completed.

Install crimp-style terminal lugs on stranded conductors smaller than no. 14.

Solder no. 8 and smaller conductors to connectors and terminal lugs.

#### **87-1.03J Standards, Poles, Pedestals, and Posts**

Install standards, poles, pedestals, and posts under section 56-3.

Ground standards with a handhole by attaching a bonding jumper from the bolt or lug inside the standard to a metal conduit or to the grounding wire in the adjacent pull box. The bonding jumper must be visible when the handhole cover is removed.

Ground standards without a handhole or standards with a slip base by attaching a bonding jumper to all anchor bolts using ground clamps and connecting it to a metal conduit or to the grounding wire in the adjacent pull box. The bonding jumper must be visible after mortar has been placed on the foundation.

#### **87-1.03K Reserved**

#### **87-1.03L Utility Service**

##### **87-1.03L(1) General**

Install the service equipment early enough to allow the utility to complete its work before completion of the electrical work.

At least 15 days before permanent electrical and telecommunication service is required, request the service connections for permanent installations. The Department arranges with the utilities for completion of the connections and pays all costs and fees required by the utilities.

### **87-1.03L(2) Electric Service**

#### **87-1.03L(2)(a) General**

If service equipment is to be installed on a utility-owned pole, furnish and install the conduit, conductors, pull boxes, and other necessary material to complete the service installation. The service utility decides the position of the riser and equipment on the pole.

#### **87-1.03L(2)(b) Electric Service for Irrigation**

Establishing electric service for irrigation includes installing conduit, conductors, and pull boxes and making connections from the service point to the irrigation controllers.

#### **87-1.03L(2)(c) Electric Service for Booster Pumps**

Establishing electric service for a booster pump includes installing conduit, conductors, and pull boxes and making connections from the service point to the booster pump enclosure.

#### **87-1.03L(3) Telecommunications Service**

Establishing telecommunication service includes installing conduit, conductors, and pull boxes and making connections from the service point to the telephone demarcation cabinet.

#### **87-1.03M Photoelectric Controls**

Mount the photoelectric unit on the top of the pole for Type I, II, and III photoelectric controls. Use mounting brackets where pole-top mounting is not possible. Orient the photoelectric unit to face north.

Mount the enclosure at a height of 6 feet above finished grade on the same standard as the photoelectric unit.

Install a minimum 100 VA, 480/120 V(ac) transformer in the contactor enclosure to provide 120 V(ac) for the photoelectric control unit when switching 480 V(ac), 60 Hz circuits.

#### **87-1.03N Fused Splice Connectors**

Install a fuse splice connector in each ungrounded conductor for luminaires mounted on standards. The connector must be located in the pull box adjacent to the standard.

Crimp the connector terminals onto the ungrounded conductors using a tool under the manufacturer's instructions. Insulate the terminals and make them watertight.

#### **87-1.03O Grounding Electrodes**

Install a grounding electrode for each cabinet, service equipment enclosure, and transformer.

Attach a grounding conductor from the electrode using either a ground clamp or exothermic weld. Connect the other end of the conductor to the cabinet, service equipment enclosure, and transformer.

#### **87-1.03P Service Equipment Enclosures**

Installing a service equipment enclosure includes constructing the foundation and pad and installing conduit, adjacent pull boxes, and grounding electrode.

Locate the foundation such that the minimum clearance around the front and back of the enclosure complies with NEC, article 110.26, "Spaces About Electrical Equipment, (600 V, nominal or less)."

Bond and ground metal conduit as specified in NEC and by the service utility except the grounding electrode conductor must be no. 6 or larger.

If circuit breakers and components do not have a description on engraved phenolic nameplates, install them using stainless steel rivets or screws under section 86-1.02P(2).

#### **87-1.03Q Cabinets**

##### **87-1.03Q(1) General**

Installing a cabinet includes constructing the foundation and pad and installing conduit, adjacent pull boxes, and grounding electrode.

Apply a mastic or caulking compound before installing the cabinet on the foundation to seal the openings.

Connect the field wiring to the terminal blocks in the cabinet. Neatly arrange and lace or enclose the conductors in plastic tubing or raceway. Terminate the conductors with properly sized captive or spring spade terminals. Apply a crimp-style connector and solder them.

Install and solder a spade-type terminal on no. 12 and smaller field conductors and a spade-type or ring-type terminal on conductors larger than no. 12.

#### **87-1.03Q(2) Department-Furnished Controller Cabinets**

Arrange for the delivery of Department-furnished controller cabinets.

#### **87-1.03Q(3) Reserved**

#### **87-1.03Q(4) Telephone Demarcation Cabinets**

Installing a telephone demarcation cabinet includes installing conduit, cable, and pull boxes to the controller cabinet.

Install the cabinet with the back toward the nearest lane of traffic.

#### **87-1.03R Signal Heads**

##### **87-1.03R(1) General**

Installing a signal head includes mounting the heads on standards and mast arms, installing backplates and visors, and wiring conductors to the terminal blocks.

Keep the heads covered or direct them away from traffic until the system is ready for operation.

##### **87-1.03R(2) Signal Faces**

Use the same brand and material for the signal faces at each location.

Program the programmable visibility signal faces under the manufacturer's instructions. The indication must be visible only in those areas or lanes to be controlled.

##### **87-1.03R(3) Backplates**

Install backplates using at least six 10-24 or 10-32 self-tapping and locking stainless steel machine screws and flat washers.

If a plastic backplate requires field assembly, attach each joint using at least four no.10 machine screws. Each machine screw must have an integral or captive flat washer, a hexagonal head slotted for a standard screwdriver, and either a locking nut with an integral or captive flat washer or a nut, flat washer, and lock washer. Machine screws, nuts, and washers must be stainless steel or steel with a zinc or black oxide finish.

If a metal backplate has 2 or more sections, fasten the sections with rivets or aluminum bolts peened after assembly to avoid loosening.

Install the backplate such that the background light is not visible between the backplate and the signal face or between sections.

##### **87-1.03R(4) Signal Mounting Assemblies**

Install a signal mounting assembly such that its members are arranged symmetrically and plumb or level. Orient each mounting assembly to allow maximum horizontal clearance to the adjacent roadway.

For a bracket-mounted assembly, bolt the terminal compartment or pole plate to the pole or standard.

In addition to the terminal compartment mounting, attach the upper pipe fitting of Type SV-1-T with 5 sections or a SV-2-TD to the standard or pole using the mounting detail for signal heads without a terminal compartment.

Use a 4-1/2-inch slip fitter and set screws to mount an assembly on a post top.

After installing the assembly, clean and paint the exposed threads of the galvanized conduit brackets and bracket areas damaged by the wrench or vise jaws. Use a wire brush to clean and apply 2 coats of unthinned, organic zinc-rich primer. Do not use an aerosol can to apply the primer.



Install the conductors in the terminal compartment and secure the cover.

### **87-1.03S Pedestrian Signal Heads**

Installing a pedestrian signal head includes mounting the heads on standards and wiring conductors to the terminal blocks.

Install the pedestrian signal mounting assembly under section 87-1.03R(4).

Use the same brand and material for the pedestrian signal faces at each location.

Install a pedestrian signal face such that its members are arranged symmetrically and plumb or level.

### **87-1.03T Accessible Pedestrian Signals**

Use the same brand for the accessible pedestrian signals at each location.

Install an accessible pedestrian signal and the R10 series sign on the crosswalk side of the standard.

Attach the accessible pedestrian signal to the standard with self-tapping screws.

Attach the sign to the standard using 2 straps and saddle brackets.

Point the arrow on the accessible pedestrian signal in the same direction as the corresponding crosswalk.

Furnish the equipment and hardware to set up and calibrate the accessible pedestrian signal.

Arrange to have a manufacturer's representative at the job site to program the accessible pedestrian signal with an audible message or tone.

### **87-1.03U Push Button Assemblies**

Install the push button assembly and the R10 series sign on the crosswalk side of the standard.

Attach the sign to the assembly for Type B assemblies.

Attach the sign to the standard using 2 straps and saddle brackets for Type C assemblies.

You may use straps and saddle brackets to secure the push button to the standard.

Use a slip fitter to secure the assembly on top of a 2-1/2-inch-diameter post.

### **87-1.03V Detectors**

#### **87-1.03V(1) General**

Installing a detector includes installing inductive loop conductors, sealant, conduit, and pull boxes.

Center the detectors in the traffic lanes.

Do not splice the detector conductor.

#### **87-1.03V(2) Inductive Loop Detectors**

Mark the location of the inductive loop detectors such that the distance between the side of the loop and a lead-in saw cut from an adjacent detector is at least 2 feet. The distance between lead-in saw cuts must be at least 6 inches.

Saw cut the slots under section 13-4.03E(7). The bottoms of the slots must be smooth with no sharp edges. For Type E detector loops, saw the slots such that the sides are vertical.

Wash the slots clean using water and blow dry them with compressed air to remove all moisture and debris.

Identify the start of the conductor.

Waterproof the ends of a Type 2 loop conductor before installing it in the conduit to prevent moisture from entering the cable.

Install the loop conductor in the slots and lead-in saw cuts using a 3/16- to 1/4-inch-thick wood paddle. Hold the conductors in place at the bottom of the slot with wood paddles during placement of the sealant.

Wind adjacent loops on the same sensor unit channel in opposite directions.

Twist the conductors for each loop into a pair consisting of a minimum of 2 turns per foot before placing them in the lead-in saw cut and the conduit leading to the pull box. Do not install more than 2 twisted pairs of conductors per lead-in saw cut.

Provide 5 feet of slack in the pull box.

Test each loop for continuity, circuit resistance, and insulation resistance before filling the slots with sealant.

Remove excess sealant from the adjacent road surface before it sets. Do not use solvents to remove the excess.

Identify the loop conductor pair in the pull box, marking the start with the letter *S* and the end with the letter *F*. Band conductors in pairs by lane in the pull box adjacent to the loops and in the cabinet. Identify each pair with the detector designation and loop number.

Install the conductors in a compacted layer of HMA immediately below the uppermost layer if more than one layer will be placed. Install the loop conductors before placing the uppermost layer of HMA. Fill the slot with a sealant flush to the surface.

Install the conductors in the existing pavement if one layer of HMA is to be placed. Install the loop conductors before placing the layer of HMA. Fill the slot with a sealant flush to the surface.

### **87-1.03V(3) Preformed Inductive Loop Detectors**

Construct a preformed inductive loop detector consisting of 4 turns in the loop and a lead-in conductor pair twisted at least 2 turns per foot all encased in conduit and sealed to prevent water penetration. The detector must be 6-foot square unless shown otherwise.

Construct the loop detector using a minimum 3/8-inch Schedule 40 or Schedule 80 PVC or polypropylene conduit and no. 16 or larger conductor with Type THWN or TFFN insulation.

In new roadways, place the detector in the base course with the top of the conduit flush with the top of the base. Cover with HMA or concrete pavement. Protect the detector from damage before and during pavement placement.

In new reinforced concrete bridge decks, secure the detector to the top of the uppermost layer of reinforcing steel using nylon wire ties. Hold the detector parallel to the bridge deck using PVC or polypropylene spacers where necessary. Place conduit for lead-in conductors between the uppermost 2 layers of reinforcing steel.

Do not install detectors in existing bridge decks unless authorized.

Install a detector in existing pavement before placement of concrete or HMA as follows:

1. Saw cut slots at least 1-1/4 inches wide into the existing pavement.
2. Place the detector in the slots. The top of the conduit must be at least 2 inches below the top of the pavement.
3. Test each loop circuit for continuity, circuit resistance, and insulation resistance.
4. Fill saw cuts with elastomeric or hot melt rubberized asphalt sealant for asphalt concrete pavement and with epoxy sealant or hot melt rubberized asphalt sealant for concrete pavement.

### **87-1.03W Sealants**

#### **87-1.03W(1) General**

Reserved

#### **87-1.03W(2) Elastomeric Sealant**

Apply an elastomeric sealant with a pressure feed applicator.

#### **87-1.03W(3) Asphaltic Emulsion Sealant**

Asphaltic emulsion sealant must:

1. Be used for filling slots in asphalt concrete pavement of a maximum width of 5/8 inch
2. Not be used on concrete pavement or where the slope causes the material to run from the slot
3. Be thinned under the manufacturer's instructions
4. Be placed when the air temperature is at least 45 degrees F

#### **87-1.03W(4) Hot-Melt Rubberized Asphalt Sealant**

Melt the sealant in a jacketed, double-boiler-type, melting unit. The temperature of the heat transfer medium must not exceed 475 degrees F.

Apply the sealant with a pressure feed applicator or a pour pot when the surface temperature of the pavement is greater than 40 degrees F.

#### **87-1.03X Reserved**

#### **87-1.03Y Transformers**

Installing a transformer includes placing the transformer inside a pull box, a cabinet, or an enclosure.

Wire the transformer for the appropriate voltage.

Ground the secondary circuit of the transformer as specified in the NEC.

#### **87-1.03Z Reserved**

#### **87-1.04 PAYMENT**

Not Used

## **87-2 LIGHTING SYSTEMS**

### **87-2.01 GENERAL**

#### **87-2.01A Summary**

Section 87-2 includes specifications for constructing lighting systems.

Lighting system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Standards
6. Luminaires
7. Service equipment enclosure
8. Photoelectric control
9. Fuse splice connectors
10. High mast lighting assemblies

The components of a lighting system are shown on the project plans.

#### **87-2.01B Definitions**

Reserved

#### **87-2.01C Submittals**

Submit a certificate of compliance and test data for the high mast lighting luminaires.

#### **87-2.01D Quality Assurance**

Reserved

### **87-2.02 MATERIALS**

#### **87-2.02A General**

Reserved

### **87-2.02B High Mast Lighting Assemblies**

A high mast lighting assembly includes the foundation, pole, lowering device system, luminaires, and control pedestal.

Each luminaire in a high mast lighting assembly must include a housing, an optical system, and a ballast.

The housing must be made of aluminum.

A painted or powder-coated housing for a high mast lighting luminaire must be able to withstand a 1,000-hour salt spray test as specified in ASTM B117.

The optical system, consisting of the reflector, refractor or lens, lamp socket, and lamp, must be in a sealed chamber. The chamber must be sealed by a gasket between the reflector and refractor or lens and a gasket between the reflector and lamp socket. The chamber must have a separate filter or filtering gasket for flow of air.

An asymmetrical luminaire must have a refractor or reflector that is rotatable 360 degrees around a vertical axis to orient the distribution of light.

The luminaire must have a slip fitter for mounting on a 2-inch horizontal pipe tenon and must be adjustable  $\pm 3$  degrees from the axis of the tenon.

The reflector must have a specular surface made of silvered glass or aluminum protected by either an anodized finish or a silicate film. The reflector must be shaped such that a minimum of light is reflected through the arc tube of the lamp.

The refractor and lens must be made of heat-resistant glass.

The lamp socket must be a porcelain-enclosed, mogul-multiple type. The shell must contain integral lamp grips to ensure electrical contact under conditions of normal vibrations. The socket must be rated for 1,500 W, 600 V(ac) and 4,000 V(ac) pulse for a 400 W lamp and 5,000 V(ac) pulse for a 1,000 W lamp.

The luminaire must have a dual fuse holder for 2 fuses rated at 5 A, 480 V(ac). The fuses must be 13/32 inch by 1-1/2 inches, standard midjet ferrule type with a nontime-delay feature.

The lamps must be vertical burning, protected from undue vibration, and prevented from backing out of the socket by a stainless steel clamp attached to the luminaire.

A 1,000 W metal halide lamp must have an initial output of 100,000 lumens and an average rated life of 12,000 hours based on 10 hours per start.

A 400 W high-pressure sodium lamp must have an initial output of 50,000 lumens. A 1,000 W high-pressure sodium lamp must have an initial output of 140,000 lumens.

The ballast for the luminaire must be a regulator type and have a core and coils, capacitors, and starting aid.

Ballast must be:

1. Mounted within a weatherproof housing that integrally attaches to the top of a luminaire support bracket and lamp support assembly
2. Readily removable without removing the luminaire from the bracket arm
3. Electrically connected to the optical assembly by a prewired quick disconnect

The ballast for a metal halide luminaire must comply with luminaire manufacturer's specifications.

The wattage regulation spread at any lamp voltage, from nominal through the life of the lamp, must vary no more than 22 percent for a 1,000 W lamp and a  $\pm 10$  percent input voltage variation. The ballast's starting line current must be less than its operating current.

### **87-2.02C Soffit and Wall-Mounted Luminaires**

#### **87-2.02C(1) General**

Soffit and wall-mounted luminaires must be weatherproof and corrosion resistant.

Each luminaire must include a 70 W high-pressure sodium lamp with a minimum average rated life of 24,000 hours. The lamp socket must be positioned such that the light center of the lamp is located within 1/2 inch of the designed light center of the luminaire.

Luminaire wiring must be SFF-2.

Flush-mounted soffit luminaire must have:

1. Metal body with two 1-inch-minimum conduit hubs and a means of anchoring the body into the concrete
2. Prismatic refractor made of heat-resistant polycarbonate:
  - 2.1. Mounted in a door frame
  - 2.2. With the street side identified
3. Aluminum reflector with a specular anodized finish
4. Ballast located either within the housing or in a ceiling pull box if shown
5. Lamp socket

The door frame assembly must be hinged, gasketed, and secured to the luminaire body with at least 3 machine screws.

A pendant soffit luminaire must be enclosed and gasketed and have an aluminum finish. Luminaire must have:

1. Aluminum reflector with a specular anodized finish
2. Refractor made of heat-resistant polycarbonate
3. Optical assembly that is hinged and latched for lamp access and a device to prevent dropping
4. Ballast designed for operation in a raintight enclosure
5. Galvanized metal box with a gasketed cover, 2 captive screws, and 2 chains to prevent dropping and for luminaire mounting

Wall-mounted luminaire must have:

1. Cast metal body
2. Prismatic refractor:
  - 2.1. Made of glass
  - 2.2. Mounted in a door frame
3. Aluminum reflector with a specular anodized finish
4. Integral ballast
5. Lamp socket
6. Gasket between the refractor and the body
7. At least 2 mounting bolts of minimum 5/16-inch diameter

A cast aluminum body of a luminaire to be cast into or mounted against concrete must have a thick coat of alkali-resistant bituminous paint on all surfaces to be in contact with the concrete.

### **87-2.02C(2) High-Pressure Sodium Lamp Ballasts**

#### **87-2.02C(2)(a) General**

A high-pressure sodium lamp ballast must operate the lamp for its rated wattage.

Starting aids for a ballast must be interchangeable between ballasts of the same wattage and manufacturer without adjustment.

The ballast must be provided with a heat-generating component to serve as a heat sink. The capacitor must be placed at the maximum practicable distance from the heat-generating components or thermally shielded to limit the case temperature to 75 degrees C.

The transformer and inductor must be resin impregnated for protection against moisture. Capacitors, except for those in starting aids, must be metal cased and hermetically sealed.

The ballast must have a power factor of 90 percent or greater.

For the nominal input voltage and lamp voltage, the ballast design center must not vary more than 7.5 percent from the rated lamp wattage.

#### **87-2.02C(2)(b) Regulator-Type Ballasts**

A regulator-type ballast must be designed such that a capacitance variance of  $\pm 6$  percent does not cause more than  $\pm 8$  percent variation in the lamp wattage regulation.

The ballast must have a current crest factor not exceeding 1.8 for an input voltage variation of  $\pm 10$  percent.

The lamp wattage regulation spread for a lag-type ballast must not vary by more than 18 percent for  $\pm 10$  percent input voltage variations. The primary and secondary windings must be electrically isolated.

The lamp wattage regulation spread for a constant-wattage, autoregulator, lead-type ballast must not vary by more than 30 percent for  $\pm 10$  percent input voltage variations.

#### **87-2.02C(2)(c) Nonregulator-Type Ballasts**

A nonregulator-type ballast must have a current crest factor not exceeding 1.8 for an input voltage variation of  $\pm 5$  percent.

The lamp wattage regulation spread for an autotransformer or high reactance type ballast must not vary by more than 25 percent for  $\pm 5$  percent input voltage variations.

### **87-2.03 CONSTRUCTION**

#### **87-2.03A General**

Set the foundations for standards such that the mast arm is perpendicular to the centerline of the roadway.

Tighten the cap screws of the luminaire's clamping bracket to 10 ft-lb for LED and low-pressure luminaires.

Label the month and year of the installation inside the luminaire housing's door.

Perform the conductor and operational tests for the system.

#### **87-2.03B High Mast Lighting Assemblies**

Mount and connect the luminaires to the accessory support ring. Aim the asymmetrical luminaire to orient the distribution of light.

#### **87-2.03C Soffit and Wall-Mounted Luminaires**

For a flush-mounted soffit luminaire:

1. Prevent concrete from getting into the housing during pouring of the concrete for the structure
2. Install the luminaire with the axis vertical and the street side of the refractor oriented as indicated
3. Locate the luminaire to provide a minimum 2-foot clearance from the inside surface of the girders and 1-foot clearance from the near face of the diaphragm
4. Install the bridge soffit and ceiling pull box over the same lane

For a pendant soffit luminaire:

1. Cast in place the inserts for the no. 8 pull box during concrete placement for a new structure
2. Drill holes for expansion anchors to support the no. 8 pull box on existing structures
3. Bond the suspension conduit and luminaire to the pull box

For a wall-mounted luminaire, provide:

1. Extension junction box or ring on a new structure
2. 4 external mounting taps on an existing structure

Place the soffits or wall-mounted luminaires in operation as soon as practicable after the falsework has been removed from the structure.

If the Engineer orders soffit or wall-mounted luminaires to be activated before permanent power service is available, installing and removing the temporary power service is change order work.

#### **87-2.04 PAYMENT**

Not Used

### **87-3 SIGN ILLUMINATION SYSTEMS**

#### **87-3.01 GENERAL**

##### **87-3.01A Summary**

Section 87-3 includes specifications for constructing sign illumination systems.

Sign illumination system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Sign lighting fixtures
6. Enclosure for the disconnect circuit breaker
7. Service equipment enclosure
8. Photoelectric control

The components of a sign illumination system are shown on the project plans.

##### **87-3.01B Definitions**

Reserved

##### **87-3.01C Submittals**

Submit the manufacturer's test data for the induction sign-lighting fixtures.

##### **87-3.01D Quality Assurance**

Reserved

#### **87-3.02 MATERIALS**

An induction sign-lighting fixture must include a housing with a door, reflector, refractor or lens, lamp, socket assembly, power coupler, high-frequency generator, fuse block, and fuses.

The fixture must comply with the isofootcandle curves as shown.

Fixture must weigh no more than 44 lb, be rated for 87 W at 120/240 V(ac), and have a mounting assembly made of one of the following materials:

1. Cast aluminum
2. Hot-dip galvanized steel plate
3. Galvanized steel plate finished with one of the following:
  - 3.1. Polymeric coating
  - 3.2. Same finish used for the housing

Housing must:

1. Be corrosion resistant and suitable for wet locations
2. Be above the top of the mounting rails at a maximum height of 12 inches
3. Have weep holes

Door must:

1. Hold a refractor or lens
2. Open without the use of special tools
3. Have a locking position at 50 degrees minimum from the plane of the door opening
4. Be hinged to the housing on the side of the fixture away from the sign panel
5. Have 2 captive latch bolts or other latching device

When the door is opened, it must lock in the 50 degrees position when an 85 mph, 3-second wind-gust load strikes the door from either side.

The housing and door must be manufactured of sheet or cast aluminum and have a gray powder coat or polyester paint finish. The sheet aluminum must comply with ASTM B209 or B209M for 5052-H32 aluminum sheet. External bolts, screws, hinges, hinge pins, and door closure devices must be corrosion resistant.

The housing and door must be gasketed. The thickness of the gasket must be a minimum of 1/4 inch.

Reflector must not be attached to the outside of the housing and must be:

1. Made of a single piece of aluminum with a specular finish
2. Protected with an electrochemically applied anodized finish or a chemically applied silicate film
3. Designed to drain condensation away from it
4. Secured to the housing with a minimum of 2 screws
5. Removable without removing any fixture parts

Refractor or lens must have a smooth exterior and must be manufactured from the materials shown in the following table:

**Refractor and Lens Material Requirements**

Component	Material
Flat lens	Heat-resistant glass
Convex lens	Heat-resistant, high-impact-resistant tempered glass
Refractor	Borosilicate heat-resistant glass

The refractor and convex lens must be designed or shielded such that no luminance is visible if the fixture is approached directly from the rear and viewed from below. If a shield is used, it must be an integral part of the door casting.

Lamp must:

1. Be an 85 W induction type with a fluorescent, phosphor-coated, interior wall
2. Have a minimum 70 percent light output of its original lumen output after 60,000 hours of operation
3. Have a minimum color-rendering index of 80
4. Be rated at a color temperature of 4,000K
5. Be removable with common hand tools

The lamp socket must be rated for 1,500 W and 600 V(ac) and be a porcelain-enclosed mogul type with a shell that contains integral lamp grips to ensure electrical contact under normal vibration conditions. The shell and center contact must be made of nickel-plated brass. The center contact must be spring loaded.

The power coupler must be removable with common hand tools.

High-frequency generator must:

1. Start and operate lamps at an ambient temperature of -25 degrees C or greater for the rated life of the lamp
2. Operate continuously at ambient air temperatures from -25 to 55 degrees C without a reduction in the generator life
3. Have a design life of at least 100,000 hours at 55 degrees C
4. Have an output frequency of 2.65 MHz  $\pm$  10 percent
5. Have radio frequency interference that complies with 47 CFR 18 regulations regarding harmful interference
6. Have a power factor greater than 90 percent and total harmonic distortion less than 10 percent

The high frequency generator must be mounted such that the fixture can be used as a heat sink and be replaceable with common hand tools.



Each fixture must include a barrier-type fuse block for terminating field connections. Fuse block must:

1. Be rated 600 V(ac)
2. Have box terminals
3. Be secured to the housing and accessible without removal of any fixture parts
4. Be mounted to leave a minimum of 1/2 inch of air space from the sidewalls of the housing
5. Be designed for easy removal of fuses with a fuse puller

The fixture's fuses must be 13/32-inch-diameter, 1-1/2-inch-long ferrule type and UL listed or NRTL certified. For a 120 V(ac) fixture, only the ungrounded conductor must be fused and a solid connection must be provided between the grounded conductor and the high frequency generator.

The fixture must be permanently marked with the manufacturer's brand name, trademark, model number, serial number, and date of manufacture on the inside and outside on the housing. The same information must be marked on the package.

If a wire guard is used, it must be made of a minimum 1/4-inch-diameter galvanized steel wire. The wires must be spaced to prevent rocks larger than 1-1/2-inch diameter from passing through the guard. The guard must be either hot-dip galvanized or electroplated zinc-coated as specified in ASTM B633, service condition SC4, with a clear chromate dip treatment.

### **87-3.03 CONSTRUCTION**

Perform the conductor and operational tests for the system.

### **87-3.04 PAYMENT**

Not Used

## **87-4 SIGNAL AND LIGHTING SYSTEMS**

### **87-4.01 GENERAL**

#### **87-4.01A Summary**

Section 87-4 includes specifications for constructing signal and lighting systems.

Signal and lighting system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Cables
6. Standards
7. Signal heads
8. Internally illuminated street name signs
9. Service equipment enclosure
10. Department-furnished controller assembly
11. Detectors
12. Telephone demarcation cabinet
13. Accessible pedestrian signals
14. Push button assemblies
15. Pedestrian signal heads
16. Luminaires
17. Photoelectric control
18. Fuse splice connectors
19. Battery backup system
20. Flashing beacons
21. Flashing beacon control assembly

The components of a signal and lighting system are shown on the project plans.

#### **87-4.01B Definitions**

Reserved

### **87-4.01C Submittals**

Submit shop drawings showing the message for each internally illuminated street sign, including the size of letters, symbols, and arrows.

### **87-4.01D Quality Assurance**

#### **87-4.01D(1) General**

Reserved

#### **87-4.01D(2) Quality Control**

##### **87-4.01D(2)(a) General**

Reserved

##### **87-4.01D(2)(b) Battery Backup System**

Notify the Engineer 48 hours before testing the battery backup system.

Test the system in the presence of the Engineer by turning off the power to the signal system at the service equipment enclosure. The signal system must run continuously for 30 minutes. If the battery backup system fails, correct the problem and retest the system for another 30 minutes. After successful completion of the test, turn the power on for the signal system.

### **87-4.02 MATERIALS**

#### **87-4.02A General**

Reserved

#### **87-4.02B Battery Backup System**

A battery backup system includes the cabinet, batteries, and the Department-furnished electronics assembly.

The electronics assembly includes the inverter/charger unit, power transfer relay, and the battery harness.

#### **87-4.02C Internally Illuminated Street Name Signs**

An internally illuminated street name sign includes housing, brackets, sign panels, gaskets, ballast, lampholder, terminal blocks, conductors, and fuses.

An internally illuminated street sign must be designed and constructed to prevent deformation or failure when subjected to an 85 mph, 3-second wind-gust load as specified in the AASHTO publication, "Standard Specifications for Structural Supports of Highway Signs, Luminaires and Traffic Signals."

Sign must:

1. Be Types A or B
2. Have galvanized or cadmium-plated ferrous parts
3. Have screened weep holes
4. Have fasteners, screws, and hardware made of passive stainless steel, Type 302 or 304, or aluminum Type 6060-T6
5. Operate at a temperature from -20 to 74 degrees C

Photoelectric unit sockets are not allowed.

The housing must be constructed to resist torsional twist and warp. The housing must be designed such that opening or removing the panels provides access to the interior of the sign for lamp, ballast, and fuse replacement.

The top and bottom of the sign must be manufactured from formed or extruded aluminum and attached to formed or cast aluminum end fittings. The top, bottom, and end fittings must form a sealed housing.

For a Type A sign, both sides of the sign must be hinged at the top to allow installation or removal of the sign panel.

For a Type B sign, the sign panel must be slide mounted into the housing.

The top of the housing must have 2 free-swinging mounting brackets. Each bracket must be vertically adjustable for leveling the sign to either a straight or curved mast arm. The bracket assembly must allow the lighting fixture to swing perpendicular to the sign panel.

The reflectors must be formed aluminum and have an acrylic, baked-white-enamel surface with a minimum reflectance of 0.85.

Sign panel must be translucent, high-impact-resistant, and made of one of the following plastic materials:

1. Glass-fiber-reinforced, acrylated resin
2. Polycarbonate resin
3. Cellulose acetate butyrate

The sign panel must be designed not to crack or shatter if a 1-inch-diameter steel ball weighing 2.4 ounces is dropped from a height of 8.5 feet above the sign panel to any point on the panel. For this test, the sign panel must be lying in a horizontal position and supported within its frame.

The sign panel's surface must be evenly illuminated. The brightness measurements for the letters must be a minimum of 150 foot-lamberts, average. The letter-to-background brightness ratio must be from 10:1 to 20:1. The background luminance must not vary by more than 40 percent from the average background brightness measurement. The luminance of letters, symbols, and arrows must not vary by more than 20 percent from their average brightness measurement.

The sign panel's white or green color must not fade or darken if exposed to an accelerated test of UV light equivalent to 2 years of outdoor exposure.

The sign panel's legend, symbols, arrows, and border on each face must be white on a green background. The background must comply with color no. 14109 of FED-STD-595.

The message must appear on both sides of the sign and be protected from UV radiation. The letters must be 8-inch upper case and 6-inch lower case, series E.

A Type A sign must have a closed-cell, sponge-neoprene gasket installed between the sign panel frame to prevent the entry of water. The gasket must be uniform and even textured.

The sign ballast must be a high-power-factor type for outdoor operation from 110 to 125 V(ac) and 60 Hz and must comply with ANSI C82.1 and C82.2.

The ballast for a Type A sign must be rated at 200 mA. The ballast for a Type B sign must be rated at 430 mA.

Sign lampholder must:

1. Be the spring-loaded type
2. Have silver-coated contacts and waterproofed entrance leads
3. Have a heat-resistant, circular cross section with a partially recessed neoprene ring

Removal of the lamp from the socket must de-energize the primary of the ballast.

The springs for the lampholders must not be a part of the current-carrying circuit.

The sign's wiring connections must terminate on a molded, phenolic, barrier-type, terminal block rated at 15 A, 1,000 V(ac). The connections must have a white, integral, waterproof marking strip. The terminal screws must not be smaller than a no. 10.

The terminal block must be insulated from the fixture to provide protection from the line-to-ground flashover voltage.

A sectionalized terminal block must have an integral barrier on each side and must allow rigid mounting and alignment.

Fixture's conductors must:

1. Be stranded copper wire with a minimum thermoplastic insulation of 28 mils

2. Be rated at 1,000 V(ac) and for use up to 90 degrees C
3. Be a minimum of no. 16
4. Match the color coding of the ballast leads
5. Be secured with spring cross straps, installed 12 inches apart or less in the chassis or fixture

Stranded copper conductors connected to screw-type terminals must terminate in crimp-type ring connectors.

No splicing is allowed within the fixture.

The sign's fuse must be the Type 3AG, miniature, slow-blow type.

The fuse holder must be a panel-mounting type with a threaded or bayonet knob that grips the fuse tightly for extraction. Each ballast must have a separate fuse.

### **87-4.03 CONSTRUCTION**

#### **87-4.03A General**

Set the foundations for standards such that the mast arm is perpendicular to the centerline of the roadway.

Tighten the cap screws of the luminaire's clamping bracket to 10 ft-lb for LED and low-pressure luminaires.

Label the month and year of the installation inside the luminaire housing's door.

Perform the conductor and operational tests for the system.

#### **87-4.03B Battery Backup System Cabinets**

Install the battery backup system cabinet to the right of the Model 332L cabinet.

If installation on the right side is not feasible, obtain authorization for installation on the left side.

Provide access for power conductors between the cabinets using:

1. 2" nylon-insulated, steel chase nipple
2. 2" steel sealing locknut
3. 2" nylon-insulated, steel bushing

Remove the jumper between the terminals labeled *BBS-1* and *BBS-2* in the 5 position terminal block in the controller cabinet before connecting the Department-furnished electronics assembly.

#### **87-4.03C Internally Illuminated Street Name Signs**

Mount the internally illuminated street name sign to the signal mast arm using the adjustable brackets. Connect the conductors to the terminal blocks in the signal head mounting terminal block.

#### **87-4.04 PAYMENT**

Not Used

## **87-5 RAMP METERING SYSTEMS**

### **87-5.01 GENERAL**

Section 87-5 includes specifications for constructing ramp metering systems.

Ramp metering system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Standards
6. Signal heads
7. Service equipment enclosure
8. Department-furnished controller assembly

9. Detectors
10. Telephone demarcation cabinet

The components of a ramp metering system are shown on the project plans.

#### **87-5.02 MATERIALS**

Not Used

#### **87-5.03 CONSTRUCTION**

Connect the field wiring to the terminal blocks in the controller cabinet. The Engineer provides you a list of field conductor terminations for each controller cabinet.

Perform the conductor and operational tests for the system.

#### **87-5.04 PAYMENT**

Not Used

### **87-6 TRAFFIC MONITORING STATION SYSTEMS**

#### **87-6.01 GENERAL**

Section 87-6 includes specifications for constructing traffic monitoring station systems.

Traffic monitoring station system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Cables
5. Conductors
6. Service equipment enclosure
7. Controller cabinet
8. Detectors
9. Telephone demarcation cabinet

The components of a traffic monitoring station system are shown on the project plans.

#### **87-6.02 MATERIALS**

Not Used

#### **87-6.03 CONSTRUCTION**

Connect the field wiring to the terminal blocks in the controller cabinet. The Engineer provides you a list of field conductor terminations for the controller cabinet.

Perform the conductor and operational tests for the system.

#### **87-6.04 PAYMENT**

Not Used

### **87-7 FLASHING BEACON SYSTEMS**

#### **87-7.01 GENERAL**

Section 87-7 includes specifications for constructing flashing beacon systems.

Flashing beacon system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Standards
6. Service equipment enclosure
7. Signal heads
8. Flashing beacon control assembly

The components of a flashing beacon system are shown on the project plans.

The flash rate for the flashing beacon must comply with chapter 4L, "Flashing Beacons," of the *California MUTCD*.

The flashing beacon must allow alternating flashing wig-wag operation.

The flashing beacon must have a separate flasher unit installed in the flashing beacon control assembly.

#### **87-7.02 MATERIALS**

Flashing beacon control assembly must:

1. Have a NEMA 3R enclosure with a dead front panel and a hasp with a 7/16-inch hole for a padlock. The enclosure must have one of the following finishes:
  - 1.1. Powder coating.
  - 1.2. Hot-dip galvanized coating.
  - 1.3. Factory-applied, rust-resistant prime coat and finish coat.
2. Have barrier-type terminal blocks rated for 25 A, 600 V(ac), made of molded phenolic or nylon material and have plated-brass screw terminals and integral marking strips.
3. Include a solid state flasher complying with section 8 of NEMA standards publication no. TS 1 for 10 A, dual circuits.

#### **87-7.03 CONSTRUCTION**

Perform the conductor and operational tests for the system.

#### **87-7.04 PAYMENT**

Not Used

### **87-8–87-11 RESERVED**

## **87-12 CHANGEABLE MESSAGE SIGN SYSTEMS**

### **87-12.01 GENERAL**

Section 87-12 includes specifications for constructing changeable message sign systems.

Changeable message sign system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Service equipment enclosure
6. Department-furnished controller cabinet
7. Department-furnished changeable message sign
8. Department-furnished wiring harness
9. Service equipment enclosure
10. Sign disconnect

The components of a changeable message sign system are shown on the project plans.

### **87-12.02 MATERIALS**

Not Used

### **87-12.03 CONSTRUCTION**

Install the changeable message sign.

Connect the field wiring to the terminal blocks in the sign assembly and controller cabinet.

The Engineer provides you a list of field conductor terminations for each sign cabinet and controller cabinet.

The Department maintains the sign assemblies.

#### **87-12.04 PAYMENT**

Not Used

#### **87-13–87-17 RESERVED**

#### **87-18 INTERCONNECTION CONDUIT AND CABLE**

##### **87-18.01 GENERAL**

Section 87-18 includes specifications for constructing interconnection conduit and cable.

Interconnection conduit and cable includes:

1. Pull boxes
2. Conduit
3. Signal interconnect cables

The components of an interconnection conduit and cable are shown.

##### **87-18.02 MATERIALS**

Not Used

##### **87-18.03 CONSTRUCTION**

Test the signal interconnect cable.

Connect the signal interconnect cable to the terminal block in the controller cabinets. The Engineer provides you a list of terminations for each controller cabinet.

##### **87-18.04 PAYMENT**

Not Used

#### **87-19 RESERVED**

#### **87-20 TEMPORARY ELECTRICAL SYSTEMS**

##### **87-20.01 GENERAL**

Section 87-20 includes specifications for providing temporary electrical systems.

Obtain the Department's authorization for the type of temporary electrical system and its installation method.

A temporary system must operate on a continuous, 24-hour basis.

##### **87-20.02 MATERIALS**

###### **87-20.02A General**

Material and equipment may be new or used.

The components of a temporary system are shown on the project plans.

If you use Type UF-B cable, the minimum conductor size must be no. 12.

###### **87-20.02B Temporary Flashing Beacon Systems**

A temporary flashing beacon system consists of a flashing beacon system, wood post, generator, and photovoltaic system.

The system must comply with the specifications for a flashing beacon system in section 87-7, except it may be mounted on a wood post or a trailer.

###### **87-20.02C Temporary Lighting Systems**

A temporary lighting system consists of a lighting system, generator, and wood poles.

The system must comply with the specifications for a lighting system in section 87-2, except it may be mounted on a wood pole or a trailer.

### **87-20.02D Temporary Signal Systems**

A temporary signal system consists of a signal and lighting system, wood poles and posts, and a generator.

System must comply with the specifications for a signal and lighting system in section 87-4, except:

1. Signal heads may be mounted on a wood pole, mast arm, tether wire, or a trailer
2. Flashing beacons may be mounted on a wood post, or a trailer

### **87-20.03 CONSTRUCTION**

#### **87-20.03A General**

Provide electrical and telecommunication services for temporary systems. Do not use existing services unless authorized.

Provide power for the temporary electrical systems under section 12-3.33, except you may use a photovoltaic system for the temporary flashing beacon system.

Install conductors and cables in a conduit, suspended from wood poles at least 25 feet above the roadway, or use direct burial conductors and cables.

You may saw slots across paved areas for burial conductors and cables.

Install conduit outside the paved area at a minimum of 12 inches below grade for Type 1 and 2 conduit and at a minimum of 18 inches below grade for Type 3 conduit.

Install direct burial conductors and cables outside the paved area at a minimum depth of 24 inches below grade.

Place the portions of the conductors installed on the face of wood poles in either Type 1, 2, or 3 conduit between the point 10 feet above grade at the pole and the pull box. The conduit between the pole and the pull box must be buried at a depth of at least 18 inches below grade.

Place conductors across structures in a Type 1, 2, or 3 conduit. Attach the conduit to the outside face of the railing.

Mount the photoelectric unit at the top of the standard or wood post.

You may abandon in place conductors and cables in sawed slots or in conduit installed below the ground surface.

#### **87-20.03B Temporary Flashing Beacon Systems**

Install a fused-splice connector in the pull box adjacent to each flashing beacon. Wherever conductors are run overhead, install the splice connector in the line side outside of the control assembly.

#### **87-20.03C Temporary Lighting Systems**

Wherever conductors are run overhead, install the fuse splice connectors in the line side before entering the mast arm.

#### **87-20.03D Temporary Signal Systems**

You may splice conductors that run to a terminal compartment or a signal head on a pole to the through conductors of the same phase in a pull box adjacent to the pole. Do not splice conductors or cables except in a pull box or in a NEMA 3R enclosure.

The Department provides the timing for the temporary signal.

Maintain the temporary signal except for the Department-furnished controller assembly.

### **87-20.04 PAYMENT**

Not Used



## **87-21 EXISTING ELECTRICAL SYSTEMS**

### **87-21.01 GENERAL**

Section 87-21 includes general specifications for performing work on existing electrical systems.

### **87-21.02 MATERIALS**

Not Used

### **87-21.03 CONSTRUCTION**

#### **87-21.03A General**

You may abandon unused underground conduit after pulling out all conductors and removing conduit terminations from the pull boxes.

If standards are to be salvaged, remove:

1. All components
2. Mast arms from the standards
3. Luminaires, signal heads, and signal mounting assemblies from the standards and mast arms

If the existing material is unsatisfactory for reuse and the Engineer orders you to replace it with new material, replacing the existing material with new material is change order work.

If the removed electrical equipment is to be reinstalled, supply all materials and equipment, including signal mounting assemblies, anchor bolts, nuts, washers, and concrete, needed to complete the new installation.

#### **87-21.03B Maintaining Existing Electrical Systems**

##### **87-21.03B(1) General**

Maintain the existing electrical system in working order during the progress of the work. Conduct your operations to avoid damage to the elements of the systems.

##### **87-21.03B(2) Maintaining Existing Traffic Management System Elements During Construction**

Section 87-21.02B(2) applies if a bid item for maintaining existing traffic management system elements during construction is shown on the Bid Item List.

Traffic management system elements include:

1. Ramp metering system
2. Traffic monitoring stations
3. Microwave vehicle detection system
4. Changeable message sign system
5. Extinguishable message sign system
6. Highway advisory radio system
7. Closed circuit television camera system
8. Roadway weather information system

Obtain authorization at least 72 hours before interrupting communication between an existing system and the traffic management center.

If the Engineer notifies you that an existing system is not fully operational due to your activities, repair or replace the system within 72 hours. If the system cannot be fixed within 72 hours or it is located on a structure, provide a temporary system within 24 hours until the system can be fixed. Perform a functional test of the system in the presence of the Engineer. If you fail to perform the necessary repair or replacement work, the Department may perform the repair or replacement work and deduct the cost.

If you damage an existing fiber optic cable, install a new cable such that the length of cable slack is the same as before the damage, measured from an original splice point or termination. All splices must be made using the fusion method.

You may interrupt the operation of traffic monitoring stations:

1. For 60 days if another operational traffic monitoring station is located within 3 miles



For volumetric proportioning of RPC:

1. The volumetric container must be imprinted with manufacturer's name, model number, serial number, the as-calibrated volume and date of the last calibration. Cross sectional dimensions of the container must remain the same as those during its calibration.
2. The device must be re-calibrated monthly and at any time when the container shape has been deformed from its original condition or there is evidence of material build-up on the inside of the device.
3. The device must be held in a level condition during filling. Fill the device to the measure or strike-off line. Each measurement must be filled to within 1.0% of the device as-calibrated volume.
4. The device interior must be cleaned after each measurement to maintain a zero condition.

For weight proportioning, proportion RPC with a weigh hopper attached to the plant at a position which allows the addition of the RPC to the mixer truck with the conventional PCC ingredients. The plant process controller must control the proportioning of RPC to within 1.0% of its target weight.

## **90-9.02 MATERIALS**

### **90-9.02A General**

The quantity of RPC added to the concrete must not exceed 15 percent.

The cementitious material content of the RPC must be at least that specified for the concrete that allows the use of RPC.

Water must not be added to the RPC after batching, including in the truck mixer.

Use HSA for controlling and reducing the hydration rate of RPC.

Incorporate RPC by mixing into the concrete before arriving at the jobsite.

### **90-9.02B Returned Plastic Concrete**

The RPC must not exceed 100 degrees F at any time.

If HSA is not used, RPC must be incorporated into the concrete before attaining initial set or within 4 hours after batching of RPC, whichever is earlier.

If HSA is used:

1. Add HSA to RPC within 4 hours after original batching.
2. Measure and record the time, dosage of HSA, and temperature of RPC when HSA is added.
3. Mix the RPC under the HSA manufacturer's instructions after adding HSA or at least 30 revolutions, whichever is greater.
4. Incorporate RPC into the concrete within 4 hours after adding HSA.

RPC must not contain:

1. Accelerating admixture
2. Fiber
3. Pigment
4. Lightweight aggregate
5. Previously returned RPC
6. Any ingredient incompatible with the resultant concrete

### **90-9.02C Hydration Stabilizing Admixture**

HSA must comply with ASTM C494 admixture Type B or Type D.

HSA must have a proven history of specifically maintaining and extending both plasticity and set.

HSA dosage must comply with the manufacturer's instructions.

### **90-9.02D Production**

Proportion concrete containing RPC under section 90-2.02E.



# BID BOOK

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## COUNTY SERVICE AREAS 30 & 32 WATER SYSTEM IMPROVEMENTS

STATE WATER RESOURCES CONTROL BOARD PROJECT NUMBER:  
1000359-005C

DEPARTMENT OF WATER RESOURCES PROJECT NUMBER:  
4600011626

BUDGET / ACCOUNT / PROGRAM : 9172 / 8400 / 91317



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*Department of Public Works and Planning*

CONTRACT NUMBER 20-10-C

COPY NUMBER:

# BID BOOK TABLE OF CONTENTS

## COUNTY SERVICE AREAS 30 & 32 WATER SYSTEM IMPROVEMENTS

### CONTRACT NUMBER 20-10-C

<b>PROPOSAL NUMBER</b>	<b>TITLE</b>
<b>NOT APPLICABLE</b>	<b>INSTRUCTIONS FOR COMPLETING THE BID BOOK</b>
<b>1</b>	<b>PROPOSAL TO THE BOARD OF SUPERVISORS OF THE COUNTY OF FRESNO</b>
<b>2</b>	<b>BID ITEM LIST/BID SHEET</b>
<b>3</b>	<b>EVALUATION OF BID PROPOSAL SHEETS</b>
<b>4</b>	<b>BID SECURITY</b>
<b>5</b>	<b>NONCOLLUSION AFFIDAVIT</b>
<b>6</b>	<b>PUBLIC CONTRACT CODE SECTION 10285.1 STATEMENT</b>
<b>7</b>	<b>PUBLIC CONTRACT CODE SECTION 10162 QUESTIONNAIRE AND PUBLIC CONTRACT CODE 10232 STATEMENT</b>
<b>8(A) – 8(D)</b>	<b>SUBCONTRACTORS</b>
<b>9</b>	<b>CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS</b>
<b>10</b>	<b>TITLE 40, CODE OF FEDERAL REGULATIONS, PART 32 DEBARMENT AND SUSPENSION CERTIFICATION</b>
<b>11</b>	<b>NONLOBBYING CERTIFICATION FOR FEDERAL-AID CONTRACTS</b>
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<b>13(A) – 13(C)</b>	<b>DBE INFORMATION —GOOD FAITH EFFORTS</b>
<b>14</b>	<b>GUIDELINES FOR MEETING THE CALIFORNIA STATE REVOLVING FUND PROGRAMS DISADVANTAGED BUSINESS ENTERPRISE REQUIREMENTS</b>
<b>15</b>	<b>GUARANTY</b>

# INSTRUCTIONS FOR COMPLETING THE BID BOOK FOR FEDERAL AID PROJECTS

## General

Complete forms in the *Bid* book.

Submit your bid:

1. Under sealed cover addressed to the Department and labeled with the name of the bidder, the name of the project and the statement 'Do Not Open Until The Time Of Bid Opening.'
2. Marked as a bid
3. Identifying the contract number and the bid opening date

Certain bid forms must be submitted with the bid and properly executed.

Certain other forms and information must be submitted either with the bid or within the prescribed period after bid opening as specified elsewhere in these special provisions.

Failure to submit the forms and information as specified results in a nonresponsive bid.

If an agent other than the authorized corporation officer or a partnership member signs the bid, file a Power of Attorney with the Department either before opening bids or with the bid. Otherwise, the bid may be nonresponsive.

## Bid Item List and Bid Comparison

Submit a bid based on the bid item quantities the Department shows on the Bid Item List. Bids will be evaluated and the low bidder determined as indicated in the *Notice to Bidders*.

## Bid Document Completion

Proposal sheets are identified by title and by the letter "P" followed by the number assigned to the proposal sheet in question. Proposal sheets are included in the *Bid Book*.

## Proposal 1 - Proposal to the Board of Supervisors of Fresno County

Provided for information.

## Proposal 2 - Bid Proposal Sheet

One or more sheet(s) upon which the bidder completes the bid.

Fill out completely including a unit price and total for each unit price-based item and a total for each lump sum item.

Do not make any additions such as "plus tax", "plus freight", or conditions such as "less 2% if paid by 15th".

Use ink or typewriter.

## Proposal 3 - Evaluation of Bid Proposal Sheet

Describes how inconsistencies and irregularities are evaluated and corrected when Design Services reviews the Bid Item List.

#### **Proposal 4 - Bid Security and Signature**

Submit one of the following forms of bidder's security equal to at least 10 percent of the bid:

- Cash
- Cashier's check
- Certified check
- Signed bidder's bond by an admitted surety insurer

Indicate type of bid security provided.

- Cash – Acceptable but not recommended. Cash is deposited in a clearing account and is returned to bidders by County warrant. This process may take several weeks.
- Cashier's or Certified Checks. This type of security is held until the bid is no longer under consideration. If submitted by a potential awardee, they will be returned when the contract is fully executed by the bidder and bonds and insurance have been approved.
- Bid Bonds - Must be signed by the bidder and by the attorney-in-fact for the bonding company. Provide notarized signature of attorney-in-fact accompanied by bonding company's affidavit authorizing attorney-in-fact to execute bonds. An unsigned bid bond will be cause for rejection.

Acknowledge Addenda

Provide contractor's license information.

State business name and if business is a:

- Corporation - list officers
- Partnership - list partners
- Joint Venture - list members; if members are corporations or partnerships, list their officers or partners.
- Individual - list Owner's name and firm name style

Signature of Bidder - the following lists types of companies and corresponding authorized signers.

- Corporation - by an officer
- Partnership - by a partner
- Joint Venture - by a member
- Individual - by the Owner

If signature is by a Branch Manager, Estimator, Agent, etc., the bid must be accompanied by a power of attorney authorizing the individual to sign the bid in question or to sign bids more generally, otherwise the bid may be rejected.

- Business Address - Firm's Street Address
- Mailing Address - P.O. Box or Street Address
- Complete, sign, and return with bid.



**Proposal 5 - Noncollusion Affidavit**

Must be completed, signed, and returned with bid.

**Proposal 6 - Public Contract Code Section 10285.1 Statement**

Check “has” or “has not” in accordance with instructions on form, return with completed for with bid. Note that signing the bid constitutes signing this statement.

**Proposal 7 - Public Contract Code Section 10162 Questionnaire And Public Contract Code 10232 Statement**

Check: “yes” or “no” accordance with instructions on form, include explanation if “yes” is checked. Return completed form with bid. Note that signing the bid constitutes signing this questionnaire and statement.

**Proposal 8(a) through Proposal 8(d) - Subcontractors**

Sheet(s) upon which bidders list subcontractors. List each subcontractor to perform work in an amount in excess of 1/2 of 1 percent of the total bid or \$10,000, whichever is greater (Pub Cont Code § 4100 et seq.).

The *Subcontractor List* submitted with the bid must show the name, location of business, work portions to be performed, and the contractor’s license number for each subcontractor listed.

- Use subcontractor's business name style as registered with the License Board.
- Specify the city in which the subcontractor’s business is located and the state if other than California.
- Description of the work to be performed by the subcontractor. Indicate with bid item numbers from the bid sheet and/or work descriptions similar to those on bid sheet.
- List license number for each subcontractor.

Upon request from Design Services, provide the following additional information within 24 hours of bid opening if not included on the *Subcontractor List* submitted with the bid:

- Complete physical address for each subcontractor listed.
- Percentage of the total bid or dollar amount associated with each subcontractor listed.
- Department of Industrial Relations registration number

**Proposal 9 - Certification With Regard To The Performance Of Previous Contracts Or Subcontracts Subject To The Equal Opportunity Clause And The Filing Of Required Reports**

For a Federal-aid contract, complete, sign, and return with bid.

**Proposal 10 - Title 40, Code of Federal Regulations, Part 32 Debarment And Suspension Certification**

For a Federal-aid contract, complete, sign, and return with bid.

**Proposal 11 – Non-Lobbying Certification for Federal-Aid Contracts**

For a Federal-aid contract, complete, sign, and return with bid.

**Proposal 12(a) through Proposal 12(b) - Disclosure of Lobbying Activities**

For a Federal-aid contract, complete, sign, and return with bid.

**Proposal 13(a) through Proposal 13(c) - DBE Information — Good Faith Efforts**

For a Federal-aid contract, if you did not meet the DBE goal, bidders must complete and submit so that it is received by Design Services no later than 4:00 PM on the fifth business day after the bid opening if not submitted with the bid.

**Proposal 14 - Guidelines for Meeting the California State Revolving Fund Programs Disadvantaged Business Enterprise Requirements**

Instructions and Forms required by the Federal and State agencies financing the project. To be completed and submitted per the instructions.

**Proposal 15 - *Guaranty***

Does not need to be signed with the bid. Part of the contract which must be signed by the contractor when contract is executed.

**PROPOSAL TO THE BOARD OF SUPERVISORS OF THE COUNTY OF FRESNO**

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hereinafter called the Owner

**COUNTY SERVICE AREAS 30 & 32 WATER SYSTEM IMPROVEMENTS**

**SWRCB PROJECT NUMBER: 1000359-005C**

**DWR PROJECT NUMBER: 4600011626**

The work embraced herein shall be done in accordance with the 2015 Standard Specifications and with the 2015 Standard Plans, of the State of California, Department of Transportation insofar as the same may apply and in accordance with these special provisions.

Except to the extent that they may conflict with these special provisions, revised Standard Specifications apply to the extent included in the section entitled "Project Details" of the book entitled "Specifications."

The work to be done is shown on a set of Plans, Department File No. 11305, entitled: "County Service Areas 30 & 32, El Porvenir & Cantua Creek, State of California Department of Water Resources, Water System Improvements"

The undersigned, as bidder, declares that the only persons, or parties interested in this proposal as principals are those named herein, that this proposal is made without collusion with any other person, firm or corporation; that he has carefully examined the location of the proposed work, the annexed proposed form of contract, and the plans therein referred to; and he proposes and agrees if this proposal is accepted, that he will contract with the Owner to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all the materials specified in the contract in the manner and time therein prescribed, and according to the requirements of the Engineer as therein set forth, and that he will take in full payment therefor the following unit prices, to-wit:

**Proposal 1  
Contract Number 20-10-C**

COUNTY OF FRESNO  
DEPARTMENT OF PUBLIC WORKS AND PLANNING  
PROJECT: CSA 30 AND CSA 32 WATER SYSTEM IMPROVEMENTS  
SWRCB Project Number: 1000359-005C  
DWR Project Number: 460011626

**BID ITEM LIST**

**CSA 30 - EL PORVENIR BASE BID ITEMS (A)**

ITEM	QUANTIT Y	F	UNIT OF MEASURE	ITEM	ITEM PRICE	TOTAL PRICE
1	1		LS	MOBILIZATION, BONDS & INSURANCE		
2	1		EA	CONSTRUCTION PROJECT INFORMATION SIGN		
3	1		LS	JOB SITE MANAGEMENT		
4	1		LS	TRAFFIC CONTROL		
5	1		LS	LEAD COMPLIANCE PLAN		
6	1		LS	PREPARE & IMPLEMENT STORM WATER POLLUTION PREVENTION PLAN		
7	500		\$	STATE WATER RESOURCES CONTROL BOARD - NOTICE OF INTENT	\$ 1.00	\$ 500.00
8	1		LS	DUST CONTROL		
9	30,000		\$	SUPPLEMENTAL WORK ALLOWANCE	\$ 1.00	\$ 30,000.00
10	2,500		\$	SUPPLEMENTAL WORK (Payment Adjustments for Price Index Fluctuations)	\$ 1.00	\$ 2,500.00
11	1		LS	CLEARING AND GRUBBING		
12	1		LS	UTILITY POTHOLING		
13	2,698		LF	6" DI, TR XTREME WATER MAIN		
14	144		LF	4" DI, TR FLEX WATER MAIN		
15	9		EA	6" GATE VALVE ASSEMBLY		
16	2		EA	4" GATE VALVE ASSEMBLY		
17	4		EA	1" COMBINATION AIR VALVE ASSEMBLY		
18	5		EA	PERMANENT BLOW OFF ASSEMBLY		
19	5		EA	BACTERIOLOGICAL SAMPLING STATION		
20	4		EA	FIRE HYDRANT ASSEMBLY AND LATERAL		
21	53		EA	TYPE A 1" WATER SERVICE LATERAL REPLACEMENT		
22	1		EA	TYPE A 3" WATER SERVICE LATERAL REPLACEMENT (Hidalgo Avenue)		
23	2,471	F	LF	TEMPORARY TRENCH RESURFACING (Mains & F.H. Laterals)		
24	68	F	EA	TEMPORARY TRENCH RESURFACING (Services and Appurtenances)		
25	440		TON	PERMANENT TRENCH RESURFACING (Mains, Services and Appurtenances)		
26	88		LF	SAWCUT, REMOVE AND REPLACE CONCRETE CURB AND GUTTER		
27	200		SF	SAWCUT, REMOVE AND REPLACE CONCRETE VALLEY GUTTER		
28	14		EA	REMOVE EXISTING VALVE BOXES		
29	4		EA	REMOVE EXISTING FIRE HYDRANTS		
30	16		EA	REMOVE AND DISPOSE OF ASBESTOS CEMENT PIPE		
31	1		EA	CSA 30 TANK SITE CONNECTION		
32	1		LS	WATER SYSTEM ABANDONMENT		
<b>SUBTOTAL (Bid Items 1-32)</b>						

**CSA 30 - EL PORVENIR BASE BID ITEMS (B) (Water Meters)**

ITEM	QUANTIT Y	F	UNIT OF MEASURE	ITEM	ITEM PRICE	TOTAL PRICE
33	1		LS	MOBILIZATION, BONDS & INSURANCE		
34	1		LS	JOB SITE MANAGEMENT		
35	53		EA	1" WATER METER AND METER BOX		
36	1		EA	2" WATER METER AND METER BOX		
<b>SUBTOTAL (Bid Items 33-36)</b>						

**CSA 32 - CANTUA CREEK BASE BID ITEMS (A)**

ITEM	QUANTIT Y	F	UNIT OF MEASURE	ITEM	ITEM PRICE	TOTAL PRICE
37	1		LS	MOBILIZATION, BONDS & INSURANCE		
38	1		EA	CONSTRUCTION PROJECT INFORMATION SIGN		
39	1		LS	JOB SITE MANAGEMENT		
40	1		LS	TRAFFIC CONTROL		
41	1		LS	LEAD COMPLIANCE PLAN		
42	1		LS	PREPARE & IMPLEMENT STORM WATER POLLUTION PREVENTION PLAN		
43	500		\$	STATE WATER RESOURCES CONTROL BOARD - NOTICE OF INTENT	\$ 1.00	\$ 500.00
44	1		LS	DUST CONTROL		
45	30,000		\$	SUPPLEMENTAL WORK ALLOWANCE	\$ 1.00	\$ 30,000.00
46	3,000		\$	SUPPLEMENTAL WORK (Payment Adjustments for Price Index Fluctuations)	\$ 1.00	\$ 3,000.00
47	1		LS	CLEARING AND GRUBBING		
48	1		LS	UTILITY POTHOLING		
49	1,489		LF	8" PVC, C900, DR-14 WATER MAIN		
50	2,836		LF	6" PVC, C900, DR-14 WATER MAIN		
51	120		LF	6" DIP, CLASS 52 WATER MAIN		
52	8		EA	8" GATE VALVE ASSEMBLY		
53	10		EA	6" GATE VALVE ASSEMBLY		
54	5		EA	1" COMBINATION AIR VALVE ASSEMBLY		
55	5		EA	PERMANENT BLOW OFF ASSEMBLY		
56	5		EA	BATERIOLOGICAL SAMPLING STATION		
57	6		EA	FIRE HYDRANT ASSEMBLY AND LATERAL		
58	4		EA	INSTALL BOLLARDS FOR FIRE HYDRANT		
59	74		EA	TYPE A AND B 1" WATER SERVICE LATERAL REPLACEMENT		
60	3417	F	LF	TEMPORARY TRENCH RESURFACING (Mains & F.H. Laterals)		
61	88	F	EA	TEMPORARY TRENCH RESURFACING (Services and Appurtenances)		
62	570		TON	PERMANENT TRENCH RESURFACING (Mains, Serrvices and Appurtenances)		
63	346		LF	SAWCUT, REMOVE AND REPLACE CONCRETE CURB AND GUTTER		
64	560		SF	SAWCUT, REMOVE AND REPLACE CONCRETE VALLEY GUTTER		
65	1391		SF	SAWCUT, REMOVE AND REPLACE CONCRETE SIDEWALK		
66	20		EA	REMOVE EXISTING VALVE BOXES		
67	6		EA	REMOVE EXISTING FIRE HYDRANTS		
68	4		EA	REMOVE AND DISPOSE OF ASBESTOS CEMENT PIPE		
69	6		EA	REMOVE AND REPLACE SEWER HOUSE BRANCHES WITH 4" PVC SDR 35		
70	3		EA	TEMPORARY BY PASS CONNECTION OF EXISTING WATER MAIN		
71	1		EA	CSA 32 TANK SITE CONNECTION		
72	1		LS	WATER SYSTEM ABANDONMENT		
<b>SUBTOTAL (Bid items 37-72)</b>						

**CSA 32 - CANTUA CREEK BASE BID ITEMS (B); (Water Meters & All Facilities East of Santa Clara Avenue)**

ITEM	QUANTIT Y	F	UNIT OF MEASURE	ITEM	ITEM PRICE	TOTAL PRICE
73	1		LS	MOBILIZATION, BONDS & INSURANCE		
74	1		LS	JOB SITE MANAGEMENT		
75	1		LS	TRAFFIC CONTROL		
76	1		LS	LEAD COMPLIANCE PLAN		
77	1		LS	PREPARE & IMPLEMENT STORM WATER POLLUTION PREVENTION PLAN		
78	500		\$	STATE WATER RESOURCES CONTROL BOARD - NOTICE OF INTENT	\$ 1.00	\$ 500.00
79	1		LS	DUST CONTROL		
80	500		\$	SUPPLEMENTAL WORK (Payment Adjustments for Price Index Fluctuations)	\$ 1.00	\$ 500.00
81	1		LS	CLEARING AND GRUBBING		
82	1		LS	UTILITY POTHOLING		
83	2,246		LF	8" PVC, C900, DR-14 WATER MAIN (East of Santa Clara Avenue)		
84	268		LF	4" PVC, C900, DR-14 WATER MAIN		
85	3		EA	8" GATE VALVE ASSEMBLY		
86	2		EA	4" GATE VALVE ASSEMBLY		

87	2		EA	1" COMBINATION AIR VALVE ASSEMBLY		
88	2		EA	PERMANENT BLOW OFF ASSEMBLY		
89	4		EA	FIRE HYDRANT ASSEMBLY AND LATERAL		
90	12		EA	INSTALL BOLLARDS FOR FIRE HYDRANT & AIR VALVE		
91	3		EA	TYPE A 1" WATER SERVICE LATERAL REPLACEMENT (Clarkson Avenue)		
92	1		EA	TYPE A 4" WATER SERVICE LATERAL REPLACEMENT (Mobile Home Park)		
93	1		EA	TYPE A 3" WATER SERVICE LATERAL (Cantua Creek Vineyards IV)		
94	77		EA	1" TYPE A&B WATER METER AND METER BOX		
95	1		EA	2" WATER METER AND METER BOX (Mobile Home Park)		
96	2		EA	2" WATER METER AND METER BOX (School)		
97	1		EA	3" WATER METER AND METER BOX (Cantua Creek Vineyards IV)		
98	1		LS	ABANDON EXISTING 4" WATER MAIN (Clarkson Avenue)		
99	241	F	LF	TEMPORARY TRENCH RESURFACING (Mains)		
100	40		TON	PERMANENT TRENCH RESURFACING (Mains, Services and Appurtenances)		
101	2		EA	CONNECT TO EXISTING 8" PVC WATER MAIN		
<b>SUBTOTAL (Bid items 73-101)</b>						

**CSA 30 ADDITIVE BID ITEM LIST #1**

ITEM	QUANTIT Y	F	UNIT OF MEASURE	ITEM	ITEM PRICE	TOTAL PRICE
102	1		LS	MOBILIZATION, BONDS & INSURANCE		
103	1		LS	JOB SITE MANAGEMENT		
104	53		EA	COUNTY OF FRESNO PLUMBING AND ELECTRICAL PERMITS	\$ 135.50	\$ 7,181.50
105	53		EA	UPDATE GROUNDING SYSTEM		
106	1		LS	CLEARING AND GRUBBING		
107	1,855		LF	1" HOUSE SERVICE LINE		
<b>SUBTOTAL (Bid items 102-107)</b>						

**CSA 32 ADDITIVE BID ITEM LIST #2**

ITEM	QUANTIT Y	F	UNIT OF MEASURE	ITEM	ITEM PRICE	TOTAL PRICE
108	1		LS	MOBILIZATION, BONDS & INSURANCE		
109	1		LS	JOB SITE MANAGEMENT		
110	77		EA	COUNTY OF FRESNO PLUMBING AND ELECTRICAL PERMITS	\$ 135.50	\$ 10,433.50
111	77		EA	UPDATE GROUNDING SYSTEM		
112	1		LS	CLEARING AND GRUBBING		
113	2,735		LF	1" HOUSE SERVICE LINE		
<b>SUBTOTAL (Bid items 108-113)</b>						

<b>TOTAL (Bid items 1-113)</b>						
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F - FINAL PAY ITEM

## **EVALUATION OF BID PROPOSAL SHEETS**

Abbreviations used in the bid proposal sheet are identified in Section 1-1.06, "Abbreviations," of these special provisions.

Bids are required for the entire work. Bids will be compared on the basis indicated in the Notice to Bidders. The bidder shall set forth for each unit basis item of work a unit price and a total for the item, and for each lump sum item a total for the item, all in clearly legible figures in the respective spaces provided for that purpose. In the case of unit basis items, the amount set forth under the "Item Total" column shall be the product of the unit price bid and the estimated quantity for the item.

In case of discrepancy between the unit price and the total set forth for a unit basis item, the unit price shall prevail, except as provided in (a) or (b), as follows:

- (a) If the amount set forth as a unit price is unreadable or otherwise unclear, or is omitted, or is the same as the amount as the entry in the item total column, then the amount set forth in the item total column for the item shall prevail and shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price;
- (b) (Decimal Errors) If the product of the entered unit price and the estimated quantity is exactly off by a factor of ten, one hundred, etc., or one-tenth, or one-hundredth, etc. from the entered total, the discrepancy will be resolved by using the entered unit price or item total, whichever most closely approximates percentage-wise the unit price or item total in the Owner's Final Estimate of cost.

If both the unit price and the item total are unreadable or otherwise unclear, or are omitted, the bid may be deemed irregular. Likewise, if the item total for a lump sum item is unreadable or otherwise unclear, or is omitted, the bid may be deemed irregular unless the project being bid has only a single item and a clear, readable total bid is provided.

Symbols such as commas and dollar signs will be ignored and have no mathematical significance in establishing any unit price or item total or lump sums. Written unit prices, item totals and lump sums will be interpreted according to the number of digits and, if applicable, decimal placement. Cents symbols also have no significance in establishing any unit price or item total since all figures are assumed to be expressed in dollars and/or decimal fractions of a dollar. Bids on lump sum items shall be item totals only; if any unit price for a lump sum item is included in a bid and it differs from the item total, the items total shall prevail.

The foregoing provisions for the resolution of specific irregularities cannot be so comprehensive as to cover every omission, inconsistency, error or other irregularity which may occur in a bid. Any situation not specifically provided for will be determined in the discretion of the Owner, and that discretion will be exercised in the manner deemed by the Owner to best protect the public interest in the prompt and economical completion of the work. The decision of the Owner respecting the amount of a bid, or the existence or treatment of an irregularity in a bid, shall be final.

If this proposal shall be accepted and the undersigned shall fail to contract, as aforesaid, and to give the two bonds in the sums to be determined as aforesaid, with surety satisfactory to the Owner, within eight (8) days not including Saturdays, Sundays and legal holidays, after the bidder has received notice of award of the contract, the Owner, at its option, may determine that the bidder has abandoned the contract, and thereupon this proposal and the acceptance thereof shall be null and void, and the forfeiture of such security accompanying this proposal shall operate and the same shall be the property of the Owner.

**Proposal 3**  
**Contract Number 20-10-C**

**BID SECURITY AND SIGNATURE**

Accompanying this proposal is security (check one only) in amount equal to at least ten percent (10%) of the total amount of the bid:

Bid Bond ( ) ; Certified Check ( ) ; Cashier's Check ( ) ; Cash (\$ )

Bidder has and acknowledges the following addenda: \_\_\_\_\_

The names of all persons interested in the foregoing proposal as principals are as follows:

IMPORTANT NOTICE: If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners composing firm; if bidder or other interested person is an individual, state first and last name in full.

FIRM NAME \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Licensed in accordance with an act providing for the registration of Contractors,

Class \_\_\_\_\_ License No. \_\_\_\_\_ Expires \_\_\_\_\_

DIR Registration Number \_\_\_\_\_

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Dated

**NOTE:** If bidder is a corporation, the legal name of the corporation shall be set forth above together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation; if bidder is a co-partnership, the true name of the firm shall be set forth above together with the signature of the partner or partners authorized to sign contracts on behalf of the co-partnership; and if bidder is an individual, his signature shall be placed above. If signature is by an agent, other than an officer of a corporation or a member of a partnership, a Power of Attorney must be on file with the Owner prior to opening bids or submitted with the bid; otherwise, the bid will be disregarded as irregular and unauthorized.

BUSINESS ADDRESS: \_\_\_\_\_  
Zip Code

MAILING ADDRESS: \_\_\_\_\_  
Zip Code

BUSINESS PHONE: (\_\_\_\_\_) \_\_\_\_\_ FAX NUMBER: (\_\_\_\_\_) \_\_\_\_\_

EMAIL ADDRESS \_\_\_\_\_

**Proposal 4  
Contract Number 20-10-C**



**SWRCB Project Number: 1000359-005C**  
**DWR Project Number: 4600011626**

To the Board of Supervisors, County of Fresno:

**NONCOLLUSION DECLARATION**

**TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID\***

The undersigned declares:

I am the \_\_\_\_\_ of  
(Owner, Partner, Corporate Officer (list title), Co-Venturer)

\_\_\_\_\_, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, and has not paid, and will not pay, any person or entity for that purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on \_\_\_\_\_, 2020,

at \_\_\_\_\_,"  
[city] [state]

\_\_\_\_\_  
(Signature)

(See Title 23 United States Code Section 112; Calif Public Contract Code Section 7106)

\*NOTE: Completing, signing, and returning the Non-Collusion Affidavit is a required part of the Proposal. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

**Proposal 5**  
**Contract Number 20-10-C**

## **PUBLIC CONTRACT CODE**

### **Public Contract Code Section 10285.1 Statement**

In conformance with Public Contract Code Section 10285.1 (Chapter 376, Stats. 1985), the bidder hereby declares under penalty of perjury under the laws of the State of California that the bidder has \_\_\_\_, has not \_\_\_\_been convicted within the preceding three years of any offenses referred to in that section, including any charge of fraud, bribery, collusion, conspiracy, or any other act in violation of any state or Federal antitrust law in connection with the bidding upon, award of, or performance of, any public works contract, as defined in Public Contract Code Section 1101, with any public entity, as defined in Public Contract Code Section 1100, including the Regents of the University of California or the Trustees of the California State University. The term "bidder" is understood to include any partner, member, officer, director, responsible managing officer, or responsible managing employee thereof, as referred to in Section 10285.1.

Note: The bidder must place a check mark after "has" or "has not" in one of the blank spaces provided. The above Statement is part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature of this Statement. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

**Public Contract Code Section 10162 Questionnaire**

In conformance with Public Contract Code Section 10162, the Bidder shall complete, under penalty of perjury, the following questionnaire:

Has the bidder, any officer of the bidder, or any employee of the bidder who has a proprietary interest in the bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state, or local government project because of a violation of law or a safety regulation?

Yes \_\_\_\_\_ No \_\_\_\_\_

If the answer is yes, explain the circumstances in the following space.

**Public Contract Code 10232 Statement**

In conformance with Public Contract Code Section 10232, the Contractor, hereby states under penalty of perjury, that no more than one final unappealable finding of contempt of court by a federal court has been issued against the Contractor within the immediately preceding two-year period because of the Contractor's failure to comply with an order of a federal court which orders the Contractor to comply with an order of the National Labor Relations Board.

Note: The above Statement and Questionnaire are part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature of this Statement and Questionnaire.

Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

**Proposal 7  
Contract Number 20-10-C**

**BIDDER:** \_\_\_\_\_

**SUBCONTRACTORS:**

The following named subcontractor(s) will perform with labor, or otherwise render services to the general contractor in or about the construction of the work or improvement in an amount in excess of **one-half of one percent of the total bid presented herewith**. Please fill out as completely as possible when submitting your bid. Use subcontractor's business name style as registered with the License Board. Each listed subcontractor's name, location of business and description of work, and both their contractor's license number and public works contractor registration number, issued pursuant to Section 1725.5 of the Labor Code, are REQUIRED, by Section 4104 of the California Public Contract Code, to be submitted prior to bid opening. (The "location of business" must specify the city in which the subcontractor's business is located, and the state if other than California.) All other requested information shall be submitted, either with the bid or within 24 hours after bid opening.

Please fill out as completely as possible when submitting your bid. Use subcontractor's business name style as registered with the License Board.

**FAILURE TO LIST SUBCONTRACTORS AS DIRECTED MAY RENDER THE BID NON-RESPONSIVE, OR MAY RESULT IN ASSESSMENT OF A PENALTY AGAINST THE BIDDER IN ACCORDANCE WITH SECTION 4110 OF THE CALIFORNIA PUBLIC CONTRACT CODE.**

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**BIDDER:** \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**Proposal 8(b)  
Contract Number 20-10-C**

**BIDDER:** \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**Proposal 8(c)  
Contract Number 20-10-C**

**BIDDER:** \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Business Address: \_\_\_\_\_

Class \_\_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

Email Address \_\_\_\_\_

**Proposal 8(d)  
Contract Number 20-10-C**

**CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS.**

The bidder \_\_\_, proposed subcontractor \_\_\_, hereby certifies that he has \_\_\_, has not \_\_\_, participated in a previous contract or subcontract subject to the equal opportunity clause, as required by Executive Orders 10925, 11114, or 11246, and that he has \_\_\_, has not \_\_\_, filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

\_\_\_\_\_  
(Company)

By: \_\_\_\_\_

\_\_\_\_\_  
(Title)

Date: \_\_\_\_\_

**NOTE:** The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7(b) (1)), and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the equal opportunity clause. Contracts and subcontracts which are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5. (Generally only contracts or subcontracts of \$10,000 or under are exempt.)

Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed the required reports should note that 41 CFR 60-1.7(b) (1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Director, Office of Federal Contract Compliance, U. S. Department of Labor.

**Proposal 9  
Contract Number 20-10-C**



## Certification Regarding Debarment, Suspension, and Other Responsibility Matters

**STATE WATER RESOURCES CONTROL BOARD PROJECT NUMBER: 1000359-005C**

**DEPARTMENT OF WATER RESOURCES PROJECT NUMBER: 4600011626**

The prospective 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 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 judgement 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, 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 government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b) 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.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in a fine of up to \$10,000 or imprisonment for up to 5 years, or both.

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Name & Title of Authorized Representative

Date

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Signature of Authorized Representative

I am unable to certify to the above statements. My explanation is attached.

## NONLOBBYING CERTIFICATION FOR FEDERAL-AID CONTRACTS

The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

- (1) 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 awarding of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) 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 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 of Lobbying Activities," in accordance with its instructions.

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 Section 1352, Title 31, U.S. Code. 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.

The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such sub-recipients shall certify and disclose accordingly.

Bidder: \_\_\_\_\_

By: \_\_\_\_\_

Date: \_\_\_\_\_

Title: \_\_\_\_\_

**Proposal 11**  
**Contract Number 20-10-C**

### Disclosure of Lobbying Activities

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352  
(See reverse for public burden disclosure)

<b>1. Type of Federal Action:</b> a. contract _____ b. grant c. cooperative agreement d. loan e. loan guarantee f. loan insurance	<b>2. Status of Federal Action:</b> a. bid/offer/application _____ b. initial award c. post-award	<b>3. Report Type:</b> a. initial filing _____ b. material change  <b>For material change only:</b> Year _____ quarter _____ Date of last report _____
<b>4. Name and Address of Reporting Entity:</b> _____ Prime _____ Subawardee Tier _____, if Known:  <b>Congressional District, if known:</b>	<b>5. If Reporting Entity in No. 4 is Subawardee,</b> Enter Name and Address of Prime:  <b>Congressional District, if known:</b>	
<b>6. Federal Department/Agency:</b>	<b>7. Federal Program Name/Description:</b>  CFDA Number, if applicable: _____	
<b>8. Federal Action Number, if known:</b>	<b>9. Award Amount, if known:</b> \$	
<b>10. a. Name and Address of Lobbying Registrant</b> <i>(if individual, last name, first name, MI):</i>	<b>b. Individuals Performing Services</b> <i>(including address if different from No. 10a)</i> <i>(last name, first name, MI):</i>	
<b>11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.</b>	<b>Signature:</b> _____ <b>Print Name:</b> _____ <b>Title:</b> _____ <b>Telephone No.:</b> _____ <b>Date:</b> _____	
<b>Federal Use Only</b>	<b>Authorized for Local Reproduction</b> <b>Standard Form - LLL (Rev. 7-97)</b>	

**Proposal 12(a)**  
**Contract Number 20-10-C**

## INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether sub-awardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or sub-award recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Sub-awards include but are not limited to subcontracts, sub-grants and contract awards under grants.
5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitations for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Included prefixes, e.g., "RFP-DE-90-001."
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.  
  
(b) Enter the full names of the individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).
11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

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According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503

**Proposal 12(b)**  
**Contract Number 20-10-C**

**DBE Information - Good Faith Efforts**

Federal-aid Project No(s). \_\_\_\_\_ Bid Opening Date \_\_\_\_\_

The information provided herein shows the required good faith efforts to meet or exceed the DBE contract goal.

Proposers or bidders submit the following information to document their good faith efforts no later than 4:00 PM on the fifth business day after the bid opening. Proposers and bidders are required to submit the following information even if the proposer or bidder has met the DBE goal. This form protects the proposer's or bidder's eligibility for award of the contract if the administering agency determines that the bidder failed to meet the goal for various reasons, e.g., a DBE firm was not certified at bid opening, or the bidder made a mathematical error.

The following items are listed in the Section entitled "Submission of DBE Commitment" of the Special Provisions, **please attach additional sheets as needed:**

- A. The names and dates of each publication in which a request for DBE participation for this project was placed by the bidder (please attach copies of advertisements or proofs of publication):

Publications	Dates of Advertisement

- B. The names and dates of written notices sent to certified DBEs soliciting bids for this project and the dates and methods used for following up initial solicitations to determine with certainty whether the DBEs were interested (please attach copies of solicitations, telephone records, fax confirmations, etc.):

Names of DBEs Solicited	Date of Initial Solicitation	Follow Up Methods and Dates

**Proposal 13(a)**

C. The items of work made available to DBE firms including those unbundled contract work items into economically feasible units to facilitate DBE participation. It is the bidder's responsibility to demonstrate that sufficient work to facilitate DBE participation in order to meet or exceed the DBE contract goal.

Items of Work	Proposer or Bidder Normally Performs Item (Y/N)	Breakdown of Items	Amount (\$)	Percentage Of Contract

D. The names, addresses and phone numbers of rejected DBE firms, the reasons for the bidder's rejection of the DBEs, the firms selected for that work (please attach copies of quotes from the firms involved), and the price difference for each DBE if the selected firm is not a DBE:

Names, addresses and phone numbers of rejected DBEs, and the reasons for the bidder's rejection of the DBEs:

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Names, addresses and phone numbers of firms selected for the work above:

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E. Efforts (e.g. in advertisements and solicitations) made to assist interested DBEs in obtaining information related to the plans, specifications and requirements for the work which was provided to DBEs:

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California State Water Resources Control Board  
Division of Financial Assistance  
1001 I Street • Sacramento, California 95814 • (916) 341-5700 FAX (916) 341-5707  
Mailing Address: P. O. Box 944212 • Sacramento, California • 94244-2120  
Internet Address: <http://www.waterboards.ca.gov>

## **Guidelines for Meeting the California State Revolving Fund (CASRF) Programs (Clean Water and Drinking Water SRF) Disadvantaged Business Enterprise Requirements**

The Disadvantaged Business Enterprise (DBE) Program is an outreach, education, and objectives program designed to increase the participation of DBEs in the Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) Programs.

### **How to Achieve the Purpose of the Program**

Recipients of CWSRF/DWSRF financing that are subject to the DBE requirements (recipients) are required to seek, and are encouraged to use, DBEs for their procurement needs. Recipients should award a "fair share" of sub-agreements to DBEs. This applies to all sub-agreements for equipment, supplies, construction, and services.

The key functional components of the DBE Program are as follows:

- Fair Share Objectives
- DBE Certification
- Six Good Faith Efforts
- Contract Administration Requirements
- DBE Reporting

### **Disadvantaged Business Enterprises are:**

- Entities owned and/or controlled by socially and economically disadvantaged individuals as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note) (10% statute), and Public Law 102-389 (42 U.S.C. 4370d) (8% statute), respectively;
- Minority Business Enterprise (MBE) - entities that are at least 51% owned and/or controlled by a socially and economically disadvantaged individual as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note), and Public Law 102-389 (42 U.S.C. 4370d), respectively;
- Women Business Enterprise (WBE) - entities that are at least 51% owned and/or controlled by women;
- Small Business Enterprise (SBE);
- Small Business in a Rural Area (SBRA);
- Labor Surplus Area Firm (LSAF); or
- Historically Underutilized Business (HUB) Zone Small Business Concern or a concern under a successor program.

### **Certifying DBE Firms:**

Under the DBE Program, entities can no longer self-certify and contractors and sub-contractors must be certified at bid opening. Contractors and sub-contractors must provide to the CASRF recipient proof of DBE certification. Certifications will be accepted from the following:

- The U.S. Environmental Protection Agency (USEPA)
- The Small Business Administration (SBA)
- The Department of Transportation's State implemented DBE Certification Program (with U.S. citizenship)
- Tribal, State and Local governments
- Independent private organization certifications

If an entity holds one of these certifications, it is considered acceptable for establishing status under the DBE Program.



**Six Good Faith Efforts (GFE)**

All CWSRF/DWSRF financing recipients are required to complete and ensure that the prime contractor complies with the GFE below to ensure that DBEs have the opportunity to compete for financial assistance dollars.

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practical through outreach and recruitment activities. For Tribal, State and Local Government Recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
2. Make information on forthcoming opportunities available to DBEs. Posting solicitations for bids or proposals for a minimum of 30 calendar days in a local newspaper, before the bid opening date.
3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs.
4. Encourage contracting with a group of DBEs when a contract is too large for one firm to handle individually.
5. Use the services of the SBA **and/or** Minority Business Development Agency (MBDA) of the US Department of Commerce.
6. If the prime contractor awards subcontracts, require the prime contractor to take the above steps.

The forms listed in the table below and attached to these guidelines; must be completed and submitted with the GFE:

FORM NUMBER	FORM NAME	REQUIREMENT	PROVIDED BY	COMPLETED BY	SUBMITTED TO
SWRCB Form 4500-2 or EPA Form	DBE Sub-Contractor Participation Form	As Needed to Report Issues	Recipient	Sub-contractor	EPA DBE Coordinator
SWRCB Form 4500-3 or EPA Form	DBE Sub-Contractor Performance Form	Include with Bid or Proposal Package	Prime Contractor	Sub-Contractor	SWRCB by Recipient
SWRCB Form 4500-4 or EPA Form	DBE Sub-Contractor Utilization Form	Include with Bid or Proposal Package	Recipient	Prime Contractor	SWRCB by Recipient

**The completed forms must be submitted with each Bid or Proposal.** The recipient shall review the bidder’s documents closely to determine that the GFE was performed **prior** to bid or proposal opening date. Failure to complete the GFE and to substantiate completion of the GFE before the bid opening date could jeopardize CWSRF/DWSRF financing for the project. The following situations and circumstances require action as indicated:

1. If the apparent successful low bidder was rejected, a complete explanation must be provided.
2. Failure of the apparent low bidder to **perform** the GFE **prior** to bid opening constitutes a non-responsive bid. The construction contract may then be awarded to the next low, responsive, and responsible bidder that meets the requirements or the Recipient may re-advertise the project.
3. If there is a bid dispute, all disputes shall be settled **prior** to submission of the Final Budget Approval Form.

**Administration Requirements**

- A recipient of CWSRF/DWSRF financing must require entities receiving funds to create and maintain a Bidders List if the recipient of the financing agreement is subject to, or chooses to follow, competitive bidding requirements.
- The Bidders list must include all firms that bid or quote on prime contracts, or bid or quote on subcontracts, including both DBEs and non-DBEs.

- Information retained on the Bidder's List must include the following:
  1. Entity's name with point of contact;
  2. Entity's mailing address and telephone number;
  3. The project description on which the entity bid or quoted and when;
  4. Amount of bid/quote; and
  5. Entity's status as a DBE or non-DBE.
- The Bidders List must be kept until the recipient is no longer receiving funding under the agreement.
- The recipient shall include Bidders List as part of the Final Budget Approval Form.
- A recipient must require its prime contractor to pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the Recipient.
- A recipient must be notified in writing by its prime contractor prior to any termination of a DBE subcontractor by the prime contractor.
- If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the six GFEs if soliciting a replacement subcontractor.
- A recipient must require its prime contractor to employ the six GFEs even if the prime contractor has achieved its fair share objectives.

### **Reporting Requirements**

For the duration of the construction contract(s), the recipient is required to submit to the State Water Resources Control Board DBE reports annually by October 10 of each fiscal year on the attached Utilization Report form (UR-334). Failure to provide this information as stipulated in the financial agreement language may be cause for withholding disbursements.

### **CONTACT FOR MORE INFORMATION**

SWRCB, CASRF – Barbara August (916) 341-6952 [barbara.august@waterboards.ca.gov](mailto:barbara.august@waterboards.ca.gov)

US EPA, Region 9 – Joe Ochab (415) 972-3761 [ochab.joe@epa.gov](mailto:ochab.joe@epa.gov)

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**Disadvantaged Business Enterprise (DBE) Program**  
**DBE Subcontractor Participation Form**

A Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE<sup>1</sup> subcontractor<sup>2</sup> the opportunity to describe work received and/or report any concerns regarding the funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid / Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity	

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Amount Received by Prime Contractor

<sup>1</sup> A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

<sup>2</sup> Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

Please use the space below to report any concerns regarding the above funded project:

Subcontractor Signature	Print Name
Title	Date

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency’s need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

**Send completed Form 4500-2 to:**  
 Mr. Joe Ochab, DBE Coordinator  
 US EPA, Region 9  
 75 Hawthorne Street  
 San Francisco, CA 94105

**FORM 4500-2 (DBE Subcontractor Participation Form)**



**Disadvantaged Business Enterprise (DBE) Program  
DBE Subcontractor Performance Form**

This form is intended to capture the DBE<sup>1</sup> subcontractor's<sup>2</sup> description of work to be performed and the price of the work submitted to the prime contractor. A Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.

Subcontractor Name		Project Name	
Bid / Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity	

Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA <input type="checkbox"/> Other: _____		Meets/exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Unknown

<sup>1</sup> A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.  
<sup>2</sup> Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

**FORM 4500-3 (DBE Subcontractor Performance Form)**



## Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE<sup>1</sup> subcontractor's<sup>2</sup> and the estimated dollar amount of each subcontract. A Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid / Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Issuing/Funding Entity			

I have identified potential DBE certified subcontractors. ___ YES ___ NO If yes, please complete the table below. If no, please explain:			
Subcontractor Name/ Company Name	Company Address / Phone / Email	Estimated Dollar Amount	Currently DBE Certified?

--Continue on back if needed--

<sup>1</sup> A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

<sup>2</sup> Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.



I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

**FORM 4500-4 (DBE Subcontractor Utilization Form)**



**STATE WATER RESOURCES CONTROL BOARD – DIVISION OF FINANCIAL ASSISTANCE  
DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION  
CALIFORNIA STATE REVOLVING FUNDS (CASRF)  
FORM UR-334**

1. Grant/Finance Agreement Number:		2. Annual Reporting Period 10/1/___ through 09/30/___		3. Purchase Period of Financing Agreement:	
4. Total Payments Paid to Prime Contractor or Sub-Contractors During Current Reporting Period: \$					
5. <u>Recipient's Name and Address:</u>			6. <u>Recipient's Contact Person and Phone Number:</u>		
7. List All DBE Payments Paid by Recipient or Prime Contractor During Current Reporting Period:					
Payment or Purchase Paid by Recipient or Prime Contractor	Amount Paid to Any DBE Contractor or Sub-Contractor For Service Provided to Recipient		Date of Payment (MM/DD/YY)	Procurement Type Code** (see below)	Name and Address of DBE Contractor of Sub-Contractor or Vendor
	MBE	WBE			
8. Initial here if no DBE contractors or sub-contractors paid during current reporting period:					
9. Initial here if all procurements for this contract are completed:					
10. Comments:					
11. Signature and Title of Recipient's Authorized Representative			12. Date		

**Email Form UR-334 to:**

[DrinkingWaterSRF@waterboards.ca.gov](mailto:DrinkingWaterSRF@waterboards.ca.gov) OR [CleanWaterSRF@waterboards.ca.gov](mailto:CleanWaterSRF@waterboards.ca.gov)

**Questions may be directed to:**

Barbara August, SWRCB  
[Barbara.August@waterboards.ca.gov](mailto:Barbara.August@waterboards.ca.gov)  
 Phone: (916) 341-6952  
 Fax: (916) 327-7469

**\*\*Procurement Type:**

1. Construction
2. Supplies
3. Services (includes business services; professional services; repair services and personnel services)
4. Equipment

**STATE WATER RESOURCES CONTROL BOARD - DIVISION OF FINANCIAL ASSISTANCE  
DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION  
CALIFORNIA STATE REVOLVING FUNDS**

**INSTRUCTIONS FOR COMPLETING FORM UR-334**

- Box 1** Grant or Financing Agreement Number.
- Box 2** Annual reporting period.
- Box 3** Enter the dates between which you made procurements under this financing agreement or grant.
- Box 4** Enter the total amount of payments paid to the contractor or sub-contractors during this reporting period.
- Box 5** Enter Recipient's Name and Address.
- Box 6** Enter Recipient's Contact Name and Phone Number.
- Box 7** Enter details for the **DBE purchases only** and be sure to limit them to the current period.  
1) Use either an "R" or a "C" to represent "Recipient" or "Contractor." 2) Enter a dollar total for DBE and total the two columns at the bottom of the section. 3) Provide the payment date. 4) Enter a product type choice from those at the bottom of the page. 5) List the vendor name and address in the right-hand column
- Box 8** Initial here if no DBE contractors or sub-contractors were paid during this reporting period.
- Box 9** Initial this box only if all purchases under this financing agreement or grant have been completed during this reporting period or a previous period. If you initial this box, we will no longer send you a survey.
- Box 10** This box is for explanatory information or questions.
- Box 11** Provide an authorized representative signature.
- Box 12** Enter the date form completed.

(This guaranty shall be executed by the successful bidder in accordance with instructions in the special provisions. The bidder may execute the guaranty on this page at the time of submitting his bid.)

**G U A R A N T Y**

To the Owner: County of Fresno

**CONTRACT NUMBER 20-10-C**

The undersigned guarantees the construction and installation of the following work included in this project:

**ALL WORK**

Should any of the materials or equipment prove defective or should the work as a whole prove defective, due to faulty workmanship, material furnished or methods of installation, or should the work or any part thereof fail to operate properly as originally intended and in accordance with the plans and specifications, due to any of the above causes, all within twelve (12) months after date on which this contract is accepted by the Owner, the undersigned agrees to reimburse the Owner, upon demand, for its expenses incurred in restoring said work to the condition contemplated in said project, including the cost of any such equipment or materials replaced and the cost of removing and replacing any other work necessary to make such replacement or repairs, or, upon demand by the Owner, to replace any such material and to repair said work completely without cost to the Owner so that said work will function successfully as originally contemplated.

The Owner shall have the unqualified option to make any needed replacement or repairs itself or to have such replacements or repairs done by the undersigned. In the event the Owner elects to have said work performed by the undersigned, the undersigned agrees that the repairs shall be made and such materials as are necessary shall be furnished and installed within a reasonable time after the receipt of demand from the Owner.

Name (Printed): \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Contractor: \_\_\_\_\_

## A G R E E M E N T

THIS AGREEMENT made at Fresno, in Fresno County, California, by and between \_\_\_\_\_ hereinafter called the Contractor, and the County of Fresno hereinafter called the Owner.

WITNESSETH: That the Contractor and the Owner, for the consideration hereinafter named, agree as follows:

**ARTICLE I.** The Contractor agrees to furnish all labor and materials, including tools, implements, and appliances required, but excluding such materials as are mentioned in the specifications to be furnished by the Owner, and to perform all the work in a good and workmanlike manner, free from any and all liens and claims of mechanics, materialmen, teamsters, subcontractors, artisans, machinists, and laborers required for:

### COUNTY SERVICE AREAS 30 & 32 WATER SYSTEM IMPROVEMENTS

**STATE WATER RESOURCES CONTROL BOARD PROJECT NUMBER: 1000359-005C**

**DEPARTMENT OF WATER RESOURCES PROJECT NUMBER: 4600011626**

### CONTRACT NUMBER 20-10-C

All in strict compliance with the plans, drawings and specifications therefor prepared by the Owner, and other contract documents relating thereto.

**ARTICLE II.** The Contractor and the Owner agree that the Notice to Bidders and Special Provisions, the Wage Scale (Prevailing Wages), the Plans and Drawings, Addenda and Bulletins thereto, and the Proposal (Bid Book) hereto attached, together with this Agreement, form the contract, and they are as fully a part of the contract as if hereto attached or herein repeated.

All portions of the Standard Specifications of the State of California, Department of Transportation, dated 2015, which are not in conflict with this contract shall be deemed a part of the specifications as though fully therein set forth; provided, however, that revisions to the said Standard Specifications shall apply only to the extent, if any, included in the Project Details of these specifications or as otherwise incorporated directly herein. No part of said specifications which is in conflict with any portion of this agreement, or which is not actually descriptive of the work to be done thereunder, or of the manner in which said work is to be executed, shall be considered as any part of this agreement, but shall be utterly null and void.

**ARTICLE III.** The Owner agrees to pay the Contractor in current funds for the performance of the contract the sum of \_\_\_\_\_ **DOLLARS AND xx/100** ( \_\_\_\_\_ ) it being understood that said price is based upon the estimated quantities of materials to be used as set forth in the Proposal, except where provisions are made in the contract documents whereby the estimated quantities shall constitute the final quantity; that upon completion of the project the final contract prices shall be revised by change order, if necessary, to reflect the true quantities used at the stated unit price thereof as contained in the Contractor's Proposal hereto attached. Payments on account thereof will be made as set forth in the special provisions.

**ARTICLE IV.** If the Contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he or any of his subcontractors should persistently violate any of the provisions of the contract, or if he should persistently or repeatedly refuse or should fail, except in cases for which

extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Engineer, then the Owner may, upon certificate of the Engineer when sufficient cause exists to justify such action, serve written notice upon the Contractor and his surety of its intention to terminate the contract, and unless within five days after the serving of such notice, such violations shall cease and satisfactory arrangements for correction thereof be made, the contract shall, upon the expiration of said five days, cease and terminate.

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

**ARTICLE V.** With respect to any work required to be done under this contract, the Contractor will indemnify and hold harmless the COUNTY OF FRESNO, CALIFORNIA STATE WATER RESOURCES CONTROL BOARD, CALIFORNIA DEPARTMENT OF WATER RESOURCES, UNITED STATES OF AMERICA, CONSULTANTS and all other participating public agencies, whether or not said agencies are named herein, who have jurisdiction within the areas in which the work is to be performed, and all officers and employees of the Owner, the County, the State, the United States and said other participating agencies, from any and all costs and expenses, attorney fees and court costs, damages, liabilities, claims and losses occurring or resulting to COUNTY in connection with the performance, or failure to perform, by CONTRACTOR, its officers, agents or employees under this Agreement, and from any and all costs and expenses, attorney fees and court costs, damages, liabilities, claims and losses occurring or resulting to any person, firm or corporation who may be injured or damaged by the performance, or failure to perform, of CONTRACTOR, its officers, agents or employees under this Agreement. In addition, CONTRACTOR agrees to indemnify COUNTY for Federal, State of California and/or local audit exceptions resulting from non-compliance herein on the part of CONTRACTOR.

CONTRACTOR agrees to indemnify, save, hold harmless, and at COUNTY'S request, defend the COUNTY, its officers, agents, and employees from any and all costs and expenses, damages, liabilities, claims, and losses occurring or resulting to COUNTY in connection with the performance, or failure to perform, by CONTRACTOR, its officers, agents, or employees under this Agreement, and from any and all costs and expenses, damages, liabilities, claims, and losses occurring or resulting to any person, firm, or corporation who may be injured or damaged by the performance, or failure to perform, of CONTRACTOR, its officers, agents, or employees under this Agreement.

The Certificate of Insurance shall be issued in duplicate, to the COUNTY OF FRESNO and all other participating agencies, whether or not said agencies are named herein, who contribute to the cost of the work or have jurisdiction over areas in which the work is to be performed and all officers and employees of said agencies while acting within the course and scope of their duties and responsibilities.

In the event CONTRACTOR fails to keep in effect at all times insurance coverage as herein provided, the COUNTY may, in addition to other remedies it may have, suspend or terminate this Agreement upon the occurrence of such event.

All policies shall be with admitted insurers licensed to do business in the State of California. Insurance purchased shall be purchased from companies possessing a current A.M Best Company rating of A FSC VII or better.

Without limiting the COUNTY’S right to obtain indemnification from CONTRACTOR or any third parties, CONTRACTOR, at its sole expense, shall maintain in full force and effect, the following insurance policies or a program of self-insurance, including but not limited to, an insurance pooling arrangement or Joint Powers Agreement (JPA) throughout the term of the Agreement:

**A. Commercial General Liability**

Commercial General Liability Insurance with limits not less than those shown in the following table:

**Liability Insurance Requirements**

Total bid	For each occurrence <sup>a</sup>	Aggregate for products/completed operation	General aggregate <sup>b</sup>	Umbrella or excess liability <sup>c</sup>
≤ \$1,000,000	\$1,000,000	\$2,000,000	\$2,000,000	\$5,000,000
> \$1,000,000	\$1,000,000	\$2,000,000	\$2,000,000	\$10,000,000
≤ \$10,000,000	\$1,000,000	\$2,000,000	\$2,000,000	\$10,000,000
> \$10,000,000	\$2,000,000	\$2,000,000	\$4,000,000	\$15,000,000
≤ \$25,000,000	\$2,000,000	\$2,000,000	\$4,000,000	\$15,000,000
> \$25,000,000	\$2,000,000	\$2,000,000	\$4,000,000	\$25,000,000

<sup>a</sup>Combined single limit for bodily injury and property damage.

<sup>b</sup>This limit must apply separately to your work under this Contract.

<sup>c</sup>The umbrella or excess policy must contain a clause stating that it takes effect (drops down) in the event the primary limits are impaired or exhausted.

This policy shall be issued on a per occurrence basis. COUNTY may require specific coverages including completed operations, products liability, contractual liability, Explosion-Collapse-Underground, fire legal liability, or any other liability insurance deemed necessary because of the of the nature of this contract.

Such Commercial General Liability insurance shall name the County of Fresno, California State Water Resources Control Board, California Department of Water Resources, their officers, agents, and employees, individually and collectively, as additional insured, but only insofar as the operations under this Agreement are concerned. Such coverage for additional insured shall apply as primary insurance and any other insurance, or self-insurance, maintained by COUNTY, its officers, agents and employees shall be excess only and not contributing with insurance provided under CONTRACTOR's policies herein. This insurance shall not be cancelled or changed without a minimum of thirty (30) days advance written notice given to COUNTY. CONTRACTOR shall obtain endorsements to the Commercial General Liability insurance policy naming COUNTY as an additional insured and providing for a thirty (30) day prior written notice of cancellation or change in terms or coverage.

Within eight (8) days from date CONTRACTOR executes this Agreement, CONTRACTOR shall provide certificates of insurance and endorsement as stated above for all of the foregoing policies, as required herein, to the County of Fresno, Department of Public Works and Planning, Design Services, 2220 Tulare Street, Fresno, CA 93721, stating that such insurance coverages have been obtained and are in full force; that the County of Fresno, its officers, agents and employees will not be responsible for an premiums on the policies; that such Commercial General Liability insurance names the County of Fresno, its officers, agents, and employees, individually and collectively, as additional insured, but only insofar as the operations under this Agreement are concerned; that such coverage for additional insured shall apply as primary insurance an any other insurance, or self- insurance shall not be cancelled or changed without a minimum of thirty (30) days advance, written notice given to COUNTY.

CONTRACTOR shall obtain endorsements to the Commercial General Liability insurance naming the County of Fresno, its officers, agents, and employees, individually and collectively, as additional insured, but only insofar as the operations under this Agreement are concerned. Such coverage for additional insured shall apply as primary insurance and any other insurance, or self-insurance, maintained by COUNTY, its officers, agents, and employees shall be excess only and not contributing with insurance provided under CONTRACTOR'S policies herein. This insurance shall not be cancelled or changed without a minimum of thirty (30) days advance written notice given to COUNTY.

#### B. Automobile Liability

Comprehensive Automobile Liability Insurance with limits of not less than One Million Dollars (\$1,000,000) per accident for bodily injury and property damage. Coverage should include owned and non-owned vehicles used in connection with this Agreement and all applicable endorsements.

#### C. Professional Liability

If CONTRACTOR is a licensed professional or employs professional staff, (e.g., Architect, Engineer, Surveyor, etc.) in providing services, Professional Liability Insurance with limits of not less than One Million Dollars (\$1,000,000.00) per occurrence, Three Million Dollars (\$3,000,000.00) annual aggregate with a provision for 3 year tail coverage.

#### D. Worker's Compensation

A policy of Worker's Compensation insurance as may be required by the California Labor Code.

**ARTICLE VI.** Contractor represents that he has secured the payment of Worker's Compensation in compliance with the provisions of the Labor Code of the State of California and during the performance of the work contemplated herein will continue so to comply with said provisions of said Code. Contractor shall supply the Owner with certificates of insurance, in duplicate, evidencing that Worker's Compensation Insurance is in effect and providing that the Owner will receive ten days notice of cancellation. If Contractor self-insures Worker's Compensation, Certificate of Consent to Self-insure should be provided the Owner.

**ARTICLE VII.** The Contractor shall forthwith furnish in duplicate, a faithful performance bond in an amount equal to 100% of the contract price and a payment bond in an amount equal to 100% of the contract price, both bonds to be written by a surety company acceptable to the Owner and in the form prescribed by law.

The payment bond shall contain provisions such that if the Contractor or his subcontractors shall fail to pay (a) amounts due under the Unemployment Insurance Code with respect to work performed under the contract, or (b) any amounts required to be deducted, withheld and paid over to the Employment Development Department and to the Franchise Tax Board from the wages of the employees of the Contractor and subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to such work and labor, then the surety will pay these amounts. In case suit is brought upon the payment bond, the surety will pay a reasonable attorney's fee to be fixed by the court.

**ARTICLE VIII.** This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

Except as provided in Labor Code section 1725.5(f), no contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].

Except as provided in Labor Code section 1725.5(f), no contractor or subcontractor may be awarded a contract for public work on a public works project or engage in the performance of work on any public



works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

Contractor shall comply with all applicable laws and regulations relating to wages and employment, including all requirements imposed by the California Department of Industrial Relations (DIR). Contractor shall cooperate with County to furnish timely all information necessary for County's completion of the form required to be submitted by County when registering the Project on the DIR website; and County thereafter shall provide to Contractor the "Project ID Number" assigned by DIR in order to facilitate Contactor's submission to DIR of its certified payrolls for the Project, in the manner required and using such form as may be prescribed by DIR, in accordance with the provisions of Labor Code section 1771.4(a)(3).

**ARTICLE IX: Governing Law – Venue** for any action arising out of or relating to this Agreement shall be in Fresno County, California. This Agreement shall be governed by the laws of the State of California.

This Contract, **20-10-C**, was awarded by the Board of Supervisors on \_\_\_\_\_. It has been reviewed by the Department of Public Works and Planning and is in proper order for signature of the Chairman of the Board of Supervisors.

IN WITNESS WHEREOF, they have executed this Agreement this \_\_\_\_\_ day of \_\_\_\_\_, 2020.

\_\_\_\_\_  
(CONTRACTOR)

\_\_\_\_\_  
COUNTY OF FRESNO  
(OWNER)

\_\_\_\_\_  
(Taxpayer Federal I.D. No.)

By \_\_\_\_\_

By \_\_\_\_\_  
Ernest Buddy Mendes, Chairman  
of the Board of Supervisors of the  
County of Fresno

Title \_\_\_\_\_

**ATTEST:**  
Bernice E. Seidel  
Clerk of the Board of Supervisors  
County of Fresno, State of California

By \_\_\_\_\_  
Deputy