

# SPECIFICATIONS

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## CSA 43W RAISIN CITY GROUNDWATER WELL

6425 W BOWLES AVE, RAISIN CITY, CA 93652

BUDGET / ACCOUNT: 8870 / 8400 / 91762



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*Department of Public Works and Planning*

CONTRACT NUMBER 24-14-C

# **T A B L E O F C O N T E N T S**

## **COVER SHEET**

## **COUNTY ADOPTION AND ACKNOWLEDGMENT**

Engineer's Signature  
Consultant's Signature

## **NOTICE TO BIDDERS**

## **SPECIAL PROVISIONS**

## **TECHNICAL SPECIFICATIONS**

## **PROJECT DETAILS / DRAWINGS**

Project Drawings/Details  
Location Map  
Construction Funding Sign  
County of Fresno Dummy Permit  
Self-Dealing Transactions Disclosure Form

## **BID BOOK**

Bidder's Declaration  
Bid Form  
Abbreviations Used  
Bid Security and Signature  
Noncollusion Declaration  
Public Contract Code  
Subcontractor List  
General Requirements for In-Use Off-Road Diesel-Fueled Fleets  
Certifications  
Guaranty

## **AGREEMENT**

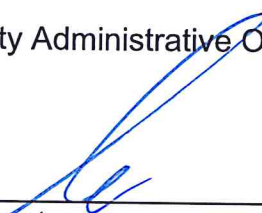
Agreement

## **PLANS**

**COUNTY ADOPTION AND ACKNOWLEDGEMENT  
PROJECT: CSA 43W RAISIN CITY GROUNDWATER WELL  
CONTRACT NUMBER: 24-14-C**

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

Paul Nerland, County Administrative Officer

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

  
\_\_\_\_\_  
Date

Date Signed: 10/1/24



Supervising Engineer: \_\_\_\_\_  
  
Sebastian Artal, PE 76724

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

In responsible charge of the Standard Special Provisions Sections 1-14 and Project Details.

**COUNTY ADOPTION AND ACKNOWLEDGEMENT  
PROJECT: CSA 43W RAISIN CITY GROUNDWATER WELL  
CONTRACT NUMBER: 24-14-C**



Date Signed: 10/1/2024

DATE SIGNED 10/1/2024

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

Nicholas Jacobson, PE C84909

PROVOST & PRITCHARD CONSULTING  
455 W. Fir Ave.  
Fresno, CA 93611

In responsible charge of the Technical Specifications.

**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 31, 2023**

**If you have any questions about bid submission, please contact us at [DesignServices@fresnocountyca.gov](mailto:DesignServices@fresnocountyca.gov) or call (559) 353-4919 or (559) 600-4543.**

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.fresnocountyca.gov/planholders>) for construction in accordance with the project specifications therefor, to which special reference is made as follows:

**CSA 43W RAISIN CITY GROUNDWATER WELL**

**6425 W BOWLES AVE, RAISIN CITY, CA 93652**

**CONTRACT NUMBER 24-14-C**

The work to be done consists of, in general, furnishing all labor, materials and equipment necessary to drill and equip a water well at the location indicated on the plans and connect to the existing water distribution main in the community of Raisin City, CA, in accordance with the Plans and Specifications. Electrical work, grading, fence removal and installation and other appurtenant work as indicated on the plans and specifications is also part of the work.

A pre-bid conference will be held at 1:00 p.m., on October 16, 2024. A discussion of the project will be held and the project sites will be open for examination. Contractors should meet at 6425 W Bowles Ave, Raisin City, CA 93652. Attendance at the pre-bid is not mandatory; however, the scheduled pre-bid will be the only opportunity for prospective bidders to visit the site in the presence of County staff, and requests for individual site visits with County staff will not be granted.

**This project is funded by the American Rescue Plan Act (ARPA).**

**This project is subject to the contracting requirements and implementing regulations as amended in Title 13, Section 2449 General Requirements for In-Use Off-Road Diesel-Fueled Fleets, of the California Code of Regulations (13 CCR § 2449(i)). Bidders must submit a valid Certificate of Reported Compliance (CRC) issued by the California Air Resources Control Board at the time of bidding. Bidders are responsible for submitting their listed subcontractors' CRCs and any supporting documentation within five (5) calendar days of bid opening. Failure to submit the required CRCs may render a bid non-responsive.**

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

<https://www.fresnocountyca.gov/Departments/Public-Works-and-Planning/Construction-Bidding-Opportunities/Request-to-Be-Added-to-the-Planholders-List-Form>

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

Prospective bidders may also select the project on [www.BidExpress.com](http://www.BidExpress.com). Those that demonstrate interest in the project will be added to the planholders list, and receive notifications and addenda issued for the project.

Planholder and exchange/publication names may be obtained from the Fresno County website at <http://www.fresnocountyca.gov/planholders>.

Electronic copies, in “.pdf” file format, of the official project plans and specifications, bid books and proposal sheets and such additional supplemental project information as may be provided, are available to view, download, and print at <http://www.fresnocountyca.gov/planholders>.

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.

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

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. You must either attach an electronic bid bond or provide an original bid bond (or other form of bid security authorized by Public Contract Code section 20129(a)), prior to the bid opening. Bid security shall be made in favor of the County of Fresno.

Hardcopy bid bonds 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 – BID BOND”.

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 “Request for Clarification Form” provided on our website:

<https://www.fresnocountyca.gov/Departments/Public-Works-and-Planning/Construction-Bidding-Opportunities/24-14-C-CSA-43W-Raisin-City-Groundwater-Well/Request-for-Clarification-Form>

Any changes to, or clarification of, the project plans and 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.

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.

Bids are required for the entire work described herein. Bids will be compared on the basis of the cumulative sum of the bid amounts listed for the individual line items.

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

Paul Nerland, County Administrative Officer

Bernice E. Seidel, Clerk of the Board

Issue Date: October 1, 2024



# 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 2023 *Standard Specifications*, 2023 *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 2023 *Standard 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.

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

#### Bid Items and Applicable Sections

**Refer to Section 01 22 00 "EXPLANATION OF BID ITEMS" of the Technical Specifications**

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

SJVAPCD	San Joaquin Valley air pollution control district
METS	Caltrans Material Engineering and Testing Services

#### Add to section 1-1.06:

Abbreviations in the Bid Items and Applicable Sections are also used in the Bid Item List - Proposal 2.

#### Add or Replace items in Section 1-1.07 with:

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

**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.

**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.

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

**County:** The County of Fresno

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

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

**Director:** Department's Chairman

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

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

**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
Juneteenth	June 19 <sup>th</sup>
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, June 19th, 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.

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

**permanent erosion control establishment period:** Number of working days shown in Section 8-1.04 for permanent erosion control establishment work.

**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*.

**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. **special provisions:** Specifications specific to the project. These specifications are in a section titled *Special Provisions* of a book titled *Specifications*.

**Replace Section 1-1.08 with:**

**1-1.08 DISTRICTS**

Not Used

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

This project is not in a freeze-thaw area.

**Replace 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 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://californiaucp.dbesystem.com/">https://californiaucp.dbesystem.com/</a>	--	--
<i>California MUTCD</i>	<a href="https://dot.ca.gov/programs/safety-programs/camutcd">https://dot.ca.gov/programs/safety-programs/camutcd</a>	--	--
Department	<a href="https://www.fresnocountyca.gov/">https://www.fresnocountyca.gov/</a>	2220 Tulare Street Design Division – Seventh Floor Fresno, CA 93721	(559) 600-9908
Department of Conservation, Office of Mine Reclamation	<a href="http://www.conservation.ca.gov/dmr/">http://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, Planholders, Bid Results	<a href="https://www.fresnocountyca.gov/planholders">https://www.fresnocountyca.gov/planholders</a>	2220 Tulare Street Design Division – Seventh Floor Fresno, CA 93721	Tel: (559) 353-4919 Fax:(559) 455-4609 Email: <a href="mailto:DesignServices@fresnocountyca.gov">DesignServices@fresnocountyca.gov</a>
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="https://dot.ca.gov/programs/engineering-services">https://dot.ca.gov/programs/engineering-services</a>	Geotechnical Services Department of Transportation 5900 Folsom Blvd Sacramento, CA 95819-4612	(916) 227-7000
METS	<a href="https://dot.ca.gov/programs/engineering-services">https://dot.ca.gov/programs/engineering-services</a>	Materials Engineering and Testing Services Department of Transportation 5900 Folsom Blvd Sacramento, CA 95819-4612	(916) 227-7000
<i>MPQP</i>	<a href="https://dot.ca.gov/programs/construction/material-plant-quality-program">https://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
Office of Electrical Systems Regional Transportation Management Center	--	Office of Electrical Systems Regional Transportation Management Center 3165 Gold Valley Dr Rancho Cordova, CA 95742	
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 Section 1-1.12 with:**

**1-1.12 MISCELLANY**

Make checks and bonds payable to the County of Fresno.

**2 BIDDING**

**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)].

**Replace Section 2-1.04 with:**

**2-1.04 PREBID OUTREACH MEETING**

Section 2-1.04 applies if a mandatory prebid meeting is shown on the Notice to Bidders.

The Department may conduct a meeting to provide access to the site and/or discuss the project in the presence of County staff.

Each bidder must attend the meeting. The bidder's representative must be a company officer, project superintendent, or project estimator. For a joint venture, one of the parties must attend the mandatory prebid meeting.

The Department does not accept a bid from a bidder who did not attend the meeting.

A sign-in will be used to identify the attendees. Each bidder must include the name and title of the company representative attending the meeting.

The Department may hold a single prebid meeting for more than one contract. Sign in for the contract you intend to bid on. If you are bidding on multiple contracts, sign-in for each contract you intend to bid on. The sign-in lists, with the names of all companies in attendance at each prebid meeting, will be made available at the website shown on the Notice to Bidders for bidder inquiries.

**Replace Section 2-1.06 with:**

**2-1.06 BID DOCUMENTS**

**2-1.06A General**

The *Bid* book includes bid forms and certifications and may be requested from Design Services and are available online at <http://www.BidExpress.com>.

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

The *Specifications*, project plans, and any addenda to these documents may be accessed at the planholders website at <https://www.fresnocountyca.gov/planholders>.

The *Standard Specifications* and *Standard Plans* may be accessed online at [2015 Caltrans Standard Specifications](#) and [2023 Caltrans Standard Specifications](#)

**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	<ul style="list-style-type: none"><li>• Location Map</li><li>• Construction Funding Sign</li><li>• County of Fresno Dummy Permit</li></ul>

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.

**2-1.12 RESERVED** **Replace Section 2-1.12 with:**

**2-1.15 RESERVED** **Replace Section 2-1.15 with:**

**2-1.18 RESERVED** **Replace Section 2-1.18 with:**

**2-1.27 RESERVED** **Replace Section 2-1.27 with:**

**2-1.33 RESERVED** **Replace Section 2-1.33 with:**

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

**2-1.33A General**

Complete forms in the *Bid* book.

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.

*Electronic Bids:* Complete and submit the bid online at <http://www.BidExpress.com> (Section 2-1.33). Your electronic signature is your confirmation of and agreement to all certifications and statements contained in the Bid book. On forms and certifications that you submit through the electronic bidding service, you agree that each form and certification where a signature is required is deemed as having your signature.

*Hardcopy Bid:* Submit a hardcopy bid:

1. Under sealed cover
2. Marked as a bid
3. Identifying the contract number and the bid opening date
4. Use ink or typewriter

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

Submit a bid based on the bid item quantities the Department shows on the Bid Item List (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 items are identified by title and by the word "Proposal" followed by the number assigned to the proposal item in question. Proposal items 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 Item List**

One or more sheet(s) or list(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 for paper bids.

**2-1.33C(3) Proposal 3 - Evaluation of Bid Item List**

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

**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.

Bonding companies may provide their own bid bond forms. Bid Security and Signature sections must be completed by the bidder and submitted with their bid.

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 Declaration**

Must be completed, signed, and returned with bid.

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

Select "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**

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

**2-1.33C(8) Proposal 8 - Subcontractors**

Sheet(s) or spaces where bidders list subcontractors. List each subcontractor to perform work in an amount in excess of 1/2 of 1 percent of the total bid (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 item list and/or work descriptions similar to those on bid item list.
- 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 -Title 13, California Code of Regulations § 2449(i) General Requirements for In-Use Off-Road Diesel-Fueled Fleets**

Contractors, if applicable, must submit valid Certificates of Reported Compliance with their bid. Subcontractor certificates will be due no later than 4:00 p.m. on the fifth (5<sup>th</sup>) calendar day after the bid opening if not submitted with the bid.

**2-1.33C(18) Proposal 10 - 2-1.33C(17) Proposal 18**

Not used

**2-1.33C(19) Proposal 19 - 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.

### **2-1.33D Electronic Bid Document Completion**

Electronic versions of the bid book documents are available online at <http://www.BidExpress.com>, and may be submitted through that website.

You must either attach an electronic bid bond or provide an original bid bond (or other form of bid security authorized by Public Contract Code Section 20129(a)), prior to the bid opening.

Bidders submitting online may use one of the accepted electronic sureties (SurePath or Tinubu) to submit their bid bond; or may submit cash, cashier's check, certified check, or a bidder bond to Design Services at 2220 Tulare St., Seventh Floor, Fresno, CA 93721. Those submitting bid bonds directly to Design Services must submit their bid bond:

1. Under sealed cover
2. Marked as a bid-bond
3. Identifying the contract number and the bid opening date on the cover

### **Replace Section 2-1.34 with:**

#### **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.

### **Replace Section 2-1.40 with:**

#### **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

**Replace Section 2-1.47 with:**

**2-1.47 BID RELIEF**

The Department may grant bid relief under Pub Cont Code § 5100 et seq. Submit any request for bid relief via email to Design Services at the address listed in the table in Section 1-1.11.

**Add Section 2-1.51:**

**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 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 bid opening for any issues found within the bid itself, or 5:00 p.m. of the third (3<sup>rd</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 54 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**

### **3-1.14–3-1.17 RESERVED**

### **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 Section 4-1.07D with:**

### **4-1.07D Reserved**

**Replace the last paragraph of Section 4-1.13 with:**

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

## 5 CONTROL OF WORK

**Delete the last paragraph of Section 5-1.01**

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

Caltrans Standard Plans, County 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 Section 5-1.09 with:**

**5-1.09 RESERVED**

**Replace Section 5-1.12 with:**

**5-1.12 ASSIGNMENT**

The performance of the Contractor or any Contract part may be assigned only with prior written consent from the Department. To request consent, submit a Contractor Action Request – Assignment of Contract Performance form. The Department does not consent to any requested assignment that would relieve you of your surety of the responsibility to complete the work or any part of the work. 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 Contractor Action Request – Assignment of Contract Monies, Assignee Change of Name/Address form. 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 Section 5-1.13C with:**

**5-1.13C RESERVED**

**Replace Section 5-1.13D with:**

**5-1.13D RESERVED**

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

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

**Replace Section 5-1.20B(4) with:**

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

The County contacted the owner of the property APN 03518044, immediately south of the school property.

The property owner is willing to cooperate with the contractor to use their site as an area for proper disposing of mud, cutting and development water during the construction of the well. The contractor is responsible for coordinating and obtaining authorization per this section. Any potential fees that may be

requested by the owner shall be included in the various items of work and no further compensation will be allowed therefor.

Private property contact information: Liz Clark, phone number (559) 284-5110.

Before procuring material from or disposing or stockpiling of material, or development water, or staging materials and equipment on non-highway property:

1. Provide proof that the property where materials are to be disposed of 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 disposed of, stockpiled or equipment parked/stored.
3. Provide proof that the signor(s) of the authorization are the owners of the property or authorized person.
4. Provide an executed release from the property owner(s) absolving the Department from any and all responsibility in connection with the disposing of materials or parking/storage of equipment on said property.
5. Obtain written permission from the Engineer to dispose of 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 Section 5-1.20C with:**

**5-1.20C Permits with County of Fresno Building Department and Health Department**

Contractor is required to obtain the necessary permits from the County of Fresno Health Department and Building Department.

A dummy permit with the Building Department required permits and fees are incorporated in the Project Details sections of these Specifications

**Replace Section 5-1.23A with:**

**5-1.23A General**

Section 5-1.23 includes specifications for action and informational submittals. Attention is directed to Section 01 33 00 Submittal Procedures of the Technical specifications

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 the first paragraph of Section 5-1.23B(2)(b) with:**

If specified, email electronic shop drawing and calculation sheet submittals to the Engineer.

**Replace Section 5-1.24 with:**

**5-1.24 CONSTRUCTION SURVEYS**

The Engineer places stakes and/or marks as the Engineer determines to be necessary to establish the lines and grades required for the work.

Submit your request for Engineer-furnished stakes:

1. Once staking area is ready for stakes
2. On a Request for Construction Stakes form

After your submittal, the Engineer starts staking within 2 working days.

Preserve stakes and marks placed by the Engineer. If the stakes or marks are destroyed, the Engineer replaces them at the Engineer's earliest convenience and deducts the cost.

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

**5-1.27E CHANGE ORDER BILLS**

Maintain separate records for change order work costs.

**Replace Section 5-1.32 with:**

**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.

**Replace Section 5-1.43A with:**

**5-1.43A General**

Minimize and mitigate the impacts of work or events for which you will make a potential claim.

For each potential claim assign an identification number determined by chronological sequencing and the 1<sup>st</sup> date of the potential claim.

Use the identification number for each potential claim on the:

1. Initial Potential Claim Record form

2. Supplemental Potential Claim Record form
3. Full and Final Potential Claim Record form

Failure to comply with this procedure is:

1. Waiver of the potential claim and a waiver of the right to a corresponding claim for the disputed work in the administrative claim procedure
2. Bar to arbitration (Pub Cont Code § 10240.2)

**Replace the word “State” with “Department” in the 3<sup>rd</sup> paragraph of Section 5-1.43D.**

**Replace the word “Department’s” with “Caltrans” in the 6<sup>th</sup> paragraph of Section 5-1.43E(1)(a).**

**Replace the word “Department” with “Caltrans” where it appears in Section 5-1.43E(2)(a).**

**Replace the word “Department” with “Caltrans” where it appears in Section 5-1.43E(3)(a).**

## **6 CONTROL OF MATERIALS**

**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.

**Replace Section 6-1.06 with:.**

### **6-1.06 RESERVED**

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

**Add after the last paragraph of Section 7-1.02C:**

The following information is provided for the Contractor’s information, and nothing herein or elsewhere within these special provisions shall be construed as limiting the Contractor’s responsibility for complying with all applicable rules and regulations. In conformance with Title 13 § 2449(i), between March 1 and June 1 of each year, new valid Certificates of Reported Compliance for the current compliance year, as defined in section 2449(n) for the Contractor and all applicable subcontractors must be submitted. Submit

new valid Certificates of Reported Compliance to the Engineer at least one week prior to the expiration date of the current certificate.

**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

**Add to the list in the second paragraph of Section 7-1.02K(3) with:**

- 1.10. Fringe Benefits

**Replace section 7-1.02K(4)(a) with:**

**7-1.02K(4)(a) 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.

**Replace the 4th paragraph of section 7-1.02K(6)(j)(ii) with:**

Submit the lead compliance plan as an informational submittal.

**Add to the end of Section 7-1.02M(2):**

Except for motor trucks, truck tractors, buses, and passenger vehicles, equip all hydrocarbon-fueled engines, both stationary and mobile including motorcycles, with spark arresters that meet USFS standards as specified in the *Forest Service Spark Arrester Guide*. Maintain the spark arresters in good operating condition. Spark arresters are not required by Cal Fire, the BLM, or the USFS on equipment powered by properly maintained exhaust-driven turbo-charged engines or equipped with scrubbers with properly maintained water levels. The *Forest Service Spark Arrester Guide* is available at the district offices.

Each toilet must have a metal ashtray at least 6 inches in diameter by 8 inches deep half-filled with sand and within easy reach of anyone using the facility.

Locate flammable materials at least 50 feet away from equipment service, parking, and gas and oil storage areas. Each small mobile or stationary engine site must be cleared of flammable material for a radius of at least 15 feet from the engine.

Each area to be cleared and grubbed must be cleared and kept clear of flammable material such as dry grass, weeds, brush, downed trees, oily rags and waste, paper, cartons, and plastic waste. Before clearing and grubbing, clear a fire break at the outer limits of the areas to be cleared and grubbed. Other fire breaks may be ordered and are change order work.

Furnish the following fire tools:

1. 1 shovel and 1 fully charged fire extinguisher UL rated at 4 B:C or more on each truck, personnel vehicle, tractor, grader, or other heavy equipment.

The pickup truck and operator must patrol the area of construction for at least 1/2 hour after job site activities have ended.

Cal Fire, USFS, and BLM have established the following adjective class ratings for 5 levels of fire danger for use in public information releases and fire protection signing: low, moderate, high, very high, extreme. Obtain the fire danger rating daily for the project area from the nearest Cal Fire unit headquarters, USFS ranger district office, or BLM field office.

Arrangements have been made with Cal Fire, USFS, and BLM to notify the Department when the fire danger rating is very high or extreme. This information will be furnished to the Engineer who will notify you for dissemination and action in the area affected. If a discrepancy between this notice and the fire danger rating obtained from the nearest office of either Cal Fire or USFS exists, you must conduct operations according to the higher of the two fire danger ratings.

If the fire danger rating reaches very high:

1. Falling of dead trees or snags must be discontinued.
2. No open burning is permitted and fires must be extinguished.
3. Welding must be discontinued except in an enclosed building or within an area cleared of flammable material for a radius of 15 feet.
4. Blasting must be discontinued.
5. Smoking is allowed only in automobiles and cabs of trucks equipped with an ashtray or in cleared areas immediately surrounded by a fire break unless prohibited by other authority.
6. Vehicular travel is restricted to cleared areas except in case of emergency.

If the fire danger rating reaches extreme, take the precautions specified for a very high fire danger rating except smoking is not allowed in an area immediately surrounded by a firebreak and work of a nature that could start a fire requires that properly equipped fire guards be assigned to such operation for the duration of the work.

The Engineer may suspend work wholly or in part due to hazardous fire conditions. The days during this suspension are non-working days.

If field and weather conditions become such that the determination of the fire danger rating is suspended, section 7-1.02M(2) will not be enforced for the period of the suspension of the determination of the fire danger rating. The Engineer will notify you of the dates of the suspension and resumption of the determination of the fire danger rating.

**Place the contents of Section 7-1.04 under the heading:**

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

##### **7-1.04A General**

**Replace the 7<sup>th</sup> paragraph in Section 7-1.04A with:**

Provide flaggers whenever necessary to ensure that the public is given safe guidance through the work zone.

**Replace the 11<sup>th</sup> paragraph in Section 7-1.04A with:**

Cover signs that direct traffic to a closed area.

**Add to the end of Section 7-1.04A:**

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.

**Add the following to the end of Section 7-1.04:**

**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 word "State" with "County" where it occurs in Section 7-1.05C.**

**Replace the word "State" with "Department" in the 1<sup>st</sup> paragraph of Section 7-1.06B.**

**Replace the word "State" with "County" in the 5<sup>th</sup> paragraph of Section 7-1.06C.**

**Replace the word "State" with "the Department" in Section 7-1.06D(1).**

**Replace Section 7-1.06D(2) with:**

**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 and CG 2037 (for completed operations), as published by the Insurance Services Office (ISO), or equivalent form as approved by the Department.

**Replace the word “State” with “County” in Section 7-1.06D(3).**

**Replace the word “State” with “County” in Section 7-1.06D(4).**

**Replace Section 7-1.06E with:**

**7-1.06E Automobile Liability Insurance**

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

**Replace Section 7-1.06G with:**

**7-1.06G NOT USED**

**Replace Section 7-1.06H with:**

**7-1.06H Enforcement**

The Department may assure your compliance with your insurance obligations. 30 days before an insurance policy lapses, expires, 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.

Any failure to comply with the reporting provisions of your policy shall not affect coverage provided to the Department, including its officers, directors, agents (excluding agents who are design professionals), and employees.

You are not relieved of your duties and responsibilities to indemnify, defend, and hold harmless the County, 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 County from taking other actions available to it, including the withholding of funds under this Contract.

**Replace Section 7-1.06I with:**

**7-1.06I Self-Insurance**

Comply with the *Agreement* of these special provisions.

**Add to the beginning of Section 7-1.07B:**

This section applies to seal coat projects.

**Add Section 7-1.07C:**

**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.

## **8 PROSECUTION AND PROGRESS**

### **Replace Section 8-1.01 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 except drilling operations that may proceed 24 hrs a day.

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, except drilling operations that may proceed 24 hrs a day.

For work other than drilling operations, 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.

For work other than drilling operations, if you 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.

**Replace the 1<sup>st</sup> paragraph of Section 8-1.02B(1) with:**

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

**Add to the end of the list in the 4<sup>th</sup> paragraph of Section 8-1.02B(3) with:**

3. Time Impact Analysis (Refer to Section 8-1.02C(8)(b) for description)

**Replace Section 8-1.02C with:**

**8-1.02C Reserved except for 8-1.02C(8)(b)**

**Replace Section 8-1.04 with:**

**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. Are authorized by the Department to start
4. Perform work at your own risk
5. 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 Reserved**

**Replace Section 8-1.04C with:**

**8-1.04C Long Lead Time Equipment Start**

Section 8-1.04B, Standard Start, does not apply to this project.

This project includes two, non-concurrent phases.

The first order of work (submittals) involves potholing, submittals and equipment procurement.

The second order of work involves physical construction upon the project site.

**8-1.04C(1) First Order of Work, Submittals**

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

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



Start the first order of 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 for the first order of work if you fail to provide Contracts, including bonds and insurance certificates or other required documents timely.

The Engineer shall have a maximum of ten (10) working days in which to review and approve or reject each submittal from the Contractor. In the event that the Engineer rejects any of the Contractor's initial submittals, the Engineer shall have a maximum of ten (10) working days in which to review and approve or reject each re-submittal from the Contractor. The ten (10) working day time period for the Engineer's review shall commence on the day upon which the Engineer receives the submittal or re-submittal in question.

In the event that the Engineer's review of a submittal or re-submittal requires in excess of ten (10) working days, the Engineer shall extend the number of working days allowed for the completion of the first order of work by one working day for each working day of delay in the Engineer's completion of the review.

The first order of work is complete when you:

- have received approval for all submittals required for the project.
- have furnished a statement from the vendors that the orders for required equipment and materials has been received and accepted by said vendor
- have furnished a statement from vendors which indicates that the anticipated delivery date for the equipment and materials ordered is in conformance with contract requirements.
- Receive a written statement that the first order of work is complete.

**Complete the first order of work before the expiration of  
FIFTY (50) WORKING DAYS**

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

**Pay to the County of Fresno the sum of  
FIVE HUNDRED DOLLARS (\$500)**

per day for each and every calendar day's delay in finishing the first order of work in excess of the number of working days prescribed above.

**8-1.04C(2) Second Order of Work**

The Engineer, in their sole discretion, may issue the Notice to Proceed – Second Order of Work immediately upon delivery to the Contractor of the materials and equipment necessary to construct the project. Alternatively, the Engineer may defer issuance of the Notice to Proceed – Second Order of Work to the extent the Engineer, in their sole discretion, deems appropriate.

Begin work at the site on the date shown on the Notice to Proceed – Second Order of Work. Do not begin site work prior to the date shown on the Notice to Proceed – Second Order of Work. The date shown on the Notice to Proceed – Second Order of Work will be the first working day charged against the allotted number of working days for the second order of work.

**Complete the second order of work before the expiration of  
ONE HUNDRED (100) WORKING DAYS**

from the date shown in said Notice to Proceed – Second Order of Work.

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.

**Pay to the County of Fresno the sum of  
THREE THOUSAND DOLLARS (\$3,000)**

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

Such payment is in addition to payment, if any, for failure to complete the first order of work as specified.

**Replace the 1<sup>st</sup> paragraph in Section 8-1.05 with:**

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.

**Replace the 3<sup>rd</sup> and 4<sup>th</sup> paragraph including the table in Section 8-1.10A with:**

Liquidated damages are specified in section 8-1.04.

**Replace the word "State's" with "County's" in Section 8-1.14A.**

## **9 PAYMENT**

**Add Section 9-1.01A:**

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

The bid items shown in the bid item list 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.

**Delete paragraphs 11-14 of Section 9-1.03.**

**Add after the 6<sup>th</sup> paragraph of Section 9-1.03:**

**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.**

**Replace the last paragraph of Section 9-1.03 with:**

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

**Replace the word "Department's" with "Caltrans" in the 5<sup>th</sup> paragraph of Section 9-1.07A.**

**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 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.

## **DIVISION II GENERAL CONSTRUCTION**

### **10 GENERAL**

#### **Add to the end of Section 10-1.02C(2):**

Protect any irrigation component to be relocated before performing any other construction activity in the area.

#### **Replace *Reserved* in Section 10-1.02C(3) with:**

Transplant any plant to be transplanted before performing any other construction activity in the area.



## 12 TEMPORARY TRAFFIC CONTROL

Replace section 12-2 with:

### 12-2 CONSTRUCTION PROJECT FUNDING 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 6 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 1 construction project information signs at the location 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. 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.

Replace the 3<sup>rd</sup> paragraph of Section 12-3.01C with:

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 the last paragraph of Section 12-3.03C with:

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 the last paragraph of Section 12-3.10C with:**

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 12-3.11B(5)(b) with:**

**12-3.11B(5)(b) Construction Project Funding Identification Signs**

Reserved

**Replace the word “Department’s” with the word “Caltrans” in the 1<sup>st</sup> paragraph of Section 12-3.20A(4)(a).**

**Replace the last paragraph of Section 12-3.20C(1) with:**

If the Engineer orders a lateral move of temporary barrier system 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 the 2<sup>nd</sup> paragraph of Section 12-3.20C(2)(c) with:**

Install K rail as shown in the project plans.

**Replace the last paragraph of Section 12-3.31C with:**

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 the 2<sup>nd</sup> paragraph of Section 12-3.35B(6) with:**

Provide any software on a CD or other Engineer-authorized data-storage device to the Engineer.

**Add before the 1<sup>st</sup> paragraph of Section 12-3.41A(1):**

Section 12-3.41 is used when shown in the Bid Item List.

**Replace Section 12-4.02A(3)(a) with:**

**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.

**Replace Section 12-4.02A(3)(b) with:**

**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.

**Replace Section 12-4.02A(3)(d) with:**

**12-4.02A(3)(d) Traffic Break Schedule**

Not Used.

**Replace Section 12-4.02C(1) with:**

**12-4.02C(1) General**

Work that interferes with traffic is limited to the hours when closures are allowed.

Do not reduce an open traffic lane width to less than 10 feet. If 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.

Discuss the contingency plan for any activity that could affect the closure schedule with the Engineer at least 5 business days before starting the activity requiring the plan.

The Engineer may reschedule a closure that was canceled due to unsuitable weather.

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.

You may use automated flagger assistance devices to enhance the traffic control system for a lane closure on a two-lane convention highway, except if a bid item for automated flagger assistance devices is shown in the Bid Item List, the use of AFADs is required.

Do not use automated flagger assistance devices:

1. On multi-lane highways
2. As a substitute or a replacement for a temporary traffic control signal
3. If the devices impair access for pedestrians and bicycles, unless alternate access is provided
4. If the usable shoulder area is not wide enough to place a trailer mounted device
5. If the distance between the devices is more than 800 feet, except when each device is controlled by a separate operator and radio communication is available between the AFAD operators

**Replace Section 12-4.02C(2) with:**

**12-4.02C(2) Not Used**

**Replace Section 12-4.02C(3) with:**

**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).

Allow public traffic to pass through construction at all times unless otherwise specified herein.

Provide access to properties abutting the project site at all times.

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.

No work that would require a lane closure shall be performed.

Keep driveways and access roads accessible at all times.

Maintain vehicular access to the channel bank access roads at all times.

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders including sections closed to public traffic.

**12-4.02C(3)(p)–12-4.02C(3)(s) Reserved**

**Replace Section 12-4.02C(7)(d) with:**

**12-4.02C(7)(d) Reserved**

**Replace the word “Department’s” with “Caltrans” in Section 12-4.02C(9)(a)(iv).**

**Replace section 12-4.02C(9)(d) with:**

**12-4.02C(9)(d) Payment**

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.

**Add before the 1<sup>st</sup> paragraph of Section 12-4.02C(10):**

Section 12-4.02C(10) is used when Pickup Truck Mounted Changeable Message Sign is shown in the Bid Item List.

**Replace item 3.6.1 in the list in Section 12-4.02C(11)(a)(iii)(B) with:**

Not Used

**Replace item 5 in the list in Section 12-4.02C(11)(a)(iv)(C) with:**

Not Used

**Replace Section 12-4.02C(11)(d) with:**

**12-4.02C(11)(d) Payment**

Full payment for conforming to the requirements of this section shall be considered to be included in the Traffic Control Plan item on the Bid Items List.

**Replace Section 12-4.02C(14) with:**

**12-4.02C(14) 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, 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 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.

**Replace Section 12-4.02D with:**

**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.

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.

## **13 WATER POLLUTION CONTROL**

**Replace the word "Department" with "Caltrans" where it occurs in Section 13-1.01A.**

**Replace the 1<sup>st</sup> paragraph of Section 13-1.01D(2) 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)

**Add to the end of Section 13-1.01D(2):**

This Project disturbs 0.6 acres of soil. A WPCP is required for this project.

**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

**Replace Section 13-2.04:**

**13-2.04 PAYMENT**

The Department pays for prepare water pollution control program as follows:

1. Total of 50 percent of the item total upon authorization of the WPCP
2. Total of 90 percent of the item total upon work completion
3. Total of 100 percent of the item total upon Contract acceptance

**Add Section 13-3.01C(5):**

**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 the 2<sup>nd</sup> paragraph of Section 13-5.04 with:**

If there is no bid item for temporary soil stabilization measures, payment therefor is considered to be included in the bid item for prepare and implement 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 and implement 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 and implement water pollution control program or in the bid item for prepare and implement stormwater pollution prevention plan, as applicable.

**Replace the 1<sup>st</sup> paragraph and the 1<sup>st</sup> line of the 2<sup>nd</sup> paragraph of Section 13-8.01C(2) with:**

Within 20 days of Contract approval, submit 3 copies of the ATS plan if an ATS plan is required for the project.

The plan, if required, must include:

**Replace the word “Department’s” with “Caltrans” in items 3 and 4 of the list in Section 13-8.01C(2).**

## **14 ENVIRONMENTAL STEWARDSHIP**

**Add after the 3rd paragraph of section 14-10.01:**

Food scraps, paper wrappers, food containers, cans, bottles and all food related trash and litter must be removed from the project site at the end of each working day.

**Replace the 8th paragraph of section 14-10.01 with:**

Furnish and use closed-lid trash containers in the job-site yard, field trailers, and locations where workers gather for lunch and breaks.

**Replace Section 14-11.08 with:**

### **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, implementation of an SJVAPCD-approved dust control plan is not required prior to commencement of any dust generating activities. You must file Construction Notification with SJVAPCD 48 hours prior to starting work.

Pursuant to section 6.4 of District Rule 8021 – Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities, the owner or operator of a construction project of at least 1.0 acre in size



shall provide written notification to the District at least 48 hours prior to his/her intent to commence any earthmoving activities. Use the first two pages of this form to submit a written Construction Notification. There are no fees for filing a construction notification.

It is your responsibility to be fully informed of the requirements of all rules, regulations, plans and conditions that may govern your operations and to conduct the work accordingly.

**Replace Section 14-12.05–14.12.08 With:**

**14-12.05–14.12.08 RESERVED**

# Technical Specifications

**County of Fresno**

**CONTRACT DOCUMENTS**

**AND**

**SPECIFICATIONS**

**FOR THE**

**CSA 43W Raisin City Groundwater Well Project**

**September 2024**

**Prepared for:**

**County of Fresno  
Department of Public Works and Planning, Design Division  
2220 Tulare St, 6<sup>th</sup> Floor  
Fresno, California 93721**

**Prepared by:**

**PROVOST & PRITCHARD  
CONSULTING GROUP**



455 W FIR AVE  
CLOVIS, CALIFORNIA 93611-0242  
559/449-2700 FAX 559/449-2715

DATE SIGNED 9/30/2024

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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: Bid Documents, Division 0
  - Fourth: Technical Specifications, Division 2 through Division 43
  - Fifth: Plans
  - Sixth: General Requirements, Division 1
  - Seventh: State Standard Specifications
  - Eighth: 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 (Division 2 through Division 43) 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.

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- 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. Caltrans State Standard Specifications
  9. National Electric Code
  10. 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.

SPECIFICATIONS  
01 00 05-2



1.4 LIST OF DRAWINGS

A. The Work shall conform to the following Drawings:

TITLE	SHEET NUMBERS
GENERAL	
COVER SHEET	G1
SHEET INDEX & GENERAL NOTES	G2
CIVIL LEGEND	G3
HYDRAULIC PROFILE	G4
CIVIL	
PROCESS FLOW DIAGRAM	C1
DEMOLITION PLAN	C2
SITE & PIPING PLAN	C3
CONTROL PLAN	C4
WELL PUMP FOUNDATION & CASING	C5
WELL EQUIPMENT	C6
DETAILS	
FENCE DETAILS	D1
CONSTRUCTION DETAILS	D2
CONSTRUCTION DETAILS	D3
ELECTRICAL	
COVER SHEET	E11
ENLARGED PLAN – POWER	E21
DETAILS	E31
CONTROL DIAGRAM	E41

1.5 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.

1.6 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

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said rules and regulations, the provisions of these Specifications shall take precedence over said rules and regulations. Contractor shall furnish, without any extra charge, all additional labor or materials, or both, when required for compliance with these rules and regulations.

**END SECTION**

SPECIFICATIONS  
01 00 05-4

## 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 to drill and equip a second water well at the location indicated on the conformed plans and connect to the existing water distribution main in the community of Raisin City, CA, in accordance with the Plans and the Specifications.
- B. The construction site is located in Fresno County south of Fresno, California.
- C. The primary components are generally described as follows:
  - 1. Drilling a new well
  - 2. Equipping new well
  - 3. Connecting new well to existing water distribution system
  - 4. Electrical work as indicated on the plans

##### 1.2 BEGINNING OF WORK

- A. The Contractor shall begin work as stated in Section 8-1.04A Start of Job Site Activities.
  - 1. Depending on lead times for materials and equipment, the project may be split into 2 phases:
    - a. First Order of Work: Submittals Phase
    - b. Second Order of Work: Construction Phase

##### 1.3 TIME OF COMPLETION

- A. The Contractor shall substantially complete all work as stated in Section 8-1.04A Start of Job Site Activities.

##### 1.4 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.

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1.5 *ORDER OF WORK*

- A. Drilling of the pilot hole and zone sampling shall be the Contractor's first order of business.

**END SECTION**

DESCRIPTION OF WORK AND SCHEDULE CONSTRAINTS  
01 11 00-2

**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 9-1.16 of the State Standard Specifications which, except as modified herein, shall apply in its entirety.
  - 1. The department shall withhold not less than 5 percent of the contract price until final completion and acceptance of the project.
  - 2. Partial payments for materials on hand shall not exceed one hundred percent (100%) of 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.

MEASUREMENT & PAYMENT  
01 20 00-1

COUNTY OF FRESNO  
CSA 43W RAISIN CITY GROUNDWATER WELL PROJECT

1.3 *FINAL PAYMENT*

- A. Refer to State Standard Specifications Section 9-1.17.

MEASUREMENT & PAYMENT  
01 20 00-2

## ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between \_\_\_\_\_  
\_\_\_\_\_ whose address is \_\_\_\_\_  
\_\_\_\_\_ herein after called "Owner," \_\_\_\_\_  
\_\_\_\_\_ whose address is \_\_\_\_\_  
\_\_\_\_\_ hereinafter called "Contractor" and \_\_\_\_\_  
\_\_\_\_\_ whose address is \_\_\_\_\_  
\_\_\_\_\_ hereinafter called "Escrow Agent."

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

(1) Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by Owner pursuant to the Construction Contract entered into between the Owner and Contractor for \_\_\_\_\_ in the amount of \_\_\_\_\_ dated \_\_\_\_\_ (hereinafter referred to as the "Contract"). Alternatively, on written request of the Contractor, the Owner shall make payments of the retention earnings directly to the escrow agent. When the Contractor deposits the securities as a substitute for Contract earnings, the Escrow Agent shall notify the Owner within 10 days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between the Owner and Contractor. Securities shall be held in the name of \_\_\_\_\_, and shall designate the Contractor as the beneficial owner.

(2) The Owner shall make progress payments to the Contractor for those funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above.

(3) When the Owner makes payment of retentions earned directly to the Escrow Agent, the Escrow Agent shall hold them for the benefit of the Contractor until the time that the escrow created under this contract is terminated. The Contractor may direct the investment of the payments into securities. All terms and conditions of this agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the Owner pays the Escrow Agent directly.

(4) Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of the Owner. These expenses and payment terms shall be determined by the Owner, Contractor, and Escrow Agent.

(5) The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to the Owner.

(6) Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from the Owner to the Escrow Agent that Owner consents to the withdrawal of the amount sought to be withdrawn by Contractor.

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(7) The Owner shall have a right to draw upon the securities in the event of default by the Contractor. Upon seven days' written notice to the Escrow Agent from the owner of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by the Owner.

(8) Upon receipt of written notification from the Owner certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payments of fees and charges.

(9) Escrow Agent shall rely on the written notifications from the Owner and the Contractor pursuant to Sections (5) to (8), inclusive, of this agreement and the Owner and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

(10) The names of the persons who are authorized to give written notice or to receive written notice on behalf of the Owner and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

On behalf of Owner:

On behalf of Contractor:

On behalf of Escrow Agent:

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name

\_\_\_\_\_  
Name

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
Address

\_\_\_\_\_  
Address

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

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

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Owner

Contractor

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

**END SECTION**

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**SECTION 01 22 00**  
**EXPLANATION OF BID ITEMS**

**PART 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.

- A. 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.
- B. 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.
  - 1. 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 *BID ITEMS*

**Bid Item 1 – Mobilization, Demobilization, Insurance, and Bonds:**

This item is a lump sum bid for mobilization, all necessary bonds, insurance, permits, licenses, fees required during the performance of the work, necessary potholing, and demobilization and shall conform to the provisions of these Specifications.

This item shall consist of covering the Contractors cost for Contract Documents and for the moving of personnel, equipment, supplies and incidentals to the project site. This item shall include obtaining all permits required for the 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. All costs for furnishing and installing the required construction funding sign shall be included in this bid item. This item also includes demobilization, including removal of all equipment supplies, personnel, and incidentals from the 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

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Section 9 Payment and Sub-Section 9-1.16D Mobilization of the State Standard Specifications.

**Bid Item 2 – Prepare and Implement WPCP:**

This bid item is a lump sum bid for all materials, labor and appurtenances required to prepare and implement a Water Pollution Control Program (“WPCP”), including preparing the WPCP, testing, monitoring and all other work associated with implementing the WPCP and complying with State and Federal permit requirements. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of contract work completed.

**Bid Item 3 – Dust Control:**

This bid item is a lump sum bid for all materials, labor and appurtenances required to perform dust control measures for the project limits in accordance with conditions of these Specifications. This bid item shall be paid at the lump sum price bid. Payment will be prorated based on the percentage of contract work completed.

**Bid Item 4 – Job Site Management**

This bid item is a lump sum bid item for the cost of all work involved with CSA 43W 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. 4 is intended to cover all of the base “Job Site Management” costs for CSA 43W.

The contractor shall abide by all federal and state regulations regarding removal and disposal of hazardous waste materials including, but not limited to 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 43W contract work completed.

**Bid Item 5 – 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 43W project limits in accordance with Section 12 of the Standard Specifications, special provisions and as directed by the Engineer and County inspector. The Contractor shall submit a traffic control plan for review and approval by the County. The County will require only one traffic control plan for the entire project. Traffic control provisions shall conform to the following requirements:

1. The California Manual on Uniform Traffic Control Devices (MUTCD) and Section 12 of the Special Provisions and Standard Specifications, 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.

Full compensation for furnishing all labor, 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 contract work completed.

**Bid Item 6 – Clearing and Grubbing:**

Payment for this item shall include full compensation for all labor, materials, tools, equipment and incidentals making up the cost of all work involved in clearing and grubbing within project site, all as described in the Specifications. This bid item will be paid as a lump sum, prorated based on the percentage of this item completed.

**Bid Item 7 – Site Demolition:**

Payment for this item shall include full compensation for all labor, materials, tools, equipment and incidentals making up the cost of all work involved in demolition of indicated components within the work site, including sawcutting and removal of concrete, concrete curb, fence mow strips, removal and disposal of fence, tree removal, and other facilities as described in the Specifications and shown on the Plans. This bid item will be paid for by Lump Sum, prorated, based on percentage of work completed.

**Bid Item 8 – Furnish and Install 30” Diameter Conductor Casing:**

This bid item is a unit price bid for furnishing and installing 30-inch diameter conductor casing and shall be per lineal foot complete in place, and shall be full compensation for furnishing all labor, equipment and materials to complete the installation, including cement seals outside of casing, as described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 9 – Drill Pilot Hole (to 700-ft Total Depth):**

This bid item is a unit price bid for drilling the pilot hole from the bottom of the conductor casing and shall be per lineal foot completed, and shall be full compensation for furnishing all labor, equipment and materials to complete the installation as described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 10 – Perform Electric Log and Deviation Log:**

Payment for this item shall include full compensation for furnishing all labor, equipment, materials, and incidentals to complete the work as described herein, and no additional compensation will be made therefore. This bid item will be paid for by Lump Sum, prorated, based on percentage of work completed.

**Bid Item 11 – Collect Depth Zone Samples:**

This bid item is a unit price bid for collection of individual depth zone samples and shall be per zone sampled, and shall be full compensation for furnishing all labor, equipment and materials to complete the sample collection as described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 12 – Open Pilot Hole to 24” Diameter (to 700-ft Total Depth):**

This bid item is a unit price bid for opening the pilot hole to 24-inch diameter well bore hole from the bottom of the conductor casing the total depth and shall be per lineal foot completed, and shall be full compensation for furnishing all labor, equipment, and materials to complete the installation as described herein, including drillers log and report. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 13 – Furnish and Install 12” Diameter Blank Casing:**

This bid item is a unit bid price for furnishing and installing 12-inch diameter blank casing and shall be per lineal foot complete in place, and shall be full compensation for furnishing all labor, equipment and materials to complete the installation as described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 14 – Furnish and Install 12” Diameter Perforated Casing:**

This bid item is a unit bid price for furnishing and installing 12-inch diameter mill slot perforated casing and shall be per lineal foot complete in place, and shall be full compensation for furnishing all labor, equipment and materials to complete the installation as described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 15 – Furnish and Install 20-foot Compression Section:**

This bid item is for furnishing and installing 20-foot lengths of compression section, complete in place, and shall be full compensation for furnishing all labor,

equipment and materials to complete the installation as described herein. This bid item will be paid for by Lump Sum.

**Bid Item 16 – Furnish and Install 3” Diameter Gravel Fill Pipe:**

This bid item is a unit bid price for furnishing and installing 3-inch diameter schedule 40 steel gravel fill pipe in accordance with the Technical Specifications and shall be per lineal foot complete in place, and shall be full compensation for furnishing all labor, equipment and materials complete the installation described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 17 – Furnish and Install Gravel Pack:**

This bid item is a unit bid price for furnishing and installing gravel pack and shall be per lineal foot complete in place, and shall be full compensation for furnishing all labor, equipment, and other materials to complete the installation as described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 18 – Furnish and Install Annular Seal:**

This bid item is a unit bid price for furnishing and installing cement-grout and bentonite annular seals and shall be per lineal foot complete in place, and shall be full compensation for furnishing all labor, equipment and materials to complete the installation as described herein and shown on the bid documents. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 19 – Perform Preliminary Well Development:**

This bid item is a unit bid price for preliminary well development. Payment will be on a per hour basis, and shall be full compensation for furnishing all labor, equipment and materials to complete the work as described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 20 – Perform Pump Development and Pump Test (Mob/Demob pump and pump up to 40 hours):**

This bid item is a lump sum bid price for pump development and pump tests. Payment for this bid item shall include full compensation for furnishing all labor, equipment and materials and incidentals to complete the work as described herein, and no additional compensation will be made therefore.

**Bid Item 21 – Additional Pump Development and Pump Testing Time:**

This is a unit price bid item for pump development and pump testing and shall be on a per hour basis, and shall be full compensation for furnishing all labor, equipment, materials, and incidentals to complete the well development as

described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 22 – Perform Video Log:**

This bid item includes performing the video log and plumbness and alignment testing, and shall be full compensation for furnishing all labor, equipment and materials to complete the work as described herein. The item will be paid for by Lump Sum.

**Bid Item 23 – Construct Well Pump Foundation:**

This bid item includes constructing a well pump foundation and shall be full compensation for furnishing all labor, equipment and materials to complete the work as described herein. The item will be paid for by Lump Sum.

**Bid Item 24 – Furnish and Install Submersible Well Pump and Motor:**

This bid item includes furnishing and installing the pump, motor, well head facilities, and sounding tube and shall be full compensation for furnishing all labor, equipment and materials to complete the work as described herein. The item will be paid for by Lump Sum.

**Bid Item 25 – Furnish and Install 4” Diameter Column Pipe:**

This bid item includes furnishing and installing the column pipe and shall be per lineal foot complete in place, and shall be full compensation for furnishing all labor, equipment and materials to complete the installation as described herein. The quantities may be increased, decreased, or deleted entirely by Owner, with no change in unit price.

**Bid Item 26 – Site Grading:**

This bid item includes rough and finish grading, import material and all labor and equipment required to complete the grading of the site including over excavation under all concrete slabs and compaction of fill material, fill areas and spreading unsuitable material at the end of the job at the direction of the Owner. This bid item will be paid for by Lump Sum.

**Bid Item 27 – Well Discharge, Site Piping, Valves, and Appurtenances:**

This bid item is a lump sum bid for installing all well discharge piping and valves, onsite and offsite piping and fittings, valves and all appurtenances as detailed on the Plans and Specifications. This item shall include trenching, bedding, backfill and compaction, well supply pipe, well discharge valves and fittings, meter, air release valve, sample taps, injection taps, pipe supports, polyethylene encasement, tracer wire, caution tap, fittings, valves and valve boxes, restoring surface to original condition, and testing, as shown on the Plans. Completed item shall provide a complete and fully operational 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 work under this bid item, in conformance with the plans and specifications, and as directed by the Engineer. This bid item will be paid for by Lump Sum on a prorated basis based on the percentage of work completed.

**Bid Item 28 – Temporary Chain Link Fence:**

This bid item includes furnishing for all labor, materials, tools, and equipment necessary for furnishing and installing a temporary 6-foot chain link fence. Temporary fence installation includes, but is not limited to, furnishing of the 6-foot-tall, free-standing chain link fence, and installation of all appurtenances required as indicated on the Plans. This bid item will be paid for by Lump Sum on a prorated basis based on the percentage of work completed under this bid item.

**Bid Item 29 – Permanent Chain Link Fence:**

This bid item includes furnishing for all labor, materials, tools, and equipment necessary for furnishing and installing a permanent 6-foot chain link fence with 25-year privacy slats as indicated in the Plans. Permanent fence installation includes, but is not limited to, forming and pouring concrete mow strip and installation of all appurtenances required to enclose the site and connect the new fence to the existing site perimeter fencing. This bid item will be paid for by Lump Sum on a prorated basis based on the percentage of work completed under this bid item.

**Bid Item 30 – Electrical, Controls, & Lighting:**

This bid item is a lump sum bid for all work associated with all electrical equipment required for the CSA 43W site, including, but not limited to modification at the existing electrical facilities, pump starter, site lighting, site electrical, conduit and conductors for all work, and all electrical connections.

The bid item price shall include full compensation for furnishing all labor, tools, equipment and materials, coordination with Building Department inspector, along with all associated appurtenances required to complete electrical, controls and lighting 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 work completed under this bid item.

**Bid Item 31 – Connection to Existing Water System:**

Payment under this item shall be considered full compensation for all labor, materials, tools, equipment and incidentals necessary for removal, installation, and fitment of all Water Connection pipe, fittings, and all appurtenances necessary for connection of proposed well piping to existing well piping; excavation, bedding, connections, abandoning and restoring existing services, backfilling, thrust block, compaction and watering; disinfection, testing; and doing all work involved in installing Water Connection as detailed in the Plans and Specifications.

**Bid Item 32 – Start-up and Testing**

This bid item is a lump sum bid and includes furnishing services associated with startup and testing. Completed bid item shall provide a complete and fully operational facility with complete integration between well, tank, hydropneumatic tank, and booster pumps.

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 will be paid for by Lump Sum on a prorated basis based on the percentage of work completed under this bid item.

**Bid Item 33 – Operations and Maintenance Manuals**

This bid item is a lump sum bid and includes preparing and furnishing an operations and maintenance manuals for all equipment.

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 will be paid for by Lump Sum on a prorated basis based on the percentage of work completed under this bid item.

**Bid Item 34 – Record Drawings**

This bid item is a lump sum bid and includes preparing and furnishing record drawings for Raisin City (CSA 43W) improvements.

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 will be paid for by Lump Sum on a prorated basis based on the percentage of work completed under this bid item.

**Bid Item 35 – 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.

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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.

**END SECTION**

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**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, Product Information, Calculations, Test Reports, Certificates, Samples, Manuals, and Record Drawings.

*1.2 RELATED WORK*

- A. General Conditions
- B. Section 01 77 00 – Contract Closeout
- C. Individual equipment specifications

*1.3 GENERAL*

- A. Contractor shall have completed the following work tasks before a submittal:
  - 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.

*1.4 TRANSMITTAL INFORMATION*

- A. Each submittal document shall have a separate cover or transmittal. Transmittals shall include the following identification data, as applicable:
  - 1. Submittal number
  - 2. Contract number

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3. Project name and location
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:
  - a. "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."
- B. 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 of each such variation.
- C. Furnish neat, legible, and sufficiently explicit detail to enable proper review for Contract compliance.
- D. Contractor assumes all risks of error and omission.
- E. Work performed before acceptance, or not conforming to accepted submittals, shall be at Contractor's risk.
- F. Submittal requirements contained in this specification are in addition to specific submittal requirements contained in individual equipment specification sections.

**1.5 LIMITATIONS OF ENGINEER'S REVIEW**

- A. Engineer's review is only for the purposes of determining if the items covered by the submittals will conform to the requirements in the Contract Documents.
- B. Engineer's review will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
- C. Engineer's review of a separate item will not indicate acceptance of the assembly in which the item functions.
- D. Engineer's review of a Submittal shall not relieve Contractor from responsibility for any deviation from the requirements of the Contract Documents unless Contractor has given Engineer specific written notice of any deviation per the requirements of this Section. Engineer will document any such accepted variation from the requirements of the Contract Documents in a Field Order.

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- E. Engineer's review of a Submittal, 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.

**1.6 SUBMITTAL PROCESS**

- A. Submittals shall be sent to the Engineer electronically through email or a file transfer system agreed upon by the Owner, Engineer, and Contractor during the Preconstruction Conference.
- B. Engineer will provide timely review of Submittals in accordance with the Schedule of Submittals agreed upon by the Owner, Engineer, and Contractor during the Preconstruction Conference.
- C. Submittals will be returned, marked with one of the following classifications:
  - 1. NO EXCEPTION TAKEN: Requires no corrections, no marks.
  - 2. MAKE CORRECTIONS NOTED: Requires minor corrections. Items may be fabricated as marked without further resubmission. Resubmit 2 corrected copies to the Engineer.
  - 3. REVISE AND RESUBMIT: Requires corrections. Resubmit entire submittal following original submission with corrections noted. Allow time for checking and Engineer's appropriate action.
  - 4. REJECTED: Submitted information does not comply with the Contract Documents. No items shall be fabricated. Resubmit entire submittal following original submission with corrections noted.
  - 5. INFORMATION ONLY: Items in the submittal are saved in the project file for information only but were not reviewed by the Engineer.

**PART 2 SUBMITTAL DOCUMENTS**

**2.1 SHOP DRAWINGS**

- A. When requested submit, submit two (2) sets of shop drawings.

**2.2 SAMPLES**

- A. When requested or required by individual specification sections, submit one (1) sample 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 submittal number

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2. The contract number
  3. Project name and location
  4. Product identification
  5. Applicable contract drawing and specification section number
  6. 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 acceptance. 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.
  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 accepted 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

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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 accepted 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 contactors, 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. Preliminary
    - 1) Submit one (1) electronic copy of the preliminary O&M manuals in searchable PDF format.
  - b. Final
    - 1) Submit one (1) electronic copy of the final O&M manuals in searchable PDF format.
    - 2) Submit two (2) hard copies of the final O&M Manual as described below:
      - a) Covers: Oil, moisture, and wear resistant 9 inches by 11-1/2 inches size.

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- 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.

**PART 3 EXECUTION**

*NOT USED*

**END SECTION**

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**SECTION 01 42 13**  
**DEFINITIONS AND ABBREVIATIONS**

**PART 1 GENERAL**

*1.1 DEFINITIONS AND TERMS*

- 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: Fresno County Board of Supervisors.
  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.
    - a. Where pronouns "he", "his", or "him" are used in reference to the Contractor, it shall be inferred to be inclusive of all genders.
  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. Design Engineer: Provost & Pritchard Consulting Group.
  8. Engineer: County of Fresno Director of Public Works and Planning, and/or his designee.
  9. 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.
  10. General Conditions: As specified in Section 00 72 00 – General Conditions.
  11. General Requirements: All specifications contained in Division 1.
  12. Notice: Any notice allowed or required to be given by the Owner may be given by the Engineer.

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13. Owner: Fresno County.
14. Person: Any individual, association, partnership, corporation, trust, joint venture or other legal entity.
15. 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.
16. Proposal: The offer of a Bidder when submitted on the Proposal form; properly signed and guaranteed.
17. 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).
18. 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.
19. Sanitary Sewer: Any conduit and appurtenances intended for the reception and transfer of sewage.
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", current version, 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 other provisions contained in Divisions 0 through 43 of these Specifications.
23. Storm Sewer: Any conduit and appurtenances intended for the reception and transfer of storm water.

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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 or 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.

### 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
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

### DEFINITIONS AND ABBREVIATIONS

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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
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

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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
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

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UPC	Uniform Plumbing Code
USBR	U.S. Bureau of Reclamation
USGS	United States Geological Survey
WCLA	West Coast Lumbermen's Association (Standard 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 SECTION**

DEFINITIONS AND ABBREVIATIONS  
01 42 13-6



**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, ordered to be 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 Procedures.

*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. Except for specified material suitability tests, all initial routine field tests of materials shall be at the expense of the Owner and shall be performed by an independent certified laboratory designated by the Owner. Whenever a specified percent relative compaction test is required and the material or portion thereof so tested fails to meet or exceed the relative compaction specified, all subsequent retesting shall be performed at the expense of the Contractor.

*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 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 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.

*1.3 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 persons 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.

#### 1.4 ACCESS ROADS AND STAGING AREA

- A. Adequate 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 to the location indicated on the plans. 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 in 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 SECTION**

TEMPORARY FACILITIES  
01 50 00-2

**SECTION 01 51 36**  
**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 for landscaping, and other construction operation.

*1.2 RELATED WORK*

- A. Section 01 50 00 – Temporary Facilities
- B. Section 01 57 27 – Dust Control

*1.3 REFERENCES*

- A. State Standard Specifications Section 10-6, Watering

**PART 2 PRODUCTS**

*2.1 WATER*

- A. Free of debris, organic matter, and other objectionable substances.

**PART 3 EXECUTION**

*3.1 WATER TRUCK*

- 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.

WATERING  
01 51 36-1

### 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

1. The County will allow connection to the existing storage tank with the following limitations.
  - a. Use of CSA 43 water from the system will not be allowed during peak hours (6 am to 8 am and 5 pm to 8 pm daily).
  - b. Contractor shall be responsible for providing all necessary materials, equipment, and labor (under County operator's supervision) to connect to the tank, including necessary pump and water meter.
  - c. Furthermore, the Contractor shall be responsible to provide necessary back up water supply or storage if Contractor feels the water provided by County will not fulfill their needs during well drilling operations.
  - d. The water supply will be limited to 100 gpm during off peak demand and/or when tank level is not less than ½ level. Contractor will be forced to stop pumping out of the tank until it gets refilled. The tank has a volume of approximately 200,000 gallons. The level on the tank can be read from the existing gauge attached to the tank.
2. A potential alternative source of water is the fire suppression storage tank located on the elementary school's property. Should Contractor require use of this source, it is the Contractor's responsibility to coordinate directly with the School district and arrange necessary fees and usage agreement.
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. Full compensation for furnishing all labor, materials, tools and equipment and for doing all work involved in furnishing and applying water as required by the Contract Documents and Specifications, 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 SECTION**

WATERING  
01 51 36-2

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WATERING  
01 51 36-3

**SECTION 01 57 13**  
**EROSION CONTROL**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. The work of this section consists of protecting from erosion all areas disturbed by new construction and construction operations, including areas disturbed by demolition, earthwork, and fence, piping and equipment installation.

*1.2 RELATED WORK*

- A. Section 01 57 23 – Storm Water Pollution Prevention Plan
- B. Section 01 57 27 – Dust Control

*1.3 SUBMITTALS*

- A. As specified in Section 01 33 00 – Submittal Procedures.
- B. One-bale of proposed straw.

**PART 2 PRODUCTS**

*2.1 RICE STRAW*

- A. Sterile rice straw.

**PART 3 EXECUTION**

*3.1 PREPARATION*

- A. Loosen areas to be protected by raking or other approved method before application. Maintain grading and drainage patterns.

*3.2 PLACING STRAW*

- A. Exercise particular care to ensure application is made uniformly.
- B. The Contractor shall install and maintain protected areas as required by the Storm Water Pollution Prevention Plan.

*3.3 ACCEPTANCE*

- A. Application will be considered complete when all soil disturbing activities are completed and all unpaved disturbed areas have an even application of straw. No gaps (larger than 6 inches x 6 inches) will be permitted.



**END SECTION**

**SECTION 01 57 23**  
**STORM WATER POLLUTION PREVENTION PLAN**

**PART 1 GENERAL**

*1.1 WORK INCLUDES*

- A. It is assumed the Project total disturbed area is less than 1 acre. The Contractor shall develop a Water Pollution Control Plan (WPCP) that shall prevent sediment and/or pollutants from entering the ground, storm drains, streams, or water bodies throughout the duration of the Work in compliance with the permit requirements, including CalGreen Building Standards. Work shall be performed in accordance with all Federal, State, and local regulations.
- B. The Contractor shall furnish and exercise every reasonable precaution to protect groundwater, channels, storm drains, and bodies of water from pollution and provide all labor, materials, tools, and equipment necessary to prevent pollution associated with construction activities, including preparation of a WPCP or Stormwater Pollution Prevention Plan (SWPPP) and amendments if necessary for CGP Compliance, installation, maintenance and final removal of all temporary and permanent erosion and sediment control measures, in accordance with the requirements of the Contract Documents.
- C. **Penalties:** Failure to comply with this Section may result in significant fines and possible imprisonment. The Regional Water Quality Control Board (RWQCB) or other prosecuting authority may assess fines for each violation. Should the District be fined or penalized as a result of the Contractor failing to comply with this Section and applicable permit requirements, the Contractor shall reimburse the County for any and all fines, penalties and related costs.
- D. All costs for work required for compliance with this Section shall be included in the price bid for "Prepare and Implement SWPPP (or WPCP)".

*1.2 REFERENCES*

- A. California State Water Resources Control Board, Construction General Permit 2022-0057-DWQ, [https://www.waterboards.ca.gov/board\\_decisions/adopted\\_orders/water\\_quality/2022/wqo\\_2022-0057-dwq.pdf](https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2022/wqo_2022-0057-dwq.pdf)
- B. California Stormwater Quality Association (CASQA), <https://www.casqa.org/>

*1.3 SUBMITTALS*

- A. As specified in Section 01 33 00 – Submittal Procedures.
- B. The contractor shall submit a Water Pollution Control Plan (WPCP) demonstrating pollution prevention measures and steps to be taken to ensure no pollutant discharges from the project site at least three weeks prior to beginning work and within 2 days of issuance of the Notice to Proceed.

#### 1.4 QUALITY ASSURANCE

At minimum, the following measures shall be taken to help ensure control of storm water and non-storm water pollution. These measures shall not be construed to limit or override the measures set forth and called for in the WPCP.

- A. Control the rate and effect of dewatering in such a manner as to avoid all objectionable settlement and subsidence and to assure the integrity of the finished work.
- B. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, establish reference points and observe at frequent intervals to detect any settlement that may develop. Conduct the dewatering operation in a manner that protects adjacent natural resources and facilities. Cost of repairing all damage to adjacent resources and facilities shall be the sole responsibility of the Contractor.
- C. Arrange demolition activities to minimize erosion to the maximum practical extent. Clearing, excavation, and grading shall be limited to those areas of the Project site necessary for demolition. Minimize the area exposed and unprotected.
- D. Clearly mark and delineate the work limits activities.

#### 1.5 GENERAL REQUIREMENTS

- A. The Contractor shall exercise care in preserving vegetation and protecting property, to avoid disturbing areas beyond the limits of the Work and promptly repair any damage caused by Contractor operations.
- B. The Contractor shall provide all necessary water pollution control devices to prevent, control, and abate water pollution, and implement good housekeeping pollution control measures to reduce the discharge of pollutants from the Site to the maximum extent practicable. These water pollution control devices include structural BMPs, drains, gutters, slope protection blankets and retention basins and shall be constructed concurrently with other Work at the earliest practicable time.
- C. Stockpiles of earth and other construction-related materials shall be protected from being transported from the Site by wind or water using covers or equivalent.
- D. The Contractor shall properly store and handle fuels, oils, solvents, and other toxic materials in a manner not to contaminate the soil or surface waters, enter the groundwater, or be placed where they may enter a live stream, channel, drain, or other water conveyance facilities. All approved toxic storage containers shall be protected from weather. Spills shall be cleaned immediately, and soiled materials shall be properly disposed of. Spills shall not be discharged.
- E. Excess or waste concrete (including concrete decant water) shall not be washed onto bare ground, into the public way or any drainage systems. The concrete wastes shall be retained on-site until they can be appropriately disposed of or recycled. Concrete wastes shall not be discharged.

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- F. Non-stormwater runoff from equipment washing, vehicle washing, and any other activities shall be contained at the work site and properly disposed of. Non-stormwater runoff shall not be allowed to discharge.
- G. The Contractor shall prevent sediments and other materials to be tracked from the Site by vehicle traffic. Construction entrance roadways shall be stabilized to inhibit sediments from being deposited onto public ways. The Contractor shall immediately sweep up accidental depositions and not allow depositions to be washed away by rain or by any other means.

1.6 *REGULATORY REQUIREMENTS*

- A. The Contractor shall comply with the requirements of the State Water Resources Control Board (SWRCB), RWQCB, California Administrative Code, 2016 California Green Building Standards Code Section 5, Owner and any other agencies having jurisdiction in storm water and non-storm water discharges and waste management.

**PART 2 PRODUCTS**

2.1 *GENERAL*

- A. Materials furnished for BMPs shall meet the requirements of the California Stormwater Quality Association, *Stormwater Best Management Practice Handbook, Construction* – August 2023 edition (or most current version) unless otherwise indicated.

**PART 3 EXECUTION**

3.1 *GENERAL DESCRIPTION*

- A. The Contractor shall install and maintain all pollution, erosion, and sediment control measures and carry out inspections in accordance the approved WPCP.

3.2 *FIELD QUALITY CONTROL*

- A. The Contractor shall maintain the BMPs and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures.

3.3 *MAINTENANCE OF TEMPORARY FACILITIES*

- A. Inspect erosion and sediment control structures daily, including site exit locations, and as specified in the SWPPP.
- B. Sediment shall be removed from behind run off control structures after each storm, or as directed by the Engineer or Owner.
- C. If areas are seeded, Contractor shall examine those areas during and after major storms to check that grass is becoming established.

**3.4 *DISPOSAL OF SEDIMENT FROM STORM WATER POLLUTION CONTROL STRUCTURES***

- A. Sediment excavated from temporary sediment control structures shall be disposed on the site with general fill or with topsoil. Sediment shall be allowed to dry out as required before reuse. All trash shall be removed before reuse.
- B. Contractor shall place the sediment removed from traps and other structures where it will not enter a storm drain or water course and where it will not immediately reenter the basin.

**3.5 *REMOVAL OF TEMPORARY STORM WATER POLLUTION CONTROL MEASURES***

- A. In accordance with SWPPP requirements, temporary control measures shall be removed once all drainage area ground disturbance is completed, permanent drainage works have been constructed and full stabilization is achieved. Contractor shall not breach any temporary control structures until the associated catchment area is complete unless approved by the Engineer.

**END SECTION**

**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, in accordance with Federal, State, and local regulations. It is assumed that the Project will have a total disturbed area less than 5 acres.

*1.2 RELATED WORK*

- A. Section 01 50 00 – Temporary Facilities
- B. Section 01 51 36 – Watering
- C. Division 2 – Existing Conditions
- D. Division 31 – Earthwork

*1.3 REFERENCES*

- A. San Joaquin Air Pollution Control District (SJVAPCD) Regulation VIII.

*1.4 SUBMITTALS*

- A. As specified in Section 01 33 00 – Submittal Procedures.
- B. Submittals under this section shall be completed and submitted at least 48 hours prior to beginning work.
- C. Proof of submittal of San Joaquin Air Pollution Control District (SJVAPCD) Construction Notification Form.

*1.5 QUALITY ASSURANCE*

- A. Control the rate and effect of watering in such a manner as to avoid all objectionable settlement and subsidence as approved by the Engineer and to assure the integrity of the finished work.
- B. Clearly mark and delineate the work limits activities.

*1.6 REGULATORY REQUIREMENTS*

- A. Contractor shall comply with all provisions of the SJVAPCD regulations, as well as Federal and State regulations.

## **PART 2 PRODUCTS**

### *2.1 EQUIPMENT*

- A. Before the work begins, sufficient equipment and resources shall be available on the site to assure that the operation and adequacy of the dust control measures can be continuously maintained.

### *2.2 DUST CONTROL MEASURES*

- A. Water shall be available to the contractor for dust control as specified in section 01 50 00 – Temporary Facilities.

## **PART 3 EXECUTION**

### *3.1 GENERAL DESCRIPTION*

- A. Dust control measures shall include, but may not be limited to: Water application, physical barriers limiting site access, reduction of vehicle speed on site, utilization of gravel pads, and utilization of grizzlies. If physical barriers are utilized, the Engineer shall approve the location, size, and type. Physical barriers shall be removed upon project completion.
- B. Furnish, install, maintain, and operate necessary control measures and other equipment necessary to prevent dust. Temporary measures shall be to Contractor's own design and Contractor shall be solely responsible for risks related to the management of dust control during construction.

### *3.2 DUST CONTROL*

- A. The Contractor shall take whatever steps, procedures, or means as are required to limit dust generated by his operations during the Work, including Saturdays, Sundays, and Holidays. Dust shall be controlled to the standards of the local governing agency or, in the absence of local standards, to the satisfaction of the Engineer. Dust control shall extend to any unpaved road which the Contractor or any of his subcontractors are using, to excavation or fill areas, to demolition operations, and to other activities. Control shall be by sprinkling, use of dust palliatives, modification of operations, or any other means acceptable to the local governing agency or, in the absence of same, the Engineer.
- B. If the dust control is not adequate in the opinion of the Engineer, this work may be done by others, and the cost shall be deducted from the total payment due the Contractor.

**END 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 CONSTRUCTION STAKING*

- A. Engineer or Engineer's representative will provide project control monuments as shown on the Plans (vertical and horizontal) at the Owner's expense. The Engineer will provide one set of grade control stakes.
- B. All other construction staking necessary for the work shall be done by Contractor with compensation included in bid item(s), as deemed appropriate by the Contractor.
- C. The Contractor shall be responsible for preserving construction survey stakes, permanent survey monuments and benchmarks 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.
- 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. 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 SECTION**



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**SECTION 01 74 19**  
**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. The provisions of this Section apply to newly constructed buildings, building additions of 1,000 square feet or greater, and/or building alterations with a permit valuation of \$200,000 or above (for occupancies within the authority of California Building Standards Commission)
- B. This section includes administrative and procedural requirements for the following:
  - 1. Recycling nonhazardous demolition and construction waste.
  - 2. Disposing of nonhazardous demolition and construction waste.
- C. Related Requirements
  - 1. Comply with local regulations for disposal of waste resulting from site clearing and removal of above- and below-grade improvements.
  - 2. Comply with the local codes and requirements governing construction waste management for municipal construction waste management requirements.

**1.2 RELATED WORK**

- A. Section 02 41 00 - Demolition

**1.3 REFERENCES**

- A. California Green Building Standards Code, latest revision.

**1.4 DEFINITIONS**

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations, including packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition or construction waste and subsequent recycling, salvage, reuse, or disposal, as acceptable to authorities having jurisdiction.

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- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility, or delivery to the Owner as specified in Section 02 41 00 Demolition.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.5 *PERFORMANCE REQUIREMENTS*

- A. Recycle and/or salvage for reuse a minimum of 65 percent of the nonhazardous construction and demolition waste, in accordance with the 'Guide to the 2016 California Green Building Standards Code, Nonresidential', Section 5.408.1.1, 5.408.1.2, or 5.408.1.3; or meet the local construction and demolition waste management ordinance, whichever is more stringent.

1.6 *SUBMITTALS*

- A. Waste Management Plan
  - 1. Submit Waste Management Plan within 7 days of date established for the Notice to Proceed.
  - 2. The Waste Management Plan shall be prepared in accordance with the California Green Building Standards Code, latest revision, and shall include the following:
    - a. Identify the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project, or salvage for future use or sale.
    - b. Indicate if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
    - c. Identify diversion facilities where construction and demolition waste material collected will be taken.
    - d. Specify that the amount of construction waste and demolition materials diverted shall be calculated by weight or volume, but not by both.
    - e. Construction Waste Management Acknowledgement Form. The Acknowledgement Form shall be signed by all subcontractors, to acknowledge that they have read the Waste Management Plan for the project, they understand the goals of the plan, and agree to follow the procedures described in the plan.

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

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B. Waste Reduction Progress Reports

1. Documentation shall be provided to the Owner, which demonstrates compliance with Sections 5.408.1.1 through 5.408.1.3 of the 'Guide to the 2016 California Green Building Standards Code, Nonresidential'. The Waste Management Plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.
2. Concurrent with each Application for Payment, submit report. Include the following information, as applicable:
  - a. Material type.
  - b. Total quantity of waste in tons.
  - c. Quantity of waste salvaged, both estimated and actual in tons.
  - d. Quantity of waste recycled, both estimated and actual in tons.
  - e. Total quantity of waste recovered (salvaged plus recycled) in tons.
  - f. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Construction Waste Management Final Report

1. A construction waste management final report containing information and supporting documentation that demonstrates compliance with the Waste Management Plan, shall be provided to the enforcing agency before the final inspection. The required documentation shall include, but is not necessarily limited to, the following:
  - a. Documentation of the quantity by weight of each material type diverted or disposed, consistent with the requirements of the approved Waste Management Plan, and receipts or written certification from all facilities and waste management companies utilized to divert or dispose waste generated by the project to substantiate the amounts specified on the construction waste management final report.
  - b. For projects that satisfy the waste stream reduction alternative specified in Section 5.408.1.3, documentation of the quantity by weight of each material type disposed and the total combined weight of construction and demolition waste disposed in landfills as a result of the project, the corresponding pounds disposed per square foot of the building area, and receipts or written certification from all facilities and waste management companies utilized to dispose waste generated by the project that substantiate the amounts specified on the construction waste management final report.

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

### 1.7 QUALITY ASSURANCE

- A. Waste Management Conference: Contractor will conduct regular meetings at Project site to review methods and procedures related to waste management. Meetings shall be conducted as needed, but not less than one time per month, and shall include, but not be limited to, the following:
1. Review and discuss Waste Management Plan including responsibilities of Contractor and subcontractors.
  2. Review requirements for documenting quantities of each type of waste and its disposition.
  3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  5. Review waste management requirements for each trade.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.1 PLAN IMPLEMENTATION

- A. General: Implement approved Waste Management Plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract, or contract with an acceptable Waste Management firm to pick up and sort construction waste materials for recycling and disposal.
- B. Contractor shall be responsible for implementing, monitoring, and reporting status of Waste Management Plan.
1. At the Contractor's option, they may contract with a qualified Waste Management firm to manage and process the construction waste.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
1. Distribute waste management plan to all subcontractors.

- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

### 3.2 *RECYCLING DEMOLITION AND CONSTRUCTION WASTE*

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- C. Procedures for On-Site Separation: Unless Waste Management firm is coordinating all construction waste recycling and disposal, comply with requirements for separating recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
  - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 3. Stockpile materials away from construction area.
  - 4. Store components off the ground and protect from the weather.
  - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

### 3.3 *RECYCLING CONSTRUCTION WASTE*

- A. Packaging:
  - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
  - 2. Polystyrene Packaging: Separate and bag materials.

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3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
  4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
1. Clean Cut-Offs of Lumber: Recycle.
  2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
    - a. Comply with requirements in Landscaping Specification Sections for use of clean sawdust as organic mulch.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

### 3.4 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from project property and dispose in a legal manner.

### 3.5 PAYMENT

- A. The work under this section will be paid under the various items of work included in the Bid Schedule. Not additional payment shall be made thereto.

## END SECTION

### CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

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CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

01 74 19-7



**SECTION 01 77 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 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.

*1.5 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.

*1.6 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. Exposed structure surfaces
  - 2. Exposed equipment surfaces
  - 3. Exposed piping surfaces

*1.7 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.

*1.8 OPERATION AND MAINTENANCE (O&M) MANUALS*

- A. See Section 01 33 00 – Submittal Procedures.

*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)

CONTRACT CLOSEOUT  
01 77 00-2

**END SECTION**

**CONTRACT CLOSEOUT**  
01 77 00-3

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CONTRACT CLOSEOUT  
01 77 00-4

**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 benchmarks). 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 SECTION**

**SECTION 02 41 00**  
**DEMOLITION**

**PART 1 GENERAL**

*1.1 DESCRIPTION*

- A. The work of this section consists of demolition and removal of concrete curb, fencing, trees, miscellaneous debris, and salvaged items.
- B. This work may also include 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.

*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 fencing 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 23 – Storm Water Pollution Prevention Plan
- B. Section 01 57 27 – Dust Control
- C. Section 03 33 00 – Cast In Place Concrete
- D. Section 31 11 00 – Clearing and Grubbing
- E. Section 31 23 35 – Disposal of Materials

#### 1.4 SEQUENCING

- A. Sequence work to minimize interference with water distribution facilities operation. The existing water well must remain in operation throughout construction with only temporary shut-downs allowed with storage tank full.

#### 1.5 REGULATORY REQUIREMENTS

- A. Obtain all 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 33 00 – Cast In Place Concrete.
- B. Backfill materials shall be as required by Section 19 – Earthwork, State Standard Specifications.
- C. Concrete shall match existing materials and conditions.
- D. Concrete shall be replaced in conformance with governing authority standards.

*2.2 TOPSOIL*

- A. Not used.

*2.3 MATERIALS*

- A. Salvaged Materials: No materials shall be salvaged.
- B. 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.
- C. 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.

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- B. Prior to demolition work, all soil erosion control measures specified in Section 01 57 23 - Stormwater Pollution Prevention Plan (SWPPP) 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. All work within a Caltrans right of way shall conform to Section 15 of the State Standard Specifications.
- D. 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.
- E. Pavement and Slabs:
  - 1. Remove completely all Portland cement concrete slabs-on-grade including, but not limited to, curbs and footings. If approved by the Engineer, the Contractor may crush Portland concrete for use as aggregate base.
  - 2. Saw cut existing concrete curbs cleanly in straight continuous lines. Remove concrete as shown on the drawings.
  - 3. Any material thus processed shall conform to the specifications for Section 32 11 23 – Aggregate Base.

3.4 *ORDER OF WORK*

- A. Existing facilities shall remain in operation until the new well is in operation. Coordination will be required with the Owner for temporary shut-off of existing well for connection of new pipeline to existing pipelines and new chlorination connection. 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.

3.5 *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.

DEMOLITION  
02 41 00-4

3.6 *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.

3.7 *DISPOSAL*

A. As specified in Section 01 50 00 – Temporary Facilities.

**END SECTION**

DEMOLITION  
02 41 00-5

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DEMOLITION  
02 41 00-6

**SECTION 03 30 00**  
**CAST-IN-PLACE CONCRETE (SITE WORK)**

**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.
- 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. Division 3 – Concrete
- B. Section 05 05 20 – Bolts, Washers, Anchors and Eyebolts
- C. Section 09 90 00 – Painting and Coating
- D. Division 31 – Earthwork
- E. Division 32 – Exterior Improvements
- F. Division 33 – Utilities

*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. Submittals shall be in accordance with Section 01 33 00 of these Specifications.
- B. Provide material certificates, mix designs including laboratory testing, 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

- A. Concrete shall conform to Section 90 of the State Standard Specifications. Unless otherwise shown on the concrete note sheet or specified in other sections, all concrete shall conform to the following table of Portland cement mix requirements and minimum 28-day compressive strength. Portland cement shall be Type II.

Location	Mix Requirements
Paving, Exterior Slabs, and Sidewalks Exposed to Freezing	3,500 PSI, F1, S0, W1, C1 (W/C Max 0.55)
Paving, Exterior Slabs, and Sidewalks	2,500 PSI, F0, S0, W1, C1
Structural Footings and Interior Slabs	3,000 PSI, F0, S0, W1, C1

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All Other Structural Concrete	4,000 PSI, F0, S0, W0, C0
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1. Water/cement ratio shall not exceed 0.45 (by weight).
  2. Slump at placement shall be 4 inches +/- 1 inch.
- B. Concrete used for thrust blocks or for pipe encasement shall contain not less than 517 pounds of Type II Portland Cement per cubic yard of concrete (5 1/2 sack) with a slump of 4 inches +/- 1 inch.
- C. 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.

## 2.2 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

- A. Admixtures shall comply with Section 90-1.02E, "Admixtures", of the State Standard Specifications
- B. Air Entraining: ASTM C260

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- C. Water Reducing: ASTM C494, Type A, D or F
- D. Accelerating: ASTM C494, Type C or E
  - 1. No admixture containing any chloride ions is acceptable.
- E. Retarding: ASTM C494, Type B, D or G

2.6 *REINFORCING STEEL*

- A. Rebar shall be ASTM A615, Grade 60.
- B. Welded wire fabric shall conform to ASTM A1064.

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

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- b. Clear pigment may be used for concrete that will be exposed to public view.

2.10 WATERSTOP

- A. Comply with the provisions of Section 03 15 00 – Concrete Accessories.

**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 50 bar diameters for bar size through #6 and 62 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

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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 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 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

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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 8-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

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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

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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:

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- 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 ¼" 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 ACI 301, Chapter 1.6.
1. All costs of initial testing will be paid by the Owner unless otherwise noted.
  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.

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### 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 include areas

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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 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.

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- 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.

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### **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.

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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 SECTION**

BOLTS, WASHERS, ANCHORS AND EYEBOLTS  
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**SECTION 09 90 00**  
**PAINTING AND COATING (SITE)**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. Field painting including surface preparation, surface protection, clean up, and/or other appurtenant work.
- B. All labor, materials, tools and equipment, and incidentals necessary and required for their completion.
- C. All pipe, fittings, equipment, and structures are to be field coated except for those specific exceptions contained in this specification or identified on the drawings. The painting schedule included at the end of this specification summarizes the surfaces to be coated, the required surface preparation, and the coating systems to be applied. Coating notes on the drawings are used to show exceptions to the schedules, to extend the limits of coating systems, or to clarify or show details for application of the coating systems.
- D. All coatings for potable water service shall be ANSI-NSF Standard 61 certified.

*1.2 RELATED WORK*

- A. Section 03 30 00 – Cast-in-Place concrete

*1.3 SUBMITTALS*

- A. Submittals shall be in accordance with 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.

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- 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 09900-3.01 and 3.02 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.
- E. All paint used for intermediate and finish coats shall be guaranteed by the paint manufacturer to be fumeproof. Paint shall be lead-free and mercury-free.

#### 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.

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### 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 33 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 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.

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- 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 fumeproof. 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.

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### 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 "Devflex 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 *FUSION BONDED EPOXY LINING AND COATING*

- A. Lining and coating shall be a 100% solids, thermosetting, fusion-bonded, dry powder epoxy resin. Provide Scotchkote 134 or 206N, Lilly Powder Coatings "Pipeclad 1500 Red", or equal. Epoxy lining and coating shall meet or exceed the following requirements:

Hardness (Minimum):	Barcol 17 (ASTM D2583) Rockwell 50 ("M" Scale)
Abrasion Resistance (Minimum)	1,000 cycles: 0.05 gram removed 5,000 cycles: 0.115 gram removed ASTM D1044, Tabor CS 17 wheel 1,000 gram weight
Adhesion (Minimum)	3,000 psi (Elcometer)
Tensile Strength	7,300 psi (ASTM D2370)

2.6 *ALUMINUM SURFACES*

- A. All aluminum in contact with steel or concrete: Sherwin Williams "Macropoxy 646 FC Epoxy B58-600 series or approved equivalent.

2.7 *SHOP COATINGS*

- A. Shop coatings shall be applied as indicated in the individual equipment and component specifications.
- B. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with a high grade, oil resistant enamel suitable for top coating in the field with an alkyd enamel.
- C. All shop coatings shall be compatible with the paint system specified in the Painting Schedule contained at the end of this specification.

2.8 *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 (aluminum in contact with concrete is to be coated).
  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.

## 2.9 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 1/2" 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.

## 2.10 COLORS

- A. All colors and shades of colors shall be as specifically indicated in the specifications or plans, or, where not specifically indicated, selected from the manufacturer's standard color samples by the Owner.
- B. Electrical conduit shall be painted to match adjacent ceiling or wall surfaces as directed by the Engineer.

## 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

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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

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- 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.

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- 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

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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 degrees F, or when the temperature of the air, surface to be painted or substrate, is below (or likely to fall below) 50 degrees 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 5 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



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work all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer.

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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 exposed surfaces of new piping, pumps, motors, electrical equipment and other unsubmerged mechanical and structural items.	SP-2 or 3	P-2	F-2	F-2
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	

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7.	All new buried valves and flanged joints and other buried miscellaneous ferrous piping and metal surfaces (excluding cast 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 *When conflicting painting specifications or requirements are encountered in the contract documents, the more restrictive specifications or requirements shall be required.*

**END SECTION**

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**SECTION 09 97 57**  
**POLYETHYLENE TAPE PIPE COATING (AWWA C214)**

**PART 1 GENERAL**

*1.1 DESCRIPTION*

- A. This section describes materials, installation, and testing of a cold-applied polyethylene pipe coating complying with AWWA C209 and C214 with a cement mortar armor coat in accordance with AWWA C205 for pipe sizes 4 inches and larger.
- B. Supervisors of tape coating and cement mortar coating operations shall have at least two years' continuous recent experience in the application of tape and cement-mortar coating systems for steel pipe. The manufacturer of the tape coatings shall demonstrate a minimum of five years' successful application of this product on large diameter steel water pipelines.

*1.2 RELATED WORK SPECIFIED ELSEWHERE*

- A. Section 09 90 00 – Painting and Coating
- B. Section 40 05 00 – Pipe and Fittings

*1.3 SUBMITTALS*

- A. Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- B. Submit certificates of tests of physical and performance characteristics of each batch of primer and tape.
- C. Submit method approved by tape manufacturer to minimize voids at weld seams. Submit method approved by tape manufacturer to minimize disbondment of free ends of tape during shipping and storage.
- D. Submit application procedure approved by tape manufacturer, including the pattern of distribution and method of application of the weld seam tape system.
- E. Submit an affidavit of compliance with the referenced standards (e.g., AWWA C209, C214, etc.).
- F. Submit schedule for application of tape coating. Schedule coating to be accomplished during normal working hours. Provide a minimum of two weeks' notice to the Construction Manager prior to commencing or rescheduling work.
- G. Submit the names and qualifications of the workers and supervisors to be employed on the coating operation a minimum of 14 days prior to the start of taping operations.

#### 1.4 INSPECTION

- A. The entire procedure of applying the protective coating material as herein described will be inspected by the Construction Manager from surface preparation to completion of coating. Such inspection shall not relieve the Contractor of responsibility to furnish material and perform work in accordance with this specification. All coating work shall be done in the presence of the Construction Manager. Coating work not done in the Construction Manager's presence will be subject to rejection.

### PART 2 MATERIALS

#### 2.1 POLYETHYLENE TAPE COATING

- A. Polyethylene tape coating shall be in accordance with AWWA C214 as modified herein. The entire taping operation shall be developed by the pipe manufacturer with the assistance from and approval of the tape manufacturer. Inner layer and outer layer polyethylene tape shall exhibit properties meeting the requirements of AWWA C214. The total coating system shall be the Polyken YGIII System, Alta 100.20 Innerlayer/206.30 Outerlayer System, or equal. The application shall consist of one inner layer and one outer layer with the inner layer tape of thickness 20 mils minimum and the outer layer tape of thickness 35 mils minimum each. The total coating thickness shall not be less than 55 mils measured in the unapplied state and shall exhibit the properties meeting the requirements of AWWA C214, Table 4. Tape width shall not exceed 12 inches regardless of pipe diameter.
- B. Polyethylene tape coating for fittings and specials shall be three layers of 30-mil or two layers of 50-mil Type I or Type II in accordance with AWWA C209. The tape applied to fittings shall be compatible with the polyethylene tape coating system applied to pipe. Width of tape used shall be selected on the basis of the geometry of the particular fitting or special being coated. Alternatively, coat fittings and specials with two layers of half lapped 50-mil hot-applied coal-tar tape in accordance with AWWA C203. Total thickness shall be 100 mils in the unapplied state. Prepare and coat weld seams as specified for normal straight pipe.

#### 2.2 TAPE MATERIALS

- A. Tape materials shall conform to the following criteria:

1. Inner Layer Tape:

Backing	98% blend of high- and low-density polyethylene with the remaining portion a blend of colorants and stabilizers.
Adhesive	100% butyl-based elastomers with resins for adhesion, cathodic disbonding, and long-term in- ground performance.

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Tensile strength at break	30 lb/in. per ASTM D1000
Elongation at break	200% per ASTM D1000
Adhesion to steel	100 oz/in. width per ASTM D1000
Adhesion to primed steel	300 oz/in. width per ASTM D1000
Adhesion to backing	40 oz/in. width per ASTM D1000
Dielectric strength	Greater than or equal to 20 kV per ASTM D149
Insulation resistance	$1 \times 10^{12}$ ohms per ASTM D1000
Water vapor transmission rate	<0.2 gm/100 sq. in./24 hours at 70°F per ASTM E96, Method B
Cathodic disbonding at 20°C (68°F) for 30 days	0.2 sq. in. per ASTM G8
Shear resistance at 66°C (150°F) for four weeks	0.2 mm/day per ASTM D3654, Procedure A
Hydrolytic stability for 200 hours at 98°C H <sub>2</sub> O, adhesion > 150 oz/in.	
Thermal stability for 2,000 hours at 100°C air, adhesion > 150 oz/in.	

2. Outer Layer Tape:

Backing	96% blend of high- and low-density polyethylene with the remaining portion a blend of colorants and stabilizers.
Adhesive	100% butyl-based elastomer with resins for adhesion, cathodic disbonding, and long-term in-ground performance.
Tensile strength	45 lb/in. width (inner wrap) per ASTM D1000
Tensile strength	55 lb/in. width (outer wrap) per ASTM D1000
Elongation	200% per ASTM D1000
Adhesion to steel	80 oz/in. width per ASTM D1000

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Adhesion to backing	40 oz/in. width (inner wrap) per ASTM D1000
Adhesion to backing	60 oz/in. width (outer wrap) per ASTM D1000
Water vapor transmission	<0.2 gm/100 sq. in./24 hours at 70°F per ASTM E96, Method B
Dielectric strength	Greater than or equal to 25 kV per ASTM D149
Second mechanical outer layer shall have UV protection.	

**PART 3 EXECUTION**

**3.1 PIPE PREPARATION**

- A. Perform the entire coating operation as a one-station operation where the pipe is supported at the ends in a manner that will permit the application of the specified coatings. No additional handling following the initial setup of the pipe section, from application of primer, tape coating, and cement-mortar coating, will be allowed. No application involving rollers to support the pipe during the primer application, plastic tape application will be permitted.
- B. The pipe shall be of sufficient stiffness or have sufficient internal bracing to keep pipe cylindrical during taping. Maintain the axis of pipe during application without rocking, pitching, or yawing.
- C. Perform the coating operation in an environmentally controlled area such that it is protected from direct sunlight, wind, rain, snow, mist, fog, dust, and hail.
- D. Remove welding slag or scale by wire brushing, hammering, or other means prior to priming. Completely remove corrosion and foreign substances from the exterior of the pipe by blasting. The blast profile depth shall not exceed 3 mils. Wipe and broom the pipe surface after sandblasting and transport to coating station to remove grit, dust, and foreign substances.
- E. Prepare the exterior weld bead as follows:
  - 1. Where the exterior weld bead has a rough or irregular surface or narrow profile or is in excess of 1/16 inch in height, remove the exterior weld bead along the entire exterior surface of the pipe. The exterior weld bead shall be flush with the exterior surface of the pipe with a tolerance of +1/64 inch. Remove the weld bead such that no gouging or nicking of the plate surface will occur. This operation shall result in a smooth exterior surface with no ridges or valleys that may allow bridging or disbonding of the tape from the surface of the pipe.
  - 2. Where the exterior weld bead has a smooth surface and broad profile and is not in excess of 1/16 inch in height, remove the exterior weld bead within 18 inches of the ends of the pipe. The resultant bead shall be flush with the

exterior surface of the pipe with a tolerance of +1/64 inch. Remove the weld bead such that no gouging or nicking of the plate surface will occur. Apply primer as specified hereinafter, then prior to application of the inner wrap, apply a thin 6-inch-wide weld seam tape by automatic means over the weld seam. Construct the weld stripping tape of a low-density plastic backing not more than 5 mils thick and soft adhesive not more than 20 mils thick (Polyken 932-25 or equal). Immediately upon application, mechanically press the tape into place with a pressure roller to eliminate voids, wrinkles, or bubbles. Tape width shall extend 2 inches beyond the weld bead in each direction and shall be centered on the weld bead.

- F. Where pipe is shop cement-mortar lined, apply the exterior coating after the pipe is lined with mortar and the mortar is cured.
- G. Surface temperature of pipe shall be uniform, between 50 degrees Fahrenheit and 100 degrees Fahrenheit, and greater than 5-degrees Fahrenheit above the dew point.

### 3.2 APPLICATION OF PRIMER

- A. Uniformly heat primer to maintain at 70 degrees Fahrenheit  $\pm$ 10 degrees Fahrenheit (or slightly above pipe surface temperature when greater than 70 degrees Fahrenheit), throughout the application procedure. Use continuous recording chart-type devices to monitor primer temperature. Thoroughly mix the primer and agitate continuously during application to prevent settling of solids.
- B. Wipe the pipe surface free of dust and grit. Apply the primer coating immediately after surface preparation. Apply primer by automatic means with the spray shielded from drafts to result in a uniform thin primer over the entire pipe surface. Primer coverage shall be in accordance with manufacturer's recommendations but shall not exceed 600 square feet per gallon.
- C. Remove any imperfections from priming such as foreign material, drips, and runs. Reprime at location of such imperfections. Primer shall be sufficiently tacky prior to tape application to result in a void-free bond to steel.
- D. Thoroughly mix and heat primer, if necessary, to apply at optimum temperature.

### 3.3 TAPE APPLICATION

- A. The entire coating operation shall be performed by experienced workers skilled in the application of prefabricated cold-applied tape wrap coating and cement-mortar coating under qualified supervisors.
- B. Apply pipeline tape at a uniform roll body temperature above 50 degrees Fahrenheit and at an ambient temperature above 30 degrees Fahrenheit. Store up to the time of application under such conditions and for a sufficient period of time that the roll body temperature shall be within the temperature range recommended by the tape system manufacturer at the time of application.



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- C. Prime and hand press the free ends of outer wrap of each pipe section into place. Immediately upon application, mechanically press the inner layer tape into place by means of coating equipment with constant tension tape dispensing machines to result in a void-free coating, bonded to the primed steel surface and weld seam tape system. Spirally apply the inner layer tape with a 1-inch-minimum overlap, incorporating a pressure roller wider than the tape width to provide maximum contact at the step-down of the overlap and to eliminate air entrapment between the tape and the pipe. The pressure roller shall be hard rubber applying 1,000 to 1,200 psi against the pipe exactly at the tape-to-pipe contact.
- D. Operators shall make adjustments, including spindle-brake tension adjustments, to provide a continuous, uniform, tight coating. Apply tape at a uniform rate throughout the entire length of pipe at a tape speed not in excess of 3 fps. A smooth, taut coating accomplished with a tape-width drawdown not in excess of 2 percent shall be considered adequate. Keep wrinkles, puckers, and voids to a minimum and maintain the specified lap.
- E. Simultaneously with tape application, apply the specified outer wraps spirally. Make necessary adjustments to achieve a uniform, tightly applied outer wrap, essentially free of wrinkles, puckers, and voids, with a 1-inch-minimum lap width. Continuously record tape temperature near the point of application, and provide automatic means to adjust tape temperature during application.
- F. When solvent is used to remove coating or primer prior to welding, none of it shall be permitted to contact the exposed tape adhesive. Precautions shall be taken to protect the exposed tape, and only solvents approved by the tape manufacturer shall be used.
- G. Hold back the tape coating a sufficient length to provide clearance for welding joints in the field.

### 3.4 CEMENT MORTAR ARMOR COATING

- A. Apply a 1-inch-thick reinforced cement mortar armor coating over the tested and holiday-free completed tape coating, in accordance with AWWA C205. The cement mortar shall consist of not more than 4.5 cubic feet of sand to one sack (94 lbs) of cement.
- B. Leave 3 inches of tape uncoated at each end of the pipe in order to facilitate field tape coating of the joints.

### 3.5 COATING OF WELDED FIELD JOINTS

- A. When the joints are bell-and-spigot (weld bell) for field welding and the drawings or specifications do not require a full fillet weld or when the welding is accomplished from the inside only, apply a moldable filler material (per Section 09 90 00 – Painting and Coating) to fill all voids at the step down prior to tape coating the joint. Place the filler material firmly against the primed steel surfaces to eliminate voids under the tape and provide a smooth transition surface between bell and spigot.

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- B. Complete the coating of the joint in accordance with Section 09 90 00 – Painting and Coating, then after successful holiday testing of the joint, apply mortar coating over the joint in accordance with AWWA C205.

3.6 *MECHANICAL COUPLINGS AND PIPE ENDS*

- A. Where rubber-gasketed joints or mechanical couplings are used, apply a moldable filler material as specified for field-welded joints to fill all surface irregularities prior to application of tape. Alternatively for mechanical couplings, apply petrolatum or petroleum wax tape coating in accordance with AWWA C217.

**END SECTION**

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**SECTION 26 05 19**  
**CONDUCTORS AND CABLES**

**PART 1 - GENERAL**

*1.1 SUMMARY*

A. Section includes

1. Provide all labor, materials and equipment necessary for the installation of all conductors and cables under this Section related to lighting, power, mechanical, control and signal systems.

B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

*1.2 REFERENCES*

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. ASTM -American Society for Testing and Materials
  - a. B3; Standard Specification for Soft or Annealed Copper Wire
  - b. B8; Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
  - c. B787/B787M; Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation
  - d. D1000; Standard Test Method for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
2. CCR –California Code of Regulations, Title 24
  - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
3. UL -Underwriters Laboratories, Inc.
  - a. UL 83; Thermoplastic-Insulated Wire and Cables

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- b. UL 486A 486B; Wire Connectors
  - c. UL 486C; Splicing Wire Connectors
  - d. UL 486D; Standard for Insulated Wire Connector Systems For Underground Use Or In Damp Or Wet Locations
  - e. UL 486E; Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
  - f. UL 493; Thermoplastic-Insulated Underground Feeders and Branch Circuit Cables
  - g. UL 510; Standard for Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
  - h. UL 854; Service-Entrance Cables
4. NEMA –National Electrical Manufacturer’s Association
- a. WC 70-1999; Nonshielded Power Cables Rated 2000 Volts or less for the Distribution of Electrical Energy
5. IEEE –Institute of Electrical and Electronic Engineers
- a. 82; Standard Test Procedure for Impulse Voltage Tests on Insulated Conductors

1.3 *DELIVERY*

- A. Wire shall be in original unbroken package. Obtain approval of Inspector or Engineer before installation of wires.

**PART 2 - PRODUCTS**

2.1 *BUILDING WIRE*

- A. Conductor material
  - 1. Provide annealed copper for all wire, conductor and cable of not less than 98% conductivity.
  - 2. Wire #8 AWG and larger shall be stranded.
  - 3. Wire #10 AWG and smaller shall be solid.
- B. Insulation material
  - 1. All insulated wire, conductor and cable shall be 600 Vac rated.

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2. Feeder and branch circuits larger than #6 AWG shall be type THW, XHHW or THHN/THWN.
3. Feeder and branch circuits #6 AWG and smaller shall be type TW, THW, XHHW or THHN/THWN.
4. Control circuits shall be type THW or THHN/THWN.
5. Wires shall bear the UL label, be color-coded and marked with gauge, type and manufacturer's name on 24" centers.

2.2 *FLEXIBLE CORDS AND CABLES*

- A. Provide flexible cords and cables of size, type and arrangement as indicated on Drawings.
- B. Type S flexible cords and cable shall be manufactured in accordance with CEC Article 400 and composed of two or more conductors and a full sized green insulated grounding conductor with an outer rubber or neoprene jacket.
- C. Flexible cords and cables shall be fitted with wire mesh strain relief grips either as a integral connector component or an independently supported unit.
- D. Suspended flexible cords and cables shall incorporate safety spring(s).

2.3 *WIRE CONNECTIONS AND TERMINATIONS*

- A. Electrical spring wire connectors
  1. Provide multi-part construction incorporating a non-restricted, zinc coated square cross-sectional steel spring enclosed in a steel sheet with an outer jacket of plastic and insulating skirt.
  2. Self-striping pigtail and tap U-contact connectors are not acceptable.
- B. Compression type terminating lugs
  1. Provide tin-plated copper high compression type lugs for installation with hand or hydraulic crimping tools as directed by manufacturer. Notch or single point type crimps are not acceptable.
  2. Two hole, long barrel lugs shall be provided for size #4/O AWG and larger wire where terminated to bus bars. Use minimum of three crimps per lug where possible.
- C. Splicing and insulating tape
  1. Provide black, UV resistant, self extinguishing, 7 mil thick vinyl general purpose electrical tape per UL 510 and ASTM D1000. 3M Scotch 33 or equal.
- D. Insulating putty

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1. Provide pads or rolls of non-corrosive, self-fusing, 125 mil thick rubber putty with PVC backing sheet per UL 510 and ASTM D1000. 3M Scotchfil or equal.
- E. Insulating resin
1. Provide two-part liquid epoxy resin with resin and catalyst in pre-measured, sealed mixing pouch. 3M Scotchcast 4 or equal.
  2. Use resin with thermal and dielectric properties equal to the cable's insulating properties.
- F. Terminal strips
1. Provide box type terminal strips in the required quantities plus 25% spare. Install in continuous rows.
  2. Use the box type terminal strips with barrier open backs and with ampere ratings as required.
  3. Identify all terminal strips and circuits.
- G. Crimp type connectors
1. Provide insulated fork or ring crimp terminals with tinned electrolytic copper-brazed barrel with funnel wire entry and insulation support.
  2. Fasten crimp type connectors or terminals using a crimping tool recommended by the manufacturer.
  3. Provide insulated overlap splices with tinned seamless electrolytic copper-brazed barrel with funnel wire entry and insulation support.
  4. Provide insulated butt splices with tinned seamless electrolytic copper-brazed barrel with center stop, funnel wire entry and insulation support.
- H. Cable ties
1. Provide harnessing and point-to-point wire bundling with nylon cable ties. Install using tool supplied by manufacturer as required.
- I. Wire lubricating compound
1. UL listed for the wire insulation and conduit type, and shall not harden or become adhesive.
  2. Shall not be used on wire for isolated type electrical power systems.
- J. Bolt termination hardware
1. Bolts shall be plated, medium carbon steel heat-treated, quenched and tempered equal to ASTM A-325 or SAE Grade 5; or silicon bronze alloy ASTM B-9954 Type B.

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2. Nuts shall be heavy semi-finished hexagon, conforming to ANSI B18.2.2, threads to be unified coarse series (UNC), class 2B steel or silicon bronze alloy.
3. Flat washers shall be steel or silicon bronze, Type A plain standard wide series, conforming to ANSI B27.2. SAE or narrow series shall be used.
4. Belleville conical spring washers shall be hardened steel, cadmium plated or silicon bronze.
5. Each bolt connecting lug(s) to a terminal or bus shall not carry current exceeding the following values:
  - a. 1/4" bolt – 125 A
  - b. 5/16" bolt – 175 A
  - c. 3/8" bolt – 225 A
  - d. 1/2" bolt – 300 A
  - e. 5/8" bolt – 375 A
  - f. 3/4" bolt – 450 A

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Thoroughly examine site conditions for acceptance of wire and cable installation to verify conformance with manufacturer and specification tolerances. Do not commence with work until all conditions are made satisfactory.

#### **3.2 INSTALLATION**

- A. All wire, conductor, and cable with their respective connectors, fittings and supports shall be UL listed for the installed application and ambient conditions.
- B. Feeders and branch circuits in wet locations shall be rated 75°C minimum.
- C. Feeders and branch circuits in dry locations shall be rated 90°C minimum.
- D. Minimum conductor size
  1. #12 AWG copper for all power and lighting branch circuits.
  2. #14 AWG copper for all line voltage signal and control wiring, unless otherwise indicated.
- E. Remove and replace conductors under the following conditions at no additional costs to the Owner:



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1. Installed within wrong specified conduit or raceway.
2. Damaged during installation.
3. Of insufficient length to facilitate proper splice of conductors

3.3 *WIRING METHODS*

- A. Install wires and cable in accordance with manufacturer's written instructions, as shown on Drawings and as specified herein.
- B. Install all single conductors within raceway system, unless otherwise indicated.
- C. Parallel circuit conductors and terminations shall be equal in length and identical in all aspects.
- D. Provide adequate length of conductors within electrical enclosures and neatly train to termination points with no excess. Terminate such that there is no bare conductor at the terminal.
- E. Splice cables and wires only in junction boxes, outlet boxes, pull boxes, manholes or handholes.
- F. Group and bundle with tie wrap each neutral with its associated phase conductors where more than one neutral conductor is present within a conduit.
- G. Install cable supports for all vertical feeders in accordance with CEC Article 300. Provide split wedge type fittings, which firmly clamp each individual cable and tighten due to cable weight.
- H. Seal cable where exiting a conduit from an exterior underground raceway with a non-hardening compound (i.e., duct seal or equal).
- I. Provide UL listed factory fabricated, solder-less metal connectors of size, ampacity rating, material, type and class for applications and for services indicated. Use connectors with temperature ratings equal or greater than the conductor or cable being terminated.
- J. Stranded wire shall be terminated using fittings, lugs or devices listed for the application. Under no circumstances shall stranded wire be terminated solely by wrapping it around a screw or bolt.
- K. Flexible cords and cables supplied as part of a pre-manufactured assembly shall be installed according to manufacturer's published instructions.

3.4 *WIRING INSTALLATION IN RACEWAYS*

- A. Install wire in raceway after interior of building has been physically protected from weather, and all mechanical work likely to injure conductors has been completed.
- B. Pull all conductors into raceway at the same time.

- C. Use UL listed, non-petroleum base and insulating type pulling compound as needed.
- D. Completely mandrel all underground or concrete encased conduits prior to installation.
- E. Completely and thoroughly swab raceway system prior to installation
- F. Do not use block and tackle, power driven winch or other mechanical means for pulling conductors smaller than #1 AWG.
- G. Wire pulling
  - 1. Provide installation equipment that will prevent cutting or abrasion of insulation during installation.
  - 2. Maximum pull tension shall not exceed manufacturer's recommended value during installation for cable being measured with tension dynameter.
  - 3. Use rope made of non-metallic material for pulling.
  - 4. Attach pulling lines by means of either woven basket grips or pulling eyes attached directly to the conductors.
  - 5. Pull multiple conductors simultaneously within same conduit.

### 3.5 *WIRE SPLICES, JOINTS AND TERMINATIONS*

- A. Join and terminate wire, conductors and cables in accordance with UL 486, CEC and manufacturer's instructions.
- B. Thoroughly clean wires before installing lugs and connectors.
- C. Make splices, taps and terminations to carry full conductor ampacity without perceptible temperature rise, and shall be made mechanically and electrically secure.
- D. Terminate wires in terminal cabinets using terminal strips, unless otherwise indicated.
- E. Insulate spare conductors with electrical tape and leave sufficient length to terminate anywhere within panel or cabinet.
- F. Encapsulate splices in wet locations using specified insulating resin kits.
- G. Make up all splices and taps in accessible junction or outlet boxes with connectors as specified herein. Pigtails and taps shall be the same color as feed conductor with at least 6 inches of tail, all neatly packed within box.
- H. Where conductors are to be connected to metallic surfaces, coated surfaces shall be cleaned to base metal surface before installing connector. Remove lacquer coating of conduits where ground clamps are to be installed.

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- I. Branch circuits (#10 AWG and smaller) connectors shall comply with 2.03.A and 2.03.B above.
- J. Branch circuits (#8 AWG and larger)
  - 1. Join or tap conductors using insulated mechanical compression taps with pre-molded, snap-on insulating boots or specified conformable insulating pad and over-wrapped with two half-lapped layers of vinyl insulating tape starting and ending at the middle of joint.
  - 2. Terminate conductors using mechanical compression lugs in accordance with manufacturer's recommendation or as specified elsewhere.
  - 3. Field installed compression connectors for 250 MCM and larger shall have not less than two clamping elements or compression indents per wire.
  - 4. Insulate splices and joints with materials approved for the particular use, location, voltage and temperature.
- K. Termination hardware assemblies
  - 1. Al/Cu lugs connected to aluminum plated or copper bus shall be secured with steel bolt, flat washer (two per bolt), Belleville washer and nut.
  - 2. Copper lugs connected to copper buss shall bus shall be secured using silicon bronze alloy bolt, flat washer (two per bolt), Belleville washer and nut.
  - 3. The crown of Belleville washers shall be under the nut.
  - 4. Bolt assemblies shall be torque to manufacturer's recommendations. Where manufacturer recommendation is not obtainable, the following shall be used:
    - a. 1/4" -20 bolt at 80 inch-pound torque
    - b. 5/16" -18 bolt at 180 inch-pound torque
    - c. 3/8" -20 bolt at 20 inch-pound torque
    - d. 1/2" -20 bolt at 40 inch-pound torque
    - e. 5/8" -20 bolt at 55 inch-pound torque
    - f. 3/4" -20 bolt at 158 inch-pound torque

3.6 IDENTIFICATION

- A. Securely tag all branch circuits. Mark conductors with specified vinyl wrap-around markers. Where more than two conductors run through a single outlet, mark each conductor with the corresponding circuit number.
- B. Provide all terminal strips with each individual terminal identified using specified vinyl markers.

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C. In manholes, pullboxes and handholes provide tags of embossed brass type with cable type and voltage rating. Attach tags to cable with slip-free plastic cable lacing units.

D. Color coding

1. For 120/208 Volt (or 120/240 Volt), 1 phase, 3 wire systems:

- a. Phase A – Black
- b. Phase B – Red
- c. Neutral – White
- d. Ground – Green

2. For 120/208 Volt, 3 phase, 4 wire systems:

- a. Phase A – Black
- b. Phase B – Red
- c. Phase C – Blue
- d. Neutral – White
- e. Ground – Green

3. For 277/480 Volt, 3 phase, 4 wire systems:

- a. Phase A – Brown
- b. Phase B – Orange
- c. Phase C – Yellow
- d. Neutral – Gray
- e. Ground – Green

4. Switch leg individually installed shall be the same color as the branch circuit to which they originate, unless otherwise indicated.

5. Travelers for 3-way and 4-way switches shall be a distinct color and pulled with the circuit switch leg or neutral.

3.7 *FIELD QUALITY CONTROL*

A. Supply labor, materials and test equipment required to perform continuity and ground tests.

B. Electrical testing

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1. Perform feeder and branch circuit insulation test after installation and prior to connection to device.
2. Tests shall be performed by 600 Vdc megger for a continuous 10 seconds from phase-to-phase and phase-to-ground.
3. Torque test conductor connections and terminations for conformance to Specifications.
4. If any failure is detected, locate failure, determine cause and replace or repair cable to Engineer's satisfaction at no additional costs.
5. Furnish test results in type written report form for review by Engineer.

**END OF SECTION**

**SECTION 26 05 26**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the item specified under this Section, including but not limited to power system grounding

B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

**1.2 REFERENCES**

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. CCR –California Code of Regulations, Title 24
  - a. Part 3 -California Electrical Code (CEC); NFPA 70 National Electrical Code (NEC) with California amendments
2. IEEE –Institute of Electrical and Electronic Engineers
  - a. 142; Recommend Practices for Grounding of Industrial and Commercial Power Systems
3. NFPA –National Fire Protection Association
  - a. 780; Lightning Protection Code
4. UL –Underwriters Laboratories, Inc.
  - a. 467; Grounding and Bonding Equipment

**1.3 SYSTEM DESCRIPTION**

- A. This Section provides for the grounding and bonding of all electrical and communication apparatus, machinery, appliances, components, fittings and

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accessories where required to provide a permanent, continuous, low impedance, grounded electrical system.

- B. Ground the electrical service system neutral at service entrance equipment as shown on the Drawings.
- C. Ground each separately derived system, as defined in CEC 250.5 (D) and on the Drawings, unless specifically noted otherwise.
- D. Except as otherwise indicated, the complete electrical installation including the neutral conductor, equipment and metallic raceways, boxes and cabinets shall be completely and effectively grounded in accordance with all CEC requirements, whether or not such connections are specifically shown or specified.

1.4 *SUBMITTALS*

- A. Submit manufacturer's data for equipment and materials specified within this Section in accordance to Section 26 05 00.

1.5 *QUALITY ASSURANCE*

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.

**PART 2 - PRODUCTS**

2.1 *CONCRETE ENCASED GROUNDING ELECTRODE (UFER GROUND)*

- A. #3/O AWG minimum bare stranded copper conductor.

2.2 *DRIVEN (GROUND) RODS*

- A. Copper clad steel, minimum  $\frac{3}{4}$ " diameter by 10'-0" length, sectional type with copper alloy couplings and carbon steel driving stud; Weaver, Cadweld or equal.

2.3 *INSULATED GROUNDING BUSHINGS*

- A. Plated malleable iron body with 150°C molded plastic insulated throat and lay-in ground lug; OZ/Gedney BLG, Thomas & Betts #TIGB series or equal.

2.4 *CONNECTION TO PIPE*

- A. Cable to pipe connections; OZ/Gedney G-100B series, Thomas & Betts #290X series or equal.

2.5 *CONNECTIONS TO STRUCTURAL STEEL, GROUND RODS OR SPICES*

- A. Where required by the Drawings, grounding conductors shall be spliced together, connected to ground rods or connected to structural steel using exothermic welds, Cadweld or equal, or high pressure compression type connectors, Cadweld, Thomas & Betts or equal.

2.6 *BONDING JUMPERS*

- A. OZ/Gedney Type BJ, Thomas & Betts #3840 series or equal.

2.7 *GROUND CONDUCTOR*

- A. Ground conductor shall be code size UL labeled, Type THWN insulated copper wire, green in color.

2.8 *MAIN BUILDING REFERENCE GROUND BUS (BGB)*

- A. Provide 1 24"x4"x1/4" TK copper bus bar mounted on wall with insulating stand-offs at +18" AFF. Furnish complete with cast copper alloy body Thomas Betts Series 310 or equal lugs for connecting grounding conductors. Attach lugs to bus with appropriate size bronze bolt, flat washer and Belleville washer. All connections shall be torque, and all holes shall be drilled and tapped for single hole lugs. Provide 4 spare lugs with respective spaces.

**PART 3 - EXECUTION**

3.1 *INSTALLATION*

A. Grounding electrodes

1. Concrete encased grounding electrode (Ufer ground)

- a. Provide a #3/O AWG minimum bare copper conductor encased along the bottom of concrete foundation, footing or trench which is in direct contact with the earth and where there is no impervious waterproofing membrane between the footing and soil. The electrode shall extend through a horizontal length of 30' minimum and shall be encased in not less than 2" or more than 5" of concrete separating it from surrounding soil. The electrode shall emerge from the concrete slab through a protective non-metallic sleeve and shall be extended to BGB or as shown on Drawings.

2. Supplementary grounding electrode (ground ring, grid and driven rod)

- a. Provide as shown driven ground rod(s). Interconnect ground rod with structural steel and adjacent rods with code size bare copper conductor. Ground rods shall be space no less than 6'-0" on centers from any other electrode or electrodes of another electrical system.

3. Separately derived electrical system grounding electrode

- a. Ground each separately derived system per CEC 250-26 or as shown on Drawings, whichever is greater.

4. Metal underground water pipe



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- a. Contractor shall install an accessible grounding electrode conductor from the main incoming cold water line to BGB. The electrode conductor shall be sized per CEC Table 250-94 or as shown on Drawings, whichever is greater.

B. Grounding electrode conductor

1. Provide grounding electrode conductors per CEC Table 250-94 or as shown on Drawings, whichever is greater.

C. Power system grounding

1. Connect the following items using code size copper grounding conductors to BGB or as shown on Drawings:
  - a. Concrete encased electrode (Ufer ground)
  - b. Ground rod(s)
  - c. Incoming cold and fire water pipes
  - d. Gas pipe
  - e. Structural steel
  - f. Distribution transformer secondary

D. Equipment Bonding/Grounding

1. Provide a code sized copper ground conductor, whether indicated or noted on the drawings, in each of the following:
  - a. All power distribution conduits and ducts
  - b. Distribution feeders
  - c. Motor and equipment branch circuits
  - d. Device branch circuits
2. Provide a separate grounding bus at distribution panelboards, loadcenters, switchboards and motor control centers. Connect all metallic enclosed equipment so that with maximum fault current flowing, shall be maintained at not more than 35V above ground.
3. Metallic conduits terminating in concentric, eccentric or oversized knockouts at panelboards, cabinets, gutters, etc. shall have grounding bushings and bonding jumpers installed interconnecting all such conduits.
4. Provide bonding jumpers across expansion and deflection coupling in conduit runs, pipe connections to water meters and metallic cold water dielectric couplings.

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5. Provide ground wire in flexible conduit connected at each end via grounding bushing.
6. Provide bonding jumpers across all cable tray joints.
7. Bond each end of metallic conduit longer than 36" in length to grounding conductor using a #6 AWG pigtail.

3.2 *FIELD QUALITY CONTROL*

- A. Contractor using test equipment expressly designed for that purpose shall perform all ground resistance tests in conformance with IEEE guidelines. Contractor shall submit typewritten records of measured resistance values to Engineer for review and approval prior to energizing the system.
- B. Obtain and record ground resistance measurements both from electrical equipment ground bus to the ground electrode and from the ground electrode to earth. Furnish and install additional bonding and add grounding electrodes as required to comply with the following resistance limits:
  1. Resistance from ground bus to ground electrode and to earth shall not exceed 5 ohms unless otherwise noted.
  2. Resistance from the farthest panelboard, loadcenter, switchboard or motor control center ground bus to the ground electrode and to earth shall not exceed 20 ohms maximum.
- C. Inspection
  1. The Engineer or Inspector prior to encasement, burial or concealment thereto shall review the grounding electrode and connections.

**END OF SECTION**

**SECTION 26 05 33**  
**RACEWAYS AND BOXES**

**PART 1 - GENERAL**

*1.1 SUMMARY*

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to electrical conduits; outlet, junction and pull boxes; and related supports.

B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
  - a. 26 05 26 – Grounding and Bonding for Electrical Systems
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

*1.2 REFERENCES*

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
1. ANSI –American National Standards Institute
    - a. C33.91; Specification for Rigid PVC Conduit
    - b. C80.1; Specification Rigid Steel Conduit, Zinc-Coated
    - c. C80.3; Specification for Electrical Metallic Tubing, Zinc-Coated
    - d. C80.6; Intermediate Metal Conduit (IMC), Zinc-Coated
  2. CCR –California Code of Regulations, Title 24
    - a. Part 2 -California Building Code (CBC); International Building Code (IBC) with California amendments
    - b. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
  3. NECA –National Electrical Contractors Association

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- a. 101, Standard for Installing Steel Conduit (Rigid, IMC, EMT)
  - b. 111, Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) (ANSI)
4. NEMA –National Electrical Manufacturer’s Association
- a. FB 1; Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
  - b. FB 2.10; Selection and Installation Guidelines for Fittings for Use with Non-flexible Electrical Metal Conduit or Tubing (Rigid Metal Conduit, Intermediate Metal Conduit, and Electrical Metallic Tubing)
  - c. FB 2.20; Selection and Installation Guidelines For Fittings for Use With Flexible Electrical Conduit and Cable
  - d. OS 1; Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
  - e. OS 3; Selection and Installation Guidelines for Electrical Outlet Boxes
  - f. RN 1; Polyvinyl-Chloride Externally Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing
  - g. TC 2; Electrical Plastic Tubing and Conduit
  - h. TC 3; PVC Fittings for Use with Rigid PVC Conduit and Tubing
  - i. TC 14; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
5. OSHPD Anchorage Pre-approvals
- a. OPA-0003; Superstrut Seismic Restraint System
  - b. OPA-0114; B-Line Seismic Restraints
  - c. OPA-0120; Unistrut Seismic Bracing System
  - d. OPA-0242; Power-Strut Seismic Bracing System
6. UL –Underwriter’s Laboratories, Inc.
- a. 1; Standard for Flexible Metal Conduit
  - b. 6; Rigid Metal Electrical Conduit
  - c. 360; Standard for Liquid-Tight Flexible Steel Conduit
  - d. 514A; Metallic Outlet Boxes, Electrical
  - e. 514B; Fittings for Conduit and Outlet Boxes

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- f. 651; Schedule 40 & 80 PVC Conduit
- g. 797; Electrical Metallic Tubing
- h. 1242; Intermediate Metal Conduit
- i. 1684; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

1.3 *SYSTEM DESCRIPTION*

- A. Furnish, assemble, erect, install, connect and test all electrical conduits and related raceway apparatus required and specified to form a complete installation.

1.4 *SUBMITTALS*

- A. Submit manufacturer's data for materials specified within this Section in accordance to Section 26 05 00.

1.5 *QUALITY ASSURANCE*

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.
- B. Installation shall conform to the NECA installation guidelines unless otherwise indicated within this Section

**PART 2 - PRODUCTS**

2.1 *MATERIALS*

A. Conduits and Fittings

1. Rigid steel conduit (RMC)

- a. Conduit: Standard weight, mild steel pipe, and zinc coated on both inside and outside by a hot dipping or shearardizing process manufactured in accordance with UL 6 and ANSI C80.1 specifications.
- b. Fittings (couplings, elbows, bends, etc.)
  - 1) Shall be steel or malleable iron.
  - 2) Coupling and unions shall be threaded type, assembled with anti-corrosion, conductive and anti-seize compound at joints made absolutely tight to exclude water.

c. Bushings

- 1) Insulating bushings: Threaded polypropylene or thermosetting phenolic rated at 150°C minimum.

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- 2) Insulating grounding bushing: Threaded cast body with insulating throat and steel "lay-in" ground lug.
  - 3) Insulating metallic bushing: Threaded cast body with plastic insulated throat rated at 150°C minimum.
2. Stainless steel conduit (SSC)
    - a. Conduit: Same as rigid steel conduit except Type 304 stainless steel.
    - b. Fittings (couplings, elbows, bends, etc.): Same as rigid steel conduit except Type 304 stainless steel.
    - c. Bushings: Same as rigid steel conduit except Type 304 stainless steel.
  3. Coated rigid steel conduit (CRMC)
    - a. Conduit: Equivalent to RMC with a Polyvinyl chloride (PVC) coated bonded to the galvanized outer surface of the conduit. The bonding between the PVC coating and conduit surface shall be ETL PVC-001 compliant. The coating thickness shall be a minimum of 40mil.
    - b. Fittings (couplings, elbows, bends, etc.)
      - 1) Equivalent to RMC above with bonded coating same as conduit.
      - 2) The PVC sleeve over fittings shall extend beyond hub or coupling approximately one diameter or 1 1/2" whichever is smaller.
    - c. Bushing equivalent to RMC above.
  4. Intermediate metallic conduit(IMC)
    - a. Conduit: Intermediate weight, mild steel pipe, meeting the same requirements for finish and material as rigid steel conduit manufactured in accordance with UL 1242 and ANSI C80.6 specifications.
    - b. Fittings (couplings, elbows, bends, etc.) equivalent to RMC above.
    - c. Bushing equivalent to RMC above.
  5. Electrical metallic tubing (EMT)
    - a. Conduit: Cold rolled steel tubing with zinc coating on outside and protective enamel on inside manufactured in accordance with UL 797 and ANSI C80.3 specifications.
    - b. Couplings: Steel or malleable iron with compression type fastener via a nut.
    - c. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.

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6. Rigid non-metallic conduit (PVC)
  - a. Conduit: PVC composed Schedule 40, 90°C manufactured in accordance with NEMA TC 2 and UL 651 specifications.
  - b. Fittings: Molded PVC, slip on solvent welded type in accordance to NEMA TC 3.
7. Reinforced thermosetting resin conduit (RTRC)
  - a. Conduit: Fiber impregnated with a cured thermosetting resin compound in accordance with NEMA TC 14 and UL1684.
  - b. Fittings: Molded resin with glass reinforcement manufactured in the same process as the conduit bonded with an epoxy adhesive.
8. Flexible metallic conduit (FMC)
  - a. Conduit: Continuous, flexible steel spirally wound with zinc coating on both inside and outside in accordance with UL 1.
  - b. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
9. Liquidtight flexible metallic conduit (LFMC)
  - a. Conduit: PVC coated, continuous, flexible steel spirally wound with zinc coating on both inside and outside in accordance with UL 360.
  - b. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
10. Miscellaneous Fittings and Products
  - a. Conduit sealing bushings: Steel or cast malleable iron body and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Supplied with neoprene sealing rings between body and PVC sleeve.
  - b. Watertight cable terminators: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel screws and zinc plated cast iron locking collar.
  - c. Watertight cable/cord connectors: Liquidtight steel or cast malleable iron body with sealing neoprene bushing and stainless steel retaining ring.
  - d. Expansion fittings: Multi-piece unit of hot dip galvanized malleable iron or steel body and outside pressure bussing design to allow a maximum of 4" movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. UL listed for both wet and dry locations.

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- e. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve, internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling to provide minimum of 3/4" movement and 30 degrees deflection from normal. UL listed for both wet and dry locations.
- f. Conduit bodies: Raintight, malleable iron, hot-dip galvanized body with threaded hubs, stamped steel cover, stainless steel screws and neoprene gasket.
- g. Other couplings, connectors and fittings shall be equal in quality, material and construction to items specified herein.

B. Boxes

1. Outlet boxes

- a. Standard: Galvanized one-piece of welded pressed steel type in accordance with NEMA OS 1 and UL 514. Boxes shall not be less than 4" square and at least 1 1/2" deep.
- b. Concrete: Galvanized steel, 4" octagon ring with mounting lug, backplate and adapter ring type in accordance with NEMA OS 1 and UL 514. Depth as required by application.
- c. Masonry: Galvanized steel, 3.75" high gang box in accordance with NEMA OS 1 and UL 514.
- d. Surface cast metal: Cast malleable iron body, surface mounted box with threaded hubs and mounting lugs as required in accordance with NEMA OS 1 and UL 514. Furnish with ground flange, steel cover and neoprene gasket.

2. Pull and junction boxes

- a. Sheet metal boxes: Standard or concrete outlet box wherever possible; otherwise use 16 gauge galvanized sheet metal, NEMA 1 box sized per CEC with machine screwed cover.
- b. Cast metal boxes: Install standard cast malleable iron outlet or device box when possible.
- c. Flush mounted boxes: Install overlapping cover with flush head screws.
- d. In-ground mounted pull holes/boxes: Install pre-cast concrete box, sized per Drawing or CEC with pre-cast or traffic rated lid.

3. Floor boxes

- a. Floor boxes shall be adjustable, cast metal body with threaded conduit openings, adjustable rings, brass flange or Lexan ring and cover plate with threaded plug. Include provisions to accommodate surface mounted



telephone or receptacle outlet, or flush floor mounted telephone or receptacle outlet where shown on Drawings.

C. Pull line/cord

1. Polypropylene braided line or Let-line #232 or equal of 1/8" diameter with a minimum break strength of 200 pounds.

**PART 3 - EXECUTION**

3.1 *EXAMINATION*

- A. Thoroughly examine site conditions for acceptance of wire and cable installation to verify conformance with manufacturer and specification tolerances. Do not commence with work until all conditions are made satisfactory.

3.2 *PREPARATION*

A. Conduit

1. Provide all necessary conduit fittings, connectors, bushings, etc. required to complete conduit installation to meet the CEC and intended application whether noted, shown or specified within.
2. Location of conduit runs shall be planned in advance of the installation and coordinated with other trades.
3. Where practical, install conduits in groups in parallel vertical or horizontal runs that avoid unnecessary offsets.
4. All conduits shall be parallel or at right angles to columns, beams and walls whether exposed or concealed.
5. Conduits shall not be placed closer than 12" to a flue, parallel to hot water, steam line or other heat sources; or 3" when crossing perpendicular to the above said lines when possible.
6. Install exposed conduit as high as practical to maintain adequate headroom. Notify Engineer if headroom will be less than 102".
7. Do not obstruct spaces required by Code in front of electrical equipment, access doors, etc.
8. The largest trade size conduit in concrete floors and walls shall not exceed 1/3 thickness or be spaced a less than three conduit diameters apart unless permitted by Engineer. All conduits shall be installed in the center of slab or wall, and never between reinforcing steel and bottom of floor slab.
9. Install additional pull boxes, not shown on Drawings, in sufficient quantities to facilitate pulling of conductors and cables such that total spacing does not

exceed 150 feet or 270 degrees, total; and maximum pulling tension will not be exceeded.

10. When installing underground conduits to specified depth; depth shall be taken from finished grade as it will be at project completion. Should finish grade be above existing grade by an amount equal to or greater than specified depth, conduit shall be installed not less than 6" below existing grade.
11. Verify that information concerning finish grade is accurate, for should the underground run be less than the specified depth, Contractor may be required to re-install conduit to meet the required depth.
12. Unless otherwise specified, underground conduits shall be installed with top side not less than 24" below finished grade; this depth applies to all conduits outside of building foundations including those under walks, open corridors or paved areas.
13. Utility company service conduits installation depth shall be as directed by their respective specifications and requirements.

#### B. Boxes

1. Before locating outlet boxes, check Construction Documents for type of construction and make sure that there is no conflict with other equipment. Locate outlet boxes as shown and locate so as not to interfere with other Work or equipment.
2. Install all outlet boxes flush within walls, ceiling and floors except where installed within non-finished rooms, cabinetry, attic spaces or as indicated on Drawings.
3. Locate pull boxes and junction boxes within concealed, accessible locations where possible.
4. Do not install outlet boxes back-to-back with same stud space. Where shown back-to-back, offset as required, and fill void with sound dampening material where requested by Owner.
5. In fire rated walls separate boxes by 24" minimum and with stud member.
6. Adjust position of outlet boxes within masonry wall to accommodate course lines.

### 3.3 *INSTALLATION*

#### A. Conduit

1. Minimum conduit size shall be 3/4" unless otherwise indicated.
2. All conduit work shall be concealed unless otherwise indicated. Exposed conduits shall be permitted within unfinished rooms/spaces to facilitate installation.
3. Install conduit in complete runs prior to installing conductors or cables.

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4. Make long radius conduits bends free from kink, indentations or flattened surfaces. Make bends carefully to avoid injury or flattening. Bends 1 1/4" size and larger shall be factory made ells or be made with a manufactured mechanical bender. Heating of steel conduit to facilitate bending or that damage galvanized coating will not be permitted.
5. Remove burrs and sharp edges at end of conduit with tapered reamer.
6. Protect and cover conduits during construction with metallic bushings and bushing "pennies" to seal exposed openings.
7. Assemble conduit threads with anti-corrosion, conductive, anti-seize compound and tighten securely.
8. Install conduits shall that no traps to collect condensation exist.
9. Fasten conduit securely to boxes with locknuts and bushings to provide good grounding continuity.
10. Install pull cords/line within any spare or unused conduits of sufficient length to facilitate future cable installation.
11. Penetrations
  - a. Locate penetrations within structural members as shown on Drawings and as directed by Engineer. Should it be necessary to notch any framing member, make such notching only at locations and in a manner as approved by Engineer.
  - b. Do not chase concrete or masonry to install conduit unless specifically approved by Engineer.
  - c. Cutting or holes
    - 1) Install sleeves for cast-in-place concrete floors and walls. After installing conduit through penetration, seal using dry-pack grouting compound (non-iron bearing, chloride free and non-shrinking) or fire rated assembly if rated floor or wall. Use escutcheon plate on floor underside to contain compound as necessary.
    - 2) Cut holes with a hole saw for penetrations through non-concrete or non-masonry members.
    - 3) Provide chrome plated escutcheon plates at all publicly exposed wall, ceiling and floor penetrations.
  - d. Sealing
    - 1) Non-rated penetration openings shall be packed with non-flammable insulating material and sealed with gypsum wallboard taping compound.

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- 2) Fire rated penetration shall be sealed using a UL classified fire stop assembly suitable to maintain the equivalent fire rating prior to the penetration.
- 3) Use escutcheon plates to hold sealing or fire rated compound as necessary.

e. Waterproofing

- 1) Make penetrations through any damp-proofed/waterproofed surfaces within damp/wet locations as such as to maintain integrity of surface.
- 2) Install specified watertight conduit entrance seals at all below grade wall and floor penetrations.
- 3) At roof penetrations furnish roof flashing, counter flashing and pitch-pockets compatible to roof assembly.
- 4) Where possible conduits that horizontally penetrate a waterproof membrane shall fall away from and below the penetration's exterior side.
- 5) Make penetrations through floors watertight with mastic, even when concealed within walls or furred spaces.

12. Supports

- a. Conduits shall be support and braced per OSHPD pre-approved anchorage systems when those methods are implemented and installed.
- b. Sizes of rods and cross channels shall be capable of supporting 4 times and 5 times actual load, respectively. Anchorage shall support the combined weight of conduit, hanger and conductors.
- c. Support individual horizontal conduit 1 1/2" and smaller by means of 2 hole straps or individual hangers.
- d. Galvanized iron hanger rods sizes 1/4" diameter and larger with spring steel fasteners, clips or clamps specifically design for that purpose for 1 1/2" conduits and larger.
- e. Support multi-parallel horizontal conduits runs with trapeze type hangers consisting of 2 or more steel hanger rods, preformed cross channels, 'J' bolts, clamps, etc.
- f. Support conduit to wood structures by means of bolts or lag screws in shear, to concrete by means of insert or expansion bolts and to brickwork by means of expansion bolts.
- g. Support multi-parallel vertical conduits runs with galvanized Unistrut, Power-Strut or approved equal type supports anchored to wall. Where multi-floored conduits pass through floors, install riser clamps at each floor.

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- h. Maximum conduit support spacing shall be in accordance with NECA Standard of Installation:
  - 1) Horizontal runs:
    - a) 3/4" and smaller at 60" on centers, unless building construction prohibits otherwise, then 84" on centers.
    - b) 1" and larger at 72" on centers, unless building construction prohibits otherwise or any other condition, then 120" on centers.
  - 2) Vertical runs:
    - a) 3/4" and smaller @ 84" on centers.
    - b) 1" and 1 1/4" @ 96" on centers.
    - c) 1 1/2" and larger @ 120" on centers.
    - d) Any vertical condition such as shaftways and concealed locations for any sized conduit, 120" on centers.
- i. Anchorage for RMC/IMC supports unless otherwise specified:
  - 1) < 1" IMC/RMC = #10 bolt/screw.
  - 2) 1" IMC/RMC = 1/4" bolt/screw.
  - 3) 1 1/2" and 2" IMC/RMC = 3/8" bolt/screw.
  - 4) 3" IMC/RMC, 4" EMT = 1/2" bolt/screw.
  - 5) > 3"IMC/RMC = 5/8" bolt/screw.
- j. Anchorage for EMT supports unless otherwise specified:
  - 1) < 1 1/2" EMT = #10 bolt/screw.
  - 2) 1 1/2" EMT = 1/4" bolt/screw.
  - 3) 2, 2 1/2" and 3" EMT = 3/8" bolt/screw.
  - 4) 4" EMT = 1/2" bolt/screw.
  - 5) > 4"EMT = 5/8" bolt/screw.

**B. Boxes**

- 1. Install boxes as shown on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.

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2. Install additional pull boxes, not shown on Drawings, in sufficient quantities to facilitate pulling of conductors and cables such that total spacing does not exceed 150 feet or 270 degrees, total; and maximum pulling tension will not be exceeded.
3. Install plaster rings on all outlet boxes in stud walls or in furred, suspended or exposed ceilings. Covers shall be of a depth suited for installation.
4. Provide gasketed cast metal cover plates where boxes are exposed in damp or wet locations
5. Install access door for boxes installed within concealed locations without access.
6. Install approved factory made knockout seal where knockouts are not present.
7. Refer to Architectural interior elevations and details shown for exact mounting heights of all electrical outlets. In general, locate outlets as shown or specific and complies with Americans with Disabilities Act:
  - a. Convenience outlets: +18" AFF or +6" above counter or splash.
  - b. Local switches: +48" AFF or +6" above counter or splash.
  - c. Telecommunication outlets: +18" AFF or +48" AFF for wall telephone or intercom device.
  - d. Verify all mounting heights with Drawings, and where heights are not suited for construction or finish please consult Engineer.
8. Use conduit bodies to facilitate pulling of conductor or cables or change conduit direction. Do not splice within conduit bodies.
9. Enclose pull box with additional rated gypsum board as necessary to maintain wall's original fire rating.
10. Install galvanized steel coverplates on all open boxes within dry listed areas.
11. Install in-ground pull holes/boxes flush to grade finish at finished areas or 1" above finished landscaped grade. Seal all conduits terminating in pull hole/box watertight. Install and grout around bell ends where shown. Cover and lids shall be removable without damage to adjacent finish surfaces.
12. Support
  - a. Accurately place boxes for finish, independently and securely supported by adequate blocking or manufacturer channel type heavy-duty box hangers for stud walls. Do not use nails to support boxes.
  - b. Support boxes independent of conduit system.
  - c. Mount boxes installed within ceilings to 16 gauge metal channel bars attached to main runners or joists.

- d. Support boxes within suspended acoustical tile ceilings directly from structure above when light fixture are to be installed from box.
- e. Use auxiliary plates, bar or clips and grouted in place for masonry, block or pour-in-place concrete construction.

### 3.4 APPLICATION

#### A. Conduit

1. RMC/IMC suitable for all damp, dry and wet locations except when in contact with earth. IMC not suitable for hazardous locations as stated within CEC.
2. CRMC suitable for damp or wet locations, concealed within concrete or in contact with earth.
3. EMT suitable for exposed or concealed dry, interior locations.
4. PVC/RTRC suitable for beneath ground floor slab, except when penetrating, and direct earth burial. Do not run exposed within concrete walls or in floor slab unless indicated on Drawings or per Engineer's permission.
5. FMC suitable for dry locations only for connections to motors, transformers, vibrating equipment/machinery, controllers, valves, switches and light fixtures in less than 6 foot lengths.
6. LFMC application same as FMC above but for damp or wet locations.

#### B. Termination and joints

1. Use raceway fittings compatible with associated raceway and suitable for the location.
2. Raceways shall be joined using specified couplings or transitions where dissimilar raceway systems are joined.
3. Conduits shall be securely fastened to cabinets, boxes and gutters using (2) two locknuts and insulating bushing or specified insulated connector. Where joints cannot be made tight and terminations are subject to vibration, use bonding jumpers, bonding bushings or wedges to provide electrical continuity of the raceway system. Use insulating bushings to protect conductors where subjected to vibration or dampness. Install grounding bushings or bonding jumpers on all conduits terminating at concentric or eccentric knockouts.
4. Terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.
5. Stub freestanding equipment conduits through concrete floors for connections with top of coupling set flush with finished floor. Install plugs to protect threads and entrance of debris.

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6. Install specified cable sealing bushings on all conduits originating outside the building walls and terminating within interior switchboard, panel, cabinet or gutters. Install cable sealing bushings or raceway seal for conduit terminations in all grade level or below grade exterior pull, junction or outlet boxes.
7. Where conduits enter building from below grade inject into filled raceways pre-formulated rigid 2 lbs. density polyurethane foam suitable for sealing against water, moisture, insects and rodents.
8. Install expansion fitting or expansion/deflection couplings per manufacturer's recommendations where:
  - a. Any conduit that crosses a building structure expansion joint; secure conduit on both sides to building structure and install expansion fitting at joint.
  - b. Any conduit that crosses a concrete expansion joint; install expansion/deflection at joint.
  - c. Any conduit greater than 1-1/4" is routed along roof top in runs greater than 100 feet; install expansion fittings every 100 feet.
  - d. Engineer may allow FMC or LFMC in lieu of expansion fitting or expansion/deflection couplings on conduits 2" and smaller within accessible locations upon further review and written consent.

C. Boxes

1. Standard type suitable for all flush installations and all dry concealed locations.
2. Concrete type suitable for all flush concrete installations.
3. Masonry type suitable for all flush concrete and block installations.
4. Surface cast meta type suitable for all exposed damp and wet surface mounted locations, and dry surface mounted locations less than 96" from finished floor

**END OF SECTION**



**SECTION 26 05 53**  
**ELECTRICAL IDENTIFICATION**

**PART 1 GENERAL**

*1.1 SUMMARY*

A. Section includes requirements for:

1. Identifying electrical, instrumentation, and process equipment and components.
2. Material, manufacturing, and installation requirements for identification devices.

B. Related Sections:

1. Contract Documents are a single integrated document, and as such all Divisions and Sections apply. It is the responsibility of the CONTRACTOR and its subcontractors to review all sections to ensure a complete and coordinated project.

*1.2 REFERENCES*

- A. Refer to Section 26 05 00.

*1.3 DEFINITIONS*

- A. Refer to Section 26 05 00.

*1.4 SYSTEM DESCRIPTION*

A. Nameplates:

1. Provide a nameplate for each control device or major item of electrical equipment, either located in the field or within panels.
2. Provide all nameplates of identical style, color, and material throughout the facility.
3. Device nameplates information:
  - a. Designations as indicated on the Drawings and identified on the Process and Instrumentation Drawings.
  - b. Device tag and loop number ID (e.g. EDV-60.0101.01).
  - c. Circuit ID (e.g. LPA-11).
  - d. Area served (e.g. Lighting Chemical Building).

B. Wire Numbers:

1. Coordinate the wire numbering system with all vendors of equipment so that every field wire has a unique number associated with it for the entire system:
  - a. Wire numbers shall correspond to the wire numbers on the control drawings or the panel and circuit numbers for receptacles and lighting.
  - b. Wire numbers shall correspond to the terminal block number to which they are attached in the control panel.
  - c. Internal panel wires on a common terminal shall have the same wire number.
  - d. All instrumentation cables shall be identified at pull points as described above.
2. Provide the following wiring numbering schemes throughout the project for field wires between Process Control Module, (PCM), Vendor Control Panels, (VCP), Motor Control Centers, (MCC), field starters, field instruments, etc.

(ORIGIN LOC.)-(ORIGIN TERM.)/(DEST. LOC.)-(DEST. TERM.)

OR

(ORIGIN LOC.)-(ORIGIN TERM.)  
(DEST. LOC.)-(DEST. TERM.)

Where:

- ORIGIN LOC. = Designation for originating panel or device
- ORIGIN TERM. = Terminal designation at originating panel or device
- DEST. LOC. = Designation for destination panel or device
- DEST. TERM. = Terminal designation at destination panel or device or PLC  
I/O address at destination panel

- a. Identify equipment and field instruments as the origin.
- b. PCM's are always identified as the destination.
- c. Location is the panel designation for VCP, LCP, or PCM. For connections to MCC's, location is the specific starter tag and loop number. Location is the tag and loop number for motor starters, field instruments and equipment. Any hyphen in the panel designation or

tag and loop number shall be omitted.

- d. Terminal designation is the actual number on the terminal block where the conductor terminates at field devices and vendor control panels. For multiconductor cables, all terminal numbers shall be shown, separated by commas.
- e. Terminal designations at motor leads shall be the motor manufacturer's standard terminal designation (e.g. T1, T2, T3, etc.).
- f. Terminal designations at PCM's where the field conductor connects to a PLC input or output shall be the PLC address (Note: the following PLC I/O numbering scheme is typical for Allen Bradley, the numbering scheme should be modified to match that of the actual PLC manufacturer used for the project):

1) Discrete Point: W:X:Y/Z

Analog Point: W:X:Y.Z

Where:

W = I for input, O for output

X = PLC number (1, 2, 3...)

Y = Slot number (01, 02, 03...)

Z = Terminal number (00,01,02...) for a discrete point  
or a word number for an analog point (1,2,3...)

- g. Terminal designations at PCM's where the conductor does not connect to a PLC I/O point shall be the terminal number with a "C" prefix (e.g. 010). For common power after a fuse or neutrals after a switch, the subsequent points shall have and capital letter suffix starting with "A" (e.g.. C0010A).

3. **Case 1:** Vendor Control Panel (VCP) to Process Control Module (PCM):

Field Wire Number/Label: A-B/C-D

A = Vendor Control Panel number without hyphen (VCP60.0101.01)

B = Terminal number within VCP (manufacturer's or vendor's standard terminal number)

C = Process Control Module number without hyphen (PCM60.0101)

D = Either the PLC address if the field terminal is connected directly to a PLC input or output point or the terminal number with a "C" prefix if not connected directly to a PLC I/O point (C0010)

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Examples: VCP60.0101.01-10/PCM60.0101-I:1:01/01  
VCP60.0101.01-10/PCM60.0101-O:1:10/07  
VCP60.0101.01-10/PCM60.0101-C0100

4. **Case 2:** Field Instrument to Process Control Module  
(PCM): Field Wire Number/Label: E-F/C-D

C = Process Control Module number without hyphen (PCM60.0101)

D = Either the PLC address if the field terminal is connected directly to a PLC input or output point or the terminal number with a "C" prefix if not connected directly to a PLC I/O point (C0010)

E = Field mounted instrument tag and loop numbers without hyphen  
(EDV60.0101.01)

F = Manufacturer's standard terminal number within instrument. Use both terminal numbers for analog points separated by a comma

Examples: TIT60.0101.01-2,3/PCM60.0101-I:1:01.1  
TSH60.0101-1/PCM60.0101-I:2:01/00

5. **Case 3:** Motor Control Center (MCC) to Process Control Module  
(PCM): Field Wire Number/Label: G-B/C-D

B = Terminal number within Motor Control Center (manufacturer's or vendor's standard terminal number)

C = Process Control Module without hyphen (PCM60.0101)

D = Either the PLC address if the field terminal is connected directly to a PLC input or output point or the terminal number with a "C" prefix if not connected directly to a PLC I/O point (C0010)

G = Actual starter designation in the Motor Control Center without hyphen  
(MMS60.0101)

Examples: MMS60.0101-10/PCM60.0101-I:1:01/01  
MMS60.0101-10/PCM60.0101-O:1:10/07  
MMS60.0101-10/PCM60.0101-C0100

6. **Case 4:** Motor Control Center (MCC) to Vendor Control Panel  
(VCP): Field Wire Number/Label: G-B/A-B

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A = Vendor Control Panel number without hyphen (VCP60.0101.01)

B = Terminal number within motor control center or vendor control panel  
(manufacturer's or vendors standard terminal number)

G = Actual starter designation in the Motor Control Center without hyphen  
(MMS60.0101)

Example: MMS60.0101-X2/VCP60.0101.01-10

7. **Case 5:** Motor leads to a Motor Control Center (MCC): Field Wire  
Number/Label: H-I/G-B

B = Terminal number within motor control center (manufacturer's  
standard terminal number)

G = Actual starter designation in the Motor Control Center without hyphen  
(MMS60.0101)

H = Equipment tag and loop number without hyphen (PMP60.0101.01)

I = Motor manufacturer's standard motor lead identification (e.g.T1, T2,  
T3, etc.)

Example: PMP-60.0101.01-T3/MMS60.0101.01-T3

8. **Case 6:** Remote or separately mounted starter or Variable Frequency Drive  
(VFD) to Process Control Module (PCM): Field Wire Number/Label: J-B/C-D

B = Terminal number within starter or Variable Frequency Drive (manufacturer's  
standard terminal number)

C = Process Control Module number without hyphen (VCP60.0101.01)

D = Either the PLC address if the field terminal is connected directly to a  
PLC input or output point or the terminal number with a "C" prefix if not  
connected directly to a PLC I/O point (C0010)

J = Starter or Variable Frequency Drive tag and loop number without hyphen  
(MMS60.0101)

Examples: MMS60.0101-10/PCM60.0101.01-I:1:01/01

MMS60.0101-10/PCM60.0101.01-O:2:10/07

MMS60.0101-10/PCM60.0101.01-C0010

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9. Terminate all spare conductors on terminal blocks and identify as required for other field wires with an "S" prefix:

Example: S MMS60.0101-10/PCM60.0101.01-C011

### 1.5 SUBMITTALS

- A. Furnish submittals in accordance with Section 26 05 00.

- B. Product Data:

1. Nameplates:

- a. Color.

- b. Size:

- 1) Outside dimensions.

- 2) Lettering.

- c. Material.

- d. Mounting means.

2. Nameplate Schedule:

- a. Show exact wording for each nameplate.

- b. Include nameplate and letter sizes.

3. Wire Numbers:

- a. Manufacturer's catalog data for wire labels and label printer.

- C. Record Documents:

1. Update the conduit schedule to reflect the exact quantity of wire numbers including spares and destination points for all wires.

### 1.6 QUALITY ASSURANCE

- A. Schedule a pre-installation conference in accordance with Section 26 05 00 in order to clearly define the requirements specified for equipment identification:

1. Representatives of the CONTRACTOR, OWNER, and ENGINEER shall convene before any major purchases of cable or conductors and before the installation or termination of any cables or conductors.

### 1.7 DELIVERY, STORAGE, AND HANDLING

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A. Refer to Section 26 05 00.

1.8 *WARRANT*

A. Refer to Section 26 05 00.

1.9 *SYSTEM START UP*

A. Refer to Section 26 05 00.

**PART 2 PRODUCTS**

2.1 *MANUFACTURERS*

A. Nameplates and Signs:

1. One of the following or equal:

- a. Brady.
- b. Seton.

B. Conductor and Cable Markers:

1. Heat-shrinkable tubing:

- a. One of the following or equal:
  - 1) Raychem.
  - 2) Brady.
  - 3) Thomas & Betts.
  - 4) Kroy.

C. Conduit and Raceway Markers:

1. One of the following or equal:

- a. Almetek: Almetek type mini-tag.
- b. Lapp Group: Maxi System

D. Medium Voltage Raceway Voltage Labels:

1. One of the following or equal:

- a. Brady.

- b. Seton.

## 2.2 MATERIALS

### A. Nameplates:

1. Fabricated from white-center and red or black face laminated plastic engraving stock:
  - a. 3/32-inch thick material.
  - b. Two-ply.
  - c. With chamfered edges.
  - d. Block style engraved characters of adequate size to be read easily from a distance of 6 feet:
    - 1) No characters smaller than 1/8-inch in height.

### B. Signs:

1. Automatic equipment and high voltage signs:
  - a. Suitable for exterior use.
  - b. In accordance with OSHA regulations.

### C. Conductor and Cable Markers:

1. Machine printed black characters on white tubing.
2. Ten point type or larger.

### D. Conduit and Raceway Markers:

1. UV resistant holder and letters.
2. Black letters on yellow background.
3. Minimum 1/2-inch high letters.

### E. Medium Voltage Circuit Raceway Labels:

1. Vinyl plastic.
2. Minimum 1-inch high letters.

## 2.3 SOURCE QUALITY CONTROL

### A. Nameplates:



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1. Provide all nameplates for control panel operator devices (e.g. pushbuttons, selector switches, pilot lights, etc.):
  - a. Same material and same color and appearance as the device nameplates, in order to achieve an aesthetically consistent and coordinated system.

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Refer to Section 26 05 00.
- B. Nameplates:
  1. Attach nameplates to equipment with rivets, bolts or sheet metal screws, approved waterproof epoxy-based cement or install in metal holders welded to the equipment.
  2. On NEMA 4 or NEMA 4X enclosures, use epoxy-based cement to attach nameplates.
  3. Nameplates shall be aligned and level or plumb to within 1/64 inch over the entire length:
    - a. Misaligned or crooked nameplates shall be remounted, or provide new enclosures at the discretion of the ENGINEER.
- C. Conductor and Cable Markers:
  1. Apply all conductor and cable markers before termination.
  2. Heat-shrinkable tubing:
    - a. Tubing shall be shrunk using a heat gun that produces low temperature heated air.
    - b. Tubing shall be tight on the wire after it has been heated.
    - c. Characters shall face the open panel and shall read from left to right or top to bottom.
    - d. Marker shall start within 1/32 inch of the end of the stripped insulation point.
- D. Conduit Markers:
  1. Furnish and install conduit markers for every conduit in the electrical system

that is identified in the conduit schedule or part of the process system:

- a. Conduit markings shall match the conduit schedule; refer to Section 26 05 53.
2. Mark conduits at the following locations:
  - a. Each end of conduits that are greater than 10 feet in length.
  - b. Where the conduit penetrates a wall or structure.
  - c. Where the conduit emerges from the ground, slab, etc.
  - d. The middle of conduits that are 10 feet or less in length.
3. Mark conduits after the conduits have been fully painted.
4. Position conduit markers so that they are easily read from the floor.
5. Secure all conduit markers with nylon cable ties:
  - a. Provide with ultraviolet resistant cable ties for conduit markers exposed to direct sunlight.
  - b. Adhesive labels are not acceptable.
6. Mark conduits before construction review by ENGINEER for punch list purposes.

E. Medium Voltage Raceway Labels:

1. Apply at 50 foot intervals stating the voltage level contained within the raceway.

F. Signs and Labeling:

1. Furnish and install permanent warning signs at mechanical equipment that may be started automatically or from remote locations:
  - a. Fasten warning signs with round head stainless steel screws or bolts.
  - b. Locate and mount in a manner to be clearly legible to operations personnel.
2. Furnish and install permanent and conspicuous warning signs on equipment (front and back), doorways to equipment rooms, pull boxes, manholes, etc. where the voltage exceeds 600 volts.
3. Furnish and install warning signs on equipment that has more than one

source of power.

- a. Warning signs to identify every panel and circuit number of the disconnecting means of all external power sources.
4. Place warning signs on equipment that has 120 VAC control voltage source used for interlocking.
    - a. Identify panel and circuit number or conductor tag for control voltage source disconnecting means.

### 3.2 *FIELD QUALITY CONTROL*

- A. Replace any nameplates, signs, conductor markers, cable markers, or raceway labels that in the sole opinion of the ENGINEER do not meet the ENGINEER's aesthetic requirements.

**END OF SECTION**

**SECTION 26 18 11**  
**OVERCURRENT PROTECTION DEVICES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section includes**

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to overcurrent protection devices.

**B. Related sections**

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

**1.2 REFERENCES**

**A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:**

1. CCR –California Code of Regulations, Title 24
  - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
2. Federal Specification
  - a. W-C-375; Circuit Breakers, Molded Case, Branch Circuit And Service
3. NEMA –National Electrical Manufacturer’s Association
  - a. AB 1; Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures
  - b. PB 2.2; Application Guide for Ground Fault Protective Devices for Equipment
4. UL -Underwriters Laboratories, Inc.
  - a. 248; Low Voltage Fuses
  - b. 468; Wire Connectors

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- c. 508E; IEC Type "2" Coordination Short Circuit Tests
- d. 489; Molded-Case Circuit Breakers and Circuit Breaker Enclosures
- e. 943; Standard for Ground-Fault Circuit-Interruption

1.3 *SUBMITTALS*

- A. Submit manufacturer's data for materials specified within this Section in accordance to Section 26 05 00.
- B. Production test of circuit breakers upon request of Engineer.
- C. Submittal shall show the following information: circuit breaker numbering, circuit breaker type and short circuit rating, provisions for future circuit breakers, bussing, including neutral and ground, ratings and enclosure dimensions and trims.

1.4 *QUALITY ASSURANCE*

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.
- B. The manufacturing facility shall be registered by Underwriters Laboratories Inc. to the International Organization for Standardization ISO 9002 Series Standards for quality.

1.5 *DELIVERY, STORAGE AND HANDLING*

- A. Handle carefully to avoid damage to internal components, enclosure and finish.
- B. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional cover to protect enclosure in harsh environments.

**PART 2 - PRODUCTS**

2.1 *FUSES*

- A. All power distribution fuses shall be time-delay, high interrupting (200kAIC minimum) and current limiting type, unless otherwise indicated. All fuses shall be of same manufacturer and model.
  - 1. Motor branch circuit fuses (0 – 600A): UL Class RK5 dual element, time delay type shall be size for UL 508E "Type 2" coordination for the motor controller. Coordinate fuse selection with motor starter overload relay heaters as required.
  - 2. General purpose feeder fuses (0 – 600A): UL Class RK1 dual element, time delay type shall be size per Drawings.
- B. Control and instrumentation fuses shall be of type and rating as recommended by equipment manufacturer, suitable for fuse blocks or holders installation.

## 2.2 MOLDED CASE CIRCUIT BREAKERS

### A. General

1. Circuit breakers shall be constructed using glass reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
2. Circuit breakers shall have an over center, trip free, toggle operating mechanism which will provide quick-make, quick-break contact action. The circuit breaker shall have common tripping of all poles.
3. The circuit breaker handle shall reside in a tripped position between ON and OFF to provide local trip indication.
4. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker after installation.
5. Circuit breakers shall have an RMS interrupting capacity not less than shown on Drawings, or if not shown shall not be less than:
  - a. 25kA for 480V systems
  - b. 22kA for 240V (or less) systems
6. Each circuit breaker shall be equipped with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit breaker tripping mechanism for maintenance and testing purposes.
7. Circuit breakers shall be equipped with UL Listed electrical accessories as noted on Drawing. Circuit breaker handle accessories shall provide provisions for locking handle in the ON and OFF position.
8. All circuit breakers shall be UL Listed for reverse connection without restrictive line and load markings and be suitable for mounting in any position.
9. Circuit breakers shall be constructed with factory installed mechanical lugs. All circuit breakers shall be UL Listed to accept field installable/removable mechanical type lugs. Lug body shall be bolted in place; snap in design not acceptable. All lugs shall be UL Listed to accept solid (not larger than #8 AWG) and/or stranded copper and aluminum conductors. Lugs shall be suitable for 90°C rated wire, sized according to the 75°C temperature rating in the CEC.
10. All circuit breakers shall be capable of accepting bus connections.

### B. Thermal-Magnetic Circuit Breakers

1. Circuit breakers shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.

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2. Thermal trip elements shall be factory preset and sealed. Circuit breakers shall be true RMS sensing and thermally responsive to protect circuit conductor(s) in a 40°C ambient temperature.
3. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker.
4. Provide equipment ground fault protection where shown on Drawing with the following features.
  - a. Ground fault sensing system shall be modified zero sequence sensing type and not require any external power to trip the circuit breaker.
  - b. The ground fault sensing system shall be suitable for use on grounded systems. The ground fault sensing system shall be suitable for use on three-phase, three-wire circuits where the system neutral is grounded but not carried through the system or on three-phase, four-wire systems.
  - c. Ground fault pickup current setting and time delay shall be field adjustable. A switch shall be provided for setting ground fault pickup point. A means to seal the pickup and delay adjustments shall be provided.
  - d. The ground fault sensing system shall include a ground fault memory circuit to sum the time increments of intermittent arcing ground faults above the pickup point.
  - e. A means of testing the ground fault system to meet the on-site testing requirements of CEC 230.95 (C) shall be provided.
  - f. Local visual ground fault trip indication shall be provided.
  - g. The ground fault sensing system shall be provided with Zone Selective Interlocking (ZSI) communication capabilities compatible with other thermal magnetic circuit breakers equipped with ground fault sensing, electronic trip circuit breakers with integral ground fault sensing and external ground fault sensing systems as noted on Drawings.

C. Electronic Trip Circuit Breakers

1. Circuit breaker trip system shall be a microprocessor-based true RMS sensing design with sensing accuracy through the thirteenth (13th) harmonic. Sensor ampere ratings shall be as indicated on Drawings.
2. The integral trip system shall be independent of any external power source and shall contain no less than industrial grade electronic components.
3. The ampere rating of the circuit breaker shall be determined by the combination of an interchangeable rating plug, the sensor size and the long-time pickup adjustment on the circuit breaker. The sensor size, rating plug and adjustment positions shall be clearly marked on the face of the circuit breaker. Circuit

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breakers shall be UL Listed to carry 80% (or 100% where noted on Drawings) of their ampere rating continuously.

4. The following time/current response adjustments shall be provided. Each adjustment shall have discrete settings and shall be independent of all other adjustments.
  - a. Instantaneous Pickup
  - b. Long Time Pickup
  - c. Long Time Delay
  - d. Short Time Pickup
  - e. Short Time Delay
  - f. Ground Fault Pickup (when specified with ground fault protection)
  - g. Ground Fault Delay (when specified with ground fault protection)
5. A means to seal the trip unit adjustments in accordance with CEC 240.6 (B) shall be provided.
6. Local visual trip indication for overload, short circuit and ground fault trip occurrences shall be provided.
7. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. All current values shall be displayed in true RMS with 2% accuracy.
8. Long Time Pickup indication to signal when loading approaches or exceeds the adjusted ampere rating of the circuit breaker shall be provided.
9. The trip system shall include a Long Time memory circuit to sum the time increments of intermittent overcurrent conditions above the pickup point. Means shall be provided to reset Long Time memory circuit during primary injection testing.
10. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. Indication of inherent ground fault current flowing in the system shall be provided on circuit breakers with integral ground fault protection. All current values shall be displayed in true RMS with 2% accuracy.
11. Circuit breakers shall be equipped with back-up thermal and magnetic trip system.
12. Equipment Ground Fault Protection shall be provided where noted on Drawings.
  - a. Circuit breakers shall be provided with integral equipment ground fault protection for grounded systems. The circuit breaker shall be suitable for use



- on three-phase, three-wire circuits where the system neutral is grounded but not carried through the system or on three-phase, four-wire systems.
- b. A separate neutral current transformer shall be provided for three-phase, four-wire systems.
  - c. Ground fault sensing system shall be residual sensing type.
  - d. The trip system shall include a ground fault memory circuit to sum the time increments of intermittent ground faults above the pickup point.
  - e. A means of testing the ground fault system to meet the on-site testing requirements of CEC 230.95 (C) shall be provided.
  - f. Local visual trip indication for a ground fault trip occurrence shall be provided.
  - g. The ground fault sensing system shall be provided with Zone Selective Interlocking (ZSI) communication capabilities compatible with other thermal magnetic circuit breakers equipped with ground fault sensing, electronic trip circuit breakers with integral ground fault sensing and external ground fault sensing systems as noted on Drawings.
13. Circuit breaker trip system shall be equipped with an externally accessible test port. Disassembly of the circuit breaker shall not be required for testing. Test set shall be capable of verifying the operation of all trip functions with or without tripping the circuit breaker.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Notify Engineer no later than 10 working days for adjustable circuit breaker settings not shown within Drawings. Submit to Engineer the following information:
  - 1. Panel, switchboard name/ID
  - 2. Circuit breaker identifier (i.e., main circuit breaker, load served, etc.)
  - 3. List of necessary settings (i.e., trip settings, time delays, etc.)

#### **3.2 INSTALLATION**

- A. Install equipment and their accessories in to manufacturer's instructions, pertinent Codes, and with recognized industry practices to insure device operates properly.
- B. Tighten electrical connectors and terminals in accordance to manufacturer's requirements. Where the manufacturer does not have published torque tightening values, comply with the requirements of UL 468.

### 3.3 *FIELD QUALITY CONTROL*

- A. Check tightness of circuit breaker connections using a calibrated torque wrench or torque screwdriver per manufacturer's written specifications.
- B. Contractor to obtain the services of an independent testing company who shall provide quality control and adjustments as well as tests for
  - 1. Check each circuit breaker above 100A on a 225A frame for long-time and short-time delay pickup and instantaneous pickup.
    - a. Instantaneous pickup current shall be determined by 4 cycles or less.
    - b. b. Perform timing test with 300% of breaker trip unit rated current.
    - c. Adjust unit if required, so that the tripping characteristics are within the limits of the published time-current characteristic curves for that particular trip unit.
  - 2. Test and calibrate ground fault protection trip and pickup time on 225A frame breakers and larger.
- C. Physically test key interlock systems to check for proper functionality.
- D. Check and set where required all protective device settings in accordance with approved coordination study settings and conduct ground fault acceptance tests.

### 3.4 *ADJUSTING*

- A. Adjust all operating mechanisms for free mechanical movement per manufacturer's specifications.
- B. Adjust circuit breaker trip and time delay settings to values indicated as instructed by Engineer.
  - 1. Check each circuit breaker above 100A, long-time and short-time delay pickup and instantaneous pickup. Instantaneous pickup current shall be determined by 4 cycles or less. Perform timing test with 300% of breaker trip unit rated current. Adjust unit if required, so that the tripping characteristics are within the limits of the published time-current characteristic curves for that particular trip unit.
  - 2. Main circuit breaker ground fault setting shall be per CEC 230.95 (A) or as directed by Engineer.

### 3.5 *PROTECTION*

- A. When directed by Engineer provide physical means to "permanently fix" settings for rotary and DIP type switches with a thin coat of clear lacquer.

3.6 *CLEANING*

- A. Remove marks, dirt and debris from installed equipment surfaces for “new like” appearance.

**END OF SECTION**

**SECTION 26 27 26**  
**WIRING DEVICES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to wiring devices.

B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
  - a. 26 05 26 – Grounding and Bonding for Electrical Systems
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

**1.2 REFERENCES**

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. Federal Specification
  - a. W-C-596; Connector, Electrical, Power, General Specification for
  - b. W-S-896; Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification)
2. NEMA –National Electrical Manufacturer’s Association
  - a. WD 1; General Color Requirements for Wiring Devices
  - b. WD 6; Wiring Devices-Dimensional Requirements
3. UL -Underwriters Laboratories, Inc.
  - a. 20; General-Use Snap Switches
  - b. 498; Standard for Attachment Plugs and Receptacles
  - c. 943; Standard for Ground-Fault Circuit-Interrupters

- d. 1449; Standard for Transient Voltage Surge Suppressors

### 1.3 SUBMITTALS

- A. Submit manufacturer's data for materials specified within this Section in accordance to Section 26 05 00.

### 1.4 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.

## PART 2 - PRODUCTS

### 2.1 SWITCHES

#### A. Wall switches

1. Specification grade, quiet, AC rated, mechanical, snap type with silver alloy contacts, and shall comply with NEMA WD-1 and Fed. Spec W-S-896.
2. Rating shall be 20A at 120/277Vac, unless otherwise shown.
3. Handles shall be nylon; color shall be compatible with adjacent wall finish.
4. Manufacturers and types
  - a. Single pole, single throw
    - 1) Cooper Wiring Devices #CSB120, Hubbell #CSB120, or equal.
  - b. Double pole, single throw
    - 1) Cooper Wiring Devices #CSB220, Hubbell #CSB220, or equal.
  - c. Three way
    - 1) Cooper Wiring Devices #CSB320, Hubbell #CSB320, or equal.

### 2.2 RECEPTACLES

#### A. Standards

1. Specification grade, NEMA 5-15R configuration grounding type, rated 15A at 125/250Vac that conform to NEMA WD-6 and Fed. Spec W-C-596.
2. At dedicated receptacle locations and as otherwise noted, use specification grade, NEMA 5-20R configuration grounding type, rated 20A at 125/250Vac that conform to NEMA WD-6 and when possible Fed. Spec W-C-596.
3. Specialty receptacles shall conform to NEMA WD-6 and UL standards as applicable.

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B. Color

1. General purpose receptacle face shall be nylon; color shall be compatible with adjacent wall finish, unless otherwise indicated.

C. Receptacle types

1. General purpose single

- a. Provide self-grounding back and side wired with binding head staked terminal screw.
- b. Use Cooper Wiring Devices #5261, Hubbell #5261, or equal for NEMA 5-15R.
- c. Use Cooper Wiring Devices #5361, Hubbell #5361, or equal for NEMA 5-20R.

2. General purpose duplex

- a. Provide self-grounding back and side wired with binding head staked terminal screws and break-off strip for two circuit wiring.
- b. Use Cooper Wiring Devices #5262, Hubbell #5262, or equal for NEMA 5-15R.
- c. Use Cooper Wiring Devices #5362, Hubbell #5362, or equal for NEMA 5-20R.

3. Transient voltage surge suppressor (TVSS) duplex

- a. Provide 20A, 125Vac receptacle consisting of NEMA 5-20R duplex device with integral TVSS protection circuit.
- b. Provide LED indicator to verify surge protection and ground, and audible alarm to notify bad ground connection or surge protection expiration.
- c. TVSS characteristics:
  - 1) 400V clamping voltage.
  - 2) 280J energy rating.
  - 3) 150Vac RMS MOV rating
  - 4) 18kA maximum surge current in all modes (L-N, L-G and N-G)
- d. Use Cooper Wiring Devices #5362\_S, no known equal.

4. Isolated ground

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- a. Provide receptacle specified within this Section with equipment grounding contacts connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap.
5. Ground fault circuit interrupter (GFCI) duplex
  - a. Provide 20A, 125Vac receptacle consisting of NEMA 5-20R duplex device with integral solid state sensing and signaling circuitry capable of detecting and interrupting a maximum 5mA line-to-ground fault current in approximately 1/40th of a second per UL 943.
  - b. Provide visual device with trip indication, manual reset and test mechanisms per UL 943.
  - c. Device shall be capable of point of use and multi-outlet protection.
  - d. Use Cooper Wiring Devices #XGF20, Hubbell #GF53, or equal.
6. Hospital grade and tamper resistant
  - a. Provide receptacle specified within this Section that conforms to UL 498 "Hospital Grade" requirements.
  - b. Tamper resistance receptacle shall have integral protection mechanism to prevent accidental shock from foreign object contacting energized blades.
7. Special purpose
  - a. Provide specification grade devices with NEMA configuration, voltage, ampacity, poles and ground provisions as noted on Drawings.

2.3 WALL PLATES

- A. Interior locations
  1. Finished Areas: 0.032" stainless steel, brushed or satin finish with required number of openings for location.
  2. Exposed Areas: galvanized, raised type.
- B. Exterior: die-cast copper-free aluminum, gasketed, raintight cover UL listed for exterior and wet locations while in use. Use Hubbell #WP8M (duplex), #WP26M (GFCI) or equal.
- C. Screws shall match plate.
- D. Tamper resistance receptacles shall have exposed screws of tamper-resistant type.
- E. Individual, gangable wall plates are not acceptable where two or more devices are installed at one location.

**PART 3 - EXECUTION**

3.1 *PREPARATION*

- A. Coordinate device heights with drawings and details.
- B. Locate switches on latch side of door, unless otherwise indicated.

3.2 *INSTALLATION*

- A. Mount and align device and wall plates level and plumb. Insure wall plates fit flat against wall and tight against device without strain on plate.
- B. Comply with manufacturer's instructions regarding termination of conductors to wiring device.
- C. Provide wall plates for all outlet boxes with devices.
- D. Install blank wall plates on all outlet boxes in which no device is present or installed.

**END OF SECTION**



## **SECTION 26 28 16**

### **SAFETY SWITCHES AND INDIVIDUAL MOUNTED CIRCUIT BREAKERS**

#### **PART 1 - GENERAL**

##### *1.1 SUMMARY*

###### A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to heavy duty fusible, non-fusible and double throw safety switches.

###### B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
  - a. 26 05 26 – Grounding and Bonding for Electrical Systems
  - b. 26 18 11 – Overcurrent Protection Devices
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

##### *1.2 REFERENCES*

- ###### A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
1. CCR –California Code of Regulations, Title 24
    - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
  2. NEMA –National Electrical Manufacturer’s Association
    - a. KS 1; Enclosed Switches
    - b. 250; Enclosures for Electrical Equipment
  3. UL -Underwriters Laboratories, Inc.
    - a. 98; Enclosed and Dead Front Switches
    - b. 489; Molded-Case Circuit Breakers and Circuit Breaker Enclosures

1.3 *SUBMITTALS*

- A. Submit manufacturer's data for materials specified within this Section in accordance to Section 26 05 00.

1.4 *QUALITY ASSURANCE*

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.

1.5 *DELIVERY, STORAGE AND HANDLING*

- A. Handle carefully to avoid damage to internal components, enclosure and finish.
- B. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional cover to protect enclosure in harsh environments.

**PART 2 - PRODUCTS**

2.1 *MANUFACTURERS*

- A. Square D, Cutler Hammer or approved equal.

2.2 *MATERIALS*

- A. Heavy-duty safety switches

1. Switch interior

- a. All switches shall have switch blades which are visible when the switch is OFF and the cover is open.
- b. Lugs shall be front removable and UL Listed for 75°C conductors, aluminum or copper.
- c. 30A through 100A switches shall be equipped with factory or field installed fuse pullers.
- d. Switches required for Type 12, 12K or Type 4-4X-5 stainless steel applications shall have all copper current carrying parts.
- e. All current carrying parts shall be plated to resist corrosion.
- f. Switches shall have removable arc suppressors to facilitate easy access to line side lugs.
- g. Switches shall have provisions for a field installable electrical interlock.

2. Switch mechanism

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- a. Switch operating mechanism shall be quick-make, quick-break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening action of the contacts has started.
  - b. The operating handle shall be an integral part of the box, not the cover.
  - c. Provisions for padlocking the switch in the OFF position with at least three padlocks shall be provided.
  - d. The handle position shall travel at least 90° between OFF and ON positions to clearly distinguish and indicate handle.
  - e. All switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is ON and prevent turning the switch ON when the cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
3. Switch enclosures
- a. All enclosures shall be NEMA 1 general purpose unless otherwise noted.
  - b. Switch covers shall be attached:
    - 1) with welded pin-type hinges (Type 1, 12, 12K, 4-4X-5 stainless steel).
    - 2) top hinged, attached with removable screws and securable in the open position (Type 3R).
    - 3) by molded hinges and type 316 stainless steel hinge pins (Type 4X polyester).
    - 4) by type 316 stainless steel bolts (Type 7/9).
  - c. The enclosure shall be finished with:
    - 1) gray baked enamel paint which is electrodeposited on cleaned, phosphate pre-treated steel (Type 1).
    - 2) gray baked enamel paint which is electrodeposited on cleaned, phosphate pre-treated galvanized steel (Type 3R, 12, 12K).
    - 3) a brush finish on type 304 stainless steel (Type 4-4X-5 stainless steel).
    - 4) Gray baked enamel on copper free cast aluminum alloy (Type 7/9).
  - d. The enclosure shall have ON and OFF markings:
    - 1) stamped into the cover (Type 1, 3R, 4-4X-5 stainless steel, 12, 12K).

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- 2) cast into the cover (Type 7/9).
  - 3) inked on a adhesive label (Type 4X polyester).
  - e. The operating handle shall be provided with a dual colored, red/black position indication.
  - f. All switches shall have provisions to accept up to three 3/8" hasp padlocks to lock the operating handle in the OFF position.
4. Switch ratings
- a. Switches shall be horsepower rated for ac and/or dc as indicated on Drawings.
  - b. The UL Listed short circuit current rating of the switches shall be:
    - 1) 10,000 rms symmetrical amperes when used with or protected by Class H or K fuses (30-600A).
    - 2) 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600A switches employing appropriate fuse rejection schemes).
    - 3) 200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200A)
- B. Double throw switches
1. Shall have the same characteristics as heavy-duty safety switches above for switch interior, mechanism, enclosure and rating.
  2. Additional switch operating mechanism characteristics shall be:
    - a. quick-make, quick-break for 60A through 200A, 2 pole and 3 pole devices.
    - b. Slow-make, slow-break for
      - 1) 30A and greater than 200A, 2 pole and 3 pole devices.
      - 2) 60A through 200A, 4 pole devices.
- C. Individual Mounted Circuit Breakers
1. Circuit Breaker
    - a. Circuit breakers shall be of type, rating and poles shown on Drawings per Section 26 18 11 – Overcurrent Protection Devices.
  2. Enclosure

- a. Enclosure shall be galvanized steel constructed in accordance with UL 50 requirements, and be NEMA 1, unless specifically shown or specified otherwise.

### **PART 3 - EXECUTION**

#### **3.1    *INSTALLATION***

- A. The equipment shall be installed per the manufacturer's recommendations.
- B. Anchor safety switches to structural members and as shown on Drawings. Provide additional support as required.
- C. Mount safety switches level and plumb.

#### **3.2    *FIELD QUALITY CONTROL***

- A. Inspect complete installation prior to energizing for physical damage, proper alignment, anchorage and grounding.
- B. Check tightness of bolted connections per manufacturer's written specifications.

**END OF SECTION**

**SECTION 26 29 33**  
**SOLID STATE REDUCED VOLTAGE CONTROLLER**

**PART 1 - GENERAL**

*1.1 SCOPE OF WORK*

- A. These specification requirements are for solid state reduced voltage motor controllers herein referred to as soft starters or soft starts.
- B. They are for use with NEMA design B, AC motors to reduce the current in-rush as well as mechanical shocks that can result from starting or stopping a motor across the line.

*1.2 QUALITY ASSURANCE*

- A. The electronic soft starter shall be listed by an independent testing laboratory in accordance with UL 508 - Industrial Control Equipment.
- B. The soft start shall carry the CE mark for indication of compliance to low voltage and EMC directives in accordance with EN/IEC 60947-4-2.
- C. The manufacturer shall be a certified ISO 9002 facility.

*1.3 WARRANTY*

- A. An eighteen-month warranty shall be provided on materials and workmanship from date of invoice.

**PART 2 - PRODUCTS**

*2.1 GENERAL DESCRIPTION*

- A. The soft starter shall be provided by the manufacturer factory mounted in an enclosure rated as UL Type 3R for outdoor use.
  - 1. Type 3R enclosures shall include a remote digital keypad for adjusting the soft starter parameters either mounted on the door or with provisions to close the enclosure door while the remote keypad is accessed externally.
  - 2. Provisions shall be available for padlocking the enclosure door in the off position.
- B. The enclosed product shall be provided complete with one of the following overcurrent protective devices (OCPDs) for Type 1 short circuit protection:
  - 1. Inverse-time circuit breaker disconnect means. Short circuit withstand rating shall be 65 kA, @ 208, 230, 460 V.
- C. The motor must be automatically protected from solid state component failure by one of the following means:

1. Isolation contactor that opens when the motor is stopped or when the controller detects a fault condition, including a shorted SCR condition.
- D. The soft starter shall utilize at least two SCRs per phase to control the starting and stopping of industry standard motors.
- E. The soft starter shall be controlled by a microprocessor that continuously monitors the current and controls the phasing of the SCRs. Analog control algorithms shall not be allowed.
- F. All soft starter power ratings shall utilize a common control board/module.
- G. An internal shorting contactor shall be standard on soft starters in all enclosure configurations. Protective features and deceleration control options integral to the soft starter shall be available even when the shorting contactor is engaged.
- H. The equipment shall be an Enclosed Altistart 22 Solid State Reduced Voltage Combination Motor Controller by Square D / Schneider Electric or an approved equal.

## 2.2 MOTOR DATA

- A. The soft starter shall be designed to operate a NEMA design B motor with a nameplate rating as shown on the Drawings.

## 2.3 RATINGS

- A. The soft start shall be designed to operate in an ambient temperature:
  - UL Type 1 and Type 12 at 14 °F to 104 °F (-10 °C to 40 °C);
  - UL Type 1, Type 12, and Type 3R at 14 °F to 122 °F (-10 °C to 50 °C).
- B. Storage temperature range shall be -25 °C to 70 °C (-13 °F to 158 °F).
- C. Maximum relative humidity shall be 95%, non-condensing or dripping water, conforming to IEC 60068-2-3.
- D. The soft starter shall be designed to operate in altitudes up to 1000 m (3300 ft). For higher altitudes, derate by 2.2% for each additional 100 m (330 ft) with a maximum of 2000 m (6600 ft).
- E. The soft starter shall be capable of operation between +10% / - 15% of nominal voltage rating.
- F. The soft start shall automatically adapt for operation at 50 or 60 Hz, with a frequency tolerance of +/- 5%. By configuration, it shall be capable of operation at a supply line frequency that can vary by +/- 20% during steady state operation.
- G. The soft start shall be capable of supplying 350% of rated full load current for 40 seconds from a cold state, and 300% of rated full load current for 20 seconds, or 200% of rated full load current for 40 seconds, with a load factor of 95% and 3 starts per hour.

The SCRs shall have a minimum P.I.V. rating of 1800 Vac. Lower rated SCRs with MOV protection are not acceptable.

- H. A seismic qualification label shall be provided for all units to comply with the latest IBC 2000 and NFPA 5000 guidelines

#### 2.4 ADJUSTMENTS AND CONFIGURATIONS

- A. All programming/configuration devices, display units, and field control wiring terminals shall be accessible on the front of the control module. Exposure to control circuit boards or electrical power devices during routine adjustments is prohibited.
- B. Digital indication shall provide, as a minimum, the following conditions:
1. Soft starter status - ready, starting/stopping, run.
  2. Motor status - current.
  3. Detected Fault status - Motor thermal overload, soft starter thermal fault, loss of line or motor phase, line frequency, low line voltage, motor underload, maximum start time exceeded, serial communication error, line phase reversal, motor overcurrent.
- C. The soft starter must be preset to the following for adjustment-free operation in most applications:
1. Current limitation to 300% of the motor full load current rating.
  2. Class 10 overload protection.
  3. Motor current preset per NEC / NFPA 70 table 430.250 for standard hp motors.
- D. A digital keypad shall be utilized to configure the following operating parameters as required:
1. Motor full load amperes adjustable from 40 to 110% of the soft starter's rating.
  2. Current limitation on starting adjustable from 200 to 700% of the motor current rating, not to exceed 350% of the soft starter rating.
  3. Linear acceleration ramp adjustable from 1 to 60 seconds.
  4. Maximum start time adjustable from 1 to 250 seconds.
  5. Selection of freewheel or soft stop.
  6. Linear deceleration ramp time adjustable from 1 to 60 seconds.
  7. Threshold to change to freewheel from a controlled deceleration ramp to freewheel stop: adjustable from 0 to 10% of the nominal motor torque.
  8. Selection of Class 10, 20, or 30 motor thermal overload protection.



- E. A digital keypad shall be utilized to configure the following controller parameters as required:
  - 1. Assignment of soft starter inputs and output control terminals.
  - 2. Activation of line phase reversal and phase loss protection.
  - 3. Selection of motor thermal protection by overload class or PTC.
  - 4. Return to factory settings.
- F. Output relays shall provide the following status indications:
  - 1. One Form C (N.O./N.C.) for indication of trip status.
  - 2. One Form C (N.O./N.C.) for indication that the soft start is in acceleration, running or deceleration state.
- G. Additional inputs and outputs shall be available to provide the following status indications:
  - 1. Two assignable control inputs for the following functions: force to freewheel stop, external fault input, disable serial link control, external motor overload reset or general fault reset.
  - 2. Two assignable logic-level signal outputs for the following functions: motor thermal overload alarm, "motor powered" signal, motor overcurrent alarm, or motor underload alarm.
- H. Relay and I/O functions listed above must be isolated with respect to common.

## 2.5 PROTECTION

- A. A microprocessor-based thermal protection system shall be included which continuously calculates the temperature-rise of the motor and soft starter and provides:
  - 1. A motor overload fault will stop the motor if the windings have exceeded 125% of temperature-rise.
  - 2. An electronic circuit with a time-constant adjustable to the motor's thermal cooling time-constant ensuring the memorization of the thermal state even if power is removed from the soft starter.
- B. The soft starter shall provide line and motor phase loss, phase reversal, underload, stall, and jam protection.
- C. The integral protective features shall be active even when the shorting contactor is used to bypass the SCRs during steady state operation.

## 2.6 CONTROL OPTIONS

- A. The soft starter control circuit shall be fed from the line supply and be completely independent of the power circuit and separate from the control logic.
- B. The peripheral soft starter control circuitry shall be operated at 120 Vac 60 Hz from a control power transformer included within the enclosure.
- C. Operator devices shall be door mounted and shall be as shown on Drawings.

## 2.7 COMMUNICATIONS

- A. The soft starter will have to include a multi-drop serial link for its direct connection to Modbus.
- B. The soft starter shall be able to be connected to Ethernet and other networks, with connection to communication bus as an option.
- C. The communication shall be able to provide access to the control, to the adjustment and to the supervision of the soft starter.

## 2.8 SHORTING CONTACTOR

- A. A microprocessor shall control the operation of the shorting contactor.
- B. The shorting contactor shall close, shorting the SCRs after the acceleration ramp is complete and motor current is below 130% of motor FLA, and open on a stop command to allow a deceleration ramp.
- C. Overload protection integral to the soft starter shall continue to protect the motor when shorting is engaged.
- D. The shorting contactor shall be contained within the soft starter frame.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. The soft start shall be installed per the manufacturer's specifications.
- B. A standard wiring diagram shall be included for making the appropriate electrical connections.

### 3.2 START UP OPTION

- A. The services of a qualified manufacturer's service representative shall be available to install, test, and start up all soft starts furnished under this specification.

**END OF SECTION**

**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 unsuitable material, trees, stumps, roots, vegetation debris, and existing improvements, including curb, landscaping, fencing, 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 01 20 Protection of Underground Facilities & Monuments
- B. Section 01 56 16 – Dust Control
- C. Section 01 57 13 – Erosion Control
- D. Section 01 57 23 – Storm Water Pollution Prevention Plan
- E. Section 01 74 19 – Construction Waste Management and Disposal
- F. Section 02 41 00 – Demolition

*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 19 – Earthwork, State Standard Specifications

*1.5 DEFINITION*

- A. Unsuitable Material: Unsuitable material is material determined to be:
  - 1. Material containing trash, debris, oversized material or other foreign and objectionable materials.

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2. Incapable of being compacted to Specified density using ordinary methods at optimum moisture content.
3. Too wet to be properly compacted if circumstances prevent satisfactory in-place drying prior to incorporation into the work.
4. Non-native material containing a significant amount of permeable materials, such as sand or rock, that cannot be blended with other material and requires to be off hauled.
5. Expansive clays that cannot be mixed or treated and requires to be off hauled.
6. Otherwise, unsuitable for planned use.

## **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.

**END SECTION**

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**SECTION 31 23 17**  
**TRENCHING, BACKFILLING AND COMPACTING**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. This section includes material, testing, installation, and other requirements for trench excavation, bedding, backfilling and compacting for underground pipelines and utilities. Requirements in this section do not apply to underground landscape irrigation pipes. The words pipe, utility, and pipelines are interchangeable in this Section and apply to that which is being installed in the trench.

*1.2 RELATED WORK*

- A. Section 01 33 00 – Submittal Procedures
- B. Section 01 43 00 – Quality Control and Testing
- C. Section 03 30 01 – Cast-in-Place Concrete
- D. Section 31 11 00 – Clearing and Grubbing
- E. Section 32 31 00 – Fencing
- F. Division 33 - Utilities
- G. Section 40 05 00 – Pipe and Fittings
- H. Section 40 20 10 – Pipe Supports

*1.3 REFERENCES*

- A. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>).
- C. ASTM D1556 – Density of Soil and Base Rock in Place by Sand-Cone Method.
- D. ASTM D6938 – Density of Soil and Base Rock in Place by Nuclear method.
- E. ASTM D2937 – Density of Soil In Place by Tube method
- F. Cal/OSHA Construction Safety Orders, California Code of Regulations, Chapter 4, Subchapter 4.
- G. State Standard Specifications, Section 19 – Earthwork

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- H. State Standard Specifications, Section 26 – Aggregate Bases
- I. ASTM D2321 Installation of Underground Thermoplastic Gravity Pipelines
- J. AWWA Manual M23 PVC Pipe Design and Installation
- K. AWWA Manual M55 PE Pipe Design and Installation
- L. AWWA Manual M11 Steel Pipe: A Guide for Design and Installation
- M. American Concrete Pipe Association Concrete Pipe & Box Culvert Installation Guide
- N. Ductile Iron Pipe Research Association Installation Guide for Ductile Iron Pipe
- O. PVC Pipe Association Installation Guide for Gasket-Joint PVC Pressure Pipe
- P. National Resource Conservation Service (NRCS) Construction Specification 430 Irrigation Pipeline
- Q. NRCS Construction Specification Plastic (PVC,PE) Pipe
- R. U.S. Bureau of Reclamation Method for Prediction of Flexible Pipe Deflection M-25
- S. U.S Department of Labor, 29 CFR, 1926, Subpart P
- T. National Corrugated Steel Pipe Association (NCSPA) Corrugated Steel Pipe Design Manual
- U. NCSPA Installation Manual for Corrugated Steel Pipe and Structural Plate
- V. Advanced Drainage Systems Corrugated Plastic Pipe Storm Installation Guide

**1.4 SUBMITTALS**

- A. Submit plans as required for worker protection against caving ground in excavations. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.
- B. Submit material classification and geotechnical test results on proposed imported fill.

**1.5 SAMPLES**

- A. Submit samples under provisions of Section 01 43 00 – Quality Control and Testing.

**1.6 PROTECTION**

- A. Prevent trench cave-in by sloping and/or shoring according to requirements of Cal/OSHA, the U.S. Department of Labor, and the Contract Documents.
- B. Notify Engineer of unexpected subsurface conditions.
- C. Protect bottom of trench from frost.

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- D. When pipe laying is not in progress, close the open ends of pipe. Do not allow trench water, animals or foreign material to enter the pipe.

1.7 *QUALITY ASSURANCE*

- A. Compaction Testing:
  - 1. All compaction testing shall be in accordance with Section 01 43 00 – Quality Control and Testing.

1.8 *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 trenches and other parts of the work free from water. 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. Plan – Prior to beginning any work on the removal of water from trenches, the Contractor shall submit for the Engineer's approval a water control plan showing the proposed method for the removal of water from trenches and other parts of the work.
- C. Dispose of the water in a manner that will prevent damage to the adjacent property and in accordance with regulatory requirements.
- D. Provide separate pipelines to drain trench water during construction.
- E. Provide filters on devices to control and divert water to prevent the removal of fines from the soil.
- F. Repair any damage caused by the failure of any part of equipment to control and divert water. Remove temporary equipment to control and divert water when no longer needed for dewatering purposes.
- G. Provision of equipment to control and divert water shall be considered part of the project with no additional compensation allowed.
- H. Unless otherwise specified in the Measurement and Payment section, 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.

1.9 *PROJECT CONDITIONS*

- A. Existing 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. Obtain all required permits and licenses before installing utilities and follow the rules and requirements of authorities having jurisdiction.

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- C. Arrange construction sequences to provide the shortest practical time that the trenches will be open to avoid hazard to the public, and to reduce the possibility of trench collapse.

1.10 DEFINITION

- A. Percent Compaction: The ratio of the field-tested dry density of earthfill to the maximum dry density determined in the laboratory according to the above-referenced Laboratory compaction test method – expressed as a percentage
- B. Unsuitable Material – Unsuitable material is material determined to be:
  - 1. Material containing trash, debris, oversized material or other foreign and objectionable materials.
- C. Deflection is the decrease of the vertical diameter of the pipe (and corresponding increase in horizontal diameter) due to load on the pipe. Deflection is expressed in terms of percentage as follows:  $\text{change in diameter} / \text{diameter} \times 100$ .
- D.  $\text{Ovality}\% = 2 \times [(D_{\text{max}} - D_{\text{min}}) / (D_{\text{max}} + D_{\text{min}})] \times 100$  where  $D_{\text{max}}$  and  $D_{\text{min}}$  are maximum and minimum pipe diameters in any direction.

1.11 CLASSIFICATION AND CHARACTERIZATION OF EXCAVATED MATERIAL

- A. The Contractor shall consider all trenched material as being unclassified.

1.12 HAND EXCAVATION

- A. Hand excavation will be required within 12 inches of the existing water distribution main identified in the drawings, if necessary.

**PART 2 PRODUCTS**

2.1 EXISTING GROUND AND BACKFILL

- A. Existing Ground: In-situ soil or bedrock that the Contractor excavates for trenches. The Contractor may use this excavated material as backfill if it meets backfill material property requirements and/or if the Contractor processes it so that it meets those requirements.
- B. Backfill: Soil fill that the Contractor places and compacts in trenches over granular backfill and aggregates and that meets material property requirements of the geotechnical engineering report and the Contract Documents. Backfill may consist of existing ground or imported earth material. The Engineer shall approve backfill before it is imported to the site and placed.

2.2 AGGREGATES

- A. Granular Backfill: material meeting the requirements of State Standard Specifications Section 19-3.02C.



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- B. Gravel: Natural rock; free of shale, clay, friable materials and debris; graded in accordance with 1½" x ¾" aggregate grading in Section 90-1.02C, State Standard Specifications.
- C. Pea Gravel: Natural rock aggregate; washed, free of clay, shale, organic matter; No. 8 minimum to 3/8" maximum size per State Standard Specifications Section 90-102C(4)(a).
- D. Sand: Natural sand; free of friable or soluble materials, less than 2 percent organics by dry weight, and graded in accordance with State Standard Specifications Section 90-1.02C(4)(c):

2.3 CONCRETE SLURRY

- A. Concrete slurry mix shall be as specified in Section 03 30 00 - Cast-in-Place Concrete.

2.4 MATERIALS FOR TRENCH BACKFILLING

- A. Furnish required bedding, select backfill, and backfill materials shown on the Plans and that meets requirements in this section depending on the trench type.
- B. The Engineer shall approve all trench-backfill material prior to the Contractor's import and placement.
- C. Materials used in backfill, as shown in trench details, are defined as follows:

- 1. Bedding: Where trench bottoms expose bedrock and/or soil with hard gravel/cobble particles that protrude up into the excavation, and when trench subgrades consist of soft and unstable soil, then sand bedding is required. Sand to be used shall meet the requirements listed above under Aggregates.
- 2. Select Backfill: Select Backfill may be required as shown on the Plans. Select backfill shall meet the material property requirements that follow:
  - a. Select backfill material shall have a sand equivalent of 30 per ASTM D2419.
  - b. Plasticity index of less than 6
  - c. The following particle size distribution:

<u>Sieve Size</u>	<u>Percent Passing by Dry Weight</u>
½ inch	100
No. 4	50-80
No. 200	10-25

- 3. Backfill: Soils that contain no rock larger than 3 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.
- 4. Gravel: Gravel shall meet the requirements listed above under Aggregates.

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5. Pea Gravel: Pea gravel shall meet the requirements listed above under Aggregates
6. Sand: Sand shall meet the requirements listed above under Aggregates.

**2.5 SAND-CEMENT SLURRY**

- A. Sand-cement slurry backfill shall be as specified in Section 03 30 00 – Cast-in-Place Concrete.

**2.6 WATER FOR FILL MOISTURE CONDITIONING AND COMPACTION**

- A. Water shall be free of organic materials injurious to the pipe coatings, have a pH of 7.0 to 9.3, maximum chloride concentration of 500 mg/l, and a maximum sulfate concentration of 500 mg/l.

**PART 3 EXECUTION**

**3.1 GENERAL**

- A. 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.

**3.2 INSPECTIONS**

- A. The contractor must verify that the engineer has approved stockpiled material for reuse as backfill material (for each backfill zone for intended use).
- B. The contractor shall verify that trenches that they will backfill are free of debris, snow, ice, or water, and that ground surfaces that backfill will cover are not frozen.

**3.3 PREPARATION**

- A. Identify required lines, levels, contours, and datum.

**3.4 AC PAVEMENT AND CONCRETE REMOVAL**

- A. Cut bituminous and concrete pavements, regardless of the thickness, curbs, gutters and sidewalks prior to excavation of trenches.
  1. The contractor shall saw cut existing pavement at least one lateral foot beyond (outside of) the trench edges or further out as shown on the Plans.
  2. The contractor shall remove all pavement and aggregate within the saw cuts.
  3. AC pavement and concrete rubble shall not be used for trench backfill.
  4. The contractor shall replace aggregate and pavement surfaces according to Specification Section 32 12 16 Asphalt Concrete Paving.

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### 3.5 TRENCH EXCAVATION

- A. Excavate the trench to the lines and grades shown on the Plans with allowance for pipe thickness, sheeting, shoring, and bedding.
- B. 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 trenches at least 12 inches below and beyond the planned excavation lines. The installed utility shall have at least 12 inches of clearance from any rock protrusion.
  - 2. Unstable Trench Bottom: Secure the Engineer's approval of over-excavation depth and stabilization method. The Contractor must seek the Engineer's approval of overexcavation bottoms and subgrades before the Contractor backfills and places utility pipes/conduits.
  - 3. Wet Trench Construction: use approved method of dewatering through diversion, damming and pumping, well points, or underdrain systems. Dispose 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. Place and compact backfill as specified. The Contractor must seek the Engineer's approval of overexcavation bottoms and subgrades before the Contractor backfills and places utility pipes/conduits.
- C. Correct unauthorized excavation at no cost to Owner.
  - 1. If the trench is excavated below the required grade, backfill over-excavations with compacted engineered backfill as specified.
- D. Trench widths shall be as shown on the Plans. If no details are shown, then the maximum width in the pipe zone shall be 24 inches greater than the pipe outside diameter.
- E. 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.
- F. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- G. Hand trim for bell and spigot pipe joints.
- H. During trench excavation, place the excavated material only within the working area. Do not obstruct roadways or streets. Follow Caltrans guidelines for excavation safety for conditions of surcharge from stockpiled material.

### 3.6 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.
- B. Unsuitable material shall be excavated and deposited in the location designated on the Plans.

### 3.7 CONTROL OF WATER

- A. The Contractor shall keep trenches free from water, maintain and operate all necessary pumping and other equipment for dewatering of excavations.
- B. The dewatering operation shall be continuous, so that the excavated areas are kept free from water during the construction.
- C. Do not drain trench water through pipeline under construction but use separately provided pipeline.
- 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. Use of any drain rock in the trench bottom to convey water or stabilize wet soil shall only be done if approved by the Engineer.

### 3.8 TRENCH BACKFILLING

- A. Support pipe during placement and compaction of bedding fill.
- B. Backfilling and cleanup work shall be accomplished as sections of pipe or conduit are tested and approved.
- C. Compaction: The contractor shall choose means and methods for achieving compaction. Generally, vibratory compactors tend to work better for sands and gravels (non-cohesive soils) and mechanical tampers work better for sand and gravel containing a significant portion of fine-grained materials, such as silt and clay (cohesive soils).
- D. 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.
- E. Bedding: Unless otherwise specified, compact the specified material to 95 percent of maximum density to the finished utility grade.
- F. Embedment: 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.

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- G. Backfill: Soil backfill shall be placed and backfilled in lifts, with each lift compacted to the project requirements 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 loose lifts as follows:
    - a. From top of select backfill to two feet below top of road subgrade, compact to 90 percent compaction.
    - b. From two feet below top of subgrade to top of subgrade, compact to 95 percent compaction.
  2. Non-traffic Areas: Fill and compact in 8-inch maximum layers to 90 percent compaction.
- H. Employ a placement method that will not disturb or damage pipes or utilities.
- I. Maintain moisture content of backfill materials to attain required compaction density.
- J. Compact trench-backfill to the specified percent compaction. Compact by using mechanical compaction or hand tamping. Do not use high impact hammer type equipment except where the pipe manufacturer warrants in writing that such use will not damage the pipe. Do not use water flooding or jetting for backfill compaction.
- K. Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.
1. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe.
  2. Use particular care in placing material on the underside of the pipe to prevent lateral movement during subsequent backfilling.
- L. After pipe has been bedded, place pipe zone material simultaneously on both sides of the pipe, in maximum 8-inch lifts, keeping the level of backfill the same on each side.
- M. Do not use any axle-driven or tractor-drawn compaction equipment within 5 feet of building walls, foundations, and other structures.
- N. Do not permit free fall of the material until at least two feet of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or on the surface of compacted backfill around the pipe. Do not operate heavy equipment over the pipe until at least 3 feet of backfill has been placed and compacted over the pipe.
- O. Remove surplus backfill materials from site.
- P. Leave stockpile areas completely free of excess fill materials.

**3.9 TESTING FREQUENCY**

**A. Backfill Compaction:**

Pipeline Trenches: At least 1 test per lift per every 200 feet of trench backfill placed or every 500 cubic yards placed, whichever is more frequent.

A greater frequency of testing may be required at the start of work or when new materials, crews, or equipment are introduced to the site. A lesser frequency can be utilized if approved by the Engineer and the Owner's Representative.

**B. Laboratory Index Testing:**

In addition, at least one set of index tests shall be performed for each distinct material type used as compacted fill at the site.

Additional tests may be performed, as directed by the Owner's Representative, whenever deviations in material properties or quality of workmanship are suspected.

**3.10 TOLERANCES**

**A. Top Surface of trench backfill: ±0.1 foot.**

**3.11 SAND CEMENT SLURRY, CONCRETE ENCASEMENT AND THRUST BLOCKS**

**A. Place in accordance with the Contract drawings.**

**3.12 PIPE DEFLECTION AND OVALITY CONTROL**

A. Pipe installation and backfill process shall be done in a manner that does not overly deflect pipe or make it overly oval in any direction so that deflection or ovality limits in pipe specifications or installation guidelines are exceeded. The following table has common deflection and ovality limits for flexible pipes but pipe specifications and installation guidelines shall govern over this table. Owner has the option to hire a third-party testing firm to conduct pipe mandrel testing to verify the pipe installation is within the following requirements or as stated in the individual pipe specification sections.

<b>Pipe Type</b>	<b>Deflection and Ovality Limit</b>
<b>PVC Pressure, Sewer, or Gravity Pipe</b>	<b>7.5%</b>
<b>Steel with Flexible Coating</b>	<b>5%</b>
<b>Cement Mortar Lined Steel with flexible coating</b>	<b>3%</b>
<b>Cement Mortar Coated Steel</b>	<b>2%</b>
<b>Cement Mortar Lined and Coated Steel</b>	<b>2%</b>

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**END SECTION**

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**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 SUBMITTALS*

- A. Submittals shall be in accordance with Section 01 33 00 - Submittal Procedures.

*1.3 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 unsuitable material that is hauled off-site shall be properly disposed.

*3.2 DISPOSAL OF CONCRETE AND A.C. SURFACING*

- A. All concrete 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.)

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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.

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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 SECTION**

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**SECTION 32 31 00**  
**FENCING**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. Provide all labor, materials and equipment and perform all operations necessary to complete chain link fencing as specified, shown on the Drawings, or as directed.
- B. Furnish and Install Right of Way fencing as shown on the Plans.
- C. Install salvaged chain fence as indicated on the Plans

*1.2 RELATED WORK*

- A. Section 03 33 00 – Cast-in-Place Concrete

*1.3 REFERENCES*

- A. Section 80 – Fences, State Standard Specifications

*1.4 SUBMITTALS*

- A. Submittals shall be in accordance with the Standard General Conditions and the Supplementary conditions.

**PART 2 PRODUCTS**

- A. Chain Link shall conform to State Standard Specifications Section 80-3.02
- B. Fence lines adjacent to residences shall be furnished with brown ultraviolet resistant PVC privacy slats conforming with State Standard Specifications Section 80-3.02E.
- C. Right of Way fence shall conform to State Standard Specifications Section 80-3.

**PART 3 EXECUTION**

*3.1 FENCES*

- A. Installation shall be in accordance with State Standard Specifications, Section 80, and with State Standard Plans Drawing A85, A85A and as indicated on the Plans.
- B. Relocation and installation of other fencing materials shall be in accordance with the plans and standard construction practices.

**END SECTION**

FENCING  
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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. Samples: 24-inch strips of tape and two markers.
- 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: Water Main Below". Repeat identification at approximately 24 inch intervals.
- E. Background Color: APWA color code and as specified in the following table.

Color	Utility
Safety Precaution Blue	Water System, Irrigation

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- F. Manufacturer: Lineguard, Inc., Wheaton, Illinois; Reef Industries, Inc., Houston, Texas; Thor Enterprises, Inc., Sun Prairie, Wisconsin; or Engineer-approved equivalent.

**2.2 SURFACE MARKERS**

- A. All markers shall have an identifying letter either cast or routed into marker. The Contractor has the option of any of the following. However, only one type shall be used on any one project:
- B. Cast-In-Place Concrete.
  - 1. Concrete: As specified in Section 03 33 00 – Cast in Place Concrete.
  - 2. Reinforcement: One No. 5 bar in the centre of the marker.
- C. Precast Concrete: Commercially fabricated concrete marker meeting design dimensions and concrete reinforcing requirements.
- D. Timber Posts: Any softwood lumber species meeting PS 20-70. Grade No. 1 or better, free of heart center, S4S as shown. Pressure treat timber posts for soil contact with waterborne preservative in accordance with AWPA C2-90.

**2.3 TRACER WIRE**

- A. Minimum: No.10, solid, 12 AWG copper wire with Type TW insulation. Join so as to form a mechanically and electrically continuous line throughout the length of the marked pipe.

**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 two feet 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. Conductors shall be spliced in accordance with Division 26, Electrical.
  - 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

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- 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 *SURFACE MARKERS*

- A. In addition to marking tape, install surface markers at all changes in horizontal direction and at intervals not exceeding 400 feet.
- B. Tracer wire shall be wrapped around cast iron valve boxes; while ensuring wire conductors are making contact with valve box.
  - 1. Tracer wires shall be tied together to a No. 5 rebar cast in a concrete utility line marker and terminate above grade. Allow sufficient slack in tracer wire along pipe to allow for pipe shrinkage and expansion.

**END SECTION**

UTILITY LINE MARKING  
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**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, well, hydropneumatic tank, finished water storage tank, and pumps.
- 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 40 05 00 – Pipe and Fittings

*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. 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.

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- 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.
- B. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

**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:

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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 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

#### **3.2 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

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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. Chlorinating water services: Water meters and services lines can be sprayed or swabbed with chlorine per AWWA C651, Section 4.11.3.1.
- G. 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.
- H. Disposal of flushed chlorinated water shall be at the responsibility of the Contractor. If Contractor chooses to flush water in the local storm drain system, water shall be dechlorinated as described in AWWA C655.

### 3.3 TESTS

- A. Samples shall be tested in accordance with ANSI/AWWA C651 for water mains, C652 for bolted steel storage tanks and hydropneumatic tanks, and C654 for wells.
- B. Test shall be taken no more than 10 days prior to the system being placed into service.
- C. 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 SECTION

**SECTION 33 21 00**  
**WATER WELL DRILLING**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. The work consists of constructing one (1) new well. The work on the well will consist initially of drilling a pilot hole to a depth of about 700 feet using the reverse circulation method of drilling and collecting zone specific water samples, as described in these specifications. If upon completion of the pilot hole and associated test results, completion of a production well is authorized, the work will additionally consist of reaming the pilot hole to the final bore hole diameter by the reverse circulation method of drilling, and constructing and developing a production well.
- B. The pilot hole will be used to obtain depth zone specific water samples for water quality analysis purposes as described in the specifications.
- C. The production well is expected to be about 700 feet deep and to be perforated over 200 to 250 feet of the total depth. However, the exact depth and interval of perforation will be based on the results of the pilot hole drilling and testing.
- D. Upon completion of construction of the well, the Contractor shall develop and pump test the well as described in these Specifications. Contractor shall supply equipment and labor including variable speed equipment for pump testing. If completion to a production well is not authorized, Contractor shall properly abandon the pilot hole.

*1.2 SUBMITTALS*

- A. The Contractor shall submit a Mud Program for Engineer's review prior to beginning work on the well.
- B. The Contractor shall prepare a final written report containing, as a minimum, the following information for the pilot hole and, if authorized, the production well:
  - 1. For the pilot hole: drillers log, electric log, deviation log (geophysical logging to be performed by a logging subcontractor approved by the Engineer and paid for by Contractor), and sieve analysis for up to eight (8) drill cutting samples.
  - 2. For the production well: well log submitted to State showing casing diameter and wall thickness, lengths and location of casing installed, type of perforation and aperture size, perforated intervals, bore hole diameter, cemented conductor casing, gradation of gravel envelope and location of cement seal.

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3. Construction records showing quantity of gravel initially installed, quantity of gravel added during development operations, development time, and all other pertinent information.
4. Development and test records showing production rate, static water level, pumping water level, drawdown, production of sand, and all other pertinent information concerning development by pumping.
5. Manufacturer's or suppliers standard literature and certification that the following materials for the production well comply with this specification:
  - a. Well casing
  - b. Perforated well casing
  - c. Gravel
  - d. Cement Grout

### 1.3 STANDARDS AND PERMITS

- A. The well shall be constructed in accordance with the Fresno County Water Well Ordinance, the California Water Well Standards (California DWR Bulletins 74-81 and 74-90), the AWWA Standard A100-06 for Water Wells, and as described in these Specifications. The Contractor shall obtain, and pay for, a well drilling permit from Fresno County, and shall report the results of the drilling to the California Department of Water Resources.

### 1.4 EXPERIENCE AND LICENSE

- A. Pilot hole and production well shall be drilled by a qualified well driller with experience in construction of public water supply wells.
- B. The Contractor shall have at least 5 years experience in drilling public water supply wells to a depth of at least 700 feet using the drilling, construction, development, and test pumping methods as specified. The Contractor shall submit to the Owner and Engineer three references for whom reverse rotary drilling of public supply wells, as described in these Specifications and to at least these depths, was performed and for whom water samples were collected from the pilot holes as specified herein. In listing these references, the Contractor shall give the name of the person or firm for whom the work was performed, the address and telephone number at which that person or firm can be contacted, and a description of the work performed.
- C. Well driller must possess a C-57 Well Drillers License, valid in the State of California.

### 1.5 ORDER OF WORK

- A. Upon completion of the pilot hole, Contractor shall furnish copies of the drilling log, electric log (e-log), deviation log, and suitable bagged drill cutting samples for review by the Engineer.



- B. Engineer shall be allowed up to thirty (30) calendar days from completion of zone specific water sampling to review the pilot hole data and to determine if the production well is to be built and prepare the final well design.
- C. The Contractor shall fill the remainder of the pilot hole with gravel or native material after completing depth zone sampling.
- D. Construction of a production well shall not proceed until Engineer has made final recommendation of construction details.
- E. Upon completion of the production well, development and pump test, Contractor shall furnish a copy of the pump test data to the Engineer.

#### 1.6 *WORK TO BE PERFORMED BY THE CONTRACTOR*

- A. All drilling, casing, sealing, developing, test pumping, and other work incidental to the well shall be performed by the Contractor. The Contractor shall drill the pilot hole by the reverse rotary method and, as authorized, the production well using the reverse rotary method and shall provide all necessary equipment for development and test pumping of the wells. Contractor shall provide temporary pump equipment for test pumping.
- B. The Contractor will prepare and maintain access to the work area as well as provide sufficient room for the efficient operation of his equipment. Contractor shall provide temporary fencing to enclose the work area and all stored equipment. The Contractor will be held as having examined the drilling site and access roads in order to acquaint himself with local conditions, as no allowance will be made after the bid has been accepted for any errors or omissions made by the Contractor due to site conditions.
- C. The Contractor shall diligently pursue all work to completion. Upon completion of the well, the Contractor shall level the drill site, and remove all materials incidental to the drilling operations.
- D. The Contractor shall, at his own expense, furnish all equipment, material (including lost circulation materials), supplies, and personnel necessary to perform the work (including, but not limited to, drilling rig, water truck, a crew comprised of experienced drillers, and helpers).
- E. The Contractor shall pay any federal, local, or state taxes assessed or levied on account thereof, in accordance with the practices generally acceptable for the nature of work to be performed under this Contract.
- F. The entire cost of furnishing, transporting, unloading, hauling, handling, sorting, and caring for all equipment, materials, tools, and supplies, and of removing same from the site of the work as hereinafter specified, shall be included in prices bid in the proposal for the work for which the materials are required. The drilling shall be done with well drilling equipment of proper type and size and in good working condition so that the work can be performed without interruption arising from defective or improper equipment. All materials that will become a part of the completed work shall be new.

All equipment, materials, tools, and supplies not a part of the completed well shall remain the property of the Contractor and shall be removed from the site upon completion of the work. All materials to be stored shall be stored at the drilling site within a fenced enclosure.

- G. Contractor shall be responsible for disposing of all excess material and debris produced by construction activities.

## 1.7 SECURITY

- A. The Contractor is responsible for all site safety and security. The actual work area, including the mud pit and drilling rig, shall be secured by the Contractor during the entire duration of the construction. Contractor may elect to install the new permanent fence per plans at the beginning of the project to secure the site or utilize temporary fencing. If permanent fencing is used, the contractor will be required to replace section of fences that may be damaged during construction. If Contractor elects to use temporary fencing instead of permanent fence, the Contractor shall install a temporary 6-foot high chain link fence during entire duration of construction operations. If installed, the fence shall be constructed and maintained in good condition throughout the course of the work so as to exclude unauthorized persons and animals from the well site. The fenced area shall be posted with "NO TRESPASSING" signs visible from all angles of approach. Installation of a temporary fence is at the Contractor's option and shall be included, if determined necessary by the Contractor, in the Bid Schedule submitted and no additional compensation for site security will be made after the bid has been submitted.
- B. The Contractor shall provide, at all times during the duration of the Contract, suitable means of protecting the borehole and well casing from the entrance of foreign objects.

## 1.8 NOTIFICATION

- A. The Contractor shall give notice to the Engineer of specific operations as follows:
  - 1. At least seventy-two (72) hours advance notice of start of drilling operations at the well site.
  - 2. At least eight (8) hours notice of geophysical logging.
  - 3. At least six (6) hours advance notice of start of "depth zone airlifting" from the pilot hole at each depth interval.
  - 4. At least twenty-four (24) hours advance notice of installation of casing (including conductor), gravel, and annular seal.
  - 5. At least twenty-four (24) hours advance notice of commencement of development of the completed production well.
  - 6. At least twelve (12) hours advance notice of the pump test.
  - 7. At least twenty-four (24) hours advance notice of video survey and casing alignment test.

- B. Upon completion of the pilot hole and completion of zone specific water sampling, the Owner shall have up to thirty (30) calendar days to review the results of the geologic and e-logs, and to obtain and review the results of the sieve analyses and the results of the water quality testing, whereafter the Owner shall instruct the Contractor whether to proceed with a production well or abandon the pilot hole. If a production well is built, the exact casing schedule, slot size, gravel packed interval, and gravel gradation will be provided by the Engineer.

## 1.9 WELL ABANDONMENT

- A. In the event the Contractor shall abandon a hole or well because of loss of tools or other causes which are his responsibility, or if the well fails to conform to these Specifications and the Contractor is unable to correct the condition at his own expense or negotiate a mutually-acceptable cost reduction for deviations from the Plans and Specifications, it shall be considered an abandoned hole, and the Contractor shall immediately start a new well at a nearby location designated by the Engineer. The Contractor may salvage as much undamaged materials from the initial well as possible to be used in the new well. The Contractor shall destroy the old hole (at Contractor's expense) by filling with sand-cement grout completely from bottom to top and in conformance with regulations of the Fresno County Water Well Ordinance. Contractor shall notify Fresno County Health Department and arrange for Health Department inspector to witness sealing.

## PART 2 PRODUCTS

### 2.1 CONDUCTOR CASING

- A. Conductor casing shall be manufactured in accordance with the latest edition of ASTM A252, Grade 2 and the following conditions:
1. The diameter shall be 30 inches (nominal), and the wall thickness shall be 0.375 inches.
  2. The casing sections shall be factory assembled in not less than 20-foot lengths.

### 2.2 WELL CASING

- A. Well casing shall be new, in "straight from the factory" condition and shall be manufactured in accordance with the latest edition of ASTM A53, Grade B, with the following conditions:
1. The casing will be 12 inches (nominal) diameter. The wall thickness shall be a minimum of 0.3125 inches.
  2. Casing used in the well shall be of uniform outside diameter and wall thickness and shall be factory assembled in not less than 40-foot lengths. The exact depth of the production well and location of the perforated sections shall be specified by the Engineer after all results from the zone sampling have been received and evaluated.

3. For field assembly by welding, ends of sections shall be furnished with collars. The collars shall be of the same thickness and have the same chemical and physical properties as the corresponding casing section, shall be 5 inches in width, shall be rolled to fit the outside diameter, and shall be welded to the casing section. The inside edge of the collars and the outside edge of the adjacent casing length shall be ground or sufficiently scarred to remove sharp edges or burrs. Section ends shall be machined flat, perpendicular to the axis of the casing, and shall not vary more than 0.010 inches at any point from a true point at right angles to the axis of the casing. Diametrical clearance between casing O.D. and collar I.D. shall be  $1/16$  inch  $\pm$   $1/32$  inch.
4. Alternatively, the casing sections may be provided with machined beveled joints and butt welded. The welding rod shall be of equal or better A.S.M.E. rating than that of the parent metal. Full penetration, double pass welds shall be used on each joint. An alignment clamp must be used and care taken to ensure the casing sections are properly aligned.
5. If collared pipe is used, three 3/8-inch x 1-inch alignment holes shall be provided in each collar to ensure proper matching of the sections. All of these holes shall be completely filled by welding when the casing is installed.

### 2.3 PERFORATED WELL CASING

- A. Vertical mill slot perforated well casing shall be manufactured in accordance with the aforementioned casing requirements. Casing of 12 inches (nominal) diameter will be used, and wall thickness shall be a minimum of 0.3125-inch. The openings in the perforated casing shall be machine made vertical to the axis of the casing. For bidding purposes, assume 48-Row perforated casing with a perforation size of 0.060-inch. Information obtained from the pilot hole will be used to determine the size of the openings, depths of the well, and lengths of blank and perforated casing. Perforated well casing shall be of identical inside diameter and wall thickness as the blank casing.

### 2.4 COMPRESSION SECTIONS

- A. Compression sections of well casing shall be manufactured in accordance with the aforementioned casing requirements. Casing of 12 inches (nominal) diameter will be used, and wall thickness shall match the specified casing requirements. The compression section may be of either a single style or double style configuration. The shell (outer) casing diameter shall be two inches larger than the parent casing. The shell casing shall reduce to the parent casing size at the lower end (single style type) and be connected to the parent casing as specified in the aforementioned casing requirements. The parent casing shall be able to telescope freely within the casing length of the outer shell casing. Integral beveled steel rings shall be welded to the parent casing and shell casing acting as stops and stabilizers. The casing stabilizers on the parent casing shall include elastomeric seals to seat against the ring stops on the shell casing. The compression sections shall have an overall length of 20 feet and allow 10 feet of movement.

## 2.5 GRAVEL

- A. The gravel shall be composed of sound, durable, well-rounded, naturally stream worn particles, containing no silt, clay, organic matter, or deleterious materials. No crushed rock will be accepted. Information obtained from the pilot hole will be used to determine the required gravel size. For bidding purposes, assume SRI Supreme 6x12 Gravel Pack gravel is to be used.

## 2.6 NEAT CEMENT OR SAND CEMENT GROUT

- A. Sand cement grout shall be composed of not more than two parts by weight of sand and one part of Portland Type II cement to 4.5 to 6.5 gallons of clean water per sack of cement.

## 2.7 DRILLING FLUID

- A. Water alone shall be employed as a drilling fluid in the pilot hole as well as in the production well unless prior approval is given by the Engineer.
- B. The Contractor shall submit a Mud Program to the Engineer for review.
- C. The Contractor shall dispose of surplus drilling fluid in a manner acceptable to the Owner and Engineer. Contractor is responsible for making the necessary arrangement with a property owner to dispose of mud, cuttings and development water. County has contacted the property owner immediately south of the school grounds (APN 03518044) and they are willing to cooperate with County and Contractor. Refer to section 5-1.20B(4) of the special provisions for contact information and necessary documentation.
- D. The Owner will allow use of water from the onsite storage tank. Refer to specification 01 51 36.

## 2.8 VENT PIPE AND GRAVEL CHUTE

- A. In accordance with the Plans and as described below, the following items shall be installed.
  - 1. A 2-inch Schedule 40 steel vent pipe shall be welded to the well casing as shown on the Plans. The upper end of the vent pipe shall be threaded and provided with a screened, inverted vent.
  - 2. A 3-inch Schedule 40 steel gravel fill pipe shall be installed as shown on the Plans. The upper end of the pipe shall be threaded and provided with a cap as shown on the Plans. The cap shall be marked with the termination depth of the pipe.

### **PART 3 EXECUTION**

#### **3.1 COMMUNICATIONS WITH CONSTRUCTION SUPERVISOR**

- A. A fluent English-speaking supervisor shall be on-site at all times work is occurring on the work site.

#### **3.2 HOURS OF OPERATION**

- A. Drilling operations may proceed continuously, 24 hours per day. When work is expected to occur between the hours of 7 pm and 7 am the Contractor shall notify all residents within 500 feet of the impending construction activity.
- B. Opening of the borehole to final diameter and installation of casing and gravel shall proceed continuously until complete.

#### **3.3 INSTALLING CONDUCTOR CASING**

- A. A 30-inch conductor casing shall be installed to a depth of at least 50 feet below natural grade and include an extension at least 6-inches above the ground. If an adequate clay layer is not present at that depth, the depth shall be increased as directed by the Engineer. The conductor casing shall be set in a hole not less than 36 inches in diameter. It shall be securely anchored at the ground surface to prevent falling.
- B. Care shall be taken to install the conductor casing plumb. Centralizers shall be welded to the conductor casing at intervals not to exceed 20 feet to center the casing in the bore. The centralizers shall be constructed of 3/8-inch-thick by 2-inch-wide steel strips so shaped as to form a guide approximately 2.5 inches from the casing well.
- C. Each strip shall provide at least 1-foot length of bearing surface at the bore interface. A minimum of three strips shall be provided at each circumferential location for centering the casing. Centralizer strips shall be located on the same vertical alignment to minimize interference with placing the sealing material as specified.
- D. After the conductor casing has been installed, the annular space between the conductor casing and the bore hole shall be sealed with cement grout. The cement grout shall be placed by pressure grouting with the use of a tremie pipe. The cement grout shall be placed through the tremie pipe, and the pipe shall be gradually withdrawn as the cement rises in the annulus. The quantity of cement grout placed in the annulus shall not be less than the computed volume of the annulus. A quantity less than the computed value will be judged as an indication of voids, and measures shall be taken by the Contractor to eliminate the apparent voids. Upon completion of cementing, cement shall be visible above the surface of the ground outside the conductor casing. After cementing operations are completed, the cement shall be left undisturbed for a period of not less than 24 hours. Contractor shall notify Fresno County Health Department prior to placing the grout seal.

### 3.4 *METHOD OF DRILLING*

- A. The pilot hole and the production well, as authorized, shall be drilled by the reverse rotary method of drilling.

### 3.5 *MUD PIT DESIGN*

- A. Mud pits shall be above ground dual-pits, with the ability to isolate each pit compartment from the other during depth zone development and shall be of sufficient size and configuration to ensure adequate removal of cuttings from fluid before returning into the borehole.

### 3.6 *PILOT HOLE DRILLING*

- A. The standard reverse rotary method will be used to drill the pilot hole to an anticipated depth of about 700 feet. The exact depth to which the pilot hole shall be drilled will be determined by the Engineer. The Contractor shall be responsible for keeping the hole open to the total depth of the hole. The hole will be a minimum of fifteen inches in diameter. The purpose of the pilot hole is to allow collection of drill cuttings and geophysical logging of the hole upon completion to the total depth. In addition, the pilot hole will be used to obtain depth zone specific water samples for water quality testing.
- B. Samples of drill cuttings from the bottom of the conductor casing to total depth shall be collected at changes of strata or at 10-foot depth intervals, whichever is less, and placed in separate bags or containers. These samples shall be plainly marked with the depth. One set of samples shall be collected and marked.
- C. The Engineer shall select up to eight cutting samples for sieve analysis to allow final design of slot size and gravel gradation. Contractor shall be responsible for having the sieve analysis performed, at the Contractor's expense.
- D. Electric and Deviation logs will be run in the pilot hole. The Contractor will be responsible for retaining the Engineer approved logging subcontractor, at the Contractor's expense, to perform the geophysical logging. Contractor shall remain at the site during logging and cooperate with the subcontractor in running the logging tools in the hole. Results of the deviation log must indicate the pilot hole does not deviate more than six inches per 100 feet in any portion of the completed borehole. All work shall conform to the specifications of the Owner, the County of Fresno, the State of California Standard Specifications, and local and State permits and ordinances for drilling of pilot holes and wells.

### 3.7 *DEPTH ZONE SPECIFIC WATER SAMPLING*

- A. After completion of pilot hole drilling and logging, the Contractor will perform depth zone specific water sampling. Upon notification by the Engineer to perform such sampling, the Contractor will prepare a formation testing tool to sample formation water from selected depths. The tool will consist of approved diameter pipe that contains a perforated section on the lower end of the casing, with a plate welded to

the bottom of the section. The contractor shall have sufficient segments of perforated section of the tool such that the available length of perforations are approximately 10-feet, 20-feet, 30-feet, and 40-feet. The tool will be connected to approved diameter drill pipe to allow air-lifting a minimum flow of water of 200 gpm against a head of 300-feet.

- B. Engineer, upon review of drill cuttings and geophysical log, shall determine zones to be sampled and location of bentonite seals. Prior to placing the drill pipe and testing tool at the lowest desired depth, a 10-foot seal shall be placed in the hole. Then with the drill pipe and testing tool set at the desired depth, a sufficient amount of selected gravel will be placed in the hole to fill to a depth as specified for each zone. In order to facilitate sampling, the gravel pack material for sampling should be selected to screen out the finest formation encountered and to be compatible with the 1/16-inch sampling tool slot. Then 5-feet of fine sand will be placed atop the gravel followed by 10-feet of bentonite placed on the sand. The gravel, sand and bentonite shall be placed with a tremie pipe.
- C. After the bentonite seal has set, the well should be air-lifted at a rate of 200 gpm, if possible, for at least 6 hours and until the turbidity substantially decreases. A submersible pump shall then be installed and pumped at a rate of at least 70 gpm for at least six hours. The time to be recorded shall commence when the equipment is installed in the well and is placed in operation and shall end when the pumping is stopped. When the sampling at that zone is completed the string of tools shall be raised to the next zone to be tested. The testing tool shall be tripped out of the hole and cleaned between zone setups as necessary. Seals, sand, and gravel shall be placed as in the first zone tested. It is anticipated that up to three (3) formation tests will be conducted in the pilot hole, although the Engineer may modify this number. After the last sample is collected, the remainder of the hole shall be filled with gravel. Engineer shall be allowed thirty (30) calendar days to review the pilot hole data.
- D. Full payment for formation testing shall be provided as specified and no additional payment will be made. The Contractor will not be paid for formation testing hours required as a result of negligence on his part.
- E. Engineer and Owner will be responsible for collecting water samples and for water quality testing expenses.

### 3.8 PILOT HOLE ABANDONMENT

- A. If upon completion of the pilot hole, and associated test results, the Owner decides not to proceed with a production well, the Contractor shall destroy the pilot hole by filling with sand-cement grout to top and in conformance with the specifications of the Owner, the County of Fresno, the State of California Standard Specifications, and local and State permits and ordinances for abandonment of test wells.



3.9 *REAMING HOLE AND INSTALLING BLANK AND PERFORATED WELL CASINGS*

- A. The pilot hole shall be reamed to a final minimum diameter of 24-inches from the bottom of the conductor casing to a depth of up to 700 feet. Contractor shall not begin the drilling operation until all casing and gravel is on-site. The final drilling operation shall be continuous (non-stop) through the entire length of bore to be developed into the completed well unless permitted or specified otherwise by Owner in writing. The exact depth of reaming shall be determined by the Engineer after the pilot hole is completed and all information interpreted. Perforated casing will be required as shown on the Plans or as modified by the Engineer after all results from the zone sampling have been received and evaluated.
- B. Prior to installing the casing, clean water shall be circulated in the bore hole to remove the drilling fluid and any cuttings caked to the side of the drilled hole.
- C. Upon completion of reaming the borehole to the final diameter, and after clean water has been circulated in the hole to remove drilling fluid and caked cuttings, a caliper log shall be run by a subcontractor approved by the Engineer.
- D. Casing installation shall be by methods that will ensure no damage to blank casing, perforated casing, or the hole. The casing shall be suspended above the bottom of the hole to ensure that it will not be supported from the bottom.
- E. Except when drilling is in progress, casing is being installed, or gravel is being placed, the top of the well shall be kept securely capped, both day and night, to effectively prevent tampering or entrance. Upon completion of well casing installation, placing of gravel envelope, and development and testing of well, a steel top plate shall be installed on the top of the well casing. The plate shall be welded around the full circumference.
- F. Centralizers shall be welded to the casing at intervals not to exceed 80 feet to center the casing in the bore. Centralizers shall also be installed at 5 feet from top of and bottom of the casing. The centralizers shall be welded at both points which contact the casing. Centralizers shall be constructed of 3/8-inch-thick steel strips at least 2 inches wide so shaped as to form a guide approximately 2 1/2 inches from the casing well. Each strip shall provide at least 1-foot length of bearing surface at the bore interface. At least three strips shall be provided at each centralizer location. Centralizer strips shall be placed on the same vertical alignment to minimize interference with placing of gravel or sealing material.
- G. 10 feet of blank casing shall be installed at the bottom of the well. The bottom of the casing or screen is to have a 5/16-inch minimum thickness rounded steel cap welded to casing.
- H. The welder required for final assembly of well casings and screen shall be qualified in accordance with the latest revision of the section titled "WELDING PROCEDURES" of the ASME Boiler Construction Code or by the AWS Standard Qualifications Procedure.

- I. The casing shall be lowered in the well with the collar facing upward. The plain end of the following length shall be inserted in the collar. True contact of the two joints must be verified by observation through the inspection windows. Spot welds shall be placed through the three windows to hold the contact position. A fillet type weld shall be made covering the top edge of the collar continuously for the entire circumference. Two welding passes shall be applied to 5/16 inch and thicker wall material. The inspection windows on all casing sections shall be seal welded to assure a leak-proof connection.

### ***3.10 FURNISHING AND INSTALLING GRAVEL ENVELOPE***

- A. The gravel shall be placed using double hopper and tremie pipe equipment. The rate at which gravel is allowed to drop from the upper hopper into the lower hopper, where water is added, shall result in a free-flowing water/gravel mix. The water/gravel mix shall be pumped into the tremie pipe from the lower hopper. Placement shall start with the tremie pipe near the bottom of the hole. The tremie pipe shall be withdrawn from the well at such a rate that the bottom of the tremie pipe is within a few feet of the top of the gravel pack. From time to time during the gravel packing operation, the flow of gravel shall be interrupted, the tremie pipe allowed to empty of gravel, and the top of the gravel located by "sounding" with the tremie pipe or other device.
- B. Prior to placing the gravel in the well, a granular hypochlorite or similar disinfectant shall be added to the gravel at the rate of at least 1/2 pound per cubic yard of gravel, based on 70% chlorine content. If a lower strength hypochlorite, or other chlorine product is used, the quantity shall be adjusted accordingly.
- C. The quantity of gravel placed in the annulus of the well shall not be less than the computed volume of the annulus. A quantity less than the computed value will be judged as an indication of voids, and measures shall be taken by the Contractor to eliminate the apparent voids. Significant differences between the estimated and final volume of gravel installed may be grounds for rejection of the well.
- D. Prior to placing the annular seal, the Contractor shall dry swab (no airlifting) across all perforated casing. The dry swabbing operations shall commence at the bottom of the lowest perforated section and work upward in short screen intervals of not more than 20 feet to the top of the uppermost perforated casing section. The swab shall be repeatedly hoisted at each increment.
- E. The Contractor shall tag the top of the gravel envelope after dry swabbing operations and add gravel (by the method as specified above) to bring the level back up to the depth specified by the Engineer, if required.

### ***3.11 INSTALLING CEMENT ANNULAR SEAL***

- A. A cement grout seal shall be installed in the annular space above the gravel pack between the wall of the bore hole and the well casing and shall be a minimum of 3 inches thick. The cement grout shall be sand-cement. The well casing shall be filled with water during placement of the grout seal. The Contractor may install the cement

grout in lifts to prevent casing collapse, if deemed necessary by the Contractor. Contractor shall notify Fresno County Health Department prior to placing the grout.

- B. The bottom five feet of the sealed section shall consist of five feet of bentonite. The bentonite product used shall be approved by the Engineer prior to placement and shall be placed using a tremie pipe.
- C. The cement grout shall be placed by pressure grouting with the use of a tremie pipe. Grout placement shall start with the tremie pipe at the bottom of the area to be grouted. The cement grout shall be placed through the tremie pipe, and the pipe shall be gradually withdrawn as the cement rises in the annulus. The quantity of cement grout placed in the annulus shall not be less than the computed volume of the annulus. A quantity less than the computed value will be judged as an indication of voids, and measures shall be taken by the Contractor to eliminate the apparent voids.
- D. Significant differences between the estimated and final volume of the cement seal may be grounds for rejection of the well.
- E. The cement seal will extend from the ground surface to a depth as shown on the Plans, or as indicated by Engineer after all results from the zone sampling have been received and evaluated.
- F. Each cement seal shall be allowed to set for 24 hours prior to further operations.

### 3.12 *PRELIMINARY DEVELOPMENT*

- A. Preliminary well development will begin by airlifting open-ended at the bottom of the well until the heaviest fluids are removed.
- B. Swabbing and airlifting shall then be used for preliminary development. The swabbing and airlifting operations shall commence at the bottom of the lowest perforated casing section and work upwards in short screen intervals of no more than 20 feet. The swab shall be repeatedly hoisted at each increment. Upon reaching the top of the uppermost perforated section the airlift swabbing shall begin again at the bottom of the well and proceed upward, in similar manner, to the top of the perforations again.
- C. Preliminary well development will conclude by airlifting open-ended at the bottom of the well to remove any heavy fluids and fill.
- D. During preliminary development the Contractor shall monitor the level of gravel in the gravel fill pipe and add material as necessary.
- E. The well shall then be developed by pumping and surging with a test pump. The pumping equipment shall be clean and in good operating condition upon delivery to the site. Within not more than seven (7) days after completion of preliminary development, the Contractor shall commence well development by pumping and surging.

### 3.13 DEVELOPMENT BY PUMPING

- A. The Contractor shall install, operate, and remove a pump for developing the well. The pump shall have a capacity in excess of 750 gpm against a total head of 500 feet measured at the discharge head. The prime mover shall be a variable speed type. Up to 600 feet of column pipe, tube and shaft shall be provided with the development pump. The development pump setting will be determined by the Engineer after well construction. Pump development shall be performed in conformance with these specifications and in consultation with the Engineer.
- B. Contractor is responsible for containing and disposal of initial development water. Contractor is responsible for making the necessary arrangement with a property owner to dispose of development water. County has contacted the property owner immediately south of the school grounds (APN 03518044) and they are willing to cooperate with County and Contractor. Refer to section 5-1.20B(4) of the special provisions for contact information and necessary documentation.
- C. The Contractor shall install discharge piping from the pumping unit of sufficient size and length to conduct water to the point of disposal together with a totalizing flow meter that will accurately measure the flow rate. Discharge piping as required shall be provided by the Contractor. The Contractor shall provide a manometer to check the accuracy of the totalizing flow meter. The totalizing meter shall be accurate within plus or minus 5% of the flow rate indicated by the manometer. If the totalizing meter is not within this tolerance it will be recalibrated or replaced until it does operate within this tolerance. Gauges, valves, meter, manometer, access tubes, and other equipment required shall be installed prior to start of pump development. The Contractor shall cooperate with the Engineer who will be present periodically during the well development.
- D. The initial pumping rate shall be restricted (100 gpm) and as the water clears shall be gradually increased in 50 gpm steps until the maximum rate is reached. Development shall continue at each step rate for a minimum of one hour. At intervals of approximately 10 to 15 minutes, the pump shall be stopped and the water in the pump column shall be allowed to surge back through the pump bowls and through the perforated area.
- E. Development records shall be maintained on at least a 1/2-hour interval showing pumping rate, pumping level, and sand production. Development shall continue until the following conditions are met:
  - 1. The specific capacity (gpm per foot of drawdown) no longer increases with time.
  - 2. Sand production is no greater than five (5) ppm within 10 minutes after commencement of pumping at the capacity of the well. Failure to meet this requirement may be sufficient cause for rejection of the well.
- F. The Contractor shall be responsible for disposing of all development and test water. Water, including mud, sand and debris pumped from the well during developing and testing shall be disposed of by the Contractor in such a manner as not to damage or

interfere with other work. The disposal and discharge sites shall be approved by the Owner. Contractor is responsible for making the necessary arrangement with a property owner to dispose of mud, cuttings and development water. County has contacted the property owner immediately south of the school grounds (APN 03518044) and they are willing to cooperate with County and Contractor. Refer to section 5-1.20B(4) of the special provisions for contact information and necessary documentation.

- G. Development pumping and surging (not including pump test) is expected to be completed within 40 hours of total pumping time.
- H. The Contractor may submit alternate development methods in writing for approval by the Engineer. However, the submittal must be prior to commencement of the production well drilling operation.

### 3.14 TESTING FOR YIELD AND DRAWDOWN

- A. Following development of the well, the Contractor shall perform a complete pumping test of the well including step rate and recovery tests. The Contractor shall cooperate with the Engineer who will be present during the test pumping procedure. The actual test pumping rates will be furnished by the Engineer upon completion of well development. Well shall remain idle for at least 12 hours overnight prior to commencement of test, and static or non-pumping level shall be determined prior to the pump test.
- B. The pumping equipment shall be of the variable speed type and shall be the same equipment as used during the well development procedure. Gauges, valves, meter, manometer, access tubes, and other equipment required shall be installed prior to beginning the pump test procedure.
- C. The pump shall be operated continuously for a period of 12 hours at the rates selected by the Engineer. The pumped water shall be disposed of in a manner similar to the development water.
- D. During the test, the discharge of the pump shall be measured with an accurate totalizing meter supplied by the Contractor and approved by the Engineer. Additionally, the Contractor will provide a manometer to allow a check of the accuracy of the totalizing flow meter. The totalizing flow meter shall be accurate within plus or minus 5% of the flow rate indicated by the manometer. The pump discharge shall be maintained during the test within plus or minus five (5) percent of the desired pumping rate by means of a gate valve. Prior to the start of the test, the pump shall be adjusted to each of the prescribed pumping rates to determine the appropriate motor speeds (rpm) and discharge valve positions to facilitate rapid adjustment of the pump at the commencement of testing.
- E. Upon completion of the pump test the well shall remain undisturbed for a period of at least 12 hours to allow water recovery rates to be measured. After the pump is removed, all sand and debris shall be removed from the bottom of the well.

### **3.15 COMPLETED WELL WATER SAMPLES**

- A. Water samples will be collected during the pump test. The Contractor shall cooperate with the Engineer who will collect the samples. Owner will be responsible for water quality testing expenses.

### **3.16 PLUMBNESS AND ALIGNMENT**

- A. The Contractor shall test well for plumbness and alignment by lowering a 40-foot long "dummy" or cage into the well to the bottom. The outer diameter of the dummy shall be not more than one-inch smaller than the inside diameter of the well casing. The dummy shall consist of a rigid spindle with 3-rings, each 12 inches wide and spaced top-middle-bottom. The central member of the dummy shall be sufficiently rigid to maintain the concentric alignment of the 3 rings.
- B. Should the dummy fail to move freely throughout the length of the well, the well shall be subject to rejection by the Owner.
- C. The Contractor shall guarantee that the well, when completed, shall be sufficiently straight and plumb to permit the free installation and operation of a deep well turbine pump normally used in similarly sized casings with the pump bowls set at 600 feet.

### **3.17 VIDEO SURVEY**

- A. A color video survey of the entire length of the casing will be performed to verify casing integrity, location of perforations, and effectiveness of development. The video survey equipment shall have side scan capability. A DVD with the video log shall be submitted to Engineer for review prior to casing closure. If further well cleaning is necessary, Contractor shall do so at his own expense and also pay for an additional video survey after the well is cleaned.

### **3.18 CASING CLOSURE**

- A. Upon completion of work on the well, the production well shall be capped by welding a 1/4-inch steel plate over the top of the well casing.

### **3.19 CLEANUP**

- A. Site shall be returned to essentially original condition upon completion of work. All temporary fencing shall be removed.

**END 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 17 – Trenching, Backfilling, and Compacting
- D. Section 40 05 23 – Valves and Appurtenances
- E. Section 40 20 10 – Pipe Supports

*1.3 REFERENCES*

- A. California Plumbing Code
- B. American Water Works Association Standards

*1.4 SUBMITTAL REQUIREMENTS*

- A. Submittals shall be in accordance with the Standard General Conditions and the Supplementary conditions.
- B. Submit manufacturer's catalog data. Show manufacturer's model number.
- C. 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, California Plumbing Code, NFPA 24, ASTM D2774, and all other applicable national, state, local, standards and regulations.

*1.6 MATERIALS*

- A. All materials in contact with potable water shall be certified to ANSI/NSF Standard 61.

## **PART 2 PRODUCTS**

### **2.1 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.

### **2.2 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 A53), 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.

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- 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.

2.3 *POLYVINYL CHLORIDE WATER PIPE (PVC)*

- A. General: PVC pipe shall conform to AWWA C900, unless otherwise specified.
- B. The pipe shall be minimum PR 235 (DR 18) 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 D3139 and ASTM F477. 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 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).

2.4 *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.

2.5 *FLANGED JOINTS*

- A. Flange shall conform to ANSI B16.5, Class 150.

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- B. All steel hardware installed underground shall be coated with a rust preventative, wrapped with 8 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 Style XP or equal.

## 2.6 TRACER WIRE

- A. Install No. 10 solid-core copper tracer wire.

## 2.7 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.

## 2.8 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, and dimensions shall be compatible to be used with standard mechanical joint fittings for ductile rim 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.

## 2.9 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 A194 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 A563, Grade A 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.

## 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 09 90 00.

### 3.3 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

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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.

#### 3.4 *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. 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.

### 3.5 *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.

### 3.6 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.

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- 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 = Allowable fluid loss, 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 square inch (psi).

Hydrostatic testing allowance per 1,000 ft. of pipeline in gph.

PSI	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"

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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.

3.7 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.



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**END SECTION**

PIPE AND FITTINGS  
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**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.

*1.2 RELATED WORK*

- A. Section 05 05 20 – Bolts, Washers, Anchors, and Eyebolts
- B. Section 09 90 00 – Painting and Coating
- C. Section 09 97 57 – Polyethylene Tape Pipe Coating
- D. Section 09 97 61 – Fusion-Bonded Epoxy Linings and Coatings

*1.3 REFERENCES*

- A. American Society for Testing and Materials (ASTM)
- B. American Water Works Association (AWWA)

*1.4 SUBMITTALS*

- A. Submittals shall be in accordance with 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."

## **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 AB 1953 no-lead regulations and ANSI/NSF Standard 61.
- 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. 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.
- E. 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.
- F. 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.
- G. 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.

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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.

- H. 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.
- I. Design actuators on buried valves to produce the required torque on the operating nut with a maximum input of 150 foot-pounds.
- J. 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:

<b>Valve Size (inches)</b>	<b>Minimum Extension Stem Diameter (inches)</b>
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. Lining shall be epoxy similar to Section 09 90 00, System No. 1. Apply lining at the place of manufacture.
- E. Alternatively, line and coat valves with fusion-bonded epoxy per Specification 09 90 00.
- 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. 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.
  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 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. Ball Valves:

1. 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:



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<b>Component</b>	<b>Material</b>	<b>Specification</b>
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.

2. 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 D1784 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.

3. 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 D1784 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.

C. Globe Valves, Angle Valves, Hose Valves, Hose Bibbs, and Fire Hydrants:

1. Type 1—Bronze Globe Valves 2 Inches and Smaller:

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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.

D. Check Valves:

1. 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	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.

2. 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

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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.

3. 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	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.

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Valve shall be APCO Series 800, Val-Matic Series 9600 or 9800 or equal.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

E. 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.

## PART 3

### 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

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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. 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.
- C. 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. 07.

### 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, reseat 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 SECTION**

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**SECTION 40 20 10**  
**PIPE SUPPORTS**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. All pipe hangers, brackets, supports and accessories for newly installed piping as specified and indicated in the Contract Documents.
- B. All labor, materials, equipment and incidentals necessary and required for their completion.
- C. Concrete and fabricated steel supports shall be as indicated or specified in other sections or, in the absence of such requirements, as permitted by the Engineer.

*1.2 RELATED WORK*

- A. Section 03 30 00 – Cast-in-Place Concrete
- B. Section 09 90 00 – Paintings and Coatings
- C. Section 40 05 00 – Pipe and Fittings
- D. Section 40 05 23 – Valves and Appurtenances

*1.3 REFERENCES*

- A. Seismic design requirements in applicable codes and regulations.

*1.4 QUALITY ASSURANCE*

- A. Except as modified or supplemented herein, all pipe supports shall comply with the applicable provisions of ANSI/MSS SP-58 AND MSS SP-69.
- B. In certain locations, pipe supports, anchors, and expansion joints have been indicated on the drawings, but no attempt has been made to indicate every pipe support, anchor, and expansion joint. It shall be the Contractor's responsibility to provide a complete system of pipe supports, to provide expansion joints, and to anchor all piping, in accordance with the requirements set forth herein. Additional pipe supports may be required adjacent to expansion joints, couplings, or valves.

*1.5 SUBMITTALS*

- A. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.
- B. Data shall include a listing of the intended use and general location of each item submitted.

**1.6 DELIVERY, STORAGE AND HANDLING**

- A. All pipe support materials shall be packaged as necessary to ensure delivery in satisfactory condition.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Unless otherwise specified or indicated on the drawings, pipe supports shall be fabricated of manufacturer's standard materials and provided with manufacturer's standard finish.
- B. Pipe support types and application shall comply with Schedule I in paragraph 3.2.

**2.2 PERFORMANCE AND DESIGN REQUIREMENTS**

- A. Design Criteria
  - 1. Pipe supports shall be manufactured for the size and type of pipe to which they are applied. Strap hangers will not be acceptable. Threaded rods shall have sufficient threading to permit the maximum adjustment available in the support item.
  - 2. All piping shall be rigidly supported and anchored so that there is no movement or visible sagging between supports.
  - 3. Anchorage shall be as shown on the bid documents.

**2.3 DIMENSIONS**

- A. Unless closer spacing is indicated on the drawings, the maximum spacing for pipe supports and expansion joints shall be as scheduled in Schedule II at the end of this section.

**2.4 STRUCTURAL DESIGN**

- A. Design loads for inserts, brackets, clamps, and other support items shall not exceed the manufacturer's recommended loads.

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Approved anchors shall be used to fasten supports to concrete or masonry. Unless otherwise indicated on the drawings or permitted by the Engineer, piping shall be supported so that the closest distance from pipe wall or insulation covering is at least 1-1/2 inches from the face of walls and at least 3 inches below ceilings.

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- B. Contact between dissimilar metals, including contact between stainless steel and carbon steel, shall be prevented. Those portions of pipe supports which contact dissimilar metals shall be rubber or vinyl coated.

3.2 SCHEDULES

- A. SCHEDULE I: Pipe Support Types and Application Schedule:

<u>Description or Location</u>	<u>MSS SP-69</u> (Note 1)	<u>Other</u>
<u>Floor Supports</u> , steel or cast iron:		
prefabricated channels	---	12 ga galv., 1-5/8" x 1-5/8", with suitable brackets and pipe clamps.

- B. SCHEDULE II: Spacing Schedule

- Distance between supports shall not be more than that recommended by the pipe manufacturer.
- Distance between supports shall not be more than that shown on the drawings.
- Additional supports shall be added as required to prevent visible bowing of pipe.
- In addition to the spacing requirements listed above, the distance between supports shall not be more than listed in the following schedule.

Type of Pipe	Pipe Support Max Spacing, ft	Max Run Without Expansion Joint, Loop. or Bend, ft	Expansion Joint Max Spacing, ft	Type of Expansion Joint
Ductile Iron, 4" and larger	15	80	80	Note 1
Steel for all services:				
1-1/2 to 4 inch	10	30	100	Note 1

**Notes:**

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1. Expansion joint not required in straight run of pipe if overall length does not exceed the maximum run specified in schedule.

**END SECTION**

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## SECTION 40 50 00

### INSTRUMENTATION AND CONTROLS – GENERAL PROVISIONS

#### PART 1 - GENERAL

##### 1.1 SCOPE OF WORK

- A. The Contractor shall procure the services of a single Process Control System Supplier (PCSS) and a single Pressure Filter System Supplier (PFSS) to furnish and install all materials, equipment, labor and services, except for those services and materials specifically noted, required to achieve a fully integrated and operational system as specified herein and in other Specification Sections listed below.
- B. Requirements specified in this Section apply to all equipment specified in the above sections, unless otherwise specified. The work shall include furnishing, installing and testing the equipment and materials detailed in the following Sections:
  - 1. 40 50 00 Instrumentation and Controls (I&C) - General Provisions
  - 2. 40 50 01 Testing
  - 3. 40 51 10 Computer System Hardware
  - 4. 40 51 20 PLC Hardware and Software
  - 5. 40 51 30 HMI System Software
  - 6. 40 51 50 Control Panels and Panel Mounted Equipment
  - 7. 40 51 70 SCADA Radio Communication Equipment
  - 8. 26 24 19 Motor Control Centers
- C. Auxiliary and accessory devices necessary for system operation or performance, such as transducers, relays, signal amplifiers, intrinsic safety barriers, signal isolators, software, and drivers to interface with existing equipment or equipment provided by others under other Sections of these specifications, shall be included whether they are shown on the Drawings or not.
- D. Substitutions on functions or type of equipment specified shall not be acceptable unless specifically noted. In order to confirm compatibility between all equipment, coordinate all interface requirements with mechanical and electrical systems and furnish any signal isolation devices that might be required.
- E. Equipment shall be fabricated, assembled, installed and placed in operating condition in full conformity with the project Specifications, Drawings, engineering data, instructions, and recommendations of the equipment manufacturer as approved by the Engineer.

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- F. To facilitate the Owner's future operation and maintenance, similar products (e.g., differential pressure transmitters, SCADA I/O cards) shall be supplied from the same manufacturer.
- G. All equipment and installations shall satisfy applicable Federal, State and local codes.
- H. Use the equipment, instrument, and loop numbering scheme that has been developed and shown on the Drawings and specifications in the development of the submittals. Do not deviate from or modify said numbering scheme without the Engineer's approval.
- I. The work of this project includes, but is not necessarily limited to the following:

1.2 *RELATED WORK*

- A. Process Flow Diagrams (PFD) are included in the Drawings.
- B. Control System Architecture Block Diagram is included in the Drawings.
- C. Specific control system and instrumentation materials and requirements are included in related Sections of Division 40.
- D. Instrumentation and Controls conduit systems are specified in Section 26 05 33.

1.3 *SUBMITTALS*

- A. General submittal requirements include:
  - 1. Refer to Division 01 for general submittal requirements.
  - 2. Other Division 40 Sections may have additional submittal requirements.
  - 3. Shop drawings shall be submitted as detailed herein. Shop drawings shall demonstrate that the equipment and services to be furnished comply with the provisions of these specifications and shall provide a complete record of the equipment as manufactured and delivered.
  - 4. Submittals shall be complete; giving equipment specifications, details of connections, wiring, ranges, installation requirements, and specific dimensions. Submittals consisting of only general sales literature shall not be acceptable.
  - 5. Submittals shall be bound in separate three-ring binders, with an index and sectional dividers, with all drawings reduced to a maximum size of 11-inch by 17-inch, then folded to 8.5 inch by 11 inch for inclusion within the binder. Maximum binder size shall be 3 inches.
  - 6. The submittal drawings' title block shall include, as a minimum, the PCSS registered business name and address, Owner and project name, drawing name, revision level, and personnel responsible for the content of the drawing.



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7. Incomplete or partial submittals not complying with the submittal arrangements outlined in this Section will be returned without review.
  8. Separate submittals shall be made as follows:
    - a. Project Plan, Deviation List and Schedule Submittal
    - b. Application Development System Submittal
    - c. Coordination Meetings Agenda
    - d. I/O List Submittal
    - e. Field Instrument Submittal
    - f. Hardware Submittal and Software Packages Submittal
    - g. Panel Layout Drawings and Wiring Diagram Submittal
    - h. Testing Plans Submittal
    - i. Training Plan Submittal
      - 1) Preliminary Training Plan Submittal
      - 2) Final Training Plan Submittal
    - j. Spares, Expendables, and Test Equipment Submittal
    - k. Final System Documentation
- B. Project Plan, Deviation List, and Schedule Submittal
1. Submit a Project Plan within 21 calendar days from Notice to Proceed date. The Project Plan shall, as a minimum, contain the following:
    - a. Overview of the proposed control system in clear text format describing the PCSS understanding of the project work, preliminary system architecture drawing, interfaces to other systems, schedule, startup, and coordination.
    - b. Approach to work in clearly written format describing how the PCSS intends to execute the work. A discussion of switchover, startup, replacement of existing equipment with new, and other tasks as required by these specifications shall be included as applicable.
    - c. Preliminary HMI software, PLC software, and PLC hardware submittal information, including version numbers, solely to determine compliance with the requirements of the Contract Documents prior to development of system programming. Review and approval of software and hardware systems as part of this Project Plan stage shall not relieve the PCSS of meeting all the functional and performance requirements of the system as specified herein.

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- Substitution of manufacturer or model of these systems after the submittal is approved is not allowed without Engineer approval.
- d. Project personnel and organization including the PCSS project manager, project engineer, and lead project technicians. Include resumes of each key individual and specify in writing their commitment to this project.
  - e. Preliminary coordination meeting agendas as specified herein.
  - f. Preliminary testing plan
  - g. Preliminary training plan
  - h. Sample formats of the shop drawings to be submitted and in conformance with the requirements of the Specifications. At a minimum include samples of panel fabrication drawings, loop, I/O wiring diagrams, and graphical display presentations.
2. Exceptions to the Specifications or Drawings shall be clearly defined in a separate Deviation List. The Deviation List shall consist of a paragraph by paragraph review of the Specifications indicating acceptance or any proposed deviations, the reason for exception, the exact nature of the exception and the proposed substitution so that an evaluation may be made by the Engineer. The acceptability of any device or methodology submitted as an "or equal" or "exception" to the specifications shall be at the sole discretion of the Engineer. If no exceptions are taken to the specifications or drawings the PCSS shall make a statement as such. If there is no statement by the PCSS, then it is acknowledged that no exceptions are taken.
  3. Project schedule shall be prepared and submitted using Primavera, Microsoft Project, or equal scheduling software. Schedule shall be prepared in Gantt chart format clearly showing task linkages for all tasks and identifying critical path elements. PCSS schedule must be based on the General Contractor schedule and must meet all field installation, testing, and start-up milestones in that schedule. The project schedule shall illustrate all major project milestones including the following:
    - a. All subsequent project submittals shall be scheduled. Include in the time allotment; the time required for Contractor submittal preparation, Engineer's review time, and a minimum of two complete review cycles.
    - b. Proposed dates for all project coordination meetings.
    - c. Hardware purchasing, fabrication, and assembly (following approval of related submittals)
    - d. Software purchasing and configuration (following approval of related submittals)
    - e. Shipment of all instrument and control system equipment
    - f. Installation of all instrument and control system equipment

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- g. Testing: Schedule for all testing. Testing schedule shall include submittal of test procedures a minimum of 30 days prior to commencement of testing. Schedule shall also include submittal of completed test procedure forms for review and approval by the Engineer prior to shipment, startup, or subsequent project work.
- h. Schedule for system cutover, startup, and/or going on-line for each major system. At a minimum include the schedule for each process controller and HMI server/workstation provided under this Contract.
- i. Schedule for all training; including submittal and approval of O&M manuals, factory training, and site training.

C. Coordination Meetings Agenda:

1. Agendas shall be submitted for the Coordination Meetings as specified herein. Submit proposed Control System Coordination Meeting Agenda a minimum of two weeks prior to the scheduled meeting date for review and comment by the Engineer.

D. Input/Output (I/O) Address List Submittal

1. Submit a complete system Input/Output (I/O) address list for equipment connected to the control system under this Contract.
2. I/O list shall be based on the P&ID's, the Drawings, the design I/O list (if included within these specifications), and requirements outlined in the Specifications.
3. The I/O list shall be submitted in both a Microsoft Excel readable electronic file format on a CD-ROM and an 8-1/2 inch by 11-inch hard copy.
4. The I/O list shall reflect all active and spare I/O points. Add points to accommodate spare I/O.
5. The I/O list shall be arranged such that each control panel has a dedicated worksheet. At a minimum, I/O worksheet tables shall include the following information:
  - a. TAG NUMBER(S): The identifier assigned to a device that performs a function in the control system. As part of this information, the loop number of the tag shall be broken out to allow for sorting by loop.
  - b. DESCRIPTION: A description of the function of the device (text that includes signal source, control function, etc.) Include the text "Spare Points" for all I/O module points that are not connected to equipment.
  - c. PHYSICAL LOCATION: The Control Panel designation of where the I/O point is wired to.
  - d. PHYSICAL POINT ADDRESS: Rack, Slot, and Point (or Channel) assignment for each I/O point.

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- e. LOGICAL POINT ADDRESS: If the PCSS is performing the PLC programming, I/O address of each point. If the PCSS is not performing the PLC programming, then leave this field blank for use by the PFSS.
  - f. I/O TYPE: use DO - Discrete Output, DI - Discrete Input, AO - Analog Output, AI - Analog Input, PI - Pulse Input, or PO – Pulse Output.
  - g. RANGE/STATE: The range in engineering units corresponding to an analog 4-20 mA signal, or, the state at which the value of the discrete points are "1."
  - h. ENGINEERING UNITS: The engineering units associated with the Analog I/O.
  - i. ALARM LIMITS: Include alarm limits based on the control descriptions and the Drawings.
6. The I/O list shall be sorted in order by:
    - a. Physical location
    - b. I/O Type
    - c. Loop Number
    - d. Device Tag
  7. After the I/O list is approved, do not modify the PLC I/O addresses without approval by the Engineer.
  8. Where multiple mechanical components are provided for process redundancy, their field connections to I/O modules shall be arranged such that the failure of a single I/O module will not disable all mechanical components of the redundant system. This applies to all I/O types.

E. Field Instruments Submittal

1. Submit complete documentation of all field instruments using ISA-S20 data sheet formats. Submit a complete Bill of Materials (BOM) or Index that lists all instrumentation equipment ordered by the loop numbering system as shown in the Contract Documents.
2. Submit separate data sheets for each instrument including:
  - a. Plant Equipment Number and ISA tag number per the drawings
  - b. Product (item) name used herein and on the Contract Drawings
  - c. Manufacturer's complete model number
  - d. Location of the device
  - e. Input / output characteristics

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- f. Range, size, and graduations in engineering units.
  - g. Physical size with dimensions, enclosure NEMA classification and mounting details in sufficient detail to determine compliance with the requirements of the Contract Documents.
  - h. Materials of construction for enclosure and wetted parts.
  - i. Instrument or control device sizing calculations where applicable.
  - j. Certified calibration data for all flow metering devices.
  - k. Two-wire or four-wire device type as applicable.
3. Submit index and data sheets in electronic format as well as hard copies on 8-1/2 by 11 inches formats. Electronic format shall be in Microsoft Excel or Word. Submit electronic copy on CD-ROM or DVD disk.

F. Hardware Submittal and Software Packages Submittal

1. For each hardware component indicated below, submit a cover page that lists, at a minimum, date, specification number, product name, manufacturer, model number, Location(s), and power required. Preferred format for the cover page is ISA S20, general data sheet; however, other formats will be acceptable provided they contain all required information.
2. Catalog cuts for supplied Programmable Logic Controller (PLC), process controller equipment, remote telemetry units (RTU), including central processing units, redundancy units, memory, input modules, output modules, modems, network interface modules, mounting racks, and power supplies. Submit descriptive literature for each hardware component that fully describes the units being provided. Any deviation of the hardware systems from the preliminary hardware submittal included in the Process Plan or Applications Development System submittal shall be described in detail.
3. Catalog cuts for HMI servers, HMI workstations, historian servers, memory, printers, mass storage devices, modems, peripherals, power supplies, networking and all other hardware being provided. Submit descriptive literature for each hardware component, which fully describes the units being provided.
4. Complete system architecture diagram showing in schematic form, the interconnections between major hardware components including control centers, panels, power supplies, consoles, computer and peripheral devices, networking equipment, processors, I/O modules, local operator interfaces, and like equipment. The system architecture shall be complete and shall depict all required cables, media type between components, network protocol used at each network level, details on connection requirements such as cable pin- outs, port numbers, and rack slot numbers. The intent of this specification requirement is for the PCSS to develop a diagram that is complete in every aspect to allow purchase of all required equipment by part number, and to allow a qualified technician to interconnect all equipment without having to refer to additional

manuals or literature. Minimum sheet size shall be 11"x17" and using a larger sheet size or more than one sheet is acceptable.

5. Submit details of the controller development software package, the local operator graphic panel development software package, and the HMI software application packages to be used for each piece of equipment. Indicate all standard and optional features provided. Confirm in the submittal that the licenses will be assigned to the Owner at the time of purchase. Any deviation of the software platforms from the preliminary software submittal included in the Project Plan shall be described in detail.

G. Panel Layout Drawings and Wiring Diagrams Submittal

1. Where direct hardwired interfaces exist between the PCSS control panels and vendor provided control panels furnished under other Divisions, the Contractor shall provide to the PCSS the approved shop drawings and submittals in order for the PCSS to provide complete wiring diagrams showing all wiring connections in the I/O system. This includes but is not limited to terminal block numbering, relay contact information, instruments, equipment, and control panel names. These drawings will be included in the Final Documentation submittal. Leaving this information blank on the Final Documentation drawings is not acceptable.
2. Panel Layout Drawings: Drawings shall be furnished for all panels, consoles, and equipment enclosures specified. Panel assembly and elevation drawings shall be drawn to scale and detail all equipment in or on the panel. Panel drawings shall be 11"x17" minimum in size. As a minimum, the panel drawings shall include the following:
  - a. Interior and exterior panel elevation drawings to scale.
  - b. Nameplate schedule.
  - c. Conduit access locations.
  - d. Panel construction details.
  - e. Cabinet assembly and layout drawings to scale. The assembly drawing shall include a bill of material on the drawing with each panel component clearly defined. The bill of material shall be cross-referenced to the assembly drawing so that a non-technical person can readily identify any component of the assembly by manufacturer and model number.
  - f. Fabrication and painting specifications including color (or color samples).
  - g. Submit construction details, NEMA ratings, intrinsically safe barrier information, gas sealing recommendations, purging system details, etc. for panels located in hazardous locations or interfacing to equipment located in hazardous areas.
  - h. Heating and cooling calculations for each panel supplied indicating conformance with cooling requirements of the supplied equipment and

environmental conditions. Calculations shall include the recommended type of equipment required for both heating and cooling.

- i. Submit evidence that all control panels shall be constructed in conformance with UL 508 and bear the UL seal confirming the construction. Specify if UL compliance and seal application shall be accomplished at the fabrication location or by field inspection by UL inspectors. All costs associated with obtaining the UL seal and any inspections shall be borne by the Contractor and included in the Project Bid Price.
3. Panel Wiring Diagrams: Panel wiring diagrams depicting wiring within and on the panel as well as connections to external devices. If ISA Loop Wiring Diagrams are specified below, equipment external to the control panel and related external connections do not need to be shown on the Panel Wiring Diagrams. Panel wiring diagrams shall include power and signal connections, UPS and normal power sources, all panel ancillary equipment, protective devices, wiring and wire numbers, and terminal blocks and numbering. Field device wiring shall include the device ISA-tag and a unique numeric identifier. The diagrams shall identify all device terminal points that the system connects to, including terminal points where I/O wiring lands on equipment not supplied by the PCSS. Wiring labeling used on the drawings shall match that shown on the Contract Documents or as developed by the PCSS and approved by the Engineer. I/O wiring shall be numbered with rack number, slot number, and point number. Two-wire and four-wire equipment shall be clearly identified and power sources noted. Submit final wire numbering scheme. Panel drawings shall be 11" x17" minimum in size.
  4. ISA Loop Wiring Diagrams: Detailed ISA loop wiring diagrams showing requirements for each loop which is shown on the contract drawings. The Loop Drawings shall be prepared in accordance with ISA Standard S5.4 latest edition with the layout following Figures 5 and 6 (shown in the S5.4 Standard), titled "Minimum Required Items Plus Optional items". Loop drawings shall be 11"x17" minimum in size. The information required on the Loop Drawings in order to satisfy the "minimum" and "optional" requirements is as follows:
    - a. Minimum Required Items – The following information shall be provided on Loop Drawings in order to meet this requirement:
      - 1) Identification of the loop and loop components shown on the P&IDs. Other principal components of the loop to be shown and identified under ISA-5.1, "Instrumentation Symbols and Identification".
      - 2) Word description of loop functions within the title. If not adequate, use a supplemental note. Identify any special features or functions of shutdown and safety circuits.
      - 3) Indication of the interrelation to other instrumentation loops, including overrides, interlocks, cascaded set points, shutdowns and safety circuits.
      - 4) All point-to-point interconnections with identifying numbers or colors of electrical cables, conductors, pneumatic multitubes, and individual pneumatic and hydraulic tubing. This identification of interconnections

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includes junction boxes, terminals, bulkheads, ports, and grounding connections.

- 5) General location of devices such as field, panel, auxiliary equipment, rack, termination cabinet, cable spreading room, I/O cabinet, etc.
  - 6) Energy sources of devices, such as electrical power, air supply, and hydraulic fluid supply. Identify voltage, pressure, and other applicable requirements. For electrical sources, identify circuit or disconnect numbers.
  - 7) Process lines and equipment sufficient to describe the process side of the loop and provide clarity of control action. Include what is being measured and what is being controlled.
  - 8) Actions or fail-safe positions (electronic, pneumatic, or both) of control devices such as controllers, switches, control valves, solenoid valves, and transmitters (if reverse- acting). These are to be identified in accordance with ISA-5.1, "Instrumentation Symbols and Identification".
- b. Additional Required Items – The following information shall be provided on Loop Drawings (in a tabular format as shown in Figures 5 and 6 of ISA 5.4) in order to meet this requirement:
- 1) Process equipment, lines, and their identification numbers, source, designation, or flow direction.
  - 2) Reference to supplementary records and drawings, such as installation details, P&IDs, location drawings, wiring diagrams or drawings, and instrument specifications.
  - 3) Specific location of each device, such as elevation, area, panel subdivision, rack or cabinet number and location, I/O location.
  - 4) Cross reference between loops that share a common discrete component, such as multipen recorders, dual indicators, etc.
  - 5) References to equipment descriptions, manufacturers, model numbers, hardware types, specifications or data sheets, purchase order numbers.
  - 6) Signal ranges and calibration information, including setpoint values for switches, and alarm and shutdown devices.
  - 7) Software reference numbers, such as I/O addresses, control block types and names, network interfaces, point names.
  - 8) Engraving or legend information that helps identify the instrument or accessory. Per ISA-5.4-1991 11.
  - 9) Accessories, tagged or otherwise identified, such as regulators, filters, purge meters, manifold valves, root valves.



10) References to manufacturer's documentation such as schematics, connection details, operating instructions.

11) Color code identification for conductors or tubes that use numbers for differentiation.

#### H. Testing Plan Submittals

1. Test Procedure Submittals: Submit the procedures proposed to be followed for each test. Procedures shall include test descriptions, forms, and checklists to be used to control and document the required tests. Include sign-off forms for each testing phase or loop with sign-off areas for the PCSS, Engineer, and Owner. Refer to Section 40 50 01 for specific testing requirements, and submit separate procedures for each specified test phase.
2. Test Documentation: Upon completion of each required test, document the test by submitting a copy of the signed off test procedures. Testing shall not be considered complete until the signed-off test procedures have been submitted and favorably reviewed. Submittal of other test documentation, including "highlighted" wiring diagrams with field technician notes, are not acceptable substitutes for the formal test documentation.
3. Each loop shall have a Loop Status signoff form to organize and track its inspection, adjustment and calibration. These forms shall include the following information and check-off items:
  - a. Project Name.
  - b. Loop Number.
  - c. Detailed test procedure indicating exactly how the loop will be tested including all required test equipment, necessary terminal block numbers, and simulation techniques required.
  - d. Tag Number for each component.
  - e. Check-offs/signoffs for each component.
    - 1) Tag/identification
    - 2) Installation
    - 3) Termination - wiring
    - 4) Termination - tubing
    - 5) Calibration/adjustment
  - f. Check-offs/signoffs for the loop.
    - 1) Panel interface terminations

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- 2) I/O interface terminations
  - 3) I/O signal operation
  - 4) Inputs/outputs operational: received/sent, processed, adjusted
  - 5) Total loop operation
  - 6) Space for comments.
  - 7) Sign off and date fields for the Contractor, the Engineer, and the PCSS.
4. Each active analog subsystem element shall have a Component Calibration form. These forms shall have the following information including space for data entry:
- a. Project Name.
  - b. Loop Number.
  - c. ISA Tag Number and I/O Module Address.
  - d. Manufacturer.
  - e. Model Number/Serial Number.
  - f. Summary of Functional Requirements. For example:
    - 1) For Indicators: Scale ranges
    - 2) For Transmitters/Converters: Scale and chart ranges
    - 3) For Computing Elements: Function
    - 4) For Controllers: Action (direct/reverse) control modes (PID)
    - 5) For Switching Elements: Unit range, differential (FIXED/ADJUSTABLE), reset (AUTO/MANUAL)
    - 6) For I/O Modules: Input or output
  - g. Calibrations; for example:
    - 1) For Analog Devices: Required and actual inputs and outputs at 0, 50 and 100 percent of span.
    - 2) For Discrete Devices: Required and actual trip points and reset points.
    - 3) For Controllers: Mode settings (PID).
    - 4) For I/O Modules: Required and actual inputs or outputs for 0, 50 and 100 percent of span.

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- h. Space for comments.
  - i. Sign off and date fields for the Contractor, the Engineer, and the PCSS.
- I. Spares, Expendables, and Test Equipment Lists Submittal
- 1. This submittal shall include for each Subsystem:
    - a. A list of, and descriptive literature for, spares, expendables, and test equipment as specified in Division 40.
    - b. A list of, and descriptive literature for, additional spares, expendables, and test equipment recommended by the manufacturer.
    - c. Unit and total costs for the additional spare items specified or recommended for each subsystem.
- J. Final System Documentation
- 1. The Final System Documentation shall consist of operations and maintenance manuals as specified herein. The manuals shall be bound in three-ring binders, maximum size of three inches, with Drawings reduced to 11 inch by 17 inch, then folded to 8.5 inch by 11 inch for inclusion. Each section shall have a uniquely numbered tab divider, and each component within each section shall have a separate binder tab divider.
  - 2. The operations and maintenance manuals shall, at a minimum, contain the following information:
    - a. Table of Contents
      - 1) A Table of Contents shall be provided for the entire manual with the specific contents of each volume clearly listed. The complete Table of Contents shall appear in each volume.
    - b. Instrument and Equipment Lists
      - 1) The following lists shall be developed in Excel and provided not only as a hardcopy in O&M but also electronically on a CD.
      - 2) An instrument list for all devices supplied including tag number, description, specification section and paragraph number, manufacturer, model number, serial number, range, span, location, manufacturer phone number, local supplier name, local supplier phone number, completion year replacement cost, and any other pertinent data.
      - 3) An equipment list for all non-instrument devices supplied listing description, specification section and paragraph number, manufacturer, model number, serial number, location, manufacturer phone number, local supplier name, local supplier phone number, completion year replacement cost, and any other pertinent data.

- c. Data Sheets with Vendor Operations and Maintenance Information
  - 1) ISA S20 data sheets shall be provided for all field instruments.
  - 2) Cover page for each device, piece of equipment, and OEM software that lists, at a minimum, date, specification number, product name, manufacturer, model number, Location(s), and power required. Preferred format for the cover page is ISA S20, general data sheet; however, other formats will be acceptable provided they contain all required information.
  - 3) Final vendor O&M documentation for each device, piece of equipment, or OEM software shall be either new documentation written specifically for this project, or modified standard vendor documentation. All standard vendor documentation furnished shall have all portions that apply clearly indicated with arrows or circles. All portions that do not apply shall be neatly lined out or crossed out. Groups of pages that do not apply at all to the specific model supplied shall be removed.
  - 4) For any component requiring dip switch settings or custom software configuration, that information shall be included along with the corresponding data sheets and O&M information.
- d. As-Built Drawings
  - 1) Complete as-built drawings, including all drawings and diagram specified in this section under the "Submittals" section. These drawings shall include all termination points on all equipment the system is connected to, including terminal points of equipment not supplied by the PCSS.
  - 2) As built documentation shall include information from submittals, as described in this Specification, updated to reflect the as-built system. Any errors in or modifications to the system resulting from the Factory and/or Functional Acceptance Tests shall be incorporated in this documentation.
- e. Original Licensed Software
  - 1) Submit original software diskettes or CD-ROMs of all software provided under this Contract. Submit original paper based and electronic documentation for all software provided. Submit license agreement information including serial numbers, license agreements, User Registration Numbers and related information. All software provided under this Contract shall be licensed to the Owner at the time of purchase. Provide media in software sleeves within O&M manual.
- f. Electronic O&M Information
  - 1) In addition to the hard copy of O&M data, provide an electronic version of all equipment manuals CDROM or DVD. Electronic documents shall be supplied in Adobe Acrobat format.
  - 2) Provide electronic files for all custom-developed manuals. Text shall be supplied in both Microsoft Office format and Adobe Acrobat format.

- 3) Provide electronic files for all drawings produced. Drawings shall be in AutoCAD ".dwg" format and in Adobe Acrobat format. Drawings shall be provided using the AutoCAD eTransmit feature to bind external references, pen/line styles, and fonts into individual zip files along with the drawing file.
  - 4) Each computer system hardware device shall be backed up onto CDROM or DVD after Substantial Completion and shall be turned over to the Owner.
  - 5) If specified in the training section, provide digital copies of all training videos. Videos shall be in a format that is readable by standard DVD players and by standard PC DVD drives. Format and shall be a minimum of 800 by 600 pixels and shall include sound.
3. The cover and edge of each volume shall contain the following information:
- a. Project Name (refer to Contract Documents)
  - b. Contract Number (refer to Contract Documents)
  - c. Instrumentation and Control System Hardware[or Applications Engineering] Operations and Maintenance Manual
  - d. Specification Sections [List appropriate section]
  - e. Subcontractor Name
  - f. Date
  - g. Volume X of Y [Where X is the volume number and Y is the number of volumes]

#### 1.4 REFERENCE STANDARDS

- A. Publications are referred to in the text by basic designation only. Where a date is given for reference standards, that edition shall be used. Where no date is given for reference standards, the latest edition in effect at the time of bid opening shall apply.
- B. International Society of Automation (formerly the Instrumentation, Systems and Automation Society) (ISA)
  1. ISA S5.2 Binary Logic Diagrams for Process Operations
  2. ISA S5.3 Graphic Symbols for Distributed Control/Shared Display Instrumentation Logic and Computer Systems.
  3. ISA S5.4, Instrument Loop Diagrams
  4. ISA S20, Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.

5. ISA RP60.3, Human Engineering for Control Centers
  6. ISA RP60.6, Nameplates, Labels, and Tags for Control Centers
- C. National Electrical Manufacturers Association (NEMA)
- D. National Fire Protection Agency (NFPA)
1. NFPA 70, National Electrical Code (NEC)
- E. Underwriters Laboratories, Inc. (UL)
1. UL 508 – Industrial Control Equipment
- F. American Society for Testing and Materials (ASTM)
1. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

#### 1.5 *QUALITY ASSURANCE*

- A. The Process Control System Supplier (PCSS) shall be a "systems integrator" regularly engaged in the design and the installation of instrumentation systems and their associated subsystems as they are applied to the municipal water and wastewater industry. For the purposes of this Specification Section, a "systems integrator" shall be interpreted to mean an organization that complies with all of the following criteria:
- B. The PCSS shall maintain a permanent, fully staffed and equipped service facility within 250 miles of the project site with full time employees capable of designing, fabricating, installing, calibrating, and testing the systems specified herein. At a minimum, the PCSS shall be capable of responding to on-site problems within 12 hours of notice. Provide an on-site response within 4 hours of notification starting at two months before scheduled startup to two months after startup completion.
- C. PCSS shall hold a valid UL-508 certification for their panel fabrication facility.

#### 1.6 *DELIVERY, STORAGE, AND HANDLING*

- A. Delivery, storage, and handling shall be in accordance with Division 01.
- B. Shipping Precautions
1. After completion of shop assembly, factory test and approval of all equipment, cabinets, panels and consoles shall be packed in protective crates and enclosed in heavy duty (5 mil) polyethylene envelopes or secured sheeting to provide protection from damage, dust and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving without removing protective

covering. Boxed weights shall be shown on shipping tags together with instructions for unloading, transporting, storing and handling at the job site.

2. Manufacturer's special instructions for field handling, storage and installation required for protection, shall be securely attached to the packaging for each piece of equipment prior to shipment. The instructions shall be stored in resealable plastic bags or other means of protection.
3. None of the HMI control and monitoring equipment shall be shipped to the site until the control room areas comply with specified ambient temperature and humidity. Have qualified personnel accept the equipment on delivery and supervise unloading within the control room areas.
4. If any apparatus has been damaged, such damage shall be repaired at no additional cost to the owner.

#### 1.7 *NOMENCLATURE AND IDENTIFICATION*

##### A. Field Instrument Tags

1. A permanent stainless steel or other non-corrosive material tag firmly attached and permanently and indelibly marked with the instrument tag number, as indicated in the Drawings, shall be provided on each piece of equipment supplied under this Section. Equipment shall be tagged before shipping to the site.
2. Provide 1/8-in by 3/8-in, Type 316 stainless steel button head machine screws.
3. All supplied field instrument transmitters and field instrument transmitter elements shall have a stainless steel identification tag attached to each transmitter and element prior to shipment. Tag shall be attached via stainless steel chain or stainless steel wire (24 gauge inches. Tag shall include the ISA alphanumeric instrument number as indicated in the P&ID, loop, and detail drawings. The alphanumeric instrument number shall be stamped into the tag and shall have a minimum of 3/16-in high alphanumeric characters.

##### B. Panel Nameplates

1. See Section 40 51 50.

#### 1.8 *WARRANTY*

- A. Provide warranty per Section 00 65 36, Warranties and Bonds, and as specified herein.

#### 1.9 *PROJECT/SITE REQUIREMENTS*

- A. Environmental Requirements. Refer to Section 26 05 00 and the Electrical Drawings for specific environmental and hazardous area classifications.
- B. Elevation: Equipment shall be designed to operate at the project ground elevation.
- C. Temperature:

1. Outdoor areas' equipment shall operate [between - 30 to 50 C degrees ambient].
  2. Equipment located in indoor locations shall operate between [10 to 35 C] degrees ambient minimum.
  3. Storage temperatures shall range from [0 to 50 C] degrees ambient minimum.
  4. Additional cooling or heating shall be furnished if required by the equipment as specified herein.
- D. Relative Humidity: Air conditioned area equipment shall operate between 20 to 95 percent relative, non-condensing humidity. All other equipment shall operate between 0 to 100 percent relative, condensing humidity.

## **PART 2 - PRODUCTS**

### **2.1 PRODUCTS GENERAL**

- A. All instrumentation and electronic equipment shall be of the manufacturer's latest design, utilizing printed circuitry and epoxy or equal coating to prevent contamination by dust, moisture and fungus. The field mounted equipment and system components shall be designed for installation in dusty, humid and slightly corrosive service conditions.
- B. All instruments shall be provided with mounting hardware and floor stands, wall brackets, or instrument racks unless otherwise noted. Fasteners for securing control panels and enclosures to walls and floors shall be either hot-dipped galvanized after fabrication or stainless steel. Provide stainless steel fasteners only in corrosive areas rated NEMA 4X on the Drawings or as defined under Division 26. Provide and size anchors in accordance with Divisions 01 and 05 as required per the seismic calculations. Provide minimum size anchor of 3/8-inch.
- C. All indicators shall be linear in process units, unless otherwise noted. All transmitters shall be provided with indicators in process units, accurate to two percent or better.
- D. All equipment, cabinets and devices furnished shall be heavy-duty type, designed for continuous industrial service. The system shall contain similar products of a single manufacturer, and shall consist of equipment models, which are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.
- E. All electronic/digital equipment shall be provided with radio frequency interference protection.
- F. Electrical
  1. Equipment shall operate on a 60 Hertz alternating current power source at a nominal 120 volts, plus or minus 10 percent, except where specifically noted. Regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop. Where



- equipment requires voltage regulation, constant voltage transformers shall be supplied.
2. With the exception for field device network connected devices, all electronic instrumentation shall utilize linear transmission signals of isolated 4 to 20 mA DC (milliampere direct current) capable of driving a load up to 750 ohms, unless specified otherwise. However, signals between instruments within the same panel or cabinet may be 1-5 VDC (volts direct current).
  3. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals will be allowed.
  4. All switches shall have double-pole double-throw contacts rated at a minimum of 600 VA, unless noted otherwise.
  5. Switches and/or signals indicating an alarm, failure or upset condition shall be wired fail- safe to the SCADA system. A fail-safe condition is an open circuit when in an alarm state.
  6. Materials and equipment shall be UL approved. Where components are not available with UL approval, integrate the device with ground fault protective devices, isolation transformers, fuses, or other protective equipment necessary to achieve compliance with UL 508 requirements.
  7. All equipment furnished shall be designed and constructed so that in the event of power interruption, the systems specified herein shall go through an orderly shutdown with no loss of memory, and shall resume normal operation without manual resetting when power is restored, unless otherwise noted.
  8. All transmitter output signals shall include signal and power source isolation.

## 2.2 *ELECTRICAL SURGE PROTECTION*

- A. General - Surge protection shall be provided to protect the electronic instrumentation system from induced surges propagating along the signal and power supply lines from lightning, utility, or the plant electrical system. The protection systems shall be such that the protective level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level. Protection shall be maintenance free and self-restoring. Devices shall have a response time of less than 50 nanoseconds and be capable of handling a discharge surge current (at an 8x20 $\mu$ s impulse waveform) of at least 8 kA. Ground wires for all instrumentation device surge protectors shall be connected to a low resistance ground in accordance with Section 26 05 00.
- B. Provide protection of all analog signal (4-20 mA) circuits where any part of the circuit is outside of the building envelope. Circuits shall be protected at both the transmitter and the control system end of the circuit. Protection devices located near the transmitter shall be mounted in a separate enclosure, unless conduit mounted, and shall be Phoenix Contact PT Series, MTL Surge Technologies (Telematic) TP48, Citel TSP-10 series, or equal. Substitution of a single device to protect both 120 VAC and 4-20 mA wires to an instrument is acceptable. Protection devices in control

panels shall be MTL Surge Technologies (Telematic) SD Series, Phoenix Contact PT Series, Citel BP1-24, or equal.

- C. Provide protection of all 120 VAC power feeds into control panels, instruments, and control room equipment. Surge arresters shall be Transtector ACP-100BW Series, Phoenix Contact "Mains-PlugTrab", MCG Surge Protection 400 Series, or equal.
- D. Non-Fiber Based Data Highway or Communications Circuits – Provide protection on all communication and data highway circuits that leave a building or are routed external to a building. Circuit protection shall be provided at both ends of the line. Surge protection devices shall be Phoenix Contact PlugTrab Series, Transtector FSP Series, MTL Surge Technologies (Telematic) NP Series, or equal.
- E. Inductive Loads – At a minimum, provide coil surge suppression devices, such as varistors or interposing relays, on all process controller outputs or switches rated 120 VA or less that drive solenoid, coil, or motor loads.
- F. Telephone Circuits - At a minimum, provide Telephone Company approved line protection units for all telephone lines used for telemetry or SCADA system use under this Contract.

### 2.3 TUBING AND FITTINGS

- A. All instrument air header takeoffs and branch connections less than 2-in shall be 316 stainless steel.
- B. All instrument shut-off valves and associated fittings shall be supplied in accordance with the piping specifications and all instrument installation details. The materials for fittings and valves shall be compatible with process fluids. Where metallic fittings and valves are compatible, wetted materials shall be Type 316 stainless steel.
- C. The materials for instrument tubing shall be compatible with process fluids. Where metallic tubing is compatible, tubing shall be fully annealed ASTM A269 Seamless 316 grade free of OD scratches having the following dimensional characteristics as required to fit the specific installation:
  - 1. 1/4-in to 1/2-in O.D. by 0.035 wall thickness
  - 2. 5/8-in to 1-in O.D. by 0.049 wall thickness
  - 3. 1-in O.D. by 0.065 wall thickness
  - 4. 1-1/4-in O.D. by 0.065 wall thickness
  - 5. 1-1/2-in O.D. by 0.083 wall thickness
  - 6. 2-in O.D. by 0.095 wall thickness
- D. All process connections to instruments shall be annealed 1/2-inches O.D. stainless steel tubing, Type 316.

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- E. All tube tracks shall be supported by stainless steel and installed as per manufacturer's installation instructions.

2.4 SPARE PARTS

- A. Spare parts of the type and quantity as recommended by the manufacturer shall be furnished for all devices furnished under these sections.
- B. All spare parts shall be wrapped in bubble wrap, sealed in a polyethylene bag complete with dehumidifier, then packed in cartons and labeled with indelible markings. Complete ordering information including manufacturer's part number, part ordering information including manufacturer, part number, part name, and equipment name and number(s) for which the part is to be used shall be supplied with the required spare parts. The spare parts shall be delivered and stored in a location directed by the Engineer.
- C. As a minimum, furnish the following spare parts for control panels:
  - 1. Timers - Five of each type installed
  - 2. Relays - Five of each type installed
  - 3. Fuses and circuit breakers - 10% (minimum of 10 fuses and 2 circuit breakers) of each type and size installed
  - 4. Light bulbs - 10% (minimum of 10) of each type installed
  - 5. Power supplies - one of each type installed.
  - 6. Manufacturer's cables - one of each type installed.
  - 7. Selector switches/pushbuttons - Two of each type installed including 5 contact blocks.
  - 8. Surge protection devices - One of each type installed.
  - 9. Provide one quart of touch-up paint, for each type and color used for all RTU cabinets, panels, and consoles supplied.
- D. The following field Instrument related Spare Parts shall be furnished:
  - 1. Miscellaneous: One year supply of items recommended by the manufacturer of the equipment including all reagents, dissolved oxygen probes, batteries, and calibration standards as needed to operate and maintain the furnished equipment.
- E. PLC components
  - 1. One spare CPU of each type supplied for each plant
  - 2. Two spare I/O modules of each type supplied for each plant

3. One spare specialty interface module of each type supplied for each plant
4. One spare power supply of each type supplied for each plant

### **PART 3 - EXECUTION**

#### **3.1 GENERAL INSTALLATION**

- A. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions. The locations of equipment, transmitters, alarms and similar devices indicated are approximate only. Exact locations of all devices shall be as approved by the Engineer during construction. Obtain in the field, all information relevant to the placing of process control equipment and in case of any interference with other work, proceed as directed by the Contractor and furnish all labor and materials necessary to complete the work in an approved manner at no additional cost to the Owner.
- B. All equipment used in areas designated as hazardous shall be designed for the Class, Group and Division as required for the locations as shown on the Drawings and specified in Division 26. All work shall be in strict accordance with codes and local rulings.
- C. Unless specifically indicated, direct reading or electrical transmitting instrumentation shall not be mounted on process piping. Instrumentation shall be mounted on instrument racks or stands. All instrumentation connections shall be provided with shutoff and drain valves. For differential pressure transmitters, 5-valve manifolds for calibration, testing and blow down service shall also be provided. For chemical or corrosive fluids, diaphragm seals with flushing connections shall be provided.
- D. All piping and tubing to and from field instrumentation shall be provided with necessary unions, calibrations and test tees, couplings, adaptors, and shut-off valves. Process tubing shall be installed to slope from the instrument toward process for gas measurement service and from the process toward the instrument for liquid measurement service. Provide drain/vent valves or fittings at any process tubing points where the required slopes cannot be maintained. Process tubing shall be installed rigidly with supports to prevent significant vibrations.
- E. Brackets and hangers required for mounting of equipment shall be provided. They shall be installed as shown and not interfere with any other equipment.
- F. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded at only one ground point for each shield.
- G. Investigate each space in the building through which equipment must pass to reach its final location. If necessary, ship material in sections sized to permit passing through restricted areas in the building. Provide on-site service to oversee the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices, subject to the Engineer's approval. Certify that field wiring associated with his/her equipment is installed in accordance with best industry practice. Schedule and coordinate work under this section with that of the electrical work specified under applicable Sections of Division 26.

- H. Installation of fiber optic cable within control panel and console assemblies. Refer to cable manufacturer's specifications for bend radius. Use cable breakout assembly as recommended by the cable manufacturer. Provide wire basket, strain relief as required to meet manufacturer's strain requirements.
- I. Provide local electrical shutoffs and disconnects for all 4-wire field instruments requiring 120 VAC power. Electrical disconnects shall be suitably rated disconnect switches or manual motor starters as specified under Division 26.
- J. Provide sunshades for equipment mounted outdoors in direct sunlight. Sunshades shall include standoffs to allow air circulation around the cabinet. Orient equipment outdoors to face to the North or as required to minimize the impact of glare on LED, LCD, or other digital readouts.
- K. Loop Tuning - All electronic control stations incorporating PID controllers shall be tuned following field installation and calibration of instrumentation and control system components, but prior to commencement of the specified field tests. Field testing will be immediately 'failed' if loop tuning for the entire installed system is not complete.
  - 1. Optimal loop tuning shall be achieved either by auto-tuning software or manually by trial and error, Ziegler-Nichols step-response method, or other documented process tuning method. Assigning common PID factors for identical loops following field tuning of a single typical loop is acceptable. However, tuning documentation shall be submitted for each loop individually as specified in Part 1 of these Specifications.
  - 2. Determine and configure optimal tuning parameters to assure stable, steady state operation of final control elements running under the control of field mounted, dedicated PID controllers or software based PID controllers residing as part of the programmable logic controller system. Each control loop that includes anti-reset windup features shall be adjusted to provide optimum response following startup from an integral action saturation condition.
  - 3. Tune all PID control loops to eliminate excessive oscillating final control elements. Loop parameters shall be adjusted to achieve 1/4 amplitude damping or better. In addition, loop steady state shall be achieved at least as fast as the loop response time associated with critical damping.
  - 4. Loop performance and stability shall be verified in the field following tuning by step changes to setpoint. Submit loop tuning methodology and verification as part of the final system documentation as specified in Part 1.
  - 5. For cascade loops, tune both sets of controllers so that the cascade loop achieves the loop tuning characteristics specified herein.

### 3.2 TESTING

- A. Refer to Section 40 50 01.

#### **END OF SECTION**

**SECTION 40 90 00**  
**INSTRUMENTATION**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. Supply and install sensing elements, transmitters, brackets, conduit, wiring and all related items necessary to connect and integrate with the water distribution system.

*1.2 RELATED WORK*

- A. Division 26 – Electrical
- B. Section 40 50 00 – Instrumentation and Controls-General Provisions

*1.3 SUPPLIER'S QUALIFICATIONS*

- A. Each system shall be designed, coordinated, and supplied by a qualified supplier who is regularly engaged in the business of designing and providing instrument and control systems for municipal wastewater projects. The Contractor shall submit proof of the following qualifications of his intended instrumentation supplier:
  - 1. The names of manufacturers whose products are normally supplied.
  - 2. That he has and will maintain competent service personnel to service the equipment furnished.
  - 3. That he has successfully provided similar work for at least 5 years.
  - 4. The names of at least three references who are users of similar equipment designed, fabricated, and furnished by the supplier. References shall include a general description of the project scope.

*1.4 COORDINATION*

- A. Instrument and control systems supplied under this section shall be designed and coordinated for proper operation with related equipment and materials furnished by other suppliers under other sections of these specifications and where applicable, to related existing equipment. All instruments and control devices shall be applied in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the instrument or device manufacturer, and the related equipment manufacturer.
- B. Power and Instrument Signals. Unless noted otherwise, electrical power supply to the instrumentation equipment will be unregulated 120 volts ac at the locations indicated in the electrical sections. Unless otherwise noted or specified, all transmitted electronic analog instrument signals shall be 4-20 mA dc.

## 1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

## PART 2 PRODUCTS

### 2.1 ULTRASONIC FLOW METER

- A. Each ultrasonic level transmitter shall be an all-solid-state electronic unit consisting of a sensor assembly, a signal converter/transmitter, and an interconnecting cable. The sensor shall be encapsulated in a chemical and corrosion resistant material such as Kynar or CPVC, and shall be suitable for operation over a temperature range of -20 F to +150 F with a relative humidity of 10 to 100 percent. The ultrasonic level transmitter shall have automatic compensation for changes in air temperature and density. The transmitter shall be designed to ignore momentary level spikes or momentary loss-of-echo. A loss-of-echo condition shall be indicated on the transmitter unit.
- B. The ultrasonic level sensor and transmitter shall operate on a 4-20 mA signal. The level sensor shall be located at the top of a 45 degrees V-Notch weir. The transmitter shall be mounted in a NEMA 4 housing installed at the control panel with pedestal supports for bolting to concrete pad. The sensor shall be capable of continuous operation in the moist, corrosive atmosphere. The measuring equipment shall be supplied as a fully operable unit and shall be fully calibrated. The level sensor shall have an accuracy of 0.25% of span. The level sensor shall have a digital display and shall operate on 120 Volt AC power. All programmed information shall be retained in battery backed memory. The level sensor and transmitter shall be Endress and Hauser Prosonic, Kistler-Morse, Milltronics, Polysonics, or approved equivalent.
- C. Flow measuring element shall be a 45 degree V-notch weir fabricated from minimum ¼ inch thick fiberglass sheets. The weir plate shall have sharp cut edges and be mounted vertically with gasketed bolt holes for height adjustment.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Installation Requirements: The services of the system supplier's technical representative shall be provided as necessary to calibrate, test, and advise others of procedures for adjustment and operation of the system.
1. Field Wiring - Field wiring materials and installation shall be in accordance with the electrical section.
  2. Field Piping - Field piping materials and installation shall be in accordance with the pipe and fittings section.
  3. Field-Mounted Instruments - Instruments shall be mounted so that they may be readily approached and easily serviced.

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4. Field Calibration - A technical representative of the system supplier shall calibrate each instrument indicating the results and final tuning adjustment settings. The adjustments of each calibrated instrument shall be sealed or marked, insofar as practical, so that further adjusting by unauthorized personnel is discouraged. Instrument calibration shall be accomplished prior to a checkout of the operations of a system.
5. Systems Check - A technical representative of the system supplier shall participate in the checkout of metering and control systems. If interrelated devices furnished by other suppliers, do not perform properly when placed in service, the technical representative shall use suitable test equipment to locate the source of trouble or malfunction. A written report regarding the results of such tests shall be furnished, if requested by the Engineer, as necessary to resolve a question of responsibility for corrective measures.
6. Installation drawings shall be prepared for interconnecting wiring and piping between the related equipment and the equipment furnished under this section. The supplier shall coordinate the sensor mounting requirements and shall furnish drawings, complete with dimensions and elevations, as specified in Section 01 70 00 – Project Closeout.
7. Coordination with other contractors and supervision of installation shall be provided by the Contractor as required during construction.

**END SECTION**

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**SECTION 40 91 25**  
**MAGNETIC FLOW METER**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. Furnish and install magnetic flow meters with transmitter and power supply at the locations indicated in the Plans.

*1.2 RELATED WORK*

- A. Section 40 05 00 – Piping and Fittings
- B. Section 40 05 23 – Valves and Appurtenances
- C. Division 26 - Electrical

*1.3 GENERAL*

- A. This unit shall be furnished and installed complete with all anchors and supports; all mechanical and electrical equipment required for proper operation, and all additional materials or construction required by manufacturers design.

*1.4 SERVICE CONDITIONS*

- A. Flow meter shall include the following features as indicated below:

Working pressure, psi 150

Accuracy within flow range, percent  $\pm 0.5$

- B. The new flow meters shall be fitted with a transmitter and power supply to provide a 4-20 mA signal to the plant PLC and to the remote indicator.
- C. The new flow meter shall have a rate of flow indicator calibrated in gallons per minute, and a digital totalizer.

*1.5 SUBMITTALS*

- A. Complete data, and detailed drawings of the equipment.
- B. As specified in Section 01 33 00 – Submittals.

*1.6 MATERIALS*

- A. All materials in contact with potable water shall be certified to ANSI/NSF Standard 61.

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## **PART 2 PRODUCTS**

### **2.1 MAGNETIC FLOW METER**

- A. Meter size and location shall be as shown on the Plans. Meter shall be one of the following, or Engineer approved equivalent:
  - 1. Badger Magnetoflow with Primo amplifier,
  - 2. Foxboro ABB MagMaster,
  - 3. Danfoss Magflo with MAG 6000 signal converter.
- B. Unless otherwise specified, meter shall use 120 VAC power.
- C. The magnetic flow meter shall be a velocity sensing, electromagnetic type, flanged tube meter with a microprocessor-based signal converter and sealed housing.
- D. Meter tube shall be rated for 150 psi working pressure and shall be fabricated stainless steel pipe and use 150 lb. AWWA Class "D" flat face steel flanges and PTFE liner. Meter tubes shall have a constant nominal inside diameter offering no obstruction to flow. Electrodes shall be 316 stainless steel.
- E. Provision shall be made for providing a completely sealed environment for all coils, electrode connections, and wiring harnesses, and shall be capable of submerged or buried operation (NEMA 6).
- F. Signal converter shall be, auto zeroing. The signal converter shall mount directly to the meter. The converter shall indicate direction of flow and provide a flow rate indication and a totalization of flow volume for both forward and reverse directions. Both forward and reverse totalizers shall be electronically resettable. The converter shall provide an isolated 4-20 mA output into an 800 ohm load, a frequency output of 0-800 Hz, and a scaled pulse output. The microprocessor-based signal converter shall have a self-diagnostic test mode and a backlit display that continuously displays "Rate of Flow" and "Total Volume." The signal converter configuration parameters shall be lockout protected, but is capable of being changed via the front panel or with the use of a personal computer or electronic organizer with a 9-pin RS-232 serial communications port. The converter shall be compatible with Microsoft Windows or other software with terminal communications capabilities.
  - 1. Converter shall be supplied with a programmable low-flow dropout and empty pipe zero return.
- G. Grounding rings if required shall be 316 stainless steel and shall be supplied with the meter tube.
- H. A blank pipe spool of the same laying length shall be provided to the Owner to place in the piping in the event of the requirement to remove the meter for servicing.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION**

- A. Equipment furnished and installed under this section shall be placed in operating condition and unless exceptions are noted by the Engineer.
- B. The new flow meters shall be installed in full conformity with Plans and Specifications as well as the instructions and recommendations of the equipment manufacture.
  - 1. The transmitter and power supply shall be connected to the plant PLC.
- C. A factory representative who has complete knowledge of equipment furnished herein shall be provided for at least one (1) four hour period, at equipment start up, to instruct representatives of the Owner and the Engineer on proper operation and maintenance.
- D. Following the completion of installation, the new flow meter shall be tested for proper operation using clean water.
  - 1. At least 2000 gallons shall be passed through the meter during the test. Readings on totalizer shall be recorded to verify accuracy of meter.

**END SECTION**

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MAGNETIC FLOW METER  
40 91 25-4

## **SECTION 40 96 31**

### **SCADA CONTROL LOOP DESCRIPTIONS**

#### **PART 1 GENERAL**

##### *1.1 SECTION DESCRIPTION*

- A. This section, in conjunction with specific requirements contained in the P&ID drawings, plans and specifications, describes the function of the project controls and instrumentation. The contractor is responsible for providing a finished supervisory control and data acquisition system and associated programming that can accomplish all of the following functions and provides the necessary operator interface to monitor the process, control the process, generate reports, and adjust setpoints as necessary. The system will be based on remote terminal units, manufacturer furnished equipment control panels, and a master control workstation.
- B. The control functions described in this section are in addition to any control functions described elsewhere on the plans or specifications.
- C. All analog instruments shall include the following operator adjustable alarms:
  - 1. Instrument fail
  - 2. High-high
  - 3. High
  - 4. Low
  - 5. Low-low
- D. All software control switches shall include adjustable timer delays.

##### *1.2 RELATED WORK*

- A. Section 40 50 00 – Instrumentation and Controls-General Provisions
- B. Section 40 90 00 – Instrumentation

#### **PART 2 CONTROL LOOP DESCRIPTIONS**

##### *2.1 PROCESS 00 – MISCELLANEOUS WELL FUNCTIONS*

- A. The new well shall be capable of being operated in two modes, selectable from the existing electrical panel:
  - 1. Tank supplied from Existing Well.
  - 2. Tank supplied from Proposed Well.

COUNTY OF FRESNO  
CSA 43W RAISIN CITY GROUNDWATER WELL PROJECT

- B. Under no circumstances shall both wells operate simultaneously.
- C. In Tank Supplied from Existing Well mode, the existing well shall operate independently and pump water into the water storage tank while the proposed well remains off.
- D. In Tank Supplied from Proposed Well mode, the proposed well shall operate independently and pump water into the water storage tank while the existing well remains off.
- E. Well start-up and shutdown: Provide a hand-off-automatic loop at the master control system. Furthermore, provide a selector switch to toggle between Well No. 1 and Well No. 2.
  - 1. In hand mode, the Well selected via the toggle switch per Paragraph 2.1.A.5 shall start provided that startup is not inhibited by a high-high water storage tank level.
  - 2. In hand mode, the Well selected via the toggle switch per Paragraph 2.1.A.5 shall start provided that startup is not inhibited by a high water storage tank level.
  - 3. In off mode, both wells shall be off.
  - 4. In automatic mode, the selected well shall be called on based on a low water storage tank level and shall shut off based on a high water storage tank level as measured by the existing water tank float switch. After shut off, the system shall automatically switch the selected well so that the wells alternate operation.

2.2 *PROCESS 10 - WELL*

- A. The well pump solenoid shall open when the well is called on and shall remain open for a programmable time after the well motor has started. The well motor shall be inhibited for a period of time after the prelube solenoid has been opened.
- B. The well shall shut off should the high or low pressure switch be activated following an operator adjustable time delay.
- C. The well pump shall operate in two modes: VFD operation and Soft Start (full speed) operation. VFD mode shall be the default mode. Soft start mode shall be initiated by the Operator should the VFD be out of service.
- D. Well Pump VFD Operation Mode
  - 1. Well pump speed shall be manually controlled to maintain a designated pressure of <60%, operator adjustable
- E. Soft Start Operation Mode

COUNTY OF FRESNO  
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1. The well shall be called on and off based on the water tank elevation measured by the existing tank float switch.

**END SECTION**

SCADA CONTROL LOOP DESCRIPTIONS  
40 96 31-3



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**SECTION 40 97 15**  
**PRESSURE GAUGES**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. All analog dial-type pressure gauges and accessories to be furnished and installed as indicated in the Contract Documents.
- B. All labor, materials, equipment and incidentals necessary and required for their completion.

*1.2 RELATED WORK*

- A. Section 40 05 00 – Pipe & Fittings
- B. Section 40 05 23 – Valves and Appurtenances

*1.3 QUALITY ASSURANCE*

- A. Except as modified or supplemented herein, all gauges shall conform to the requirements of ANSI B40.1.
- B. Pressure gauges shall be the standard product of a single manufacturer regularly engaged in the production of gauges of the types specified herein.

*1.4 SUBMITTALS*

- A. As specified in Section 01 33 00 – Submittal Procedures.

**PART 2 PRODUCTS**

*2.1 ACCEPTABLE MANUFACTURERS*

- A. Pressure gauges shall be manufactured by Ashcroft, Weksler, or Engineer approved equivalent.

B. MATERIALS

1. Materials of construction shall be as follows:

Function	Material
Bourdon tube	Phosphor bronze
Movement	Stainless steel
Ring	Stainless steel or phenolic
Window	Acrylic plastic or shatterproof glass

2.2 FABRICATION AND MANUFACTURE

- A. Unless otherwise specified, gauges shall be indicating dial type with C-type bourdon tube, rotary geared movement, phenolic open front turret case, and adjustable pointer.
- B. The dial shall be 4-1/2 inch size with white background and black markings. The units of measurement shall be indicated on the dial face. Subdivisions of the scale shall conform to the requirements of the governing standard. Pointer travel shall be not less than 200 degrees nor more than 270 degrees of arc. Range shall be such that the normal operating reading shall be near the midpoint of the range.
- C. All stem mounted gauges shall be provided with 1/2 inch minimum NPT connections.
- D. Unless otherwise specified, gauge accuracy shall be ANSI Grade A or better. Overall accuracy for diaphragm seal protected and liquid filled gauges shall be ANSI Grade B or better.

2.3 ACCESSORIES

- A. Isolation Valves
1. Unless otherwise indicated on the drawings, each gauge shall be provided with a threaded end ball type shutoff valve (gauge cock). Valves shall be of brass or bronze construction, two piece end entry body, bronze or brass ball, teflon or Viton stem seal. Valves shall be rated at not less than 250 psi and shall be drip-tight in all directions.
- B. Snubbers
1. Each pressure gauge shall be provided with a pressure snubber, and shall be of a size and pressure range compatible with the gauge served.
2. Pressure snubbers shall be Operating and Maintenance Specialties "Ray Snubbers", Ashcroft "Pulsation Dampers," or Engineer approved equivalent.

C. Diaphragm Seals

1. A diaphragm seal shall be provided on all gauges as indicated in the schedule.
2. Diaphragm seals shall be AISI Type 316 stainless steel diaphragm, zinc or cadmium plated carbon steel upper housing, and bronze lower housing. The upper housing shall be contoured to fit and provide a seat and seal for the diaphragm and shall be designed to permit removal of the gauge with the system under pressure. The lower housing shall be provided with a tapped and plugged 1/4 inch NPT flushing connection. Diaphragm seals shall be suitable for raw sewage.
3. Each diaphragm seal and the gauge served shall be factory assembled, filled with glycerin or silicon oil and calibrated as a unit.

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Gauges shall be installed at the locations indicated on the Plans. Pressures ranges from 0 psi – 100 psi.
- B. All gauges, snubber and diaphragm seals shall be installed in the vertical upright position. Teflon thread tape or teflon thread sealer, shall be used in the assembly of threaded connections. All connections shall be free from leaks.
- C. Lines shall be purged of trapped air at gauge locations prior to installation of the gauge or diaphragm seal.

**END SECTION**

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**SECTION 43 21 52**  
**WELL PUMPING FACILITIES**

**PART 1 GENERAL**

*1.1 WORK INCLUDED*

- A. The Contractor shall be responsible for the following:
  - 1. Furnish and install well pumps and column pipe.
  - 2. Furnish and install above ground pump manifold within the fenced well site.
  - 3. Furnish and install pump controls.
  - 4. All components that may come in contact with the potable water must be ANSI-NSF Standard 61 certified.

*1.2 RELATED WORK*

- A. Section 09 90 00 – Painting and Coating
- B. Section 33 01 00 – Piping and Fittings
- C. Section 40 05 23 – Valves and Appurtenances

*1.3 REFERENCES*

- A. American Water Works Association (AWWA)
- B. Hydraulic Institute (HI)
- C. American Society for Testing and Materials (ASTM)
- D. American National Standards Institute (ASNSI)
- E. National Electrical Manufacturers Association (NEMA)

*1.4 SUBMITTALS*

- 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 and detail drawings showing all pump parts and described by material of construction, specification (such as AISI, ASTM, etc.), and grade or type. Show linings and coatings. Include total pump weight.

- D. Submit pump manufacturer ISO-9001 certification.
- E. Show shaft diameter and bearing spacing. Submit calculations showing shaft critical frequency and determination of bearing spacings.
- F. Submit catalog pump curves on which the specified operating points are marked. Show efficiency and brake horsepower for the selected pump curve. Show required submergence and NPSH.
- G. Submit manufacturer's sample form for reporting performance test results at least two weeks before the tests. The test form should contain the data presented in the sample form in Section 6 of the ASME PTC 8.2.
- H. Submit manufacturer's certified performance curves for review at least two weeks prior to shipping the units from the factory. Show pump total head, brake horsepower, pump efficiency, required submergence, and required NPSH. Provide copies of the data recorded during the test and methods of data reduction for determining certified test results.
- I. Submit motor data.
- J. Submit manufacturer's installation instructions.
- K. Submit Operations and Maintenance Manual

#### 1.5 *QUALITY ASSURANCE*

- A. All components must be supplied by the same pump manufacturer including bowls, impellers, column, shafting, heads, coupling, sleeves, seals, and motors. The pump manufacturer shall have complete unit responsibility for meeting the requirements of this specification.
- B. Pump manufacturer shall have ISO-9001 certification. As an alternative, provide a letter from the pump manufacturer accepting warranty responsibility for the entire pump, motor, and baseplate unit.
- C. Except as modified or supplemented herein, all submersible pumps shall conform to the applicable requirements of ANSI/AWWA E102 and the Hydraulic Institute Standards.
- D. Welding shall comply with the ASME Boiler and Pressure Vessel code, Section IX. Provide full penetration welds.
- E. All materials and coatings in contact with potable water shall be ANSI/NSF-61 certified and comply with California AB 1953.

**PART 2 PRODUCTS**

**2.1 PUMP BASE**

- A. Work shall be in conformance with Section 03 30 01 - Cast-in-Place Concrete, and with the details shown on the Plans.
- B. Vent piping and fittings shall be constructed as shown on the Plans and in conformance with Section 40 05 00 – Pipe and Fittings.

**2.2 WELL PUMP AND COLUMN PIPE**

- A. Pump shall be of the submersible type including motor and power cable, discharge column, and well cap.
- B. Pump manufacturer shall supply five (5) complete set of shop drawings, pump curves, installation and operating instructions, and parts list with the pump assembly and with compliance with Section 1.3, Submittals. These documents shall become the property of the Owner and shall be delivered to the Owner by Supplier upon completion of pump installation.
- C. Pump shall conform with all local and state sanitary and safety regulations. Pump and motor shall be capable of continuous operation. Pump and motor shall meet the following conditions:

Pump Type	CSA 43W (Raisin City)
	<b>Well 2</b>
	Franklin Electric, Grundfos, Goulds or Engineer approved equal
Maximum Speed (rpm)	<b>3,450</b>
Design Flow (gpm)	<b>200</b>
Design Head (ft)	<b>420</b>
Minimum Bowl Efficiency at Design Capacity	<b>74%</b>
Maximum Motor HP	<b>50</b>



<b>CSA 43W (Raisin City) Secondary Design Conditions</b>		
<b>Flow (gpm)</b>	<b>Total Head (ft)</b>	<b>Minimum Efficiency (%)</b>
<b>140</b>	<b>485</b>	<b>69</b>
<b>175</b>	<b>452</b>	<b>73</b>
<b>240</b>	<b>354</b>	<b>70</b>

- D. The electric motor shall be a 3-phase, 60 Hz, 460 volt, water filled squirrel cage induction type suitable for “across the line” starting, shall be capable of reduced voltage starting. It shall be capable of continuous operation at nameplate rating, submerged underwater, at a maximum water temperature of 86°F (30°C). Its maximum operating horsepower shall not exceed the nameplate horsepower plus the allowable service factor and at no place on the pump curve shall the loading exceed the service factor. The motor mounting dimensions shall comply with NEMA interchangeability standards, where applicable. The motor rotor assembly shall be dynamically balanced. The rotor shall be made of stainless steel..
- E. To protect against motor overheating due to insufficient flow moving past the motor, each well pump shall include a flow inducer sleeve or pump shroud. The flow inducer sleeve shall be made of PVC or stainless steel and shall be fastened to the wet end of the pump and extend all the way down past the end of the motor to ensure water flows past the motor to reduce heat generated by the motor.
- F. Thrust bearing shall be chosen to handle the continuous down thrust as specified by the pump manufacturer with an AFBMA B-10 one year minimum or five-year average life under design conditions. Provisions shall be made for momentary up thrust equal to 30% of rated down thrust.
- G. Interconnector made of closed grained cast iron or stainless steel, shall couple the bowl unit to the motor. The interconnector shall include a bronze sleeve bearing with a length to shaft diameter ratio of at least 3:1 to protect the motor from radial loads. This bearing shall be protected from sand and grit by a labyrinth-type sand slinger. The interconnector shall include a suction screen, which has a net open area at least four times the area of the eye of the impeller. The screen shall be made of corrosion resistant material.

- H. The total length of the discharge column shall be pending until pilot hole investigation has been completed. The column pipe shall be 4-inch. The pipe shall be furnished in interchangeable sections not over 20 feet in length, and shall be connected with threaded, sleeve-type couplings, and shall conform to American Standard tapered pipe thread specification. The joints are to be butted to insure perfect alignment after assembly.
- I. The column check valve shall be expressly designed for submersible pump installation and installed in the column pipe within 20 feet of the pump discharge connection.
- J. The column pipe shall be of ASTM A53 grade B steel pipe or ASTM A120 in interchangeable sections not greater than 20 feet in length, with ends of each section faced parallel and machined with 8 straight threads per inch permitting the ends to butt and ensuring alignment when connected by standard mill steel couplings. The weight on the column pipe shall be no less than that stated in ANSI Specification E102, Section 4.10 "Discharge Pipe."
- K. The power cable shall be sized such that the voltage drop will not exceed 3 percent at the motor rated full load current and voltage. Cables shall be designed specifically for submersible pump service and shall consist of three copper conductors and ground individually insulated and the whole covered with an outer jacket. The length of submersible cable shall be long enough to reach the well head junction box, with an additional 5 feet of spare cable.
- L. Controls shall be mounted in an outdoor (NEMA 3R) cabinet shall include: Hand-off-automatic selector switch, start-stop push button, standard magnetic contactor and three adjustable ambient compensated quick-trip overload relays suitable for submersible pump motor service. Settings for control shall be coordinated with pump supplier.

### 2.3 WELL SEAL

- A. A standard well seal plate designed for submersible installation shall be provided at the top of the pump pedestal as shown on the Plans. The seal plate shall consist of a compressible gasket between two steel plates with at least four bolts to provide compression of the gasket. Well Cap shall rigidly support the total weight of the motor, bowl assembly, column pipe, cable and column of water. The cable outlet shall be designed to prevent entry of foreign matter into the well and shall be equipped with a cable seal.
- B. When the bolts are tightened, the gasket shall be compressed sufficiently to seal against the well casing and around all pipes and cables that pass through the cap.
- C. All un-used openings in the cap shall be sealed to prevent the entry of water.

## 2.4 LEVEL PROBES

- A. Level probes and cables shall be installed to allow stopping of the pump if the well water level reaches a depth of 50 ft above pump bowls and to allow re-start of the pump when water level is at an operational depth.
- B. Level probe cables shall be suitably attached to column pipe per manufacturer's recommendations and shall be of sufficient length to reach the well head junction box with an additional 5 feet of spare cable. Individual conductor and ground shall be suitable marked to ensure correct connection to motor controller.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. An experienced, competent, and authorized representative of the manufacturer shall visit the site of the Work and inspect, check, adjust if necessary, and approve the equipment installation. The representative shall be present when the equipment is placed in operation and shall revisit the job site as often as necessary until all trouble is corrected and the equipment installation and operation are satisfactory in the opinion of ENGINEER.
- B. The manufacturer's representative shall furnish a written report certifying that the equipment has been properly installed and lubricated; is in accurate alignment; is free from any undue stress imposed by connecting piping or anchor bolts; and has been operated under full load conditions and that it operated satisfactorily.
- C. All costs of these services shall be included in the contract price for the number of days and round trips to the site as required.

### 3.2 FIELD QUALITY CONTROL

- A. Bump motor to ensure proper rotational direction before coupling the motor to the pump.
- B. Perform field vibration measurements during normal operation. Vibration levels shall be within HI limits. Repair or replace pumps not meeting the HI vibration limits.
- C. Collect flow and discharge pressure data from at least three different flow rates, including the design flow rate. Compare the data with the factory performance curve and notify the Engineer if the data varies by more than 5%.

### 3.3 DISINFECTION AND TEST OF WELL

- A. After installation of well pumping facilities, well shall be pumped a minimum of 15 minutes. Water shall be discharged and conducted away from the well site to a drainage way through suitable temporary hose.
- B. After flushing, well shall be disinfected as specified in AWWA C 654.

COUNTY OF FRESNO  
CSA 43W RAISIN CITY GROUNDWATER WELL PROJECT

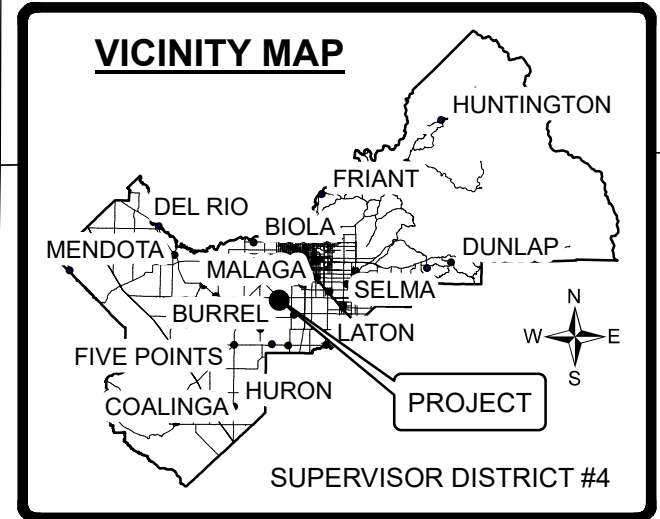
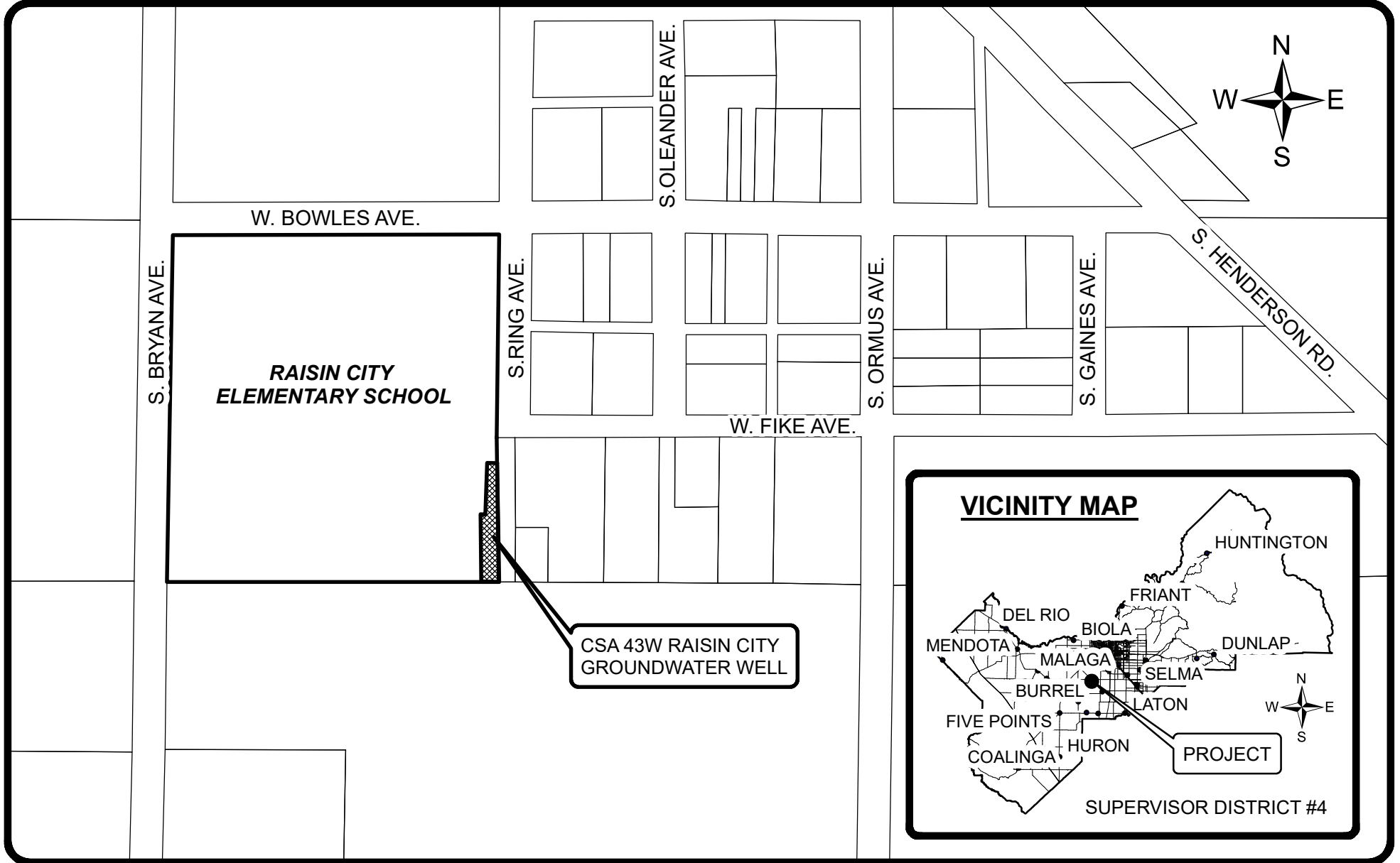
- C. After disinfection and flushing of chlorinated water, the water shall be tested for coliform bacteria as specified in AWWA C 547.

**END OF SECTION**

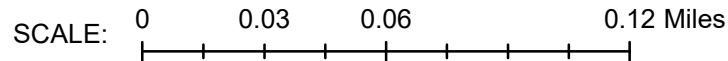
# Project Details

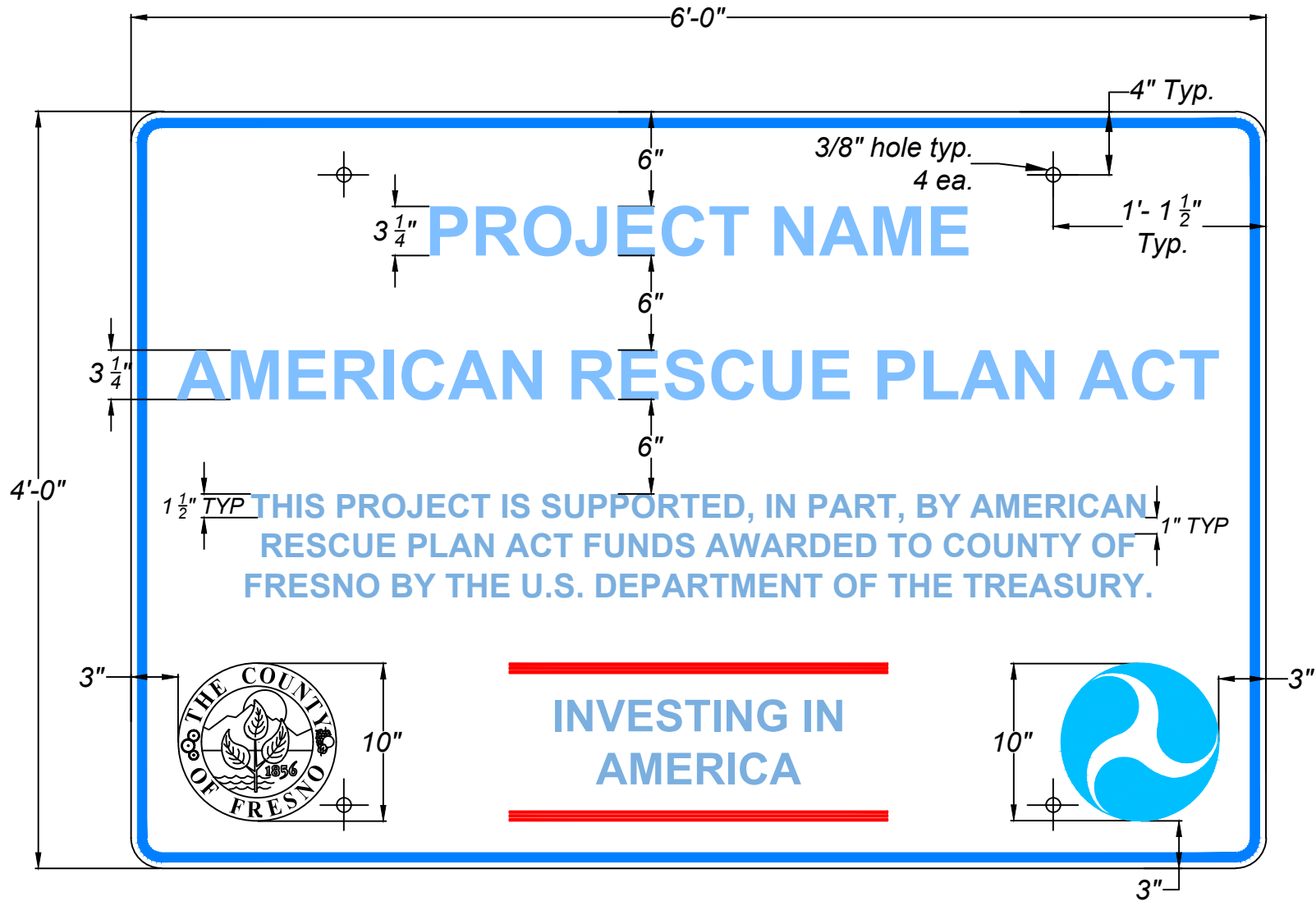
**LOCATION MAP**

**PROJECT  
CSA 43W RAISIN CITY GROUNDWATER WELL**



DEPARTMENT OF PUBLIC WORKS  
AND PLANNING





	DATE:	SCALE: NONE		DEPARTMENT OF PUBLIC WORKS AND PLANNING
DESIGNED: N/A		DRAWING NO. XX		CONSTRUCTION PROJECT FUNDING SIGN
DRAWN: R.O.J.				
CHECKED: S.A.				

**Invoice**  
 County of Fresno  
 Department of Public Works & Planning  
 Mailing Address: 2220 Tulare Street, 6th Floor Fresno, CA 93721  
 24-HR REQUEST LINE: 600-4131 LOCAL: 600-4560  
 TOLL FREE: 800742-1011 FAX: 600-4201



**INVOICE TO:**

INVOICE NO: 312844

INVOICE DATE: August 12, 2024

PERMIT #: Folder 2024 010755 000 00 FC

REFERENCE #:

PROJECT LOCATION: 1 TEST CARUTHERS CA

PROJECT DESCRIPTION: INSTALL NEW WATER PIPING AND ELECTRICAL FOR NEW WELL

<b>FEE DESCRIPTION</b>	<b>AMOUNT</b>	<b>COMMENT</b>
CA Bldg Standards Comm. Fee (SB-1473)	\$1.00	
Wiring Outlets	\$3.40	Qty 2
Workers Comp.	\$7.96	
Call-In, Fax, Email or Internet	\$21.22	
Appliances/Welders/Single Outlets	\$21.48	Qty 1
Circuits (remodel only)	\$25.46	Qty 2
Service/sub-panel 0 - 200 amps	\$30.77	Qty 1
Electrical Permit Issuance	\$40.31	
Plumbing Permit Issuance	\$40.31	
Minimum Electrical Permit fee	\$62.06	
Minimum Plumbing Permit fee	\$62.06	
Motors over 30 HP - 50 HP	\$67.90	Qty 1
Microfilm/Copies	\$92.32	
On Site Water Piping (ft)	\$106.08	Qty 300
Special Service	\$148.50	



**SUMMARY**

ELECTRICAL PERMIT

OTHER

PLUMBING PERMIT

**TOTAL**

**\$730.83**

**\$251.38**

**\$271.00**

**\$208.45**

**TOTAL**

**\$730.83**

**Total Billed:** \$730.83

**Payment Received:** \$0.00

**Balance Due:** **\$730.83**

FORM OF PAYMENT:

\_\_\_\_\_ Check

\_\_\_\_\_ Credit Card

\_\_\_\_\_ Cash

\_\_\_\_\_ DrawDown-Acct#

**Roads Charge-Use Acct#** \_\_\_\_\_

Submitted by: \_\_\_\_\_ Ext: \_\_\_\_\_

# 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).

# BID BOOK

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**CSA 43W RAISIN CITY GROUNDWATER WELL**

**6425 W BOWLES AVE, RAISIN CITY, CA 93652**

**BUDGET / ACCOUNT: 8870 / 8400 / 91762**



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*Department of Public Works and Planning*

**CONTRACT NUMBER 24-14-C**

# BID BOOK TABLE OF CONTENTS

## CSA 43W RAISIN CITY GROUNDWATER WELL CONTRACT NUMBER 24-14-C

PROPOSAL NUMBER(S)	TITLE
NOT APPLICABLE	INSTRUCTIONS FOR COMPLETING THE BID BOOK
1	PROPOSAL TO THE BOARD OF SUPERVISORS OF THE COUNTY OF FRESNO
2	BID ITEM LIST
3	EVALUATION OF BID ITEM LIST
4	BID SECURITY
5	NON-COLLUSION DECLARATION
6	PUBLIC CONTRACT CODE SECTION 10285.1 STATEMENT
7	PUBLIC CONTRACT CODE SECTION 10162 QUESTIONNAIRE AND PUBLIC CONTRACT CODE 10232 STATEMENT
8	SUBCONTRACTORS
9	TITLE 13, CALIFORNIA CODE OF REGULATIONS § 2449(I) GENERAL REQUIREMENTS FOR IN-USE OFF-ROAD DIESEL-FUELED FLEETS
10 - 18	NOT USED
19	GUARANTY

# INSTRUCTIONS FOR COMPLETING THE BID BOOK FOR NON-FEDERAL AID PROJECTS

## General

Complete forms in the Bid book.

Submit an electronic bid online at <http://www.BidExpress.com> or submit a hardcopy bid:

1. Under sealed cover addressed to the Department and labeled with the name of the bidder, contract number, 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 items are identified by title and by the word "Proposal" followed by the number assigned to the proposal item in question. Proposal items are included in the *Bid Book*.

## Proposal to the Board of Supervisors of Fresno County – Proposal 1

Provided for information.

## Bid Item List – Proposal 2

One or more sheet(s) or list(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 for paper bids.

## Evaluation of Bid Item List – Proposal 3

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

## Bid Security and Signature – Proposal 4

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.

Bonding companies may provide their own bid bond forms. The Bid Security and Signature sections must be completed by the bidder and submitted with their bid.

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.

### **Noncollusion Declaration – Proposal 5**

Must be completed, signed, and returned with bid.

### **Public Contract Code Section 10285.1 Statement – Proposal 6**

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

### **Public Contract Code Section 10162 Questionnaire And Public Contract Code 10232 Statement – Proposal 7**

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

### **Subcontractors – Proposal 8**

Sheet(s) or spaces where 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. Contract Code § 4100 et seq.).

The *Subcontractor List* submitted with the bid must show the name, location of business, work portions to be performed, Department of Industrial Relations registration number, 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 item list and/or work descriptions similar to those on bid item list.
- List Department of Industrial Relations number and 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.

### **Title 13, California Code of Regulations § 2449(i) General Requirements for In-Use Off-Road Diesel-Fueled Fleets – Proposal 9**

Contractors, if applicable, must submit valid Certificates of Reported Compliance with their bid. Subcontractor certificates will be due no later than 4:00 PM on the fifth (5<sup>th</sup>) calendar day after the bid opening if not submitted with the bid.

### **Proposal 10 - Proposal 18 – Not Used**

### **Guaranty – Proposal 19**

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 COUNTY OF FRESNO

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hereinafter called the Owner

### **CSA 43W RAISIN CITY GROUNDWATER WELL**

The work embraced herein shall be done in accordance with the 2023 Standard Specifications and with the 2023 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. 11339, entitled: "Raisin City Groundwater Well"

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 they have carefully examined the location of the proposed work, the annexed proposed form of contract, and the plans therein referred to; and they propose and agrees if this proposal is accepted, that they 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 they will take in full payment therefor the following unit prices, to-wit:

# Fresno County Department of Public Works and Planning

## Bid Item List - Proposal 2

Contract #  
24-14-C

Contract Name  
CSA 43W Raisin City Groundwater Well

Location  
6425 W Bowles Ave, Raisin City, CA 93652

**Bid Items**

Item ID	Quantity	Unit	Unit Price	Total
Description				
1	1	LS	\$	\$
Mobilization/Demobilization, Insurance, and Bonds				
2	1	LS	\$	\$
Prepare and Implement WPCP				
3	1	LS	\$	\$
Dust Control				
4	1	LS	\$	\$
Job Site Management				
5	1	LS	\$	\$
Traffic Control				
6	1	LS	\$	\$
Clearing and Grubbing				
7	1	LS	\$	\$
Site Demolition				
8	50	LF	\$	\$
Furnish and Install 30" Diameter Conductor Casing				
9	650	LF	\$	\$
Drill Pilot Hole (to 700 feet total depth)				
10	1	LS	\$	\$
Perform Electric Log and Deviation Log				

Item ID	Quantity	Unit	Unit Price	Total
11	3	EA	\$	\$
Collect Depth Zone Samples				
12	650	LF	\$	\$
Open Pilot Hole to 24" Diameter (to 700 feet total depth)				
13	442	LF	\$	\$
Furnish and Install 12" Diameter Blank Casing				
14	230	LF	\$	\$
Furnish and Install 12" Diameter Perforated Casing				
15	1	LS	\$	\$
Furnish and Install 20-foot Compression Section				
16	397	LF	\$	\$
Furnish and Install 3" Diameter Permanent Gravel Fill Pipe				
17	310	LF	\$	\$
Furnish and Install Gravel Pack				
18	390	LF	\$	\$
Furnish and Install Annular Seal				
19	48	HR	\$	\$
Perform Preliminary Well Development				
20	1	LS	\$	\$
Perform Pump Development and Pump Test (Mob/Demob pump and pump up to 40 hours)				
21	20	HR	\$	\$
Additional Pump Development and Pump Testing Time				
22	1	LS	\$	\$
Perform Video Log				
23	1	LS	\$	\$
Construct Well Pump Foundation				

Item ID	Quantity	Unit	Unit Price	Total
24	1	LS	\$	\$
Furnish and Install Submersible Well Pump and Motor				
25	500	LF	\$	\$
Furnish and Install 4" Diameter Column Pipe				
26	1	LS	\$	\$
Site Grading				
27	1	LS	\$	\$
Site Piping, Valves, and Appurtenances				
28	1	LS	\$	\$
Temporary Chain Link Fence				
29	1	LS	\$	\$
Permanent Chain Link Fence				
30	1	LS	\$	\$
Electrical, Controls, & Lighting				
31	1	LS	\$	\$
Connection to Existing Water System				
32	1	LS	\$	\$
Start-Up and Testing				
33	1	LS	\$	\$
Operations and Maintenance Manuals				
34	1	LS	\$	\$
Record Drawings				
35	25,000	\$	\$1	\$25,000
Supplemental Work Allowance				
Bid Items Total:				\$

## **EVALUATION OF BID PROPOSAL ITEM LIST**

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.

**BID SECURITY AND SIGNATURE**

**Bid Security**

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 (\$ )

**Addenda Acknowledgement**

Bidder has and acknowledges the following addenda: \_\_\_\_\_

**Bidder Signature**

Business Name \_\_\_\_\_

*Note: If bidder or other interested person is a corporation, state legal name of corporation. If bidder is a co-partnership, state true name of firm.*

Business Owners and Officers Names \_\_\_\_\_

*Note: If bidder or other interested person is:*

- a corporation, list names of the president, secretary, treasurer and manager thereof
- a partnership, list names of all individual co-partners composing firm.
- an individual, state first and last name in full.

Names of Owners and Key Employees \_\_\_\_\_

*Note: List majority owners of your firm. If multiple owners, list all. Also include anyone, including key employees, who are actively promoting the contract. (SB1439)*

Licensed in accordance with an act providing for the registration of Contractors:

Class \_\_\_\_\_ Contractor License No. \_\_\_\_\_ Expires \_\_\_\_\_

DIR Registration Number \_\_\_\_\_

Business Address: \_\_\_\_\_

Zip Code

Mailing Address: \_\_\_\_\_

Zip Code

Business Phone: (\_\_\_\_\_) \_\_\_\_\_ Fax Number: (\_\_\_\_\_) \_\_\_\_\_

Email Address \_\_\_\_\_

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 or her 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.

**Proposal 4**

**Contract Number 24-14-C**

To the 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 \_\_\_\_\_, 2024,

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 Declaration is a required part of the Proposal. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

## **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.

**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. 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.**

<p><b>SUBCONTRACTOR:</b> _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount _____ <b>OR</b> Percentage of Total Bid _____</p> <p>Email Address: _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount _____ <b>OR</b> Percentage of Total Bid _____</p> <p>Email Address: _____</p>

**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: \_\_\_\_\_

**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: \_\_\_\_\_

**TITLE 13, CALIFORNIA CODE OF REGULATIONS § 2449(I) GENERAL REQUIREMENTS FOR IN-USE OFF-ROAD DIESEL-FUELED FLEETS**

In conformance with Title 13 § 2449(i), bidders will be required to attach copies of valid Certificates of Reported Compliance for the fleet selected for the contract and their listed subcontractors.

Before May 15th of each year, the prime contractor must collect a new valid Certificate of Reported Compliance for the current compliance year, as defined in section 2449(n), from all fleets that have an ongoing contract with the prime contractor as of March 1 of that year. Prime contractors must not write contracts to evade this requirement. Annual renewals must be provided to the Resident Engineer at least one week prior to the expiration date of the current certificate.

<https://ww2.arb.ca.gov/resources/fact-sheets/fact-sheet-contracting-requirements>

Choose all that apply:

- Bidder’s Certificate of Reported Compliance has been attached to the bid.
- Bidder does not have a fleet subject to this regulation as outlined in Section 2449(i)(1)-(4).
- Listed subcontractors’ certificates have been attached or will be submitted within five (5) calendar days of the bid opening.
- The following subcontractors do not have a fleet subject to this regulation as outlined in Section 2449(i)(1)-(4):

_____	_____
_____	_____
_____	_____
_____	_____

**FAILURE TO PROVIDE THE CERTIFICATES OF REPORTED COMPLIANCE AS DIRECTED MAY RENDER THE BID NON-RESPONSIVE.**

(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 24-14-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: \_\_\_\_\_

# AGREEMENT

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:

**CSA 43W RAISIN CITY GROUNDWATER WELL**

**6425 W BOWLES AVE, RAISIN CITY, CA 93652**

**CONTRACT NUMBER: 24-14-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 or she should make a general assignment for the benefit of his or her creditors, or if a receiver should be appointed on account of his

**Contract Number 24-14-C**

or her insolvency, or if he or she or any of his or her subcontractors should persistently violate any of the provisions of the contract, or if he or she 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 or she 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.** To the fullest extent permitted by law with respect to any work required to be done under this contract, the Contractor will indemnify and hold harmless the COUNTY OF FRESNO, STATE OF CALIFORNIA, 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 ≤ \$10,000,000	\$1,000,000	\$2,000,000	\$2,000,000	\$10,000,000
> \$10,000,000 ≤ \$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, 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. 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, or to [designservices@fresnocountyca.gov](mailto:designservices@fresnocountyca.gov), 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 or 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 Contractor'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.

**ARTICLE X:** EXECUTIVE ORDER N-6-22: Under Executive Order N-6-22 as a contractor, subcontractor, or grantee, compliance with the economic sanctions imposed in response to Russia's actions in Ukraine is required, including with respect to, but not limited to, the federal executive orders identified in the EO and the sanctions identified on the U.S. Department of the Treasury website (<https://ofac.treasury.gov/sanctions-programs-and-country-information/russia-related-sanctions>). Failure to comply may result in the termination of contracts or grants, as applicable. Specially Designated Nationals and Blocked Persons List (SDN) (<https://sanctionslist.ofac.treas.gov/Home/SdnList>).

This Contract, **24-14-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 \_\_\_\_\_, 2024

\_\_\_\_\_  
(CONTRACTOR)

\_\_\_\_\_  
COUNTY OF FRESNO  
(OWNER)

By \_\_\_\_\_

By \_\_\_\_\_  
Nathan Magsig, 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