



City of Sacramento City Council

915 I Street, Sacramento, CA, 95814
www.CityofSacramento.org

Meeting Date: 3/27/2012

Report Type: Consent

Title: Contract Award: Sump 112 Electrical Improvements Project

Report ID: 2012-00274

Location: District 7

Recommendation: Pass a Motion approving the contract plans and specifications for the Sump 112 Electrical Improvements Project, and awarding the contract to JR Sharp Construction, for an amount not to exceed \$155,990.

Contact: Bill Busath, Interim Engineering Manager, (916) 808-1434; Dave Hansen, Supervising Engineer, (916) 808-1421 - Department of Utilities

Presenter: None

Department: Department Of Utilities

Division: Cip Engineering

Dept ID: 14001321

Attachments:

- 1-Description/Analysis
- 2-Background
- 3-Location Map
- 4-Unexecuted Contract with JR Sharp Construction

City Attorney Review

Approved as to Form
 Joe Robinson
 3/20/2012 4:20:00 PM

City Treasurer Review

Reviewed for Impact on Cash and Debt
 Russell Fehr
 3/8/2012 10:57:37 AM

Approvals/Acknowledgements

Department Director or Designee: Dave Brent - 3/20/2012 9:14:04 AM



Description/Analysis

Issue: Sump 112 is a storm drainage pumping station operated by the City of Sacramento that conveys storm water runoff from Basin 112 into Greenhaven Lake. This facility was originally built in 1968. Due to its age the electrical equipment is difficult to maintain and replacement parts are no longer available.

The Sump 112 Electrical Improvements project was advertised and bids were received on February 22, 2012. JR Sharp Construction was the lowest responsive and responsible bidder.

Policy Considerations: This action is in conformance with City Code Chapter 3.60 Articles I and III, which provide that the City Council may award competitively bid contracts to the lowest responsible bidder.

This report's recommendation is consistent with the City's Strategic Plan Goals of enhancing and preserving the neighborhoods and supporting the economic vitality of the area.

Environmental Considerations: The Community Development Department, Environmental Planning Services Division, has reviewed the proposed project and has determined that this project is categorically exempt from CEQA (the California Environmental Quality Act) under Class 1, Section number 15301(b) and (c) and Class 3, Section number 15303(d) of the CEQA Guidelines. Projects exempt under Class 1, Section number 15301(b) and (c) consist of minor alteration or repair of existing utility facilities and sidewalks. Projects exempt under Class 3, Section number 15303(d) consist of installation and location of new, small utility facilities.

Sustainability: The Sump 112 Electrical Improvements project is consistent with the Sustainability Master Plan goals to reduce the use of fossil fuels, improve energy efficiency, and reduce carbon dioxide emissions. Since the new switchgear will require less maintenance this will result in less vehicle miles to maintain, resulting in reduced fossil fuel usage and carbon dioxide emissions.

Commission/Committee Action: None

Rationale for Recommendation: This facility will be outfitted with new electrical switchgear and motor control centers which will improve the operation of the facility. A new control building will be installed to house the new electrical equipment which will help protect the new switchgear. The new improvements will make this facility more reliable requiring less maintenance.

Financial Considerations: The total estimated project cost including design, construction, inspection, and contingency is \$205,302. There is sufficient funding in W14003405 (Drainage Fund 6011) to award the contract in the amount of \$155,990 and complete the project. This action has no impact on the General Fund.

Emerging Small Business Development (ESBD): This project includes a participation goal of 20% for emerging and small business enterprises. JR Sharp Construction exceeded the ESBD goal with a participation level of 100%.



Background

Sump 112 is a storm drainage pump station operated by the City of Sacramento that conveys storm water runoff from Basin 112 into Greenhaven Lake. This facility was originally built in 1968 and is located at 201 Country Place Court; see Attachment 2 – Project Location Map. Due to its age the electrical equipment is difficult to maintain and replacement parts are no longer available.

This facility will be outfitted with new electrical switchgear and motor control centers that will improve the operation of the facility. A new control building will be installed to house the new electrical equipment which will help protect the new switchgear. In addition, provisions will be made to connect the new switchgear to a portable generator in the event of a SMUD power outage, which will ensure that this facility can continue to pump water during a rain event. The new improvements will make the facility more reliable, requiring less maintenance.

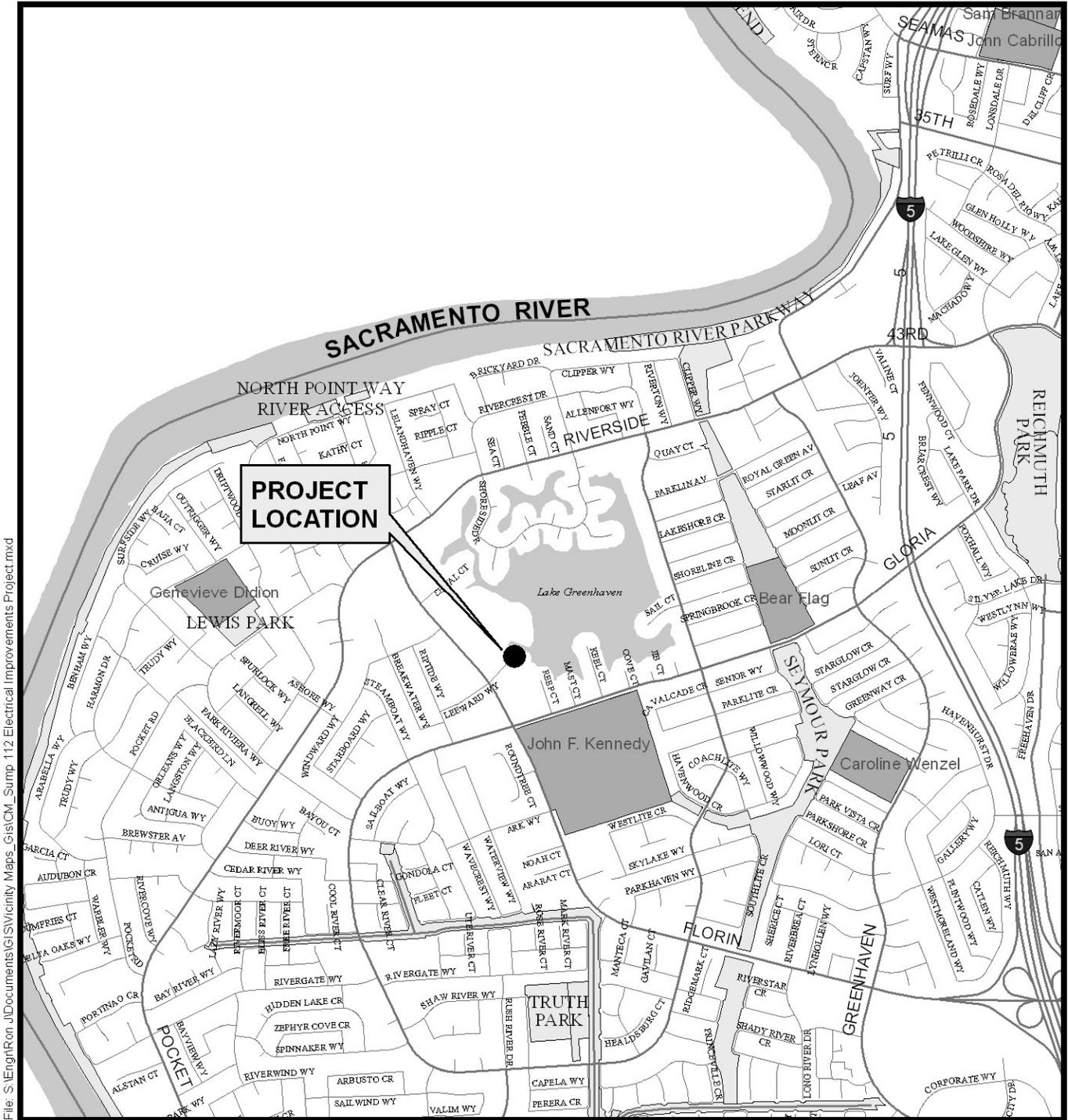
Three (3) bids were received and opened by the City Clerk on February 22, 2012, and are summarized below:

Bidder	Bid Amount
JR Sharp Construction	\$155,990
Gwinn Construction	\$175,556
Ted M. Sirgesse Construction	\$240,000

JR Sharp Construction is the lowest responsible and responsive bidder. The engineer's construction estimate was \$165,000.



Sump 112 Electrical Improvements Project PN: W14003405



File: S:\Eng\Ron J\Documents\GIS\Vicinity Maps_Sump 112 Electrical Improvements Project.mxd



Map Prepared By
City of Sacramento
Department of Utilities





CITY OF SACRAMENTO

DEPARTMENT OF UTILITIES

ENGINEERING SERVICES DIVISION



CONTRACT SPECIFICATIONS FOR SUMP 112 ELECTRICAL IMPROVEMENTS

PN: W14003405
B123331019
Engineer's Estimate: 120,000

Non-Refundable Fee
\$15.00

***Non-Mandatory Pre-Bid Site Walk: Tuesday, February 14, 2012, @ 10:30 AM
Pre-Bid Location: Sump 112, 201 County Place Court, Sacramento, CA 95831***

For Pre-Bid Information Call:

Paul Barnes
Senior Electrical Engineer
(916) 808-1442

Separate Plans

Bid to be received before 2:00 PM
February 22, 2012
Historic City Hall, City Clerk's Office
915 I Street, 1st Floor
Sacramento, CA 95814

ESBE Program Goals

For information on meeting the City of Sacramento's Small Business Enterprise (SBE) and Emerging Business Enterprise (EBE) project goals, please contact Noreen James at (916) 808-5470, or visit the City of Sacramento's small business web site at: http://dev.cityofsacramento.org/econdev/business-open/Sub_small-business-certificaiton.cfm

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CONTRACT FORMS (Only for successful Bidder)

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- Performance Bond
- Payment Bond
-

**EXCERPTS FROM THE CALIFORNIA LABOR CODE RELATING TO APPRENTICES ON
PUBLIC WORKS CHAPTER 1 OF DIVISION 2 ([HTTP://WWW.DIR.CA.GOV/DAS/DAS-10.PDF](http://www.dir.ca.gov/DAS/DAS-10.PDF))**

TAX FORMS (REQUIRED UPON AWARD)

W-9Page 1 of 1

CA Form 590Page 1 of 1

SPECIAL PROVISIONS

ESBD PRE-BID CONFERENCE

The City of Sacramento Code Section 3.60.270 requires all bidding contractors to meet or exceed the City's Emerging and Small Business Development (ESBD) participation goals established for this project in order to qualify as a responsible bidder. Attendance is recommended at the ESBD program meeting within 180 calendar days of the bid opening date.

Effective July 2010, the meetings are scheduled as requested:

For information on meeting the City of Sacramento's Small Business Enterprise (SBE) and Emerging Business Enterprise (EBE) project goals, please contact Noreen James at (916) 808-5470, or visit the City of Sacramento's small business web site at: http://dev.cityofsacramento.org/econdev/business-open/Sub_small-business-certificaiton.cfm

NOTICE TO CONTRACTORS

CITY OF SACRAMENTO

Sealed Proposals will be received by the City Clerk of the City of Sacramento at the Office of the City Clerk, Historic City Hall, located at 915 I Street, 1st Floor, up to the hour of 2:00 p.m. on **February 22, 2012** and opened at 2:00 p.m. **February 22, 2012**, or as soon thereafter as business allows, in the Hearing Room, Historic City Hall, 2nd Floor, for construction of:

SUMP 112 ELECTRICAL IMPROVEMENTS
(PN: W14003405) (B123331019)

as set forth in the Construction Documents.

Proposals received and work performed thereunder shall comply with the requirement of Chapter 3 of the Sacramento City Code. Each Bid Proposal shall be accompanied by bid security of at least 10% of the sum the Bid Proposal. The right to reject proposals or to waive any error or omission in any Bid Proposal received is reserved by the City. Signed proposals shall be submitted on the printed forms contained herein and enclosed in an envelope marked:

SEALED PROPOSAL FOR
SUMP 112 ELECTRICAL IMPROVEMENTS
(PN: W14003405) (B123331019)

Copies of the contract documents are available at:

Signature Reprographics
620 Sunbeam Avenue
Sacramento, CA 95814
(916) 454-0800

A non-refundable fee of \$15.00 will be charged.

Subcontractors shall comply with the rates of wages currently established by the Director of Industrial Relations under provisions of Sections 1773 of the Labor Code of the State of California, a copy of which is on file in the office of the City Clerk. In accordance with the Sacramento City Code Section 3.60.180 and Section 1771.5 of the California Labor Code, the payment of the general prevailing rate of per diem wages or the general prevailing rate of per diem wages for holiday and overtime is not required for any Public Construction project of \$25,000 or less, or Public Maintenance project of \$15,000 or less. The City of Sacramento has an approved Labor Compliance Program. **Electronic Web submittal of Labor Compliance Reports is effective May 1, 2008.** Each contractor and every lower-tier subcontractor is required to submit certified payrolls and labor compliance documentation electronically at the discretion of and in the manner specified by the City of Sacramento.

Electronic submittal will be web-based system, accessed on the World Wide Web by a web browser. Each contractor and subcontractor will be given a Log On identification and password to access the City of Sacramento reporting system.

Use of the system may entail additional data entry of weekly payroll information including; employee identification labor classification, total hours worked and hours worked on this project, wage and benefit rates paid, etc. The contractor's payroll and accounting software might be capable of generating a 'comma delimited file' that will interface with the software.

This requirement will be "flowed down" to every lower-tier subcontractor and vendor required to provide labor compliance documentation.

All questions regarding the Labor Compliance Program should be directed to the Labor Compliance Section at (916) 808-5524.

Pursuant to Sacramento City Code Section 3.60.250, any agreement awarded pursuant to this Invitation to Bid shall contain a provision permitting the substitution of securities for any monies withheld to ensure performance under the Agreement. The terms of such provisions shall be according to the requirements and the form required by the City.

Bid protests must be filed and maintained in accordance with the provisions of Chapter 3.60.460 through 3.60.560 of the Sacramento City Code. Bid protests that do not comply with Chapter 3.60.040 through 3.60.560 of the Sacramento City Code shall be invalid and shall not be considered. A bid protest fee of \$750.00 is required at the time of filing to be considered valid in accordance with City of Sacramento Resolution No. 2003-231 dated April 29, 2003. As used herein, the term "bid protests" includes any bid protest that (1) claims that one or more bidders on this contract should be disqualified or rejected for any reason, or (2) contests a City staff recommendation to award this contract to a particular bidder, or (3) contests a City staff recommendation to disqualify or reject one or more bidders on this contract. A copy of Chapter 3.60.010 of the Sacramento City Code may be obtained from the Project Manager or from the Office of the City Clerk, located at 915 I Street, 1st Floor, Sacramento, CA 95814.

The right to reject any and all bids or to waive any informality in any bid received is reserved by the City Council.

THE FOLLOWING DOCUMENTS
ARE TO BE COMPLETED AND
SUBMITTED WITH THE BID PACKAGE

Contractor's Name: _____
 (Please print)

CITY OF SACRAMENTO

SEALED PROPOSAL

(MUST BE SIGNED BY BIDDER)

The Sealed Proposal will be received not later than **February 22, 2012**, at the Office of the City Clerk, Historic City Hall, at 915 I Street, 1st Floor, Sacramento, California and opened at 2:00 PM, or as soon thereafter as business allows, on **February 22, 2012**, by the Office of the City Clerk, 915 I Street, Historic City Hall, Hearing Room 2nd Floor, Sacramento, California.

TO THE HONORABLE CITY COUNCIL:

The undersigned hereby proposes and agrees to furnish any and all required labor, material, transportation, and services for

SUMP 112 ELECTRICAL IMPROVEMENTS
(PN: W14003405) (B123331019)

in the City and County of Sacramento, California.

TOTAL BID: _____ (\$ _____).

The work herein described is to be performed in strict conformity with the Plans, City of Sacramento Standard Specifications (Resolution No. 89-216) and these Special Provisions, all as on file in the Office of the City Clerk, at the following unit prices.

Item No.	Description	Estimated Quantity	Unit	Total
1	Install New Control Building at Sump 112	1	EA	\$ _____
2	Install new Switchgear and MCC's at Sump 112	1	LS	\$ _____
3	Electrical Improvements at Sump 112	1	LS	\$ _____
4	Relocate the Existing Switchgear at Sump 112	1	LS	\$ _____
5	Install SMUD Improvements at Sump 112	1	LS	\$ _____

TOTAL BID: \$ _____

If awarded the contract, the undersigned shall execute said contract and furnish the necessary bonds within ten (10) days after the notice of award of said contract and begin work within fifteen (15) days after the signing of the contract by the Contractor and the City or the Notice to Proceed has been prepared, whichever is applicable.

In determining the amount bid by each bidder, City shall disregard mathematical errors in addition, subtraction, multiplication and division that appear obvious on the face of the Proposal. When such a mathematical error appears on the Proposal, the City shall have the right to correct such error and to compute the total amount bid by said bidder on the basis of the corrected figure or figures.

When the unit price of an item is required to be set forth in the Proposal, and the total for the item set forth separately does not agree with a figure derived by multiplying the item unit price times the Engineer's estimate of the quantity of work to be performed for said item, the item unit price shall prevail over the sum set forth as the total for the item unless, in the sole discretion of the City, such a procedure would be inconsistent with the policy of the City's bidding procedures. The total paid for each such item of work shall be based upon the item unit price and not the total price.

Should the Proposal contain only a total price for an item and the item unit price is omitted, the City shall determine the item unit price by dividing the total price of the item by the Engineer's estimate of the quantity of work to be performed for the item of work.

If the Proposal contains neither the item price nor the total price for the item, then it shall be deemed incomplete and the Proposal shall be disregarded.

It is understood that this bid is based upon completion of the work within a period of **one hundred ten (110) working days** commencing on the date specified in the Notice to Proceed.

The amount of liquidated damages to be paid by the Contractor for failure to complete the work by the completion date (as extended, if applicable) shall be **five hundred dollars (\$500.00) for each calendar day**, continuing to the time at which the work is completed. Such amount is the actual cash value agreed upon as the loss to the City resulting from the default of the Contractor.

The undersigned represents and warrants that he/she has examined the location of the proposed work and is familiar with the conditions at the place where the work is to be done. The undersigned further represents that he/she has reviewed and understands the Plans, Special Provisions, and other contract documents, and the undersigned is satisfied with all conditions for the performance of the work.

The undersigned has carefully checked all of the above figures and understands that the City of Sacramento will not be responsible for any errors or omissions on the part of the undersigned in making up this bid.

This proposal shall not be withdrawn for the time periods specified in Section 3-2 of the City of Sacramento Standard Specifications for award of contract to respective low bidders. This proposal is submitted in accordance with Chapter 3.60 of the Sacramento City Code and Sections 1, 2, and 3 of the City of Sacramento Standard Specifications.

In accordance with Standard Specification Section 3-2, the City shall award this contract to the lowest responsible bidder, if such award is made, within forty-five (45) working days after opening of the Proposals. The City reserves the right to reject any and all bids.

BID DEPOSIT ENCLOSED IN THE FOLLOWING FORM:

\$ _____ not less than ten (10) percent of amount bid.

- ____ CERTIFIED CHECK
- ____ MONEY ORDER
- ____ CASHIERS'S CHECK
- ____ BID BOND

<u>FOR CITY USE ONLY</u>
TYPE OF DEPOSIT
<input type="checkbox"/> Bid Bond
<input type="checkbox"/> Cashier/Certified Check
<input type="checkbox"/> Other _____
Reviewer's Initials: _____

CONTRACTOR

Addendum No. 1 _____

Addendum No. 2 _____ By: _____
(Signature)

Addendum No. 3 _____ Title: _____

Addendum No. 4 _____ Address: _____
No PO Box – Physical Address ONLY

_____ City STATE ZIP Code

Telephone No. _____

Fax No. _____

Email _____

(Federal Tax ID # or Social Security #)
Under penalty of perjury, I certify that the Taxpayer Identification Number and all other information provided here are correct.

Valid Contractor's License No. _____, Classification _____ is held by the bidder.

Expiration date _____. Representation made herein are true and correct under penalty or perjury

PN: W14003405 (B123331019)

KNOW ALL MEN BY THESE PRESENTS,

That we, _____

as Principal, and _____

a corporation duly organized under the laws of the State of _____ and duly licensed to become sole surety on bonds required or authorized by the State of California, as Surety, are held and firmly bound unto the City of Sacramento, hereinafter called the City, in the penal sum of ten percent (10%) of the (BASE OR LUMP SUM) Proposal of the Principal above named, or other amount as set forth in the Invitation to Bidders, submitted by said Principal to the City for the Work described below, for the payment of which sum in lawful money of the United States, well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH

That whereas the Principal has submitted the above mentioned proposal to the City, for which Proposals are to be opened in the Office of the City Clerk, Historic City Hall, Hearing Room 2nd Floor, 915 I Street, Sacramento, California, on **February 22, 2012**, for the Work specifically described as follows:

SUMP 112 ELECTRICAL IMPROVEMENTS
(PN: W14003405) (B123331019)

NOW, THEREFORE, if the aforesaid Principal is award the Agreement and within the time and manner required under the Contract Documents, enters into a written Agreement, in the prescribed form, in accordance with the Proposal, and files two (2) bonds with the City, one to guarantee faithful performance and the other to guarantee payment for labor and materials, and files the required insurance policies with the City, all as required by the Contract Documents or by law, then the obligation shall be null and void; otherwise it shall be and remain in full force and effect.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the Surety shall pay all costs incurred by the Obligee in such suit, including a reasonable attorney's fee to be fixed by the court, which sums shall be additional to the principal amount of this bond.

IN WITNESS THEREOF, We have hereunto set our hands and seal this _____ day of _____, 2012.

PRINCIPAL Seal

By: _____

Title

SURETY Seal

By _____

Title

Agent Name and Address

Agent Phone #

Surety Phone #

California License #

DRUG-FREE WORKPLACE POLICY AND AFFIDAVIT

BID MAY BE DECLARED NONRESPONSIVE IF THIS FORM (COMPLETED) IS NOT ATTACHED.
Pursuant to City Council Resolution CC90-498 dated 6/26/90 the following is required.

The undersigned contractor certifies that it and all subcontractors performing under this contract will provide a drug-free workplace by:

1. Publishing a "Drug-Free Workplace" statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Establishing a Drug-Free Awareness Program to inform employees about:
 - a. The dangers of drug abuse in the workplace.
 - b. The contractor's policy of maintaining a drug-free workplace.
 - c. Any available drug counseling, rehabilitation, and employee assistance program.
 - d. The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.
3. Notify employees that as a condition of employment under this contract, employees will be expected to:
 - a. Abide by the terms of the statement.
 - b. Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace.
4. Making it a requirement that each employee to be engaged in the performance of the contract be given a copy on the "Drug-Free Workplace" statement.
5. Taking one of the following appropriate actions, within thirty (30) days of receiving notice from an employee or otherwise receiving such notice, that said employee has received a drug conviction for a violation occurring in the workplace:
 - a. Taking appropriate disciplinary action against such an employee, up to and including termination; or
 - b. Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement or other appropriate agency.

* I certify that no person employed by this company, corporation, or business has been convicted of any criminal drug statute violation on any job site or project where this company, corporation, or business was performing work within three years of the date of my signature below.

EXCEPTION:

Date	Violation Type	Place of Occurrence
If additional space is required use back of this form.		

*The above statement will also be incorporated as a part of each subcontract agreement for any and all subcontractors selected for performance on this project.

IN THE EVENT THIS COMPANY, CORPORATION, OR BUSINESS IS AWARDED THIS CONSTRUCTION CONTRACT, AS A RESULT OF THIS BID; THE CONTRACTOR WITH HIS/HER SIGNATURE REPRESENTS TO THE CITY THAT THE INFORMATION DISCLOSED IN THIS DOCUMENT IS COMPLETE AND ACCURATE. IT IS UNDERSTOOD AND AGREED THAT FALSE CERTIFICATION IS SUBJECT TO IMMEDIATE TERMINATION BY THE CITY.

The Representations Made Herein On This Document Are Made Under Penalty Of Perjury.

CONTRACTOR'S NAME: _____

BY: _____ Date: _____
Signature Title

Effects of violations: a. Suspension of payments under this contract. b. Suspension or termination of the contract. c. Suspension or debarment of the contractor from receiving any contract from the City of Sacramento for a period not to exceed five years.
FM 681 7/10/9

MINIMUM QUALIFICATIONS QUESTIONNAIRE

Sacramento City Code Section 3.60.020 authorizes the Sacramento City Council to adopt standard minimum qualifications for bidders on competitively bid public works construction projects, and requires, among other provisions, that a bidder meet such minimum qualifications at the time of bid opening in order to bid. On July 31, 2007, the City Council adopted Resolution No. 2007-574 establishing these standard minimum qualifications. Pursuant to City Code section 3.60.020, a bidder failing to meet these minimum qualifications at the time of bid opening shall not be considered a responsible bidder for purposes of bidding on the subject project.

All bidders must demonstrate compliance with the minimum qualifications established by Resolution No. 2007-574 by completing all of the questions contained in this questionnaire. Bidder responses shall be limited to those operating business units, offices, branches and/or subsidiary divisions of the bidder that will be involved with the performance of any project work if awarded the contract. If a bidder answers "yes" to any single question, fails to submit a fully completed questionnaire, or submits false information, this will result in a determination that the minimum qualifications are not met, and the bidder shall not be considered a qualified bidder for purposes of bidding on this contract. If two or more entities submit a bid on a contract as a Joint Venture, each entity within the Joint Venture must separately meet these minimum qualifications for the Joint Venture to be considered a qualified bidder.

The City of Sacramento ("City") shall make its determination on the basis of the submitted questionnaire, as well as any relevant information that is obtained from others or as a result of investigation by the City. While it is the intent of this questionnaire to assist the City in determining whether bidders possess the minimum qualifications necessary to submit bids on the City's competitively bid public works construction contracts, the fact that a bidder submits a questionnaire demonstrating that it meets these minimum qualifications shall not in any way limit or affect the City's ability to: (1) review other information contained in the bid submitted by the bidder, and additional relevant information, and determine whether the contractor is a responsive and/or responsible bidder; or (2) establish pre-qualification requirements for a specific contract or contracts.

By submitting this questionnaire, the bidder consents to the disclosure of its questionnaire answers: (i) to third parties for purposes of verification and investigation; (ii) in connection with any protest, challenge or appeal of any action taken by the City; and (iii) as required by any law or regulation, including without limitation the California Public Records Act (Calif. Gov't Code sections 6250 et seq.). Each questionnaire must be signed under penalty of perjury in the manner designated at the end of the form, by an individual who has the legal authority to bind the bidder submitting the questionnaire. If any information provided by a bidder becomes inaccurate, the bidder shall immediately notify the City and provide updated accurate information in writing, under penalty of perjury.

QUESTIONNAIRE

NOTICE: For firms that maintain other operating business units, offices, branches and/or subsidiary divisions that will not be involved with the performance of any project work if the firm is awarded the contract, references hereafter to "your firm" shall mean only those operating business units, offices, branches and/or subsidiary divisions that will be involved with the performance of any project work.

All of the following questions regarding "your firm" refer to the firm (corporation, partnership or sole proprietor) submitting this questionnaire, as well as any firm(s) with which any of your firm's owners, officers, or partners are or have been associated as an owner, officer, partner or similar position within the last five years

The firm submitting this questionnaire shall not be considered a responsible bidder if the answer to any of these questions is "yes", or if the firm submits a questionnaire that is not fully completed or contains false information.

1. **Classification & Expiration Date(s) of California Contractor's License Number(s) held by firm:**

2. Has a contractor's license held by your firm and/or any owner, officer or partner of your firm been revoked at anytime in the last five years?
 Yes No
3. Within the last five years, has a surety firm completed a contract on your firm's behalf, or paid for completion of a contract to which your firm was a party, because your firm was considered to be in default or was terminated for cause by the project owner?
 Yes No
4. At the time of submitting this minimum qualifications questionnaire, is your firm ineligible to bid on or be awarded a public works contract, or perform as a subcontractor on a public works contract, pursuant to either California Labor Code section 1777.1 (prevailing wage violations) or Labor Code section 1777.7 (apprenticeship violations)?
 Yes No
5. At any time during the last five years, has your firm, or any of its owners, officers or partners been convicted of a crime involving the awarding of a contract for a government construction project, or the bidding or performance of a government contract?
 Yes No

6. Answer either subsection A or B, as applicable:

A. Your firm has completed three or more government construction contracts in Sacramento County within the last five years: Within those five years, has your firm been assessed liquidated damages on three or more government construction contracts in Sacramento County for failure to complete contract work on time?

NOTE: If there is a pending administrative or court action challenging the assessment of liquidated damages on a government contract within the last five years, you need not include that contract in responding to this question.

Yes No Not applicable

OR

B. Your firm has not completed at least three government construction contracts in Sacramento County within the last five years: Within the last three years, has your firm been assessed liquidated damages on three or more government construction contracts for failure to complete contract work on time?

NOTE: If there is a pending administrative or court action challenging an assessment of liquidated damages on a government contract within the last three years, you need not include that contract in responding to this question.

Yes No Not applicable

7. In the last three years has your firm been debarred from bidding on, or completing, any government agency or public works construction contract for any reason?

NOTE: If there is a pending administrative or court action challenging a debarment, you need not include that debarment in responding to this question.

Yes No

8. Has CAL OSHA assessed a total of three or more penalties against your firm for any "serious" or "willful" violation occurring on construction projects performed in Sacramento County at any time within the last three years?

NOTE: If there is a pending administrative or court action appealing a penalty assessment, you need not include that penalty assessment in responding to this question.

Yes No

9. Answer either subsection A or B, as preferred:

A. In the last three years has your firm had a three year average Workers' Compensation experience modification rate exceeding 1.1?

Yes No

OR

B. In the last three years has your firm had a three-year average incident rate for total lost workday cases exceeding 10?

NOTE: Incident rates represent the number of lost workday cases per 100 full-time workers and is to be calculated as: $(N/EH) \times 200,000$, where

N = number of lost workday cases (as defined by the U.S. Dept. of Labor, Bureau of Labor Statistics)
EH = total hours worked by all employees during the calendar year
200,000 = base for 100 equivalent full-time working (working 40 hours per week, 50 weeks per year)

Yes No

10. In the past three years, has the federal EPA, Region IX or a California Air Quality Management District or Regional Water Quality Control Board assessed penalties three or more times, either against your firm, or against the project owner for a violation resulting in whole or in part from any action or omission by your firm on a project on which your firm was a contractor in Sacramento County?

NOTE: If there is a pending administrative or court action appealing a penalty assessment, you need not include that penalty assessment in responding to this question.

Yes No

11. In the past three years, has the federal EPA, Region IX or a California Air Quality Management District or Regional Water Quality Control Board assessed a single penalty of \$100,000 or more, either against your firm, or against the project owner for a violation resulting in whole or in part from any action or omission by your firm on a project on which your firm was the contractor in Sacramento County?

NOTE: If there is a pending administrative or court action appealing a penalty assessment, you need not include that penalty assessment in responding to this question.

Yes No

12. In the past three years, have civil penalties been assessed against your firm pursuant to California Labor Code 1777.7 for violation of California public works apprenticeship requirements, three or more times?

NOTE: If there is a pending administrative or court action appealing a penalty assessment, you need not include that penalty assessment in responding to this question.

Yes No

13. In the past three years, has a public agency in California withheld contract payments or assessed penalties against your firm for violation of public works prevailing wage requirements, three or more times?

NOTE: If there is a pending administrative or court action appealing a withholding or penalty assessment, you need not include that withholding or penalty assessment in responding to this question.

Yes No

14. Has your firm been assessed penalties for violation of public works prevailing wage requirements in California, in an aggregate amount for the past three years of \$50,000 or more?

NOTE: If there is a pending administrative or court action appealing a penalty assessment, you need not include that penalty assessment in responding to this question.

Yes No

VERIFICATION AND SIGNATURE

I, the undersigned, certify and declare that I have read all the foregoing answers to this Minimum Qualifications Questionnaire, and know their contents. The matters stated in these Questionnaire answers are true of my own knowledge and belief, except as to those matters stated on information and belief, and as to those matters I believe them to be true. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Signed at _____, on _____.
(Location) (Date)

Signature: _____

Print name: _____

Title: _____

NOTE: If two or more entities submit a bid on a contract as a Joint Venture, each entity within the Joint Venture must submit a separate Minimum Qualifications Questionnaire.

REQUIREMENTS OF THE NON-DISCRIMINATION IN EMPLOYEE BENEFITS CODE

INTRODUCTION

The Sacramento Non-Discrimination In Employee Benefits Code (the "Ordinance"), codified as Sacramento City Code Chapter 3.54, prohibits City contractors from discriminating in the provision of employee benefits between employees with spouses and employees with domestic partners, and between the spouses and domestic partners of employees.

APPLICATION

The provisions of the Ordinance apply to any contract or agreement (as defined below), between a Contractor and the City of Sacramento, in an amount exceeding \$25,000.00. The Ordinance applies to that portion of a contractor's operations that occur: (i) within the City of Sacramento; (ii) on real property outside the City of Sacramento if the property is owned by the City or if the City has a right to occupy the property; or (iii) at any location where a significant amount of work related to a City contract is being performed.

The Ordinance does not apply: to subcontractors or subcontracts of any Contractor or contractors; to transactions entered into pursuant to cooperative purchasing agreements approved by the Sacramento City Council; to legal contracts of other governmental jurisdictions or public agencies without separate competitive bidding by the City; where the requirements of the ordinance will violate or are inconsistent with the terms or conditions of a grant, subvention or agreement with a public agency or the instructions of an authorized representative of any such agency with respect to any such grant, subvention or agreement; to permits for excavation or street construction; or to agreements for the use of City right-of-way where a contracting utility has the power of eminent domain.

DEFINITIONS

As set forth in the Ordinance, the following definitions apply:

"Contract" means an agreement for public works or improvements to be performed, or for goods or services to be purchased or grants to be provided, at the expense of the City or to be paid out of moneys deposited in the treasury or out of the trust money under the control or collected by the City. "Contract" also means a written agreement for the exclusive use ("exclusive use" means the right to use or occupy real property to the exclusion of others, other than the right reserved by the fee owner) or occupancy of real property for a term exceeding 29 days in any calendar year, whether by singular or cumulative instrument, (i) for the operation or use by others of real property owned or controlled by the City for the operation of a business, social, or other establishment or organization, including leases, concessions, franchises and easements, or (ii) for the City's use or occupancy of real property owned by others, including leases, concessions, franchises and easements.

"Contract" shall not include: a revocable at-will use or encroachment permit for the use of or encroachment on City property regardless of the ultimate duration of such permit; excavation, street construction or street use permits; agreements for the use of City right-of-way where a contracting utility has the power of eminent domain; or agreements governing the use of City property that constitute a public forum for activities that are primarily for the purpose of espousing or advocating causes or ideas and that are generally protected by the First Amendment to the United States Constitution or that are primarily recreational in nature.

"Contractor" means any person or persons, firm partnership or corporation, company, or combination thereof, that enters into a Contract with the City. "Contractor" does not include a public entity.

"Domestic Partner" means any person who has a currently registered domestic partnership with a governmental entity pursuant to state or local law authorizing the registration.

"Employee Benefits" means bereavement leave; disability, life, and other types of insurance; family medical leave; health benefits; membership or membership discounts; moving expenses; pension and retirement benefits; vacation; travel benefits; and any other benefit given to employees. "Employee benefits" shall not include benefits to the extent that the application of the requirements of this chapter to such benefits may be preempted by federal or state.

CONTRACTOR'S OBLIGATION TO PROVIDE THE CITY WITH DOCUMENTATION AND INFORMATION

Contractor shall provide the City with documentation and information verifying its compliance with the requirements of the Ordinance within ten (10) days of receipt of a request from the City. Contractors shall keep accurate payroll records, showing, for each City Contract, the employee's name, address, Social Security number, work classification, straight time pay rate, overtime pay rate, overtime hours worked, status and exemptions, and benefits for each day and pay period that the employee works on the City Contract. Each request for payroll records shall be accompanied by an affidavit to be completed and returned by the Contractor, as stated, attesting that the information contained in the payroll records is true and correct, and that the Contractor has complied with the requirements of the Ordinance. A violation of the Ordinance or noncompliance with the requirements of the Ordinance shall constitute a breach of contract.

EMPLOYER COMPLIANCE CERTIFICATE AND NOTICE REQUIREMENTS

- (a) All contractors seeking a Contract subject to the Ordinance shall submit a completed Declaration of Compliance Form (attachment "A"), signed by an authorized representative, with each proposal, bid or application. The Declaration of Compliance shall be made a part of the executed contract, and will be made available for public inspection and copying during regular business hours.
- (b) The Contractor shall give each existing employee working directing on a City contract, and (at the time of hire), each new employee, a copy of the notification provided as attachment "B."
- (c) Contractor shall post, in a place visible to all employees, a copy of the notice provided as attachment "C."

**DECLARATION OF COMPLIANCE
Equal Benefits Ordinance**

Name of Contractor

Address

The above named contractor ("Contractor") hereby declares and agrees as follows:

1. I have read and understand the Requirements of the Non-Discrimination In Employee Benefits Code (the "Requirements") provided to me by the City of Sacramento ("City") in connection with the City's request for proposals or other solicitations for the performance of services, or for the provision of commodities, under a City contract or agreement ("Contract").
2. As a condition of receiving the City Contract, I agree to fully comply with the Requirements, as well as any additional requirements that may be specified in the City's Non-Discrimination in Employee Benefits Code codified at Chapter 3.54 of the Sacramento City Code (the "Ordinance").
3. I understand, to the extent that such benefits are not preempted or prohibited by federal or state law, employee benefits covered by the Ordinance, are any of the following:
 - a. Bereavement Leave
 - b. Disability, life, and other types of insurance
 - c. Family medical leave
 - d. Health benefits
 - e. Membership or membership discounts
 - f. Moving expenses
 - g. Pension and retirement benefits
 - h. Vacation
 - i. Travel benefits
 - j. Any other benefit offered to employees

I agree that should I offer any of the above listed employee benefits, that I will offer those benefits, without discrimination between employees with spouses and employees with domestic partners, and without discrimination between the spouses and domestic partners of such employees.

4. I understand that I will not be considered to be discriminating in the provision or application of employee benefits under the following conditions or circumstances:
 - a. In the event that the actual cost of providing a benefit to a domestic partner or spouse, exceeds the cost of providing the same benefit to a spouse or domestic partner of an employee, I will not be required to provide the benefit, nor shall it be deemed discriminatory, if I require the employee to pay the monetary difference in order to provide the benefit to the domestic partner or to the spouse.
 - b. In the event I am unable to provide a certain benefit, despite taking reasonable measures to do so, if I provide the employee with a cash equivalent, I will not be deemed to be discriminating in the application of that benefit.
 - c. If I provide employee benefits neither to employee's spouses nor to employee's domestic partners.
 - d. If I provide employee benefits to employees on a basis unrelated to marital or domestic partner status.
 - e. If I submit, to the Program Coordinator, written evidence of making reasonable efforts to end discrimination in employee benefits by implementing policies which are to be enacted before the

first effective date after the first open enrollment process following the date the Contract is executed with the City.

I understand that any delay in the implementation of such policies may not exceed one (1) year from the date the Contract is executed with the City, and applies only to those employee benefits for which an open enrollment process is applicable.

- f. Until administrative steps can be taken to incorporate, in the infrastructure, nondiscrimination in employee benefits

The time allotted for these administrative steps will apply only to those employee benefits for which administrative steps are necessary and may not exceed three (3) months from the date the Contract is executed with the City.

- g. Until the expiration of a current collective bargaining agreement(s) where, in fact, employee benefits are governed by a collective bargaining agreement(s).
- h. I take all reasonable measures to end discrimination in employee benefits by either requesting the union(s) involved agree to reopen the agreement(s) in order for me to take whatever steps are necessary to end discrimination in employee benefits or by my ending discrimination in employee benefits without reopening the collective bargaining agreement(s).
- i. In the event I cannot end discrimination in employee benefits despite taking all reasonable measures to do so, I provide a cash equivalent to eligible employees for whom employee benefits (as listed previously), are not available.

Unless otherwise authorized in writing by the City Manager, I understand this cash equivalent must begin at the time the union(s) refuse to allow the collective bargaining agreement(s) to be reopened or no longer than three (3) months from the date the Contract is executed with the City.

- 5. I understand that failure to comply with the provisions of Section 4. (a) through 4. (i), above, will subject me to possible suspension and/or termination of this Contract for cause; repayment of any or all of the Contract amount disbursed by the City; debarment for future contracts until all penalties and restitution have been paid in full; deemed ineligible for future contracts for up to two (2) years; the imposition of a penalty, payable to the City, in the sum of \$50.00 for each employee, for each calendar day during which the employee was discriminated against in violation of the provisions of the Ordinance.
- 6. I understand and do hereby agree to provide each current employee and, within ten (10) days of hire, each new employee, of their rights under the Ordinance. I further agree to maintain a copy of each such letter provided, in an appropriate file for possible inspection by an authorized representative of the City. I also agree to prominently display a poster informing each employee of these rights.
- 7. I understand that I have the right to request an exemption to the benefit provisions of the Ordinance when such a request is submitted to the Procurement Services Division, in writing with sufficient justification for resolution, prior to contract award.

I further understand that the City may request a waiver or exemption to the provisions or requirements of the Ordinance, when only one contractor is available to enter into a contract or agreement to occupy and use City property on terms and conditions established by the City; when sole source conditions exist for goods, services, public project or improvements and related construction services; when there are no responsive bidders to the Ordinance requirements and the contract is for essential goods or services; when emergency conditions with public health and safety implications exist; or when the contract is for specialized legal services if in the best interest of the City.

8. In consideration of the foregoing, I shall defend, indemnify and hold harmless, the City, its officers and employees, against any claims, actions, damages, costs (including reasonable attorney fees), or other liabilities of any kind arising from any violation of the Requirements or of the Ordinance by me.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that I am authorized to bind the Contractor to the provisions of this Declaration.

Signature of Authorized Representative

Date

Print Name

Title



YOUR RIGHTS UNDER THE CITY OF SACRAMENTO'S
NON-DISCRIMINATION IN EMPLOYEE BENEFITS BY CITY CONTRACTORS ORDINANCE

On (date), your employer (the "Employer") entered into a contract with the City of Sacramento (the "City") for (contract details), and as a condition of that contract, agreed to abide by the requirements of the City's Non-Discrimination In Employee Benefits By City Contractors Ordinance (Sacramento City Code Section 3.54).

The Ordinance does not require the Employer to provide employee benefits. The Ordinance does require that if certain employee benefits are provided by the Employer, that those benefits be provided without discrimination between employees with spouses and employees with domestic partners, and without discrimination between the spouse or domestic partner of employees.

The Ordinance covers any employee working on the specific contract referenced above, but only for the period of time while those employees are actually working on this specific contract.

The included employee benefits are:

- Bereavement leave
- Disability, life and other types of insurance
- Family medical leave
- Health benefits
- Membership or membership discounts
- Moving expenses
- Pension and retirement benefits
- Vacation
- Travel benefits
- Any other benefits given to employees

(Employee Benefits does not include benefits that may be preempted by federal or state law.)

If you feel you have been discriminated or retaliated against by your employer in the terms and conditions of your application for employment, or in your employment, or in the application of these employee benefits, because of your status as an applicant or as an employee protected by the Ordinance, or because you reported a violation of the Ordinance, and after having exhausted all remedies with your employer,

You May . . .

- Submit a written complaint to the City of Sacramento, Contract Services Unit, containing the details of the alleged violation. The address is:

City of Sacramento
Contract Services Unit
915 I St., 2nd Floor
Sacramento, CA 95814

- Bring an action in the appropriate division of the Superior Court of the State of California against the Employer and obtain the following remedies:
 - Reinstatement, injunctive relief, compensatory damages and punitive damages
 - Reasonable attorney's fees and costs



YOUR RIGHTS UNDER THE CITY OF SACRAMENTO'S
NON-DISCRIMINATION IN EMPLOYEE BENEFITS BY CITY CONTRACTORS ORDINANCE

If your employer provides employee benefits, they must be provided to those employees working on a City of Sacramento contract without discriminating between employees with spouses and employees with domestic partners.

The included employee benefits are:

- Bereavement leave
- Disability, life and other types of insurance
- Family medical leave
- Health benefits
- Membership or membership discounts
- Moving expenses
- Pension and retirement benefits
- Vacation
- Travel benefits
- Any other benefits given to employees

If you feel you have been discriminated against by your employer . . .

You May . . .

- o Submit a written complaint to the City of Sacramento, Contract Services Unit, containing the details of the alleged violation. The address is:

City of Sacramento
Contract Services Unit
915 I St., 2nd Floor
Sacramento, CA 95814
- o Bring an action in the appropriate division of the Superior Court of the State of California against the employer and obtain reinstatement, injunctive relief, compensatory damages, punitive damages and reasonable attorney's fees and costs.

Discrimination and Retaliation Prohibited.

If you feel you have been discriminated or retaliated against by your employer in the terms and conditions of your application for employment, or in your employment, because of your status as an applicant or as an employee protected by the Ordinance, or because you reported a violation of this Ordinance . . .

You May Also . . .

Submit a written complaint to the City of Sacramento, Contract Services Unit, at the same address, containing the details of the alleged violation.

Guidelines for City of Sacramento Boycott of Arizona and Arizona-Headquartered Businesses

Sacramento City Council Resolution No. 2010-346 calls for a boycott of the State of Arizona and businesses headquartered in Arizona. The boycott provisions prohibit employee travel to Arizona at City expense, and restrict the purchase of goods and services with Arizona headquartered businesses.

Resolution No. 2010-346 provides that “where **practicable** and where there is no **significant** additional cost to the City, the City of Sacramento shall not enter into any new, amended, extended or supplemental contracts to purchase or procure goods or services from any business or entity that is **headquartered** in Arizona ...”

The guidelines below are provided to city staff for implementing the Resolution.

• Definitions

- **Headquartered:** State in which a company is headquartered. This may be different than the state of incorporation, where subsidiaries are located. You may determine a company headquarters from the declaration provided in a solicitation response or by calling the company directly.
- **Practicable:** The proposed or existing vendor can be replaced without interruption to services and/or supplies, and the replacement of the vendor does not adversely affect the Sacramento economy. For example, excluding a company headquartered in Arizona, but with a Sacramento-area office would not be practicable, as it would adversely affect the local economy. The cost of transition should not be significant.
- **Significant:** Costs that exceed the following percentages or dollar thresholds:
 - o For contracts valued \$250k and less – the lesser of 10% or \$25k
 - o For contracts valued between \$250k and \$1m – the lesser of 10% or \$100k
 - o For contracts valued between \$1m and 10m – the lesser of 8% or \$100k
 - o For contracts valued at \$10m and more – the lesser of 6% or 100k
- **Related companies, subcontractors:** The policy applies only to the company with which the City enters into a contract.

• Exceptions Checklist

If the lowest bidder is headquartered in Arizona, in order to have a valid exception to the boycott Resolution, you must be able to answer yes to **at least** one of the following questions:

- Is the difference between the low bid and the second low bid “significant”? (see definitions) OR if the vendor has a current contract and we evaluating a renewal, is there a significant cost to switch vendors?
- Does the lowest bidder have a local office in Sacramento, providing benefit to the local economy, if awarded the contract?
- Is the vendor the sole-source for this particular service/commodity?
- Is the contract award or extension in the “best interest of the City” for reasons not listed above?

City of Sacramento Boycott of Arizona-Headquartered Businesses

On June 15, 2010, the Sacramento City Council adopted Resolution No. 2010-346 opposing two Arizona laws (SB 1070 and HB 2162) that will allow Arizona police to arrest individuals suspected of being unlawfully present in the United States and to charge immigrants with a state crime for not carrying immigration documents. Sacramento City Council Resolution No. 2010-346 also called for a boycott of the State of Arizona and businesses headquartered in Arizona until Arizona repeals or a court nullifies SB 1070 and HB 1262. Resolution No. 2010-346 provides, in pertinent part, that "where practicable and where there is no significant additional cost to the City, the City of Sacramento shall not enter into any new, amended, extended or supplemental contracts to purchase or procure goods or services from any business or entity that is headquartered in Arizona ..."

Pursuant to the provisions of Resolution No. 2010-346, the City may determine that a bid from a business or entity that is headquartered in Arizona is nonresponsive and the City may reject the bid on that basis.

Bidders that are headquartered in the United States shall certify in the space below the state where the bidder is headquartered:

State Where Firm is Headquartered

Signature of Authorized Representative

Date

Print Name

Title

This Page to be completed and submitted with bid proposal

ESBE REQUIREMENTS
(City Contracts no Federal Funds Used)

I. ESBE PARTICIPATION REQUIREMENT

On February 9, 1999, the Sacramento City Council adopted an Emerging and Small Business Development (ESBD) program to provide enhanced opportunities for the participation of small business enterprises (SBEs) and emerging business enterprises (EBEs) in the City's contracting and procurement activities. The ESBD program establishes an annual emerging and small business enterprise (ESBE) participation goal for the City's contracts, and authorizes City departments to require minimum ESBE participation levels in individual contracts so that the annual ESBE participation goal can be met. Under City Code section 3.60.270, when the bid specifications for a City contract establishes a minimum participation level for ESBEs, no bidder on the contract shall be considered a responsive bidder unless its bid meets the minimum ESBE participation level required by the bid specifications.

The City has established a **minimum 20% participation level for ESBEs on this contract**. Pursuant to City code Section 3.60.270, no bidder on this contract shall be considered a responsive bidder unless its bid meets or exceeds this minimum participation level.

Bidders shall include copies of their Certification as a SBE or EBE and the SBE or EBE Certifications for each subcontractor, trucker, material supplier, or other business entity listed on the forms submitted within two (2) working days of submitting the sealed proposal. Failure to submit the required ESBE information will be grounds for finding the bid non-responsive.

II. ESBE CERTIFICATION

- A. A SBE designated in the bid must be certified as such by the State of California, Department of General Services, or by the City, as defined herein, prior to the time bids are received.
- B. An EBE designated in the bid must be certified as such by the City, as defined herein, prior to the time bids are received.

III. DETERMINATION OF ESBE PARTICIPATION LEVEL

- A. The percent of ESBE participation shall be determined based on the dollar value of the work to be performed or supplies to be furnished by certified ESBEs designated in the bidder's Subcontractor and ESBE Participation Verification Form, relative to the total dollar amount of the bid.
- B. To receive credit for participation, an ESBE must perform a commercially useful function; i.e., must be responsible for the execution of a distinct element of the work and must carry its responsibility by actually performing, managing, or supervising the work.

- C. ESBE Bidders: The dollar value listed for an ESBE bidder on the bidder's Subcontractor and ESBE Participation Verification Form shall include only the amount of work to be performed by the ESBE bidder, and shall not include any amount to be paid by the ESBE bidder for the cost of materials or supplies.
- D. Suppliers: Credit for an ESBE vendor of materials or supplies is counted as one hundred (100) percent of the amount paid to the vendor for the material or supplies. To receive this credit, ESBE vendors of supplies and materials must be listed on the bidder's Subcontractor and ESBE Participation Verification Form.
- E. Truckers: Credit for an ESBE trucker is counted as one hundred (100) percent of the amount paid to the trucker for trucking services, not including any amount paid to the trucker for the cost of any materials or supplies being transported by the trucker.
- F. Subcontractors (including truckers): To receive credit for an ESBE subcontractor, the subcontractor must be listed on the bidder's Subcontractor and ESBE Participation Verification Form. The dollar value listed for a subcontractor on the bidder's Subcontractor and ESBE Participation Verification Form shall not include any amount to be paid to the subcontractor for the cost of materials or supplies.

IV. ESBE REQUIREMENTS FOR CONTRACTOR

- A. ESBE Records: The Contractor shall maintain records of all subcontracts with certified ESBE subcontractors and records of materials purchased from certified ESBE vendors/suppliers for one (1) year after receiving final payment from the City. Such records shall show the name and business address of each ESBE subcontractor or vendor/supplier and the total dollar amount actually paid each ESBE subcontractor or vendor/supplier.

Upon completion of the contract, a summary of these records shall be prepared, certified correct by the Contractor's authorized representative and furnished to the City. The Contractor shall provide such other information, records, reports, certifications or other documents as may be required by City, to determine compliance with any provision of the ESBD program or these specifications.

- B. Reporting Requirements and Sanctions: Failure to provide specific information, records, reports, certifications, or any other documents required for compliance with these specifications shall be considered noncompliance with the contract. If the Contractor fails to correct a deficiency within fifteen (15) days after notification, a deduction may be made from the contract amount. The deduction shall be ten (10) percent of the estimated value of the work performed during the month, not to be less than \$1,000 nor exceed \$10,000 and shall be deducted from the next progress payment.
- C. Performance of ESBE Subcontractors and Suppliers: The ESBEs listed by the Contractor shall perform the work and supply the materials for which they are listed unless the Contractor has received prior written authorization from the City to perform the work with other forces or to obtain the material from other sources. Reasons for requesting such authorization would include:

1. The listed ESBE fails to execute a written contract based upon the general terms, conditions, plans, and specifications for the project.
2. The listed ESBE becomes bankrupt or insolvent.
3. The listed ESBE subcontractor fails to meet the bond requirements of the Contractor.
4. The work performed by the listed ESBE subcontractor is unsatisfactory and/or is not in accordance with the plans and specifications, or the subcontractor fails to perform his/her obligations under the subcontractor contract.
5. It would be in the best interest of the City.

The Contractor shall not be entitled to any payment for such work or materials unless it is performed or supplied by the listed SBE or EBE or other forces (including those of the Contractor) authorized by the City in writing.

- D. Subcontractor Substitution: No substitution of an ESBE subcontractor shall be made at any time without compliance with the Subcontracting Listing Law and the written consent of the City. If an ESBE subcontractor is unable to perform successfully and is to be replaced, the Contractor will be required to make good faith efforts to replace the original ESBE subcontractor with another certified ESBE subcontractor. The new ESBE subcontractor must be certified at the time of substitution.

V. DEFINITIONS

- A. **Emerging Business Enterprise (EBE)**: The City shall certify EBEs utilizing the small business certification criteria and standards of the State of California, General Services Department, Office of Small Business Certification and Resources, that were in effect on December 1, 1998, provided that the size standard, industry by industry, shall be set at 50% of the State small business certification criteria and standards that were in effect on December 1, 1998.
- B. **Small Business Enterprise (SBE)**: The City shall certify SBEs utilizing the small business certification criteria and standards of the State of California, General Services Department, Office of Small Business Certification and Resources. The City will also accept State certified SBEs.
- C. **Contractor**: The individual, partnership, corporation, joint venture or other legal entity entering into a contract with the City of Sacramento.
- D. **Subcontractor**: The individual, partnership, corporation, or other legal entity entering into a contract with the prime contractor to perform a portion of the work.

FOLLOWING FORMS TO BE FILLED OUT AND SIGNED

ONLY

IF AWARDED CONTRACT

WORKER'S COMPENSATION INSURANCE CERTIFICATION

TO THE CITY OF SACRAMENTO:

The undersigned does hereby certify that he is aware of the provisions of Section 3700 et seq. of the Labor Code which require every employer to be insured against liability for worker's compensation claims or to undertake self-insurance in accordance with the provisions of said Code, and that he/she will comply with such provisions before commencing the performance of the work on this contract.

Bidder

BY: _____

Title: _____

Address: _____

Date: _____

PLEASE READ CAREFULLY BEFORE SIGNING

To be signed by authorized corporate officer or partner or individual submitting the bid. If bidder is: (example)

1. An individual using a firm name, sign: "John Doe, and individual doing business as Blank Company".
2. An individual doing business under his own name, sign: Your name only.
3. A co-partnership, sign: "John Doe and Richard Doe, co-partners doing business as Blank Company, by, John Doe, Co-Partner".
4. A corporation, sign: "Blank Company, by John Doe, Secretary". (Or other title)

AGREEMENT
(Construction Contract Over \$25,000)

THIS AGREEMENT, dated for identification _____, 2012, is made and entered into between the CITY OF SACRAMENTO, a municipal corporation ("City"), and

("Contractor").

The City and Contractor hereby mutually agree as follows:

1. CONTRACT DOCUMENTS

The Contract Documents, sometimes also referred to as the "Contract," consist of the following items, which are hereby incorporated by reference as if set forth in full in this Agreement:

The Notice to Contractors

The Proposal Form submitted by the Contractor

The Instructions to Bidders

The Emerging and Small Business Enterprise (ESBE) Requirements

The Requirements for the Non-Discrimination in Employee Benefits by City Contractors Ordinance and the Declaration of Compliance

The City's Reference Guide for Construction Contracts

The Addenda, if any

This Agreement

The Standard Specifications

The Special Provisions

The Plans and Technical Specifications

The drawings and other data and all developments thereof prepared by City pursuant to the Contract

Any modifications of any of the foregoing made or approved by City, including but not limited to duly authorized change orders.

Unless specifically noted otherwise, references to the "Standard Specifications" shall mean and refer to the Standard Specifications for Public Construction of the City of Sacramento approved by the Sacramento City Council on June 4, 2007 (Resolution No. 2007-350), and any subsequent amendments thereto approved by the Sacramento City Council or the Sacramento City Manager. Work called for in any one Contract Document and not mentioned in another is to be performed and executed as if mentioned in all Contract Documents. The table of contents, titles and headings contained in the Contract Documents are provided solely to facilitate reference to various provisions of the Contract Documents and in no way affect or limit the interpretation of the provisions to which they refer.

2. DEFINITIONS

Unless otherwise specifically provided herein, all words and phrases defined in the Standard Specifications shall have the same meaning and intent in this Agreement.

3. AGREEMENT CONTROLS

In the event of a conflict between any of the terms and conditions set forth in this Agreement and the terms and conditions set forth in other Contract Documents, the terms 37 of 232

and conditions set forth in this Agreement shall prevail, except that the provisions of any duly authorized change order shall prevail over any conflicting provisions of this Agreement.

4. SCOPE OF CONTRACT

Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, material and transportation necessary to perform and complete in a good and workmanlike manner to the satisfaction of City, all the Work called for in the Contract Documents entitled:

SUMP 112 ELECTRICAL IMPROVEMENTS (PN:W14003405)

including the Work called for in the following alternative bid items described in the Proposal Form:

Contractor agrees to perform such Work in the manner designated in and in strict conformity with the Contract Documents.

5. CONTRACT AMOUNT AND PAYMENTS

City agrees to pay and Contractor agrees to accept, as complete payment for the above Work, in accordance with the schedule and procedures set forth in the Contract Documents and subject to deductions, withholdings and additions as specified in the Contract Documents, a total sum that shall not exceed the total bid amount set forth in Contractor's Proposal Form. In addition, subject to deductions, withholdings and additions as specified in the Contract Documents, payment for individual items of the Work shall be computed as follows:

(A) For items of the Work for which a lump sum price is specified in Contractor's Proposal Form, Contractor shall be paid the lump sum price(s) specified in Contractor's Proposal Form; and

(B) For items of the Work for which a unit price is specified in Contractor's Proposal Form, Contractor shall be paid the sum computed at such unit price, or computed at a different price if such different price is determined by City in accordance with the Standard Specifications, based on the actual amount of each such item performed and/or furnished and incorporated in the Work; provided that in no event shall the total sum for a unit price item exceed the total bid amount set forth for such item in the Contractor's Proposal Form, unless authorized by Change Order.

6. PROGRESS PAYMENTS

Subject to the terms and conditions of the Contract, City shall cause payments to be made upon demand of Contractor as follows:

(A) On or about the first of the month, the Engineer shall present to the Contractor a statement showing the amount of labor and materials incorporated in the Work through the twentieth (20) calendar day of the preceding month. After both Contractor and Engineer approve the statement in writing, and the City's labor compliance officer provides written approval, the City shall issue a certificate for ninety (90) percent of the

amount it shall find to be due, subject to any deductions or withholdings authorized or required under the Contract or any applicable Laws or Regulations.

(B) No inaccuracy or error in said monthly estimates shall operate to release Contractor from damages arising from such Work or from enforcement of each and every provision of the Contract Documents, and City shall have the right subsequently to correct any error made in any estimate for payment.

(C) Contractor shall not be paid for any defective or improper Work.

(D) The remaining ten (10) percent of the value of the Work performed under the Contract, if unencumbered and subject to any deductions or withholdings authorized or required under the Contract or any applicable Laws or Regulations, shall be due and payable beginning thirty-five (35) days after completion and final acceptance of the Work by City; provided that the City may determine, in its sole discretion, to release up to fifty (50) % of such retention, in whole or in part, at any time. Acceptance by Contractor of the final payment shall constitute a waiver of all claims against the City arising under the Contract Documents, except for disputed claims in stated amounts that the Contractor specifically reserves in writing, but only to the extent that the Contractor has complied with all procedures and requirements applicable to the presentation and processing of such claim(s) under the Contract Documents. Contractor shall be entitled to substitute securities for retention or to direct that payments of retention be made into escrow, as provided in Public Contract Code Section 22300, upon execution of the City's Escrow Agreement for Security Deposits in Lieu of Retention.

(E) The parties agree that, for purposes of the timely progress payment requirements specified in Public Contract Code Section 20104.50, the date that the City receives a statement jointly approved by the Contractor and the Engineer as provided above shall be deemed to constitute the date that City receives an undisputed and properly submitted payment request from the Contractor. Progress payments not made within 30 days after this date may be subject to payment of interest as provided in Section 20104.50.

7. RETENTION OF SUMS CHARGED AGAINST CONTRACTOR

When, under the provisions of this Contract or any applicable Laws or Regulations, City is authorized or required to withhold, deduct or charge any sum of money against Contractor, City may deduct and retain the amount of such charge from the amount of the next succeeding progress estimate(s), or from any other moneys due or that may become due Contractor from City. If, on completion or termination of the Contract, sums due Contractor are insufficient to pay City's charges, City shall have the right to recover the balance from Contractor or its Sureties.

8. COMMENCEMENT AND PROSECUTION OF WORK

Contractor shall commence the Work not later than fifteen (15) working days after the date of the written Notice to Proceed from City to Contractor and shall diligently prosecute the Work to final completion. The phrase "commence the Work" means to engage in a continuous program on-site including, but not limited to, site clearance, grading, dredging, land filling and the fabrications, erection, or installation of the Work. The Notice to Proceed shall be issued within fifteen (15) calendar days following execution of the Agreement by the City and the filing by Contractor of the required Bonds and proof of insurance, provided that the Engineer may delay issuance of the Notice to Proceed if the Engineer determines in the Engineer's sole discretion that conditions on the site of the

Work are unsuitable for commencement of the Work. After the Notice to Proceed is issued, the continuous prosecution of Work by Contractor shall be subject only to Excusable Delays as defined in this Agreement.

9. TIME OF COMPLETION

The entire Work shall be brought to completion in the manner provided for in the Contract Documents on or before **one hundred ten (110) working days** from the date of the Notice to Proceed (hereinafter called the "Completion Date") unless extensions of time are granted in accordance with the Contract Documents.

Failure to complete the entire Work by the Completion Date and in the manner provided for in the Contract Documents shall subject Contractor to liquidated damages as provided in this Agreement. Time is and shall be of the essence in the performance of the Contract and the Work.

10. PAYMENTS DO NOT IMPLY ACCEPTANCE OF WORK

The payment of any progress payment, or the acceptance thereof by Contractor, shall not constitute acceptance of the Work or any portion thereof and shall in no way reduce the liability of Contractor to replace unsatisfactory work or material, whether or not the unsatisfactory character of such work or material was apparent or detected at the time such payment was made.

11. ACCEPTANCE NOT RELEASE

Contractor shall correct immediately any defective or imperfect work or materials that may be discovered before final acceptance of the entire Work, whether or not such defect or imperfection was previously noticed or identified by the City. The inspection of the Work, or any part thereof, shall not relieve Contractor of any of its obligations to perform satisfactory work as herein specified.

Failure or neglect on the part of City or any of its officers, employees or authorized agents to discover, identify, condemn or reject defective or imperfect work or materials shall not be construed to imply an acceptance of such work or materials, if such defect or imperfection becomes evident at any time prior to final acceptance of the entire Work, nor shall such failure or neglect be construed as barring City from enforcing Contractor's warranty(ies) or otherwise recovering damages or such a sum of money as may be required to repair or rebuild the defective or imperfect work or materials whenever City may discover the same, subject only to any statutes of limitation that may apply to any such claim.

12. CITY'S RIGHT TO TAKE POSSESSION OF THE WORK IN WHOLE OR IN PART

The City shall have the right at any time to enter upon the Work and perform work not covered by this Contract, or to occupy and use a portion of the Work, prior to the date of the final acceptance of the Work as a whole, without in any way relieving Contractor of any obligations under this Contract.

13. NO WAIVER OF REMEDIES

Neither the inspection by City, its officers, employees or agents, nor any certificate or other approval for the payment of money, nor any payment for, nor acceptance of the

whole or any part of the Work by City, nor any extensions of time, nor any position taken by City, its officers, employees or its agents shall operate as a waiver of any provision of the Contract Documents nor of any power herein reserved to City or any right to damages herein provided, nor shall any waiver of any breach of this Agreement be held to be a waiver of any other or subsequent breach. All remedies provided in the Contract Documents shall be taken and construed as cumulative; in addition to each and every other remedy herein provided, the City shall have any and all equitable and legal remedies that it would in any case have.

14. WARRANTY

Except as otherwise expressly provided in the Contract Documents, and excepting only items of routine maintenance, ordinary wear and tear and unusual abuse or neglect by City, Contractor warrants and guarantees all Work executed and all supplies, materials and devices of whatsoever nature incorporated in or attached to the Work, or otherwise provided as a part of the Work pursuant to the Contract, to be absolutely free of all defects of workmanship and materials for a period of one year after final acceptance of the entire Work by the City. Contractor shall repair or replace all work or material, together with any other work or material that may be displaced or damaged in so doing, that may prove defective in workmanship or material within this one year warranty period without expense or charge of any nature whatsoever to City.

In the event that Contractor shall fail to comply with the conditions of the foregoing warranty within ten (10) days after being notified of the defect in writing, City shall have the right, but shall not be obligated, to repair, or obtain the repair of, the defect and Contractor shall pay to City on demand all costs and expense of such repair. Notwithstanding anything herein to the contrary, in the event that any defect in workmanship or material covered by the foregoing warranty results in a condition that constitutes an immediate hazard to public health or safety, or any property interest, or any person, City shall have the right to immediately repair, or cause to be repaired, such defect, and Contractor shall pay to City on demand all costs and expense of such repair. The foregoing statement relating to hazards to health, safety or property shall be deemed to include both temporary and permanent repairs that may be required as determined in the sole discretion and judgment of City.

In addition to the above, the Contractor shall make a written assignment of all manufacturer's and other product warranties to the City, prior to completion and final acceptance of the Work by City.

The Contractor's Performance Bond shall secure the performance of the Contractor's obligations under this Section 14, and the Contractor and its Surety shall be jointly and severally liable for these obligations.

15. LIQUIDATED DAMAGES IF WORK NOT COMPLETED ON TIME

(A) The actual fact of the occurrence of damages and the actual amount of the damages that City would suffer if the entire Work, and/or any specified portion thereof, were not completed within the time(s) specified herein are dependent upon many circumstances and conditions that could prevail in various combinations, and for this reason, it is impracticable and extremely difficult to fix the actual damages. Damages that City would suffer in the event of such delay include: loss of the use of the project;

expenses of prolonged assignment to the project of an architectural and/or engineering staff; prolonged costs of administration, inspection, and supervision; increased operational expenses and/or impaired operation of other facilities dependent upon completion of the project; and the loss and inconvenience suffered by the public within the City of Sacramento by reason of the delay in the completion of the project or portion thereof. Accordingly, the parties agree, and by execution of this Agreement, Contractor acknowledges that it understands and agrees, that the amount(s) set forth herein as liquidated damages reflect the parties' best efforts at the time of entering into the Contract to estimate the damages that may be incurred by City and the public due to the Contractor's delay in completion of the Work and/or any specified portion thereof, and shall be presumed to be the amount of damages sustained by the failure of Contractor to complete the entire Work and/or any specified portion thereof within the time(s) specified herein.

(B) Contractor shall pay liquidated damages to City for failure to complete the entire Work by the Completion Date (as extended in accordance with the Contract Documents, if applicable) in the amount of **five hundred dollars (\$500.00) for each calendar day** after the Completion Date (as extended in accordance with the Contract Documents, if applicable), continuing to the time at which the entire Work is completed. Such amount is the actual cash value agreed upon by the City and Contractor as the loss to City and the public resulting from Contractor's default.

The parties agree, and by execution of this Agreement, Contractor acknowledges that it understands and agrees, that the foregoing provisions provide for the imposition of liquidated damages from the Completion Date (as extended in accordance with the Contract Documents, if applicable) until the date of completion of the entire Work as determined by the Engineer in accordance with Section 8-4 of the Standard Specifications, whether or not the Work or any portion thereof is claimed or determined to be substantially complete prior to such date of completion.

(C) In the event Contractor shall become liable for liquidated damages, City, in addition to all other remedies provided by law, shall have the right to withhold any and all payments that otherwise would be or become due Contractor until the liability of Contractor under this section is finally determined. City shall have the right to use and apply such payments, in whole or in part, to reimburse City for all liquidated damages due or to become due to City. Any remaining balance of such payments shall be paid to Contractor only after discharge in full of all liability incurred by Contractor under this section or otherwise under any provision of the Contract Documents or any applicable Law or Regulation. If the sum so retained by City is not sufficient to discharge all such liabilities of Contractor, Contractor shall continue to remain liable to City until all such liabilities are satisfied in full. No failure by City to withhold any payment as specified above shall in any manner be construed to constitute a release of any such liabilities nor a waiver of the City's right to withhold payment for such liabilities.

16. INDEMNITY AND HOLD HARMLESS

(A) Contractor shall defend, hold harmless and indemnify the City, its officers, employees, and agents, and each and every one of them, from and against any and all actions, damages, costs, liabilities, claims, demands, losses, judgments, penalties, costs and expenses of every type and description, whether arising on or off the site of the Work, including, but not limited to, any fees and/or costs reasonably incurred by City's staff attorneys or outside attorneys and any fees and expenses incurred in enforcing this provision (hereafter collectively referred to as "Liabilities"), including but not limited to^{42 of 232}

Liabilities arising from personal injury or death, damage to personal, real or intellectual property or the environment, contractual or other economic damages, or regulatory penalties, arising out of or in any way connected with performance of or failure to perform the Work by the Contractor, any subcontractor or agent, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, whether or not (i) such Liabilities are caused in part by a party indemnified hereunder, or (ii) such Liabilities are litigated, settled or reduced to judgment; provided that the foregoing indemnity does not apply to liability for damages for death or bodily injury to persons, injury to property, or other loss, damage or expense to the extent arising from (i) the sole negligence or willful misconduct of, or defects in design furnished by, City, its agents, servants, or independent contractors who are directly responsible to City, or (ii) the active negligence of City.

(B) The existence or acceptance by City of any of the insurance policies or coverages described in this Agreement shall not affect or limit any of City's rights under this Section 16, nor shall the limits of such insurance limit the liability of Contractor hereunder. The provisions of this Section 16 shall survive any expiration or termination of the Contract.

17. CONTRACTOR SHALL ASSUME RISKS

Until the completion and final acceptance by City of all Work under this Contract, the Work shall be under Contractor's responsible care and charge, and Contractor, at no cost to City, shall rebuild, repair, restore and make good all injuries, damages, re-erections, and repairs occasioned or rendered necessary by accidental causes of any nature, to all or any portions of the Work.

18. GENERAL LIABILITY OF CONTRACTOR

Except as otherwise herein expressly stipulated, Contractor shall perform all the Work and furnish all the labor, materials, tools, equipment, apparatus, facilities, transportation, power and light, and appliances, necessary or proper for performing and completing the Work herein required in the manner and within the time herein specified. The mention of any specific duty or liability of Contractor shall not be construed as a limitation or restriction of any general liability or duty of Contractor, and any reference to any specific duty or liability shall be construed to be solely for the purpose of explanation.

19. INSURANCE

During the entire term of this Contract and until completion and final acceptance of the Work as provided in the Contract Documents, Contractor shall maintain in full force and effect the insurance coverage described in this section.

Full compensation for all premiums that Contractor is required to pay for the insurance coverage described herein shall be included in the compensation specified for performance of the Work under the Contract. No additional compensation will be provided for Contractor's insurance premiums.

It is understood and agreed by the Contractor that its liability to the City shall not in any way be limited to or affected by the amount of insurance coverage required of or carried by the Contractor.

(A) Minimum Scope and Limits of Insurance Coverage

(1) Commercial General Liability Insurance, providing coverage at least as broad as ISO CGL Form 00 01 on an occurrence basis for bodily injury, including death, of one or more persons, property damage and personal injury, with limits of not less than one million dollars (\$1,000,000) per occurrence. The policy shall provide contractual liability and products and completed operations coverage for the term of the policy.

(2) Automobile Liability Insurance providing coverage at least as broad as ISO Form CA 00 01 on an occurrence basis for bodily injury, including death, of one or more persons, property damage and personal injury, with limits of not less than one million dollars (\$1,000,000) per occurrence. The policy shall provide coverage for owned, non-owned and/or hired autos as appropriate to the operations of the Contractor.

(3) Workers' Compensation Insurance with statutory limits, and Employers' Liability Insurance with limits of not less than one million dollars (\$1,000,000). The Worker's Compensation policy shall include a waiver of subrogation.

(B) Additional Insured Coverage

(1) Commercial General Liability Insurance: The City, its officials, employees and volunteers shall be covered by policy terms or endorsement as additional insureds as respects general liability arising out of activities performed by or on behalf of Contractor, products and completed operations of Contractor, and premises owned, leased or used by Contractor. The general liability additional insured endorsement must be signed by an authorized representative of the insurance carrier.

If the policy includes a blanket additional insured endorsement or contractual additional insured coverage, the above signature requirement may be fulfilled by submitting that document with a signed declaration page referencing the blanket endorsement or policy form.

(2) Automobile Liability Insurance: The City, its officials, employees and volunteers shall be covered by policy terms or endorsement as additional insureds as respects auto liability.

(C) Other Insurance Provisions

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

(1) Contractor's insurance coverage shall be primary insurance as respects City, its officials, employees and volunteers. Any insurance or self-insurance maintained by City, its officials, employees or volunteers shall be in excess of Contractor's insurance and shall not contribute with it.

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

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

(4) City will be provided with thirty (30) days written notice of cancellation or material change in the policy language or terms.

(D) Acceptability of Insurance

Insurance shall be placed with insurers with a Bests' rating of not less than A:V. Self-insured retentions, policy terms or other variations that do not comply with the requirements of this Section 19 must be declared to and approved by the City Risk Management Division in writing prior to execution of this Agreement.

(E) Verification of Coverage

(1) Contractor shall furnish City with certificates and required endorsements evidencing the insurance required. The certificates and endorsements shall be forwarded to the City representative designated by City. Copies of policies shall be delivered to the City on demand. Certificates of insurance shall be signed by an authorized representative of the insurance carrier.

(2) The City may withdraw its offer of contract or cancel the Contract if the certificates of insurance and endorsements required have not been provided prior to execution of this Agreement. The City may withhold payments to Contractor and/or cancel the Contract if the insurance is canceled or Contractor otherwise ceases to be insured as required herein.

(F) Subcontractors

Contractor shall require and verify that all subcontractors maintain insurance coverage that meets the minimum scope and limits of insurance coverage specified in subsection A, above.

20. FAILURE TO MAINTAIN BONDS OR INSURANCE

If, at any time during the performance of this Contract, Contractor fails to maintain any item of the bonds and/or insurance required under the Contract in full force and effect, Contractor shall immediately suspend all work under the Contract and notify City in writing of such failure. After such notice is provided, or if City discovers such failure and notifies Contractor, the City thereafter may withhold all Contract payments due or that become due until notice is received by City that such bonds and/or insurance have been restored in full force and effect and that the premiums therefor have been paid for a period satisfactory to the Division of Risk Management. Contractor shall not resume work until notified by City to do so, and the City shall have no responsibility or liability for any costs incurred by Contractor as a result of such suspension of Work.

In addition to the foregoing, any failure to maintain any item of the required bonds and/or insurance at any time during the performance of this Contract will be sufficient cause for termination of the Contract by City.

The Contractor shall be solely responsible for, and shall defend, indemnify and hold harmless the City, its officers, employees and agents against and from, any and all damages, claims, losses, actions, costs or other expenses of any kind incurred by any party as a direct or indirect result of any suspension of Work or termination of the Contract under the provisions of this Section.

21. EXCUSABLE DELAYS

For the purpose of these Contract Documents, the term "Excusable Delay" shall mean, and is limited to, delay caused directly by: acts of God; acts of a public enemy; fires; inclement weather as determined by the Engineer; riots; insurrections; epidemics; quarantine restrictions; strikes; lockouts; sitdowns; acts of a governmental agency; priorities or privileges established for the manufacture, assemble, or allotment of materials necessary in the Work by order, decree or otherwise of the United States or by any department, bureau, commission, committee, agent, or administrator of any legally constituted public authority; changes in the Work ordered by City insofar as they necessarily require additional time in which to complete the Work; the prevention of Contractor from commencing or prosecuting the Work because of the acts of others, excepting Contractor's subcontractors or suppliers; or the prevention of Contractor from commencing or prosecuting the Work because of a Citywide failure of public utility service.

The term "Excusable Delay" shall specifically not include: (i) any delay that could have been avoided by the exercise of care, prudence, foresight and diligence on the part of Contractor; (ii) any delay in the prosecution of any part of the Work that does not constitute a Controlling Operation, whether or not such delay is unavoidable; (iii) any reasonable delay resulting from time required by City for review of any Contractor submittals and for the making of surveys, measurements and inspection; and, (iv) any delay arising from an interruption in the prosecution of the Work on account of reasonable interference by other Contractors employed by City that does not necessarily prevent the completion of the entire Work within the time specified. Excusable Delays, if any, shall operate only to extend the Completion Date (not in excess of the period of such delay as determined by City) and shall not under any circumstances increase the amount City is required to pay Contractor except as otherwise provided in these Contract Documents.

22. CONTRACTOR TO SERVE NOTICE OF DELAYS

Whenever Contractor foresees any delay in the prosecution of the Work, and in any event as soon as possible (not to exceed a period of ten (10) calendar days) after the initial occurrence of any delay that Contractor regards as or may later claim to be an Excusable Delay, the Contractor shall notify the Engineer in writing of such delay and its cause, in order that the Engineer: (i) may take immediate steps to prevent if possible the occurrence or continuance of the delay; or (ii) if this cannot be done, may determine whether the delay is to be considered excusable, how long it continues, and to what extent the prosecution and completion of the Work are delayed thereby. Said written notice shall constitute an application for an extension of time only if the notice requests such an extension and sets forth the Contractor's estimate of the additional time required together with a full description of the cause of the delay relied upon.

After the completion of any part or whole of the Work, the Engineer, in estimating the amount due Contractor, will assume that any and all delays that may have occurred in its prosecution and completion were not Excusable Delays, except for such delays for which the Contractor has provided timely written notice as required herein, and that the

Engineer has found to be excusable. Contractor shall not be entitled to claim Excusable Delay for any delay for which the Contractor failed to provide such timely written notice.

23. EXTENSION OF TIME

If the Contractor complies with Section 22, above, and the Engineer finds a delay claimed by the Contractor to be an Excusable Delay, the Contractor shall be allowed an extension of time to complete the Work that is proportional to the period of Excusable Delay determined by the Engineer, subject to the approval by City of a change order granting such time extension. During a duly authorized extension for an Excusable Delay, City shall not charge liquidated damages against the Contractor for such delay.

If the City extends the time to complete the Work as provided herein, such extension shall in no way release any warranty or guarantee given by Contractor pursuant to the provisions of the Contract Documents, nor shall such extension of time relieve or release the sureties of the Bonds provided pursuant to the Contract Documents. By executing such Bonds, the Sureties shall be deemed to have expressly agreed to any such extension of time. The granting of any extension of time as provided herein shall in no way operate as a waiver on the part of City of its rights under this Contract, excepting only extension of the Completion Date for such period of Excusable Delay as may be determined by the Engineer and approved by a duly authorized change order.

24. NO PAYMENT FOR DELAYS

No damages or compensation of any kind shall be paid to Contractor or any subcontractor because of delays in the progress of the Work whether or not such delays qualify for extension of time under this Agreement; except that this provision shall not preclude the recovery of damages for a delay caused by the City that is unreasonable under the circumstances and that is not within the contemplation of the parties, provided that the Contractor timely submits all such written notice(s) and fully complies with such other procedures as may be specified in the Contract Documents or any Laws or Regulations for Contractor to claim damages for such delay.

25. CHANGES IN THE WORK

Changes in the Work authorized or directed in accordance with the Contract Documents and extensions of time of completion made necessary by reason thereof shall not in any way release any warranty or guarantee given by Contractor pursuant to the provisions of the Contract Documents, nor shall such changes in the Work relieve or release the Sureties on Bonds provided pursuant to the Contract Documents. By executing such Bonds, the Sureties shall be deemed to have expressly agreed to any such change in Work and to any extension of time made by reason thereof.

26. TERMINATION AFTER COMPLETION DATE

In addition to any other rights City may have, if any services or work required under the Contract (including but not limited to punch list items) are not completed as of the Completion Date (as adjusted by any extensions of time for Excusable Delays granted pursuant to the Contract Documents), City may terminate the Contract at any time after the Completion Date (as adjusted by any extensions of time for Excusable Delays granted pursuant to the Contract Documents), by providing a written notice to Contractor specifying the date of termination. Such notice also may specify conditions or requirements that Contractor must meet to avoid termination of the Contract on such

date. If Contractor fails to fulfill all such conditions and requirements by such termination date, or, if no such conditions or requirements are specified, Contractor shall cease rendering services and performing work on such termination date, and shall not be entitled to receive any compensation for services rendered or work performed after such termination date. In the event of such termination, Contractor shall remain liable to City for liquidated damages incurred for any period of time prior to the termination date.

In addition to any other charges, withholdings or deductions authorized under the Contract or any Laws or Regulations, if City terminates the Contract pursuant to this section, City may withhold and deduct from any payment and/or retention funds otherwise due Contractor any sum necessary to pay the City's cost of completing or correcting, or contracting for the completion or correction of, any services or work under the Contract that are not completed to the satisfaction of the City or that otherwise are deficient or require correction as of such termination date, including but not limited to incomplete punch list items. Such costs shall include all of the City's direct and indirect costs incurred to complete or correct such services or work, including the City's administrative and overhead costs. If the amount of payment(s) and/or retention funds otherwise due the Contractor are insufficient to pay such costs, City shall have the right to recover the balance of such costs from the Contractor and/or its Surety(ies).

27. TERMINATION FOR CONVENIENCE

Upon written notice to the Contractor, the City may at any time, without cause and without prejudice to any other right or remedy of the City, elect to terminate the Contract for the convenience of City. In such case, the Contractor shall be paid (without duplication of any items, and after deduction and/or withholding of any amounts authorized to be deducted or withheld by the Contract Documents or any Laws or Regulations):

- (A) For Work executed in accordance with the Contract Documents prior to the effective date of termination and determined to be acceptable by the Engineer, including fair and reasonable sums for overhead and profit on such Work;
- (B) For reasonable claims, costs, losses, and damages incurred in settlement of terminated contracts with subcontractors, suppliers, and others; and
- (C) For reasonable expenses directly attributable to termination.

Contractor shall not be paid for any loss of anticipated profits or revenue for any Work not performed prior to termination, nor for any economic loss arising out of or resulting from such termination, except for the payments listed in this section. Contractor's warranty under Section 14 of this Agreement shall apply, and Contractor shall remain responsible for all obligations related to such warranty, with respect to all portions of the Work performed prior to the effective date of the termination for convenience pursuant to this section. The City shall be entitled to have any or all remaining Work performed by other contractors or by any other means at any time after the effective date of a termination for convenience pursuant to this section.

28. TERMINATION FOR BREACH OF CONTRACT

If Contractor abandons the Work under this Contract, or if the Contract or any portion of the Contract is sublet or assigned without the consent of the City, or if the Engineer determines in the Engineer's sole discretion that the conditions of the Contract in respect

to the rate of progress of the Work are not being fulfilled or any part thereof is unnecessarily delayed, or if Contractor violates or breaches, or fails to execute in good faith, any of the terms or conditions of the Contract, or if Contractor refuses or fails to supply enough properly skilled labor or materials or refuses or fails to make prompt payment to subcontractors for material or labor, or if Contractor disregards any Laws or Regulations or proper instruction or orders of the Engineer, then, notwithstanding any provision to the contrary herein, the City may give Contractor and its Sureties written notification to immediately correct the situation or the Contract shall be terminated.

In the event that such notice is given, and, in the event such situation is not corrected, or arrangements for correction satisfactory to the City are not made, within ten (10) calendar days from the date of such notice or within such other period of time as may be specified by the City in the notice, the Contract shall upon the expiration of said period cease and terminate. In the event of any such termination, City may take over the Work and prosecute the Work to completion, or otherwise, and the Contractor and its Sureties shall be liable to City for any cost occasioned City thereby, as hereinafter set forth.

In the event City completes the Work, or causes the Work to be completed, no payment of any kind shall be made to Contractor until the Work is complete. The cost of completing the Work, including but not limited to, extra costs of project administration and management incurred by City, both direct or indirect, shall be deducted from any sum then due, or that becomes due, to Contractor from City. If sums due to Contractor from City are less than the cost of completing the Work, Contractor and its Sureties shall pay City a sum equal to this difference on demand. In the event City completes the Work, and there is a sum remaining due to Contractor after City deducts the costs of completing the Work, then City shall pay such sum to Contractor. The Contractor and Contractor's Sureties shall be jointly and severally liable for all obligations imposed on Contractor hereunder.

No act by City before the Work is finally accepted, including, but not limited to, exercise of other rights under the Contract, actions at law or in equity, extensions of time, payments, assessments of liquidated damages, occupation or acceptance of any part of the Work, waiver of any prior breach of the Contract or failure to take action pursuant to this section upon the happening of any prior default or breach of Contractor, shall be construed to be a waiver or estoppel of the City's right to act pursuant to this Section upon any subsequent event, occurrence or failure by Contractor to fulfill the terms and conditions of the Contract. The rights of City to terminate the Contract pursuant to this Section and pursuant to Sections 26 and 27 are cumulative and are in addition to all other rights of City pursuant to the Contract and at law or in equity.

29. CONTRACTOR BANKRUPT

If Contractor should commence any bankruptcy proceeding, or if Contractor is adjudged a bankrupt, or if Contractor makes any assignment for the benefit of creditors, or if a receiver is appointed on account of Contractor's insolvency, then the City may, without prejudice to any other right or remedy, terminate the Contract and complete the work by giving notice as provided in Section 28 above.

30. SURETIES' OBLIGATIONS UPON TERMINATION

If the City terminates the Contract pursuant to Section 28 or Section 29 above:

(A) The Surety under Contractor's performance bond shall be fully responsible for all of the Contractor's remaining obligations of performance under the Contract as if the Surety were a party to the Contract, including without limitation Contractor's obligations, as provided in the Contract Documents, to complete and provide a one-year warranty of the entire Work, pay liquidated damages and indemnify, defend and hold harmless City, up to the full amount of the performance bond.

(B) The Surety under Contractor's payment bond shall be fully responsible for the performance of all of the Contractor's remaining payment obligations for work, services, equipment or materials performed or provided in connection with the Work or any portion thereof, up to the full amount of the payment bond.

31. ACCOUNTING RECORDS OF CONTRACTOR

During performance of the Contract and for a period of three (3) years after completing the entire Work, Contractor shall maintain all accounting and financial records related to the Contract and performance of the Work in accordance with generally accepted accounting practices, and shall keep and make such records available for inspection and audit by representatives of the City upon reasonable written notice.

32. USE TAX REQUIREMENTS

(A) Use Tax Direct Payment Permit For all leases and purchases of materials, equipment, supplies, or other tangible personal property used to perform the Contract and shipped from outside California, the Contractor and any subcontractors leasing or purchasing such materials, equipment, supplies or other tangible personal property shall obtain a Use Tax Direct Payment Permit from the California State Board of Equalization ("SBE") in accordance with the applicable SBE criteria and requirements.

(B) Sellers Permit For any construction contract and any construction subcontract in the amount of \$5,000,000 or more, Contractor and the subcontractor(s) shall obtain sellers permits from the SBE and shall register the jobsite as the place of business for the purpose of allocating local sales and use tax to the City. Contractor and its subcontractors shall remit the self-accrued use tax to the SBE, and shall provide a copy of each remittance to the City.

(C) The above provisions shall apply in all instances unless prohibited by the funding source for the Contract.

IN WITNESS WHEREOF, the parties hereto have signed this Agreement on the date set for opposite their names.

CONTRACTOR

Under penalty of perjury, I certify that the taxpayer identification number and all other information provided here are correct.

DATE _____

BY _____

Print Name

Title

BY _____

Print Name

Title

Federal ID#

State ID#

City of Sacramento Business Operation Tax Certificate No. (City will not award contract until Certificate Number is obtained)

Type of Business Entity (*check one*):

_____ Individual/Sole Proprietor

_____ Partnership

_____ Corporation

_____ Limited Liability Company

_____ Other (please

specify: _____)

CITY OF SACRAMENTO

a municipal corporation

DATE _____

BY _____

For: John F. Shirey, City Manager

Original Approved As To Form:

Attest:

City Attorney

WHEREAS, the City of Sacramento, in the State of California, hereinafter called City has conditionally awarded to *(here insert full name and address of Contractor)*:

as principal, hereinafter called Contractor, an agreement for construction of:

**SUMP 112 ELECTRICAL IMPROVEMENTS
(PN: W14003405) (B123331019)**

in accordance with the plans, specifications, drawings, conditions, and project manual prepared therefore, which agreement is by reference made a part hereof, and is hereinafter referred to as the Contract; and

WHEREAS, under the terms of the Contract, Contractor is required to furnish a bond for the faithful performance of the Contract.

NOW, THEREFORE, we the Contractor and *(here insert full name and address of Surety)*:

_____, a corporation duly authorized and admitted to transact business and issue surety bonds in the State of California, hereinafter called Surety, are held and firmly bound unto the City, as obligee, in the sum of _____ DOLLARS \$ _____), for the payment of which sum well and truly to be made, we the Contractor and Surety bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally. The condition of this obligation is such that, if the Contractor, Contractor's heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and fully perform all covenants, conditions and agreements required to be kept and performed by Contractor in the Contract and any changes, additions or alterations made thereto, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meanings, and shall indemnify and save harmless the City, its officers, employees and agents, as therein provided, then this obligation shall be null and void; otherwise shall be and remain in full force and effect. This obligation shall remain in full force and effect until (1) the date that the Contractor no longer has any remaining obligation of performance under the Contract, or (2) the date that is one year after the date that the work to be performed under the Contract is accepted as complete by the City, whichever occurs later.

As part of the obligation secured hereby and in addition to the sum specified above, there shall be included all costs, expenses and fees, including attorney's fees, reasonably incurred by City in successfully enforcing such obligation, all to be taxed as costs and included in any judgement rendered.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder, or to the specifications accompanying the same, shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration or addition.

IN WITNESS WHEREOF, this instrument has been duly executed by authorized representatives of the Contractor and Surety.
SIGNED AND SEALED on _____, 2012.

(Contractor) (Seal)

By _____

Title _____

ORIGINAL APPROVED AS TO FORM:

City Attorney

(Surety) (Seal)

By _____

Title _____

Agent Name and Address _____

Agent Phone # _____

Surety Phone # _____

California License # _____

Surety Email: _____

WHEREAS, the City of Sacramento, in the State of California, hereinafter called City, has conditionally awarded to:

hereinafter called Contractor, an agreement for construction of:

SUMP 112 ELECTRICAL IMPROVEMENTS
(PN: W14003405) (B123331019)

in accordance with the plans, specifications, drawings, conditions, and project manual prepared therefor, which agreement is by reference made a part hereof, and is hereinafter referred to as the Contract; and

WHEREAS, under the terms of the Contract, Contractor is required to furnish a good and sufficient payment bond to secure the claims to which reference is made in Title 15(commencing with Section 3082) of Part 4 of Division 3 of the California Civil Code.

NOW, THEREFORE, we the Contractor and (*here insert full name and address of Surety*):

_____, a corporation duly authorized and admitted to transact business and issue surety bonds in the State of California, hereinafter called Surety, are held and firmly bound unto the City, and unto all subcontractors, laborers, materialmen and other persons employed in the performance of the Contract and referred to in the aforesaid Civil Code in the sum of _____ DOLLARS (\$ _____), on the condition that if Contractor shall fail to pay for any materials or equipment furnished or used in performance of the Contract, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to such work or labor, or for any amounts required to be deducted, withheld, and paid over to the Franchise Tax Board from the wages of employees of the Contractor and all subcontractors with respect to such work or labor, then the Surety shall pay the same in an amount not exceeding the sum specified above. If suit is brought upon this bond, Surety shall pay, in addition to the above sum, all costs, expenses and fees, including attorney's fees, reasonably incurred by any party in successfully enforcing the obligation secured hereby, all to be taxed as costs and included in any judgment rendered. Should the condition of this bond be fully performed, then this obligation shall become null and void, otherwise it shall be and remain in full force and effect, and shall bind Contractor, Surety, their heirs, executors, administrators, successors and assigns, jointly and severally.

It is hereby stipulated and agreed that this bond shall inure to the benefit of all persons, companies, corporations, political subdivisions and State agencies entitled to file claim under Title 15 (commencing with Section 3082) of Part 4 of Division 3 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond. The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or to the specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration or addition.

IN WITNESS WHEREOF, this instrument has been duly executed by authorized representatives of the Contractor and Surety.
SIGNED AND SEALED on _____, 2012.

(Contractor) (Seal)
By _____
Title _____

(Surety) (Seal)
By _____
Title _____
Agent Name and Address _____

ORIGINAL APPROVED AS TO FORM:

City Attorney

Agent Phone # _____
Surety Phone # _____
California License # _____
Surety Email: _____

**EXCERPTS FROM THE CALIFORNIA LABOR CODE RELATING TO
APPRENTICES ON PUBLIC WORKS
Chapter 1 of Division 2
APPRENTICES ON PUBLIC WORKS**

1773.3. An awarding agency whose public works contract falls within the jurisdiction of Section 1777.5 shall, within five days of the award, send a copy of the award to the Division of Apprenticeship Standards. When specifically requested by a local joint apprenticeship committee, the division shall notify the local joint apprenticeship committee regarding all such awards applicable to the joint apprenticeship committee making the request. Within five days of a finding of any discrepancy regarding the ratio of apprentices to journeymen, pursuant to the certificated fixed number of apprentices to journeymen, the awarding agency shall notify the Division of Apprenticeship Standards.

1776. (a) Each contractor and subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following: (1) The information contained in the payroll record is true and correct. (2) The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project.

(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the contractor on the following basis: (1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request. (2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations. (3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the contractor.

(c) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division.

(d) A contractor or subcontractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested the records within 10 days after receipt of a written request.

(e) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated to prevent disclosure of an individual's name, address, and social security number. The name and address of the contractor awarded the contract or the subcontractor performing the contract shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a joint labor management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code) shall be marked or obliterated only to prevent disclosure of an individual's name and social security number. A joint labor management committee may maintain an action in a court of competent jurisdiction against an employer who fails to comply with Section 1774. The court may award restitution to an employee for unpaid wages and may award the joint labor management committee reasonable attorney's fee and costs incurred in maintaining the action. An action under this subdivision may not be based on the employer's misclassification of the craft of a worker on its certified payroll records. Nothing in this subdivision limits any other available remedies for a violation of this chapter.

(f) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.

(g) The contractor or subcontractor shall have 10 days in which to comply subsequent to receipt of a written notice requesting the records enumerated in subdivision (a). In the event that the contractor or subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars (\$25) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. A contractor is not subject to a penalty assessment pursuant to this section due to the failure of a subcontractor to comply with this section.

(h) The body awarding the contract shall cause to be inserted in the contract stipulations to effectuate this section.

(i) The director shall adopt rules consistent with the California Public Records Act, (Chapter 3.5 (commencing with Section 6250), Division 7, Title 1, Government Code) and the Information Practices Act of 1977, (Title 1.8 (commencing with Section 1798), Part 4, Division 3, Civil Code) governing the release of these records, including the establishment of reasonable fees to be charged for reproducing copies of records required by this section.

(j) This section shall remain in effect only until January 1, 2003, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2003, deletes or extends that date.

1776. (a) Each contractor and subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, and straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work.

(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the contractor on the following basis: (1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request. (2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations. (3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested

payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the contractor.

(c) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division.

(d) Each contractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested the records within 10 days after receipt of a written request.

(e) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated to prevent disclosure of an individual's name, address, and social security number. The name and address of the contractor awarded the contract or performing the contract shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code) shall be marked or obliterated only to prevent disclosure of an individual's social security number.

(f) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.

(g) The contractor shall have 10 days in which to comply subsequent to receipt of written notice specifying in what respects the contractor must comply with this section. In the event that the contractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars (\$25) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due.

(h) The body awarding the contract shall cause to be inserted in the contract stipulations to effectuate this section. These stipulations shall fix the responsibility for compliance with this section on the prime contractor.

(i) The director shall adopt rules consistent with the California Public Records Act, (Chapter 3.5 (commencing with Section 6250), Division 7, Title 1, Government Code) and the Information Practices Act of 1977, (Title 1.8 (commencing with Section 1798), Part 4, Division 3, Civil Code) governing the release of these records, including the establishment of reasonable fees to be charged for reproducing copies of records required by this section.

(j) This section shall become operative January 1, 2003.

1777.5. (a) Nothing in this chapter shall prevent the employment of properly registered apprentices upon public works.

(b) Every apprentice employed upon public works shall be paid the prevailing rate of per diem wages for apprentices in the trade to which he or she is registered and shall be employed only at the work of the craft or trade to which he or she is registered.

(c) Only apprentices, as defined in Section 3077, who are in training under apprenticeship standards that have been approved by the Chief of the Division of Apprenticeship Standards and who are parties to written apprentice agreements under Chapter 4 (commencing with Section 3070) of Division 3 are eligible to be employed at the apprentice wage rate on public works. The employment and training of each apprentice shall be in accordance with either (1) the apprenticeship standards and apprentice agreements under which he or she is training or (2) the rules and regulations of the California Apprenticeship Council.

(d) When the contractor to whom the contract is awarded by the state or any political subdivision, in performing any of the work under the contract, employs workers in any apprenticeable craft or trade, the contractor shall employ apprentices in at least the ratio set forth in this section and may apply to any apprenticeship program in the craft or trade that can provide apprentices to the site of the public work for a certificate approving the contractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected. However, the decision of the apprenticeship program to approve or deny a certificate shall be subject to review by the Administrator of Apprenticeship. The apprenticeship program or programs, upon approving the contractor, shall arrange for the dispatch of apprentices to the contractor. A contractor covered by an apprenticeship program's standards shall not be required to submit any additional application in order to include additional public works contracts under that program. "Apprenticeable craft or trade," as used in this section, means a craft or trade determined as an apprenticeable occupation in accordance with rules and regulations prescribed by the California Apprenticeship Council. As used in this section, "contractor" includes any subcontractor under a contractor who performs any public works not excluded by subdivision (o).

(e) Prior to commencing work on a contract for public works, every contractor shall submit contract award information to an applicable apprenticeship program that can supply apprentices to the site of the public work. The information submitted shall include an estimate of journeyman hours to be performed under the contract, the number of apprentices proposed to be employed, and the approximate dates the apprentices would be employed. A copy of this information shall also be submitted to the awarding body if requested by the awarding body. Within 60 days after concluding work on the contract, each contractor and subcontractor shall submit to the awarding body, if requested, and to the apprenticeship program a verified statement of the journeyman and apprentice hours performed on the contract. The information under this subdivision shall be public. The apprenticeship programs shall retain this information for 12 months.

(f) The apprenticeship program that can supply apprentices to the area of the site of the public work shall ensure equal employment and affirmative action in apprenticeship for women and minorities.

(g) The ratio of work performed by apprentices to journeymen employed in a particular craft or trade on the public work may be no higher than the ratio stipulated in the apprenticeship standards under which the apprenticeship program operates where the contractor agrees to be bound by those standards, but, except as otherwise provided in this section, in no case shall the ratio be less than one hour of apprentice work for every five hours of journeyman work.

(h) This ratio of apprentice work to journeyman work shall apply during any day or portion of a day when any journeyman is employed at the jobsite and shall be computed on the basis of the hours worked during the day by journeymen so employed. Any work performed by a journeyman in excess of eight hours per day or 40 hours per week shall not be used to calculate the ratio. The contractor shall employ apprentices for the number of hours computed as above before the end of the contract or, in the case of a subcontractor, before the end of the subcontract. However, the contractor shall endeavor, to the greatest extent possible, to employ apprentices during the same time period that the journeymen in the same craft or trade are employed at the jobsite. Where an hourly apprenticeship ratio is not feasible for a particular craft or trade, the Chief of the Division of Apprenticeship Standards, upon application of an apprenticeship program, may order a minimum ratio of not less than one apprentice for each five journeymen in a craft or trade classification.

(i) A contractor covered by this section that has agreed to be covered by an apprenticeship program's standards upon the issuance of the approval certificate, or that has been previously approved for an apprenticeship program in the craft or trade, shall

employ the number of apprentices or the ratio of apprentices to journeymen stipulated in the applicable apprenticeship standards, but in no event less than the 1-to-5 ratio required by subdivision (g).

(j) Upon proper showing by a contractor that he or she employs apprentices in a particular craft or trade in the state on all of his or her contracts on an annual average of not less than one hour of apprentice work for every five hours of labor performed by journeymen, the Chief of the Division of Apprenticeship Standards may grant a certificate exempting the contractor from the 1-to-5 hourly ratio, as set forth in this section for that craft or trade.

(k) An apprenticeship program has the discretion to grant to a participating contractor or contractor association a certificate, which shall be subject to the approval of the Administrator of Apprenticeship, exempting the contractor from the 1-to-5 ratio set forth in this section when it finds that any one of the following conditions is met: (1) Unemployment for the previous three-month period in the area exceeds an average of 15 percent. (2) The number of apprentices in training in the area exceeds a ratio of 1 to 5. (3) There is a showing that the apprenticeable craft or trade is replacing at least one-thirtieth of its journeymen annually through apprenticeship training, either on a statewide basis or on a local basis. (4) Assignment of an apprentice to any work performed under a public works contract would create a condition that would jeopardize his or her life or the life, safety, or property of fellow employees or the public at large, or the specific task to which the apprentice is to be assigned is of a nature that training cannot be provided by a journeyman.

(l) When an exemption is granted pursuant to subdivision (k) to an organization that represents contractors in a specific trade from the 1-to-5 ratio on a local or statewide basis, the member contractors will not be required to submit individual applications for approval to local joint apprenticeship committees, if they are already covered by the local apprenticeship standards.

(m) (1) A contractor to whom a contract is awarded, who, in performing any of the work under the contract, employs journeymen or apprentices in any apprenticeable craft or trade shall contribute to the California Apprenticeship Council the same amount that the director determines is the prevailing amount of apprenticeship training contributions in the area of the public works site. A contractor may take as a credit for payments to the council any amounts paid by the contractor to an approved apprenticeship program that can supply apprentices to the site of the public works project. The contractor may add the amount of the contributions in computing his or her bid for the contract.

(2) At the conclusion of each fiscal year, the California Apprenticeship Council shall distribute training contributions received by the council under this subdivision, less the expenses of the Division of Apprenticeship Standards for administering this subdivision, by making grants to approved apprenticeship programs for the purpose of training apprentices. The funds shall be distributed as follows: (A) If there is an approved multiemployer apprenticeship program serving the same craft or trade and geographic area for which the training contributions were made to the council, a grant to that program shall be made. (B) If there are two or more approved multiemployer apprenticeship programs serving the same craft or trade and geographic area for which the training contributions were made to the council, the grant shall be divided among those programs based on the number of apprentices registered in each program. (C) All training contributions not distributed under subparagraphs (A) and (B) shall be used to defray the future expenses of administering this subdivision. (3) All training contributions received pursuant to this subdivision shall be deposited in the Apprenticeship Training Contribution Fund, which fund is hereby created in the State Treasury. Notwithstanding Section 13340 of the Government Code, all money in the Apprenticeship Training Contribution Fund is hereby continuously appropriated for the purpose of carrying out this subdivision and to pay the expenses of the division in administering this subdivision.

(n) The body awarding the contract shall cause to be inserted in the contract stipulations to effectuate this section. The stipulations shall fix the responsibility of compliance with this section for all apprenticeable occupations with the prime contractor.

(o) This section does not apply to contracts of general contractors or to contracts of specialty contractors not bidding for work through a general or prime contractor when the contracts of general contractors or those specialty contractors involve less than thirty thousand dollars (\$30,000).

(p) All decisions of an apprenticeship program under this section are subject to Section 3081.

1777.6. It shall be unlawful for an employer or a labor union to refuse to accept otherwise qualified employees as registered apprentices on any public works, on the ground of the race, religious creed, color, national origin, ancestry, sex, or age, except as provided in Section 3077, of such employee.

1777.7. (a) (1) A contractor or subcontractor that is determined by the Chief of the Division of Apprenticeship Standards to have knowingly violated Section 1777.5 shall forfeit as a civil penalty an amount not exceeding one hundred dollars (\$100) for each full calendar day of noncompliance. The amount of this penalty may be reduced by the Chief if the amount of the penalty would be disproportionate to the severity of the violation. A contractor or subcontractor that knowingly commits a second or subsequent violation of Section 1777.5 within a three-year period, where the noncompliance results in apprenticeship training not being provided as required by this chapter, shall forfeit as a civil penalty the sum of not more than three hundred dollars (\$300) for each full calendar day of noncompliance.

Notwithstanding Section 1727, upon receipt of a determination that a civil penalty has been imposed by the Chief, the awarding body shall withhold the amount of the civil penalty from contract progress payments then due or to become due. (2) In lieu of the penalty provided for in this subdivision, the Chief may, for a first-time violation and with the concurrence of an apprenticeship program described in subdivision (d), order the contractor or subcontractor to provide apprentice employment equivalent to the work hours that would have been provided for apprentices during the period of noncompliance.

(b) In the event a contractor or subcontractor is determined by the Chief to have knowingly committed a serious violation of any provision of Section 1777.5, the Chief may also deny to the contractor or subcontractor, and to its responsible officers, the right to bid on or be awarded or perform work as a subcontractor on any public works Contract for a period of up to one year for the first violation and for a period of up to three years for a second or subsequent violation. Each period of debarment shall run from the date the determination of noncompliance by the Chief becomes a final order of the Administrator of Apprenticeship.

(c) (1) An affected contractor, subcontractor, or responsible officer may obtain a review of the determination of the Chief imposing the debarment or civil penalty by transmitting a written request to the office of the Administrator within 30 days after service of the determination of debarment or civil penalty. A copy of this report shall also be served on the Chief. If the Administrator does not receive a timely request for review of the determination of debarment or civil penalty made by the Chief, the order shall become the final order of the Administrator. (2) Within 20 days of the timely receipt of a request for review, the Chief shall provide the contractor, subcontractor, or responsible officer the opportunity to review any evidence the Chief may offer at the hearing. The Chief shall also promptly disclose any nonprivileged documents obtained after the 20-day time limit at a time set forth for exchange of evidence by the Administrator. (3) Within 90 days of the timely receipt of a request for review, a hearing shall be commenced before the

Administrator or an impartial hearing officer designated by the Administrator and possessing the qualifications of an administrative law judge pursuant to subdivision (b) of Section 11502 of the Government Code. The affected contractor, subcontractor, or responsible officer shall have the burden of providing evidence of compliance with Section

1777.5. (4) Within 45 days of the conclusion of the hearing, the Administrator shall issue a written decision affirming, modifying, or dismissing the determination of debarment or civil penalty. The decision shall contain a statement of the factual and legal basis for the decision and an order. This decision shall be served on all parties and the awarding body pursuant to Section 1013 of the Code of Civil Procedure by first-class mail at the last known address of the party that the party has filed with the Administrator. Within 15 days of issuance of the decision, the Administrator may reconsider or modify the decision to correct an error, except that a clerical error may be corrected at any time. (5) An affected contractor, subcontractor, or responsible officer who has timely requested review and obtained a decision under paragraph (4) may obtain review of the decision of the Administrator by filing a petition for a writ of mandate to the appropriate superior court pursuant to Section 1094.5 of the Code of Civil Procedure within 45 days after service of the final decision. If no timely petition for a writ of mandate is filed, the decision shall become the final order of the Administrator. The decision of the Administrator shall be affirmed unless the petitioner shows that the Administrator abused his or her discretion. If the petitioner claims that the findings are not supported by the evidence, abuse of discretion is established if the court determines that the findings are not supported by substantial evidence in light of the entire record. (6) The Chief may certify a copy of the final order of the Administrator and file it with the clerk of the superior court in any county in which the affected contractor or subcontractor has property or has or had a place of business. The clerk, immediately upon the filing, shall enter judgment for the state against the person assessed in the amount shown on the certified order. A judgment entered pursuant to this section shall bear the same rate of interest and shall have the same effect as other judgments and be given the same preference allowed by the law on other judgments rendered for claims for taxes. The clerk shall not charge for the service performed by him or her pursuant to this section. An awarding body that has withheld funds in response to a determination by the Chief imposing a penalty under this section shall, upon receipt of a certified copy of a final order of the Administrator, promptly transmit the withheld funds, up to the amount of the certified order, to the Administrator.

(d) If a subcontractor is found to have violated Section 1777.5, the prime contractor of the project is not liable for any penalties under subdivision (a), unless the prime contractor had knowledge of the subcontractor's failure to comply with the provisions of Section 1777.5 or unless the prime contractor fails to comply with any of the following requirements: (1) The contract executed between the contractor and the subcontractor or the performance of work on the public works project shall include a copy of the provisions of Sections 1771, 1775, 1776, 1777.5, 1813, and 1815.

(2) The contractor shall continually monitor a subcontractor's use of apprentices required to be employed on the public works project pursuant to subdivision (d) of Section 1777.5, including, but not limited to, periodic review of the certified payroll of the subcontractor.

(3) Upon becoming aware of a failure of the subcontractor to employ the required number of apprentices, the contractor shall take corrective action, including, but not limited to, retaining funds due the subcontractor for work performed on the public works project until the failure is corrected. (4) Prior to making the final payment to the subcontractor for work performed on the public works project, the contractor shall obtain a declaration signed under penalty of perjury from the subcontractor that the subcontractor has employed the required number of apprentices on the public works project.

(e) Any funds withheld by the awarding body pursuant to this section shall be deposited in the General Fund if the awarding body is a state entity, or in the equivalent fund of an awarding body if the awarding body is an entity other than the state.

(f) The Chief shall consider, in setting the amount of a monetary penalty, in determining whether a violation is serious, and in determining whether and for how long a party should be debarred for violating this section, all of the following circumstances: (1) Whether the violation was intentional. (2) Whether the party has committed other violations of Section 1777.5. (3) Whether, upon notice of the violation, the party took steps to voluntarily remedy the violation. (4) Whether, and to what extent, the violation resulted in lost training opportunities for apprentices. (5) Whether, and to what extent, the violation otherwise harmed apprentices or apprenticeship programs. If a party seeks review of a decision by the Chief to impose a monetary penalty or period of debarment, the Administrator shall decide de novo the appropriate penalty, by considering the same factors set forth above.

(g) The interpretation of Section 1777.5 and this section shall be in accordance with the regulations of the California Apprenticeship Council. The Administrator may adopt regulations to establish guidelines for the imposition of monetary penalties and periods of debarment and may designate precedential decisions under Section 11425.60 of the Government Code.

NOTE: THE ABOVE CALIFORNIA LABOR CODE SECTIONS ARE AVAILABLE FROM THE INTERNET @ www.dir.ca.gov/.

DAS 10 (Rev. 04-02)

Request for Taxpayer Identification Number and Certification

Give form to the requester. Do not send to the IRS.

Print or type See Specific Instructions on page 2	Name (as shown on your income tax return)	
	Business name, if different from above	
	Check appropriate box: <input type="checkbox"/> Individual/Sole proprietor <input type="checkbox"/> Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Limited liability company. Enter the tax classification (D=disregarded entity, C=corporation, P=partnership) ▶ <input type="checkbox"/> Exempt payee <input type="checkbox"/> Other (see instructions) ▶	
	Address (number, street, and apt. or suite no.)	Requester's name and address (optional)
	City, state, and ZIP code	
List account number(s) here (optional)		

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on Line 1 to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN), if you do not have a number, see *How to get a TIN* on page 3.

Social security number
OR
Employer identification number

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the Certification, but you must provide your correct TIN. See the instructions on page 4.

Sign Here	Signature of U.S. person ▶	Date ▶
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General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

The person who gives Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States is in the following cases:

- The U.S. owner of a disregarded entity and not the entity.

YEAR

Withholding Exemption Certificate

CALIFORNIA FORM

2011

(This form can only be used to certify exemption from nonresident withholding under California Revenue and Taxation Code (R&TC) Section 18662. Do not use this form for exemption from wage withholding.)

590

File this form with your withholding agent. (Please type or print)
Withholding agent's name _____

Payee's name _____		Payee's <input type="checkbox"/> SOS file no.	<input type="checkbox"/> SSN or FEIN <input type="checkbox"/> CA corp. no. <input type="checkbox"/> FEIN
Address (number and street, PO Box, or P.M.B. no.) _____			Apt. no./ Box no. _____
City _____		State _____	ZIP Code _____

Read the following carefully and check the box that applies to the payee.

I certify that for the reasons checked below, the payee named on this form is exempt from the California income tax withholding requirement on payment(s) made to the entity or individual.

- Individuals — Certification of Residency:**
I am a resident of California and I reside at the address shown above. If I become a nonresident at any time, I will promptly notify the withholding agent. See instructions for General Information D, Who is a Resident, for the definition of a resident.
- Corporations:**
The above-named corporation has a permanent place of business in California at the address shown above or is qualified through the California Secretary of State (SOS) to do business in California. The corporation will file a California tax return and withhold on payments of California source income to nonresidents when required. If this corporation ceases to have a permanent place of business in California or ceases to do any of the above, I will promptly notify the withholding agent. See instructions for General Information F, What is a Permanent Place of Business, for the definition of permanent place of business.
- Partnerships or limited liability companies (LLC):**
The above-named partnership or LLC has a permanent place of business in California at the address shown above or is registered with the California SOS, and is subject to the laws of California. The partnership or LLC will file a California tax return and will withhold on foreign and domestic nonresident partners or members when required. If the partnership or LLC ceases to do any of the above, I will promptly inform the withholding agent. For withholding purposes, a limited liability partnership (LLP) is treated like any other partnership.
- Tax-Exempt Entities:**
The above-named entity is exempt from tax under California Revenue and Taxation Code (R&TC) Section 23701 _____ (insert letter) or Internal Revenue Code Section 501(c) _____ (insert number). The tax-exempt entity will withhold on payments of California source income to nonresidents when required. If this entity ceases to be exempt from tax, I will promptly notify the withholding agent. Individuals cannot be tax-exempt entities.
- Insurance Companies, Individual Retirement Arrangements (IRAs), or Qualified Pension/Profit Sharing Plans:**
The above-named entity is an insurance company, IRA, or a federally qualified pension or profit-sharing plan.
- California Trusts:**
At least one trustee and one noncontingent beneficiary of the above-named trust is a California resident. The trust will file a California fiduciary tax return and will withhold on foreign and domestic nonresident beneficiaries when required. If the trustee becomes a nonresident at any time, I will promptly notify the withholding agent.
- Estates — Certification of Residency of Deceased Person:**
I am the executor of the above-named person's estate. The decedent was a California resident at the time of death. The estate will file a California fiduciary tax return and will withhold on foreign and domestic nonresident beneficiaries when required.
- Nonmilitary Spouse of a Military Servicemember:**
I am a nonmilitary spouse of a military servicemember and I meet the Military Spouse Residency Relief Act (MSRRA) requirements. See instructions for General Information E, MSRRA.

CERTIFICATE: Please complete and sign below.

Under penalties of perjury, I hereby certify that the information provided in this document is, to the best of my knowledge, true and correct. If conditions change, I will promptly notify the withholding agent.

Payee's name and title (type or print) _____ Daytime telephone no. _____

Payee's signature ► _____ Date _____

SPECIAL PROVISIONS

SUMP 112

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ITEMS OF THE PROPOSAL

All Items shall be constructed as shown on the Plans in accordance with the Special Provisions whether or not they are included in the following list of bid items. There will be no separate compensation for items shown on the Plans or where Contractor is directed in the Special Provisions but not included in the following list of bid items and the price thereof shall be included in whatever bid items the Contractor deems appropriate.

Item No. 1 - Install New Control Building at Sump 112

The work to be performed for this item includes, but is not limited to, furnishing and installing all necessary equipment and materials to install the new electrical control building at Sump 112 as indicated on the Plan sheets and called for in these Special Provisions. This item includes the concrete foundation, building, doors, door hardware, crushed rock, rebar, vents, exhaust vent, concrete step and walkway, and all appurtenances to construct the new electrical control building.

Payment shall be at the unit price bid per each and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in installing the new electrical control building in accordance with the Plans and these Special Provisions.

Item No. 2 - Install New Switchgear and MCCs at Sump 112

The work to be performed for this item includes, but is not limited to, furnishing and installing all necessary equipment and materials for the switchgear, motor control centers (MCCs), control panel, and all appurtenances at Sump 112 as indicated on the Plan sheets and called for in these Special Provisions. All other electrical work shall be paid for in bid item number 3.

Payment shall be at the lump sum price bid and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in furnishing and installing the switchgear and MCCs at Sump 112 in accordance with the Plans and these Special Provisions.

Item No. 3 - Electrical Improvements at Sump 112

The work to be performed for this item includes, but is not limited to, furnishing and installing all necessary equipment and materials for the instrumentation, PLC system, lighting fixtures, conduits, conductors, level pressure transducers, and all appurtenances at Sump 112 as indicated on the Plan sheets and called for in these Special Provisions.

This bid item also includes the installation of the new man gate, fence post, vinyl fence slats, barbed wire, and fence fabric as shown on the plans. The new fencing is approximately 4 feet in length not including the new 4'-6" man gate.

Payment shall be at the lump sum price bid and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in constructing the electrical improvements at Sump 112 in accordance with the Plans and these Special Provisions.

Item No. 4 – Relocate the Existing Switchgear at Sump 112

The work to be performed for this item includes, but is not limited to, relocating the existing control building and switchgear to a new location within the facility and the installation of temporary conduits and conductors to power the following: the existing switchgear from the new SMUD transformer, PLC, motors, and trash rack motors in order to make the facility fully operational. In addition, the Contractor shall reconnect both SCADA antennas to each radio using the existing conduits and installing new antenna cables and temporary conduits at Sump 112 as indicated on the Plan sheets and called for in these Special Provisions.

This item of work shall be completed first and no payments shall be made to the contractor until this item of work is completed and approved by the City. The Contractor shall obtain approval from the City before work begins on this bid item.

Payment shall be at the lump sum price bid and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in relocating the existing switchgear at Sump 112 in accordance with the Plans and these Special Provisions.

Item No. 5 – Install SMUD Improvements at Sump 112

The work to be performed for this item includes, but is not limited to, furnishing and installing all necessary equipment and materials for the transformer pad, 4' x 6' pull box, bollards, guard rail, primary conduits, pull tape, secondary conduit and all appurtenances at Sump 112 as indicated on the Plan sheets and called for in these Special Provisions.

This item includes the reconnection of the electrical service to the Greenhaven Association controller cabinet as shown on the plan sheets.

This item of work shall be completed after Bid Item Number 4 is completed and no payments shall be made to the contractor until this item of work is completed in the order indicated and approved by both the City and SMUD.

After the SMUD transformer is heated up the Contractor shall install temporary conduits and conductors from the new SMUD transformer to the existing switchgear to make the facility fully operational until the new switchgear is installed.

Payment shall be at the lump sum price bid and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in constructing the SMUD electrical improvements at Sump 112 in accordance with the Plans and these Special Provisions.

SECTION 01105

GENERAL INFORMATION AND REQUIREMENTS

PART 1 - GENERAL

1.01 GOVERNING DOCUMENTS

- A. All work performed under this Contract shall be in accordance with the following General Conditions:
1. Sealed Proposal
 2. Agreement
 3. City of Sacramento Standard Specifications, June 1989 (hereinafter CSSS) Sections 1 through 8 and as noted otherwise.
- B. All work performed under this Contract, unless noted otherwise, shall be in accordance with the following:
1. Technical Specifications
 2. Contract Drawings
 3. CSSS - Sections 10 through 38
 4. Payment Bond
 5. Performance Bond
 6. California Labor Code, Chapter 4 of Division 3.
- C. In the event of a conflict in the Contract Documents, priorities, as appropriate, set forth below shall govern:
1. General Conditions
 2. Technical Specifications
 3. Drawings
 4. CSSS
 5. Conflicts
 - a. In case of conflict between drawings and Special Provisions, the drawings shall govern in matters of quantity and the Special Provisions shall govern in matters of quality.
 - b. In case of conflict within the drawings involving quantities, furnish the greater quantity.
 - c. In case of conflict within the Special Provisions involving quality of

material or procedure, furnish the higher quality material and procedure.

- d. Where provisions of codes, safety orders, Contract Documents, referenced manufacturer's specifications or industry standards are in conflict, the more restrictive and higher quality shall govern.

1.02 DEFINITIONS

- A. For definitions not found herein, refer to CSSS, Section 1.
- B. "City" shall mean the City of Sacramento.
- C. "Engineer" shall mean the director of Utilities or his designated representative.
- D. "Calendar Day" shall mean every day shown on the calendar, Sundays and holidays included.
- E. "Working Day" see CSSS, Section 1, definition 1-34, page 1(4).
- F. "Contract Documents" shall mean the General Conditions identified in Paragraph 1.01.A and the Special Provisions identified in Paragraph 1.01.B of this Section.
- G. "Drawings" shall mean the Contract Drawings.
- H. "Provide" shall mean furnish and install, in accordance with the contract documents.
- I. "Addenda" shall mean a written or graphic instrument issued prior to the execution of the Contract, which modify or interpret the Contract Documents, Drawings, and Specifications, by additions, deletions, clarifications, or corrections.
- J. "Proposed Change Order" shall mean a written request for the Contractor's Cost and Time Estimate covering an addition, deletion, or revision in the work, within the General Scope of the Contract.
- K. "Change Order" shall mean a written order to the Contractor authorizing an addition, deletion, or revision in the work, within the General Scope of the Contract Documents, or authorizing an adjustment in the Contract Price or Contract Time.
- L. "Field Order" shall mean a written order from the Engineer to the Contractor, directing an addition or revision in the work.

1.03 CSSS CHANGES

- A. All references in Section 8 of the Standard Specifications to actions by the "City Council" shall be amended to read action by the "City".
- B. Wherever reference is made to City Manager, Director of Utilities, Engineer, Finance Director, Inspector, or other specifically identified individuals, it shall include their designated representative.
- C. In Section 2-9 SUBCONTRACTORS, delete the statement reading "Contractor shall perform with his own organization and with the assistance of workers under his immediate superintendence, work of a value not less than fifty percent (50%) of the value of all work in the contract."

1.04 EXCAVATIONS AND TRENCHING

- A. Excavations or trenches crossing roadways, walks, or traffic ways shall be provided with suitable traffic bearing steel plate or wood planking temporary covers. Contractor shall verify location of all underground facilities prior to excavating and shall perform the work to avoid damage to existing underground facilities. Contractor shall repair at no additional cost to the City and to prior condition, any existing utility damaged due to work of this contract.
- B. If unusual amounts of bone, stone or artifacts are uncovered, work within 50 meters of the area shall cease immediately and a qualified archaeologist shall be consulted to develop, if necessary, mitigation measure to reduce any archaeologist impact to a less than significant effect before construction resumes in the area.

1.05 SPECIFICATIONS

- A. The specifications are those bound and enumerated in the Table of Contents. The bidding Requirements, "Items of the Proposal", General Conditions, and Division 1 of the specifications apply to all work of this contract.

1.06 HOURS OF WORK

- A. Contractor shall perform the work of this contract on normal work days and within normal work hours, except after hours work, and work on Saturdays, Sundays, and holidays may be permitted if prior approval is obtained from the City. Overtime pay required to perform the work shall be included in the Contractor's bid prices, and no additional compensation to the Contractor will be made for overtime work.

1.07 CONTRACTOR'S SET OF PLANS AND SPECIFICATIONS

A. City Furnished Plans and Specifications:

Upon award of contract, the City will provide plans and specifications as follows:

1. Plans: 5 sets
2. Specifications: 5 sets

B. The Contractor is responsible for providing copies of the plans and specifications to all subcontractors as required for construction. Additional Sets of the plans and specifications may be obtained from the City. The cost charged the Contractor for additional copies obtained from the City shall cover all associated City procurement costs. City will not be responsible for incomplete information in the event partial sets are ordered.

1.08 INTERPRETATION OF DRAWINGS

- A. The Contract Drawings consist of all of the plan sheets.**
- B. The data given herein, and on the drawings, are as exact as could be secured, but their absolute accuracy is not guaranteed. The Technical Specifications and drawings are for the assistance and guidance of the Contractor; exact locations, distance, elevation, etc., will be governed by the various structures, and Contractor shall use same with this understanding.**
- C. The drawings are diagrammatic, but shall be followed as closely as existing conditions will permit. Prior to submitting their sealed Proposal, the Contractor shall inspect the site and verify all measurements and conditions and shall be responsible for the correctness of same. No extra compensation will be allowed because of differences between work shown on the drawings and measurements at the site.**
- D. Catalog numbers on the drawings and in the Technical Specifications are from the best available information and are for guidance and assistance. The Contractor shall verify all catalog numbers and install only suitable materials.**

1.09 REFERENCED PUBLICATIONS

- A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern.**

1.10 QUESTIONS PRIOR TO BID OPENING

- A. Prior to the opening of the sealed proposals, all questions concerning the Contract Documents shall be directed to Paul Barnes (916) 808-1442, or facsimile (916) 808-1497.

1.11 START OF WORK

- A. The Contractor shall commence work on the day the NOTICE TO PROCEED is issued.
- B. Any work performed by the Contractor in advance of receipt of the NOTICE TO PROCEED shall be considered as having been done by him at his own risk and as a volunteer unless NOTICE TO PROCEED is issued by the Owner.

1.12 FACILITY ACCESS

- A. The City will provide one (1) set of combination padlocks with an agreed upon combination. Contractor shall be responsible for all subsequent replacements. The Contractor shall be responsible for securing the facility after each work day and at all times during the contract.

PART 2 - PRODUCTS

2.01 CONSTRUCTION SCHEDULE

- A. Contractor shall submit a Construction Schedule for the entire project. Construction Schedule shall be in the Critical Path Method (CPM) format. The proposed dates of commencement and completion of each of the various subdivisions of work required under these Specifications. Include submittals, procurement, disposal, delivery, installation, testing, and final inspection. CPM shall be arranged in work weeks and shall show manpower. No Progress Payments will be made until the CPM schedule has been received and approved by the Engineer.

PART 3 - EXECUTION

3.01 PRE-JOB CONFERENCE

- A. Pre-Job Conference
 - 1. The Contractor, after delivery of the Contract and at least three (3) days before beginning work, shall notify Renee Graves at (916) 808-1465 and arrange a pre-job conference. At this conference, the Contractor shall deliver appropriate submittals and a Construction Schedule as detailed below. The Contractor is responsible to provide plans and special provisions to subcontractors.

3.02 CONTRACTOR COMMUNICATIONS

- A. All official communications between the Contractor and the City of Sacramento shall be made through the Engineer.

3.03 SUPERINTENDENT

- A. Contractor shall assign a Superintendent to supervise all work and to represent the Contractor on site. Superintendent shall cooperate with the Owner and shall provide assistance at all times for inspection of the work including: removing covers, operating machinery, or performing any reasonable work which, in the opinion of the Engineer, is necessary to determine the quality or adequacy of the work. Superintendent shall also furnish material shipping labels and packing slips to the Engineer to verify that the material conforms with approved submittals and Specifications.
- B. Contractor shall lay out all work in advance of fabrication and shall be responsible for coordination of all related work.
- C. Contractor shall be responsible for scheduling sump and equipment shutdowns necessary to complete the work. Two (2) days prior to the proposed shutdown, the Superintendent shall obtain approval for the shutdown from the Engineer. The Engineer shall be given the following information:
 - 1. Date and time of shutdown
 - 2. Work to be accomplished during shutdown
 - 3. Number of persons working during shutdown
 - 4. Time of re-energization
- D. Contractor shall monitor and assure that:
 - 1. Shall remove spillage resulting from hauling operations along, or across, any public traveled way, at least daily, at Contractor's expense.
 - 2. Conduct construction operations in such a manner as to cause as little inconvenience as possible to abutting property owners.
 - 3. Water or dust palliative shall be applied, if ordered by the Engineer, for the alleviation or prevention of dust nuisance and shall be done at Contractor's expense.
 - 4. Contractor shall contact the Engineer for a visual inspection 48 hours prior to covering any underground conduit.
 - 5. Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involved maintenance of traffic and public safety shall be considered as included in the prices paid for various Contract items of work, and no additional compensation will be allowed,

therefore.

3.04 PERMITS

- A. Contractor may want to use private property beyond that already owned by the City for storage and/or access. Contractor shall be responsible to the individual owner(s) to obtain and pay for any private property easements and/or right of entry permit, and for repair of any associated damage.

3.05 TRENCH SAFETY

- A. Contractor's work shall conform to the provisions of Section 6705 of the Labor Code of the State of California.
- B. Excavation for any trench five (5) feet, or more, in depth shall not begin until the City has received the Contractor's detailed plan for worker protection from the hazards of caving ground in and around trenches. Such plan shall be submitted at least five (5) days before the Contractor intends to begin trench excavation. Show details of the design of shoring, bracing, sloping, or other provisions to be made for worker protection. No such plan shall allow the use of shoring, sloping, or a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety. If such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California.
- C. In addition, the Contractor shall obtain, pay for, and comply with all provisions of the permit required by Section 6500 of the California Occupational Safety and Health Act of 1973.

3.06 PUBLIC SAFETY AND CONVENIENCE AND MAINTENANCE OF TRAFFIC

- A. Contractor's attention is directed to Sections 6-6, 6-7, 6-8, and 6-9 of the CSSS.
- B. Contractor shall be responsible for traffic control and public safety at all times. Vehicle and pedestrian traffic must be allowed to traverse all streets and alleys.
- C. Contractor shall furnish, install, and maintain temporary construction warning signs, flaggers, barricades, and other devices necessary to safeguard the general public and the work, and to provide for the safe and proper routing of all vehicular and pedestrian traffic within, and through, the limits of the project during the performance of the work.
- D. Maintenance of traffic shall apply continuously, and shall not be limited to normal working hours. The use of flaggers, barricades, and construction warning signs shall comply with the current edition of "*Work Area and Traffic Control Handbook*" (*WATCH*), available for review at the City of Sacramento, Department of

Transportation, Traffic Engineering Division, located at 915 I Street in Sacramento.

- E. All lanes of traffic on adjacent street(s) shall remain open at all times during the course of construction unless otherwise approved in writing by the Engineer.
- F. Contractor shall be required to establish traffic scheduling and control measures acceptable to the Engineer prior to starting any work. The Contractor shall submit to the Engineer for review and approval a plan showing proposed traffic control measures and/or detours for vehicles and pedestrians affected by the construction work. This plan shall be submitted a minimum of ten (10) working days prior to the scheduled commencement of any work by the Contractor. **Contractor will not be allowed to begin work until an approved plan is on file with the Engineer.** All advance warning and traffic delineation shall conform to the latest edition of "Work Area and Traffic Control Handbook", (WATCH). The approved traffic control plan shall be made available to the Engineer on site at all times.
- G. Construction operations shall be conducted in such a manner as to cause as little inconvenience as possible to abutting property owners.

3.07 PUBLIC NOTIFICATION

- A. Not applicable.

3.08 PRE-CONSTRUCTION PHOTOGRAPHS

- A. Pre-construction photographs shall be provided and shall conform to Section 11 of the Standard Specifications.

3.09 EXISTING UTILITIES

- A. Locations of both underground and overhead utilities are shown on the drawings to the extent known. The actual location and elevation of the utilities may vary from the locations shown. Unless the drawings or specifications identify that the Contractor is responsible for relocating utilities, utilities requiring relocation will be by the governing agency or their representatives. The Contractor shall coordinate relocations requested for the Contractor's convenience with the Engineer and the owner of the utility. The Contractor will cooperate with the relocation and/or protection of existing utilities.
- B. The Contractor shall contact Pete Millino of the City of Sacramento at 808-5173 two (2) working days prior to performing excavation work within existing City facilities. The City will mark locations of existing City utilities.

3.10 MAINTAINING EXISTING DRAINAGE

- B. Contractor shall be responsible for maintaining existing drainage until the new electrical improvements are complete and functioning. No additional compensation will be paid to the Contractor for said maintenance. Include the cost of this maintenance in the items of the bid as deemed appropriate.
- C. Contractor shall call City Utilities Operation Center at (916)808-5461 to report any pumping capacity change or pumping mode change during construction.
- D. Contractor shall allow City O&M access to the facility 24 hours a day, 7 days a week.
- E. The City will provide one (1) set of combination padlocks with an agreed upon combination. Contractor shall be responsible for all subsequent replacements.

3.11 PROJECT SIGN

- A. Prior to beginning any onsite work, the contractor shall install a total of 1 project sign. The sign shall be supplied by the City and are approximately thirty (30) inches by fifty-four (54) inches. Location and height of the sign installation shall be as directed by the Engineer. In general, the signs shall be installed a minimum of seven (7) feet and maximum of ten (10) feet above surrounding grade. If acceptable to the Engineer an existing sign post may be used, otherwise, the Contractor shall be required to install a new 2" post for each sign. Signs shall be maintained in a good condition throughout construction, shall not be bent and shall remain legible to traffic. Any damage shall be repaired by the Contractor. The sign and post installed by the contractor shall be removed at the end of the project and the sign returned to the City.

3.12 COMPLETION AND FINAL INSPECTION

- A. The work shall be so performed, that upon Contract completion, the project shall be ready for use. Included in the work shall be the furnishing of all labor, materials, tools, equipment, and incidentals necessary for completing the work, in accordance with the Contract Documents.

- B. Contractor shall notify the Engineer when the project is completed. Following notification, City representatives will perform a walk through and, if required, develop and list of deficient work items.
- C. Contractor shall then correct all noted deficiencies to the satisfaction of the Engineer, after which a final walk through will be scheduled with City Operation and Maintenance personnel. During the walk through, the City will develop a final punch list of deficient work items and present it to Contractor after the walk through.
- D. Following correction of all deficiencies to the satisfaction of the Engineer, a completion report will be prepared by the Engineer.

3.13 WARRANTY

- A. The term of the Contractor's warranty shall begin upon the date the job is accepted by the City.

**** END OF SECTION ****

SECTION 01110

SUMMARY OF WORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Sump 112 Electrical Improvements project consists of installing new switchgear, motor control centers, PLC system, conduit, control building, concrete, fencing, and all the appurtenances as shown on the plans and in these special provisions. The work shall be in conformance with the plans and specifications hereinafter identified; including furnishing all material, labor, plant, tools, equipment, and services necessary to complete this project.
- B. The City anticipates City Council approval of this project during the spring of 2012. A pre-construction meeting will be held after City Council approval at which time the contractor will be given a Notice to Proceed letter. **This letter will indicate the start date of the project which will be April 30, 2011. No work will be allowed at Sump 112 until April 30, 2012. During this time frame no extra days will be added to the contract for rain days or City holidays. After April 30, 2012 the Contractor may begin with their work at Sump 112 as per the plans and specifications.**
- C. The Contractor is encouraged to order the switchgear and conductors for this project as soon as possible as the production lead time for this gear may be several months.
- D. Sump 112 is a storm drainage pumping facility owned and operated by the City of Sacramento, Department of Utilities and is located at 201 County Place Court.
- E. Portions of the work will involve the following, for which no separate payment will be made, except as provided for in the items of the bid:
1. Mobilization: Supply and transport of construction equipment, materials, supplies, appurtenances, etc., to perform the work.
 2. Demobilization: Demobilization of construction plant and equipment, removal thereof and final cleanup and restoration of the site.
 3. Demolition: Remove and dispose of indicated materials at an approved off-site recycling or disposal facility.
 4. Electrical: Installation of new switchgear, conduit, and conductors.

5. Storage of Materials and Equipment: Provide necessary equipment to unload, and temporarily store materials and equipment, in accordance with the manufacturer's requirements.
6. Miscellaneous: Construction of a concrete house-keeping pad, step, and walkway.
7. Test and make site ready for operation.
8. Coordinate work activities with the City.
9. Provide project supervision and management in order to meet the project schedule.

1.02 BID ITEMS

- A. See "Items of the Proposal" in the Bid Proposal Package of these Contract Documents.

1.03 CONTRACTOR'S BID STRUCTURE AND SCOPE OF THE WORK

- A. Payment for this work will be made on a lump sum basis and/or unit price basis, as indicated in the proposal.
- B. The Scope of Work is defined in the Technical Specifications, the drawings, and the referenced publications that are made a part hereto.
- C. The Contractor shall be reimbursed for all work in the Contract Documents, in accordance with the bid Proposal prepared by the Contractor.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all work involved in each item of the proposal as described in these Specifications, as shown on the drawings and/or as required for a complete and operational facility, shall be considered as included in the bid price and no additional compensation will be made therefor.
- B. Quantities shown on the City's estimate are approximate. The City does not expressly or by implication agree that actual quantity of work will correspond therewith, but reserves the right to increase or decrease quantities of any item or to omit portions of the work as may be deemed necessary or advisable by the City; also to make such alternatives or deviations, additions to, or omissions from the Plans and Specifications as may be determined during progress of work to be

necessary and advisable for proper completion.

- C. The total bid amounts shall include, without limitation, all the work shown on the drawings and as described elsewhere in these Specifications. If a specific activity of work is not called out in the bid proposal, the Contractor shall include the cost for such work in the bid item that is deemed appropriate to the Contractor as indicated in Section 8 of the CSSS.
- D. Progress Payments for the work shall be made as provided in Section 8 of the CSSS.

1.05 WORK NOT INCLUDED

- A. The following work is NOT included in this contract.
 - 1. Work shown, but marked "NIC" (Not In Contract) or shown as Existing (E).
 - 2. Any work otherwise designated to be done by others.

1.06 CONTRACTOR FURNISHED EQUIPMENT AND MATERIALS

- A. All equipment and materials furnished by the Contractor that are to remain a part of the constructed facility shall be new and unused and shall conform to the requirements of these specifications. Where manufactured materials and equipment are specified, the same brand manufacturer for each class of material or equipment shall be used wherever possible.
- B. The manufacturer's warranty shall pass to the City and shall extend for a period of one year after project acceptance by the City.

1.07 POWER DISRUPTIONS

- ~~A. No long term electrical disruptions shall be permitted by the City during Contractor's performance of the work without prior written approval of the City. The Contractor shall furnish, install, and operate all resources required for temporary power. All short term outages necessary for change over to temporary power, to make connection, or other activity shall be scheduled with the City at least three weeks in advance and will be subject to cancellation at any time by the City.~~

1.08 PROSECUTION AND PROGRESS OF THE WORK:

- A. The Contractor shall be responsible for planning, scheduling, and reporting the progress of the work so as to ensure timely completion of the work called for in the contract. The Contractor shall prepare and submit a detailed plan as

specified.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials are specified in these Technical Specifications, and in Sections 10 through 38 of the CSSS.
- B. Submit and obtain approval for all Submittals before commencing fabrications or moving construction materials onto the job site.
- C. All equipment shall be complete, ready for installation, and tested to the satisfaction of the Engineer at the time of acceptance of the work.
- D. Unless specifically excluded in the Contractor's Proposal, all incidental parts which are not shown on the Plans, or specified herein, and which are necessary in order to have complete and operable facilities shall be furnished by the Contractor.
- E. Manufactured articles, material, and equipment shall be applied, installed, connected, erected, adjusted, tested, used, cleaned, and conditioned as recommended by the manufacturer unless specified to the contrary. Copies of the manufacturer's installation instructions and procedures shall be submitted prior to the installation of manufacturer's articles, material, and equipment.
- F. Materials and equipment shall be stored so as to insure the preservation of their quality and fitness for the work. Stores of equipment and materials shall be located to facilitate inspection. The Contractor shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment until the completion of work and final acceptance by the City.
- G. If any material does not conform with these specifications the Contractor shall, within three days after being notified by the Engineer, remove the materials from the project site or storage area.

2.02 MATERIAL PROVIDED BY THE CITY

- A. Equipment that is not specifically identified as being provided by the City will be provided and installed by the Contractor.

2.03 CONTRACTOR ESTIMATES

- A. Contractor shall provide a written estimate for all proposed changes to the work. The estimate shall be on tabular pre-printed estimating sheets. The estimate

shall list all items of deletion and addition to the Contract. Each item shall have material, equipment, and labor units extended and summed. Contractor shall apply the allowable overhead and profit (CSSS 8-16) for a total estimated cost of the proposed change order.

PART 3 - EXECUTION

3.01 CONTRACTOR'S PLANT AND EQUIPMENT

- A. Security: The Contractor shall, at all times, be responsible for the security of their plant and equipment. The City will not take any responsibility for missing or damaged equipment, tools, or personal belongings. The Contractor shall provide temporary security fencing and otherwise provide for the security of the existing facilities. These sites are particularly subject to vandalism. Materials left on-site are at the Contractor's risk and, if lost, at the Contractor's expense. The Contractor shall be responsible for the salvaged materials and equipment owned by the City and removed, or relocated, until the City has taken possession of such materials and equipment.
- B. Workshop and Storage Facilities: The Contractor shall provide storage facilities for the protection from weather of materials and supplies, and shall keep the facilities clean and in proper order at all times. The project site has limited space for a storage yard. Additional property may need to be leased, at the Contractor's expense, for storage facilities. Materials and equipment shall be stored so as to insure the preservation of their quality and fitness for the work and located so as to facilitate inspection. The Contractor shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment, including existing equipment, until completion and final acceptance of the work by the City.
- C. Parking Facilities: Parking areas at the project location are limited for the automobiles used by the Contractor's construction employees and Contractor's own vehicles. A parking area shall be designated by the Contractor and approved by the Engineer.

3.02 CONTRACTOR'S UTILITIES

- A. Electrical Power
 - 1. General: The Contractor shall provide and make arrangements for temporary electric service for all required power and lighting required for the work under this Contract and shall maintain such service until the completion of the work.
 - 2. The Contractor shall attain approval from Tim Giffin of the City of

Sacramento, (916) 808-7997, two (2) working days before installing the new switchgear and motor control centers.

3. ~~Power outage requests shall be made 48 hours in advance and shall be approved by the Engineer before proceeding.~~
- B. Sanitary Facilities: The Contractor shall make arrangements for the maintenance of adequate toilet facilities at, or near, the work site and shall pay the costs thereof.
- C. ~~Temporary Heating: The Contractor shall provide temporary heating, covering, and enclosures, as necessary, to protect all work and material against damage by dampness and cold and to facilitate completion of the work. The Contractor shall supply all the fuel, power, equipment, and materials required for temporary heating.~~

3.03 LANDS PROVIDED BY CITY

- A. Any additional land required for the construction of the work under this Contract, except that already owned by the City, shall be the Contractors responsibility to obtain.

3.04 FIELD ENGINEERING

- A. The Contractor is responsible for determining the exact location of all existing utilities and for the protection of and repair of damage to them. Contact Underground Service Alert at 1-800-227-2600, 48 hours before work is to begin. Contractor shall also contact the City Department of Utilities Plant Services Division, Pete Millino at (916) 808-5173 to identify City underground facilities on site.
- B. The Contractor shall be responsible for the protection of all existing survey monuments or markers during construction.
- C. The Contractor shall be responsible for maintaining As-Built drawings for all underground work throughout the course of construction. Such drawing shall record the location and grade (City Datum) of all underground improvements constructed and shall be delivered to the construction inspector prior to, and, in consideration of the City's acceptance of work.

3.05 SHIPPING AND PROTECTION OF EQUIPMENT

- A. Definition: For the purpose of this paragraph, "equipment" means: all mechanical devices, all electrical devices, all items supplied by the City, all items removed by Contractor for later reinstallation, and all items with one or more

moving parts.

- B. **Packing and Markings:** All equipment shall be adequately and effectively protected against damage from moisture, dust, handling or other cause during transport from manufacturer's or supplier's premises to job site. Each item or package shall be clearly marked with a fitting or distinguishing mark, which shall be shown on the packing list. Stiffeners shall be used, where necessary, to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or sub-assembled units, where possible.
- C. **Identification of Equipment:** Each item of equipment shall have firmly affixed to it a nameplate, label, or tag with its equipment number or other discrete identifying mark.
- D. **Storage of Equipment:** Contractor shall provide storage for equipment for the entire interval between receiving and installation, and for the entire interval between being removed and reinstalled. Equipment shall be stored in a enclosed space affording protection from weather, dust, and mechanical damage and providing favorable temperature, humidity and ventilation conditions, as required, to ensure against equipment deterioration. For equipment that is not intended and prepared for outdoor installation, the storage container shall be heated above dew point temperature.
- E. **Protection of Equipment After Installation:** After installation, all equipment shall be protected, as required. During construction, and until final acceptance by the City, all equipment that may be affected must be completely covered. All equipment shall be cleaned and vacuumed inside and outside prior to acceptance.
- F. **Delivery of Equipment:** City personnel will not accept materials or equipment deliveries for the Contractor.
- G. **Security:** Security of equipment stored by the Contractor is the Contractors responsibility. All losses or damage shall be replaced or repaired at the Contractor's expense.

3.07 TESTING

- A. The City will field test earth work and cast-in-place concrete materials.
- B. **Notification:** As an exception to requirements that may be stated elsewhere in the Contract, the Engineer shall be given two (2) working days notice prior to each test. The Contractor shall perform all other testing, and submit written copies of all test results to the Engineer.

- C. Failure to Meet Test: Any system material or workmanship which is found defective, on the basis of acceptable tests, shall be reported to the Engineer. Contractor shall replace the defective material or equipment and have test repeated until test proves satisfactory to the Engineer, without additional cost to the City.
- D. Operational Testing: Operational testing consists of electrical testing specified in Section 1750, **TESTING, TRAINING AND FACILITY START-UP**.
- E. Demonstration Testing: After all operational tests specified in Section 1750 are satisfactorily completed, the Contractor shall perform a demonstration test.

3.08 SAFETY

- A. Contractor shall execute and maintain all work so as to avoid injury or damage to any person or property. All work shall be done in conformance with the State of California, Division of Industrial Safety and OSHA Standards. Safety precautions, as applicable, shall include, but not be limited to, confined space procedures, adequate fume protection; adequate illumination for underground and night operation; instruction in accident prevention for all employees; such machinery guards, walkways, scaffolds, ladders, bridges, and other safety devices, equipment and wearing apparel as are necessary or lawfully required to prevent accidents or injuries; and the proper inspection and maintenance of all safety measures. Contractor shall have emergency phone numbers and addresses posted on the job site.

3.09 PROTECTION OF EXISTING IMPROVEMENTS

- A. The provisions of this Section shall supplement the provisions of CSSS Section 13.
- B. Existing facilities, utilities, and property shall be protected from damage resulting from the Contractor's operations. All trees, shrubbery, fences, walls, asphalt, and other improvements, including existing pavements, sidewalks, street improvements, and underground utilities, and other improvements not shown on the drawings shall be protected from damage by the Contractor throughout the construction period. Existing roadways and other improved surfaces shall be protected from damage by vehicles with tracks or lugs.
- C. Any damage resulting from the Contractor's operations shall be repaired by the Contractor to the condition which existed prior to the damage, and to the satisfaction of the Engineer, at no additional cost to the City.
- D. The Engineer may deduct from payments otherwise due the Contractor, the estimated cost of repairing any damage created by the Contractors operation,

until such time that repairs are made by the Contractor to the Engineers satisfaction.

- E. The Contractor shall be responsible for unlocking and locking the gates at the project site each work day in order to enter and exit the work area. During the construction period, the Contractor shall be responsible, 24 hours per day, for the security and integrity of existing project facilities, including replacing stolen materials.

3.10 MATERIAL NONCONFORMANCE

- A. If any material does not conform with these Specifications, the Contractor shall, within three (3) days after being notified by the Engineer, remove the materials from the project site or storage area.

3.11 RESTORATION OF STRUCTURES AND SURFACES

- A. Structures, Equipment and Pipework: The Contractor shall remove such existing structures, equipment, and pipework as may be necessary for the performance of the work, and shall rebuild, or replace, the items thus removed in as good a condition as found. Contractor shall repair any existing structures which may be damaged as a result of the work.
- B. Curbs, Gutters, Driveways and Sidewalks: All curbs, gutters, driveways, sidewalks, and similar structures that are broken or damaged by the installation of the work shall be reconstructed by the Contractor. Reconstruction shall be of the same kind of materials with the same finish and in not less than the same dimensions as the original work. Repairs shall be made by removing and replacing the entire portions between joints or scores, and not merely refinishing any damaged part. All work shall match the appearance of the existing improvements, as nearly as possible.
- C. Roads and Streets: All roads and streets in which the surface is removed, broken, or damaged, or in which the ground has caved, or settled, due to work under this Contract, shall be completely resurfaced and brought to the original grade and crown section, unless otherwise indicated. Before resurfacing material is placed, edges of pavements shall be trimmed back far enough to provide clean, solid, vertical faces, and shall be free of any loose material. Roadways used by the Contractor for hauling materials, equipment, supplies, etc., shall be cleaned and repaired if the condition of the roadway is damaged, or otherwise affected, due to the Contractor's operations.
- D. Cultivated Areas and Other Surface Improvements: All cultivated and natural areas, either agricultural or lawns, and other surface improvements which are damaged by actions of the Contractor shall be restored, including roadside

drainage ditches, as nearly as possible, to their original condition.

3.12 EROSION, SEDIMENT, AND POLLUTION CONTROL

A. General

Contractor shall be responsible for controlling erosion and sedimentation within the limits of the project at all times during the course of construction including evenings, weekends and holidays in addition to normal working days. The Contractor shall prevent sediment and construction debris from entering the City of Sacramento storm drain system.

At a minimum, the Contractor shall provide protection around any drain inlets located within the project area and any cross streets which receive runoff from the limits of the construction zone. The Contractor shall also exercise care during trench excavation so that excessive sediments are not tracked into the gutters and ultimately, the storm drain. Upon completion of the project, all areas within the limits of the project shall be cleaned and free of sediments.

The Contractor will not be allowed to clean the sediments from the street by means of using a water truck to spray the streets down into the storm drain via curb and gutter. The streets will be allowed to be sprayed by a water truck only when sediment barriers have been placed at drainage inlets to catch all sediments from the streets. Refer to the City of Sacramento's Administrative and Technical Procedures Manual for Grading, Erosion and Sediment Control dated January 1994, for information relating to sediment control measures and prevention. This Manual is available from the City of Sacramento, Department of Utilities, 1395 35th Avenue, Sacramento, CA 95822.

The Contractor shall prepare and submit to the Engineer for review and approval a drawing showing the placement of sediment control barriers, drop inlet protection, housekeeping practices, CIPP water catchments, and any other measures proposed to be used to prevent sediment and other sources of pollution from entering the City storm drainage system. The erosion, sediment and pollution control plan shall be submitted a minimum of ten (10) calendar days prior to start of the work. The Contractor will not be allowed to begin work until an approved erosion, sediment and pollution control plan is on file with the Engineer. (Revised 5\30\96)

B. Housekeeping Practices

Contractor shall, during the construction of this project, implement, at a minimum, the following housekeeping practices: solid waste management, material storage and delivery area, concrete waste management, and spill prevention and control.

Solid Waste Management: Contractor shall maintain a clean construction site. Contractor shall provide designated areas for waste collection. The waste

collection areas shall be leak-proof containers with lids or covers. Site trash shall be collected daily and placed in the disposal containers. The Contractor shall make arrangements for regular waste collection. The Contractor shall also regularly inspect the waste disposal areas to determine if potential pollutant discharges exist.

Material Storage and Delivery Area: Contractor shall provide one central material storage and delivery area for the duration of the project. This area shall be fenced and protected such that runoff will not be allowed to leave the material storage area. The Contractor shall regularly inspect the site to ensure that any hazardous or non-hazardous materials have not spilled.

Concrete Waste Management: The Contractor shall arrange for concrete wastes to be disposed of off-site or in one designated area. Concrete wastes, including left-over concrete and material from washing out the concrete truck, shall not be disposed to the storm drain system. If a designated area is provided, the site shall be bermed to allow the concrete to dry. The dried concrete waste shall be removed and disposed of properly at the Contractor's expense.

Spill Prevention and Control: The Contractor shall be responsible for instructing employees and sub-contractors about preventing spills of hazardous materials and controlling spills if they occur. Proper spill control and cleanup materials shall be kept on site near the storage area and updated as materials change on site.

More information about Housekeeping Practices can be obtained by referring to the City of Sacramento's Administrative and Technical Procedures Manual for Grading, Erosion and Sediment Control dated January 1994, available at 1395 35th Avenue, Sacramento, CA 95822. (Revised 5/30/96)

C. **Dewatering**

Groundwater levels in the project area fluctuate with the water level of the adjacent creeks and downstream rivers. The Contractor shall be responsible for the control, removal, and disposal of any groundwater that may be encountered in the course of excavating, trenching, placing pipe, or constructing any other improvements associated with the project. Any water containing chlorine or sediments shall not be discharged to the City storm drain system unless the water is free from such constituents. No separate payment will be made to the Contractor for dewatering.

D. **Dust Control**

Contractor shall be responsible for the control of dust within the limits of the project at all times including weekends and holidays in addition to normal working days. The Contractor shall take whatever steps are necessary or required by the Engineer to eliminate the nuisance of blowing dust.

Contractor shall keep all streets as well as all grounds adjacent to the project site clean and free of dust, mud, and debris resulting from the Contractor's operations. Daily clean up throughout the project shall be required as the Contractor progresses with the work. Extra precautions and clean up efforts shall be made prior to weekends and holidays.

Spillage of earth, gravel, concrete, asphalt, or other materials resulting from hauling operations along or across any public traveled way shall be removed immediately by the Contractor at his expense.

No separate payment will be made to the Contractor for dust control. The cost of such work shall be included in whatever bid item the Contractor deems appropriate.

3.13 CONSTRUCTION INSPECTIONS

- A. Unless otherwise directed, Contractor shall contact the Utility Department Construction Section at (916) 808-1411 two (2) working days in advance to schedule construction inspections.

****END OF SECTION****

Bill Zehnder

To: Michelle Carrey
Cc: Dan Sherry
Subject: Folsom Water Main - Pipe Restraint
Attachments: 201182386190.BRO-009 TR FLEX.pdf

Michelle

I have enclosed the TR Flex manual for your use. On page 21 of the manual it indicates that the 14 inch diameter TR Flex joint can deflect $3\frac{1}{4}$ degrees. Another issue to consider is how will they transition from DIP to Welded Steel. Also need to make sure if the pipe diameters of DIP and steel are different so it may cause turbulence, then it needs to be the proper number of diameters away from the meter to ensure accuracy of the meter.

Let me know if you have any questions.

Bill

SECTION 01330

SUBMITTALS

PART 1 - GENERAL

1.01 STANDARD COMPLIANCE

- A. When materials or equipment must conform to the standards of organizations such as, but not limited to, the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL) documents showing, or proving, conformance shall be submitted.
- B. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual Sections. In lieu of the label or listing, the Contractor shall submit a certificate from an independent testing organization, which is competent to perform acceptable tests, and is approved by the City. The certificate shall state that the item has been tested in accordance with the specified organization's standard. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product, and the referenced standard and shall state that the manufacturer certifies that the product conforms to all requirements of the project Specification and of the referenced standards listed.

1.02 REVIEW OF CONTRACTOR'S INFORMATION

- A. When review and checking for acceptance is required of any drawing, or information regarding materials and equipment, the Contractor shall prepare or secure, and submit for review, four (4) copies. The Engineer, after taking appropriate action, will return two (2) marked copies to the Contractor.

Within a reasonable time after receipt of said submittal copies, the Engineer will return the marked copies indicating one of the following four (4) actions:

1. If review and checking indicates no exceptions, copies will be returned marked "NO EXCEPTIONS TAKEN" and work may begin immediately on incorporating the material and equipment covered by the submittal into the work.
2. If review and checking indicates limited corrections are required, copies will be returned marked "MAKE CORRECTIONS NOTED". Work may begin immediately on incorporating into the work the material and equipment covered by the corrected submittal.
3. If review and checking indicates insufficient, or incorrect data, has been submitted, copies will be returned marked "REVISE AND RESUBMIT". No work may begin on incorporating the material and equipment covered by this submittal

into the work until the submittal is revised, resubmitted, and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".

4. If review and checking indicates the material and equipment submittal is unacceptable, copies will be returned marked "REJECTED". No work may begin on incorporating the material and equipment covered by this submittal into the work until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".
- B. Approval of the submittal by the Engineer shall not relieve the Contractor from responsibility for any errors or omissions in such submittals nor from responsibility for complying with the requirements of this Contract.
 - C. If Shop Drawings show variations from Contract requirements, Contractor shall describe such variations in writing, separate from the drawings, at time of submission. All such variations must be approved by the Engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURER'S DATA

- A. Submittals for each manufactured item shall be comprised of manufacturer's descriptive literature, drawings, diagrams, performance and characteristic curves, and catalog cuts. Manufacturer's name, trade name, model or catalog number, nameplate data, size, layout dimensions, capacity, project specification references, and any other additional information necessary to establish contract compliance shall be clearly indicated for each item submitted. Contractor shall identify items submitted for approval using an arrow or yellow highlighter. All submittals that fail to properly identify items will be returned to the Contractor.

2.02 SHOP DRAWINGS

- A. Shop Drawings shall show types, sizes, accessories, elevations, floor plans, sectional views, installation details, elementary control diagrams, and wiring diagrams. Wiring diagrams shall identify circuit terminals and shall indicate the internal wiring for each item of equipment. Drawings shall also indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. If any equipment is disapproved, the drawings shall be revised to show acceptable equipment and be resubmitted. **Contractor shall provide a hard copy and electronic copy of all shop drawings. The electronic copies shall be in Adobe format (Portable Document Format) and shall be provided on a CD. Contractor shall use latest version of Adobe.**

2.03 OPERATION AND MAINTENANCE MANUAL

- A. Submit an operation and maintenance manual covering the stipulated systems and equipment. Three (3) approved copies of the manual, bound in Avery D - Ring binder model number AVY79-799 or approved equal, shall be furnished to the City. **One (1) of the three copies of the operation and maintenance manual shall contain original documentation/manuals and not photocopies.** Each binder shall be no more than 75% full. Prior to system and equipment tests, one (1) complete, bound copy of the manual shall be submitted for approval. Three (3) approved copies of the manual each

for this project, with all applicable test forms completed, shall be furnished to the City before completion of the Contract. The following identification shall be inscribed on the cover and spine of the binders:

Operation and Maintenance Manual — Electrical Switchgear
Project: Sump 112 Electrical Improvements
Contractor: _____
Contract No.: _____
Date: _____

The contractor shall also provide the City with an electronic copy of each O&M manual. The electronic copies shall be in Adobe format (Portable Document Format) and shall be provided on a CD. Contractor shall use the latest version of Adobe.

- B. Provide a table of contents and tab sheets to identify discrete subjects. Instruction sheets shall be legible and easily understood with large sheets and drawings folded in. Use manufacturer's original pre-printed instructions when available, do not xerox these pre-printed instructions. Cross out all material which does not apply to the equipment furnished on this job.
- C. The operating and maintenance instruction shall include, as a minimum, the following data for each item of mechanical and electrical equipment:
1. Name and location of the manufacturer, the manufacturer's local representative, the nearest supplier and spare parts warehouse.
 2. Approved submittals applicable to operation and maintenance.
 3. Recommended installation, adjustment, start-up, calibration, and troubleshooting procedures.
 4. A control sequence describing start-up, operation, and shutdown
 5. Detailed description of the function of each principal component of the systems.
 6. Recommended lubrication and an estimate of yearly quantity needed.
 7. Recommended step-by-step procedures for all modes of operation.
 8. Complete internal and connection wiring diagrams.
 9. Complete printed circuit board schematic and assembly drawings.
 10. Recommended preventive maintenance procedures and schedule.
 11. Complete parts lists, by generic title and identification number, with exploded views of each assembly.
 12. Recommended spare parts.
 13. Disassembly, overhaul, and reassembly instructions.

- 14. All completed test forms.
 - 15. Provide ISA (International Society for Measurement and Control) S-20 forms for all instrumentation devices.
 - 16. As built single line drawings of the entire electrical system including motor control drawings of each motor. Autocad files of both single line and motor control drawings on a CD.
- D. Contractor is not required to provide manuals for equipment supplied by the City. However, any manuals provided to the Contractor by the City shall be returned in a condition acceptable to the Engineer, or replaced at no cost to the City.

2.04 PROJECT RECORD DRAWINGS

- A. The Contractor shall maintain a neatly and accurately marked set of record drawings showing the elementary control diagrams, wiring diagrams, and final locations and layout of all mechanical, electrical, and instrumentation equipment; piping and conduit; structures; and other facilities. Drawings shall be kept current weekly, with all work instructions and change orders; mechanical, electrical, and instrumentation equipment accommodations; and construction adjustment. Drawings shall be subject to the inspection of the Engineer at all times, and progress payments, or portions thereof, may be withheld if drawings are not accurate and current. Prior to acceptance of the work, the Contractor shall deliver to the Engineer two (2) sets of neatly marked record drawings, accurately showing all the information required above.

PART 3 - EXECUTION

3.01 SUBMITTAL PROCEDURE

- A. At least thirty (30) days prior to the Contractors need for approval, Contractor shall forward to the Engineer all submittals required by the individual Sections of the Specifications. The Engineer may require that the Contractor submit a legible reproducible mylar for the City's use in lieu of multiple prints of a single drawing.
- B. Identify all submittals by submittal number on letter of transmittal. Specification number shall be identified on the letter of transmittal. Submittals shall be numbered consecutively and resubmittals shall have a letter suffix. For example:
 - 1. 1st submittal: 2
 - 2. 1st resubmittal: 2A
 - 3. 2nd resubmittal: 2B, etc.

3.02 INFORMATION TO BE SUBMITTED FOR REVIEW

- A. Information on items to be submitted for review are specified in the individual Sections of these Specifications. Submittals for each Section shall be bound together in one book. Book shall have numbered tab dividers for each item. Submittals that are related to, or affect, each other shall be forwarded simultaneously as a package to facilitate coordinated review. Uncoordinated submittals will be rejected. Do not combine unrelated materials in the same submittal. Submittals shall be arranged in same order

as they appear in the Specification Section. Items shall be highlighted and clearly marked with the same identification number as indicated on the drawings. The Contractor shall include submittal time appropriate within each item of work on the Construction Schedule. The City will receive submittals at the preconstruction meeting as specified in Section 01105, General Information and Requirements.

**** END OF SECTION ****

SECTION 01420

ABBREVIATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Abbreviations and meanings. Refer to the Drawings for additional abbreviations.

1.02 INTERPRETATIONS

- A. Interpret abbreviations by context in which abbreviations are used.

1.03 ABBREVIATIONS

A. Association and Reference Standard abbreviations:

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ABC	Associated Air Balance Council
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ADC	Air Diffusion Council
AFBMA	Anti-Friction Bearing Manufacturers' Association, Inc.
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects
AIMA	Acoustical and Insulating Materials Association
AISC	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
AMG	Arizona Masonry Guild
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
ARI	Air Conditioning and Refrigeration Institute
ASAHC	American Society of Architectural Hardware Consultants
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute

AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWSC	American Welding Society code
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
BSI	Building Stone Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPSC	U.S. Consumer Product Safety Commission
CRA	California Redwood Association
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards
CSI	Construction Specifications Institute
CSSS	City of Sacramento Standard Specifications
CTI	Ceramic Tile Institute
DHI	Door and Hardware Institute
EIFS	Exterior Insulation and Finish System
EJCDC	Engineers Joint Contract Documents Committee
FGMA	Flat Glass Marketing Association
FIA	Factory Insurance Association
FM	Factory Mutual
FS	Federal Specifications
FTI	Facing Tile Institute
GA	Gypsum Association
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MS	Military Specifications
NAAMM	National Association of Architectural Metal Manufacturers
NAPA	National Asphalt Pavement Association
NBHA	National Builders Hardware Association
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NETA	International Electrical Testing Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NIST	National Institute of Standards and Technology
NMWIA	National Mineral Wood Insulation Association
NPCA	National Paint and Coatings Association
NRCA	National Roofing Contractors Association
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturer's Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

PDCA	Paint and Decorating Contractors of America
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
PS	Product Standard
RTI	Resilient Tile Institute
SAE	Society of Automotive Engineers
SCPA	Structural Clay Products Association
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
TCA	Tile council of America
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USDA	United States Department of Agriculture
VA	Vermiculite Association
WCLA	West Coast Lumberman's Association
WCLIB	West Coast Lumberman's Inspection Bureau
WPA	Western Pine Association
WPOA	Western Plumbing Officials Association
WRC	Welding Research Council
WSCPA	Western States Clay Products Association
WWPA	Western Wood Products Association

B. Miscellaneous Abbreviations:

a	year or years (metric unit)
A	Ampere or amperes
am	ante meridian (before noon)
ac	alternating current
ac-ft	acre-foot or acre-feet
atm	atmosphere
AWG	American Wire Gauge
bbl	barrel or barrels
bd	board
bhp	brake horsepower
bil gal	billion gallons
BOD	biochemical oxygen demand
Btu	British thermal unit or units
Btuh	British thermal unit per hour
bu	bushel or bushels
C	degrees Celsius
Cal	calorie or calories
cap	capita
cd	cabdeka or cabdekas
cfm	cubic feet per minute
Ci	curie or curies

cm	centimeter or centimeters
cmu	concrete masonry unit
CO	carbon monoxide
Co.	Company
CO ₂	carbon dioxide
COD	chemical oxygen demand
Corp.	Corporation
counts/min	counts per minute
cu	cubic
cu cm	cubic centimeter or centimeters
cu ft	cubic foot or feet
cu ft/day	cubic feet per day
cu ft/hr	cubic feet per hour
cu ft/min	cubic feet per minute
cu ft/sec	cubic feet per second
cu in	cubic inch or inches
cu m	cubic meter or meters
d	day (metric units)
day	day (English units)
db	decibels
DB	dry bulb (temperature)
dc	direct current
diam	diameter
DO	dissolved oxygen
DS	dissolved solids
emf	electromotive force
fpm	feet per minute
F	degrees Fahrenheit
ft	feet or foot
fc	foot-candle or foot candles
ft/day	feet per day
ft/hr	feet per hour
ft/min	feet per minute
ft/sec	feet per second
g	gram or grams
G	gravitational force
gal	gallon or gallons
gal/day	gallons per day
gal/min	gallons per minutes
gal/sec	gallons per second
g/L	grams per liter
gpd	gallons per day
gpd/ac	gallons per acre per day
gpd/cap	gallons per day per capita
gpd/sq ft	gallons per day per square foot
gph	gallons per hour
gpm	gallons per minute
gps	gallons per second
h	hour or hours (metric unit)

ha	hectare or hectares
hp	high point
hp	horse power
hp-hr	horse power-hour or horse power-hours
hr	hour or hours (English units)
Hz	hertz
ID	inside diameter
Ihp	indicated horsepower
Inc.	Incorporated
in.	inch, inches
in./sec	inches per second
J	joule or joules
JTU	Jackson turbidity unit or units
k	kips
K	kelvin
K	thermal conductivity
kcal	kilocalorie or kilocalories
kcmil	thousand circular mils
kg	kilogram or kilograms
km	kilometer or kilometers
kN	kilonewton or kilonewtons
kPa	kilopascal or kilopascals
ksi	kips per square inch
kV	kilovolt-ampere or kilovolt-smperes
kW	kilowatt or kilowatts
L	liter or liters
lb/1000 cu ft	pounds per thousand cubic foot
lb/acre-ft	pounds per acre-foot
lb/ac	pounds per acre
lb/cu ft	pounds cubic foot
lb/day/cu ft	pounds per day per cubic foot
lb/day/acre	pounds per day per acre
lb/sq ft	pounds per square foot
lin	linear, lineal
LF	linear foot or feet
lm	lumen or lumens
log	logarithm (common)
ln	logarithm (natural)
lx	lux
m	meter or meters
M	molar (concentrations)
mA	milliampere or milliamperes
max	maximum
mCi	millicurie or millicuries
meq	milliequivalent
uF	microfarad or microfarads
MFBM'	thousand feet board measure
mg	milligram or milligrams
mgd/ac	million gallons per day per acre

mgd	million gallons per day
mg/L	milligrams per liter
mg/L	parts per million
ug/L	micrograms per liter
um	micrometer or micrometers
MG	million gallons
min	minimum
min	minute or minutes
MLSS	mixed liquor suspend solids
MLVSS	mixed liquor volatile suspended solids
mm	millimeter or millimeters
mol wt	molecular weight
mol	mole
Mpa	megapascal or megapascals
mph	miles per hour
MPN	most probable number
mR	milliroentgen or milliroentgens
Mrad	megarad or megarads
mV	millivolt or millivolts
MW	megawatt or megawatts
N	newton or newtons
No.	number
Nos.	numbers
NRC	noise reduction coefficient
OC	on center
OD	outside diameter
ORP	oxidation-reduction potential
OT	ortho-tolidine
OTA	ortho-tolidine-arsenite
oz	ounce or ounces
oz/sq ft	ounce per square foot
Pa	pascal or pascals
pl	plate or property line
pm	post meridian (afternoon)
ppb	parts per billion
ppt	parts per thousand
pr	pair
psf/hr	pounds per square foot per hour
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PVC	polyvinyl chloride
qt	quart or quarts
R	radius
R	roentgen or roentgens
rad	radiation absorbed dose
RH	relative humidity
rpm	revolutions per minute
rps	revolutions per second

s	second (metric units)
S	Siemens (mho, or inverse ohm)
SDI	sludge density index
SI	International System of Units
sp	static pressure
sp gr	specific gravity
sp ht	specific heat
sq	square
cm ² or sq c	square centimeter or centimeters
sq ft	square feet or foot
sq in	square inch, square inches
km ² or sq km	square kilometer or kilometers
m ² or sq m	square millimeter or millimeters
sq yd	square yard or yards
SS	suspended solids
STC	Sound Transmission Class
SVI	sludge volume index
TDS	total dissolved solids
TKN	total Kjeldahl nitroen
TLM	median tolerance limit
TOC	total organic carbon
TOD	total oxygen demand
TOW	top of weir
TS	total solids
TSS	total suspended solids
TVS	total volatile solids
U	U factor
U	Coefficient of Heat Transfer
U	heat transfer coefficient
US	United States
V	volt or volts
VA	volt-ampere or volt-amperes
W	watt or watts
WB	wet bulb
wg	water gauge
wk	week or weeks
wt	weight
yd	yard or yards
yr	year or years (English unit)

PART 2 - PRODUCS

NOT USED

PART 3 - EXECUTION

NOT USED

****END OF SECTION****

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Requirements Included:

1. Heat, Ventilation
2. Sanitary Facilities
3. Cleaning During Construction
4. Removal
5. Security
6. Safety
7. Noise Control

B. Related Requirements:

1. Section 01770: Contract Closeout: Final Cleaning.

1.02 HEAT, VENTILATION

- A. Provide as required to maintain specified conditions for construction operations, to protect materials and finishes from damage due to temperature or humidity.
- B. Prior to operation of permanent facilities for temporary purposes, verify that installation is approved for operation, and that filters are in place. Provide and pay for operation, maintenance, and utilities.
- C. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

1.03 SANITARY FACILITIES

- A. Sanitary Facilities: The Contractor shall make arrangements for the maintenance of adequate toilet facilities at or near the work site and shall pay the costs thereof.

1.04 CLEANING DURING CONSTRUCTION

- A. Control accumulation of waste materials and rubbish; periodically dispose of off-site in a location approved by the Engineer.
- B. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

1.05 REMOVAL

- A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations to a depth of two (2) feet, grade site as indicated. Restore existing facilities used during construction to specified, or to original, condition.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 CONTRACTOR'S PLANT AND EQUIPMENT

- A. **Security:** The Contractor shall be responsible for the security of his plant and equipment at all times. The City will not take responsibility for missing or damaged equipment, tools or personal belongings.
- B. **Workshop and Storage Facilities:** The Contractor shall provide storage facilities for the protection from weather materials and supplies and shall keep the facilities clean and in proper order at all times.
- C. **Parking Facilities:** Parking areas at the project location for the vehicles used by the Contractor's construction employees and his own vehicles shall be as approved by the Engineer.

3.02 GENERAL AND TRENCH SAFETY

- A. The Contractor shall execute and maintain his work so as to avoid injury or damage to any person or property. All work shall be done in conformance with the State of California Division of Industrial Safety and OSHA Standards. Safety precautions, as applicable, shall include, but not be limited to, adequate fume protection; adequate illumination for underground and night operations; instructions in accident prevention for all employees; such machinery guards, walkways, scaffolds, ladders, bridges, and other safety devices, equipment and wearing apparel as are necessary or lawfully required to prevent accidents or injuries, and the proper inspection and maintenance of all safety measures. Contractor shall have emergency phone numbers and addresses posted on the job site.
- B. Trench safety shall conform to the provisions of Section 6705 of the Labor Code of the State of California.

- C. Excavation for any trench five (5) feet or more in depth shall not begin until the City has received the Contractor's detailed plan for worker protection from the hazards of caving ground during the excavation of such trench. Such plan shall be submitted at least five (5) days before the Contractor intends to begin excavation for the trench and shall show the details of the design of shoring, bracing, sloping or other provisions to be made for worker protection during such excavation. No such plan shall allow the use of shoring, sloping or a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety, and if such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an Engineer who is registered as a Civil or Structural Engineer in the State of California.
- D. Contractor shall obtain, pay for, and comply with all provisions of the permit required by Section 6500 of the California Occupational Safety and Health Act of 1973.

3.03 NOISE CONTROL

- A. Conform to City of Sacramento's Noise Ordinance. Section 66.203 of the ordinance exempts construction noise from the quantitative limits if the construction occurs between 7:00 am and 6:00 pm, Monday through Saturday, and/or between 9:00 am and 6:00 pm Sunday; Operation of internal combustion engines is not exempt pursuant to this subsection if engines are not equipped with suitable exhaust and intake silencers.

**** END OF SECTION ****

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Requirements Included:

1. Products.
2. Transportation and Handling.
3. Storage and Protection.
4. Substitutions and Product Options.

B. Related Requirements:

1. Section 01330: Submittals: Submittal of Manufacturers' Certificates.

1.02 QUALITY ASSURANCE

- A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.**

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Manufacturer's Recommendations:

1. Except as otherwise approved by the Engineer, determine and comply with manufacturer's recommendations on product handling, storage and protection.
 - a. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - b. Promptly remove damaged materials and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the City.
2. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality, and other pertinent information.

3. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.04 JOB CONDITIONS

A. Storage and Protection:

1. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
2. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
3. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.
4. After installation, provide coverings to protect products from damage from traffic and construction operations, remove when no longer needed.
5. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

B. Repairs and Replacements:

1. In event of damage, promptly make replacements and repairs to the approval of the Engineer and at no additional cost to the City.
2. Additional time required to secure replacements and to make repairs will not be considered to justify an extension in the Contract Time of Completion.

1.05 ALTERNATIVES

A. Product Options:

1. Within ten (10) days after date of Contract, submit complete list of major products proposed, with name of manufacturer, trade name, and model.
2. Options:
 - a. Products Specified by Reference Standards or by Description Only:
Any product meeting those standards.
 - b. Products Specified by Naming One (1) or More Manufacturers with

a Substitute Paragraph: Submit a request for substitution for any manufacturer not specifically named.

- c. Products Specified by Naming Several Manufacturers: Products of named manufacturers meeting specifications; no options, no substitutions allowed.
- d. Products Specified by Naming Only One (1) Manufacturer: No options, no substitutions allowed.

B. Substitutions:

1. Within ten (10) calendar days after date of Contract, Contractor shall submit requests to the Engineer for consideration of substitutions.
2. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
3. Request constitutes a representation that Contractor:
 - a. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
 - b. Will provide the same warranty for substitution as for specified product.
 - c. Will coordinate installation and make other changes that may be required for Work to be complete in all respects.
 - d. Waives claims for additional costs that may subsequently become apparent.
4. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.
5. Engineer will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.
6. The Engineer can, at his option, require as a condition of acceptance of a substitution that the Contractor provide a credit to the City for the difference in cost of product(s) or components, or systems proposed as a substitution.

7. If, upon Engineer's review of a substitution, it is determined by the Engineer that the substitution is not acceptable, for whatever reason, the Contractor shall supply the specified product or products.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 SHIPPING AND PROTECTION OF EQUIPMENT

- A. Definition: For the purpose of this article, "equipment" means all mechanical devices, all electrical devices, all electronic devices, and all items with one or more moving parts.
- B. Packing and Marking: All equipment shall be adequately and effectively protected against damage from moisture, dust, handling or other cause during transport from manufacturer's or supplier's premises to site. Each item or package shall be clearly marked with a fitting or distinguishing mark that shall be shown on the packing lists. Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or sub-assembled units where possible.
- C. Identification of Equipment: Each item of equipment shall have firmly affixed to it a nameplate, label or tag with its equipment number or other discrete identifying mark.
- D. Storage of Equipment: The equipment shall remain in its shipping package until installation.
- E. Protection of Equipment After Installation: After installation, all equipment shall be protected as required. During construction, including finishing, all equipment that may be affected must be completely covered.
- F. Delivery of Equipment: City personnel will not accept materials or equipment deliveries for the Contractor.
- G. Security: Security of equipment stored by the Contractor is his responsibility. All losses or damage shall be replaced or repaired at the Contractor's expense.

**** END OF SECTION ****

SECTION 01750

TESTING, TRAINING, AND FACILITY START-UP

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Equipment and system testing and start-up, services of manufacturer's representatives, training of City personnel, and final testing requirements for the completed facility.

1.02 CONTRACT REQUIREMENTS

- A. Testing, training, and start-up are requisite to the satisfactory completion of the Contract. Complete testing, training, and start-up within the Contract Time. Allow realistic time frame for testing, training, and start-up activities. Furnish labor, power, chemicals, tools, equipment, instruments, and services required for and incidental to completing functional testing, performance testing, and operational testing. Provide competent, experienced technical representatives of equipment manufacturers for assembly, installation and testing guidance, and operator training.

1.03 START-UP PLAN

- A. Submit start-up plan for each piece of equipment and each system not less than three (3) weeks prior to planned initial equipment or system start-up.
 - 1. Provide detailed information and schedule for the following activities:
 - a. Manufacturer's services
 - b. Installation certifications
 - c. Operator training
 - d. Completion of Operation and Maintenance Manual
 - e. Functional testing
 - f. Performance testing
 - g. Operational testing
- B. Provide testing plan with test logs for each item of equipment and each system when specified. Include testing of alarms, control circuits, capacities, speeds, flows, pressures, vibrations, sound levels, and other parameters.
- C. Provide summary of shutdown requirements for existing systems which are necessary to complete start-up of new equipment and systems.
- D. Revise and update start-up plan based upon review comments, actual progress, or to accommodate changes in the sequence of activities.

1.04 PERFORMANCE TESTING

- A. Test equipment for proper performance at point of manufacturer of assembly when specified.
- B. When Source Quality Control Testing is Specified:
 - 1. Demonstrate equipment meets specified performance requirements.
 - 2. Provide certified copies of test results.
 - 3. Do not ship equipment until certified copies have received written acceptance from Engineer. Written acceptance does not constitute final acceptance.

1.05 GENERAL START-UP AND TESTING PROCEDURES

- A. Mechanical Systems:
 - 1. Remove rust preventives and oils applied to protect equipment during construction.
 - 2. Flush lubrication systems and dispose of flushing oils. Recharge lubrication system with lubricant recommended by manufacturer.
 - 3. ~~Flush fuel system and provide fuel for testing and start-up.~~
 - 4. Install and adjust packing, mechanical seals, O-rings, and other seals. Replace defective seals.
 - 5. Remove temporary supports, bracing, or other foreign objects installed to prevent damage during shipment, storage, and erection.
 - 6. Check rotating machinery for correct direction of rotation and for freedom of moving parts before connecting driver.
 - 7. Perform cold alignment and hot alignment to manufacturer's tolerances.
 - 8. ~~Adjust v-belt tension and variable pitch sheaves.~~
 - 9. Inspect hand and motorized valves for proper adjustment. Tighten packing glands to insure no leakage, but permit valve stems to rotate without galling. Verify valve seats are positioned for proper flow direction.
 - 10. ~~Tighten leaking flanges or replace flange gasket. Inspect screwed joints for leakage.~~
 - 11. ~~Install gratings, safety chains, handrails, shaft guards, and sidewalks prior to operational testing.~~
- B. Electrical Systems: As specified in Division 16.
- C. Instrumentation Systems: As specified in Division 17.

1.06 FUNCTIONAL TESTING

- A. Functionally test mechanical and electrical equipment for proper operation after general start-up and testing tasks have been completed.
- B. Verify compatibility of new equipment with existing: Demonstrate proper rotation, alignment, speed, flow, pressure, vibration, sound level, adjustments, and calibration.
- C. Perform initial checks in the presence of and with the assistance of manufacturer's

representative.

- D. Demonstrate proper operation of each instrument loop function as specified in Division 17.
- E. Unless otherwise approved by the Engineer, conduct continuous eight (8) hour test under full load conditions. Replace parts which operate improperly.

1.07 CERTIFICATION OF PROPER INSTALLATION

- A. At completion of functional testing, furnish written report prepared and signed by manufacturer's authorized representative, certifying equipment:
 - 1. Has been properly installed, adjusted, aligned, and lubricated.
 - 2. Is free of any stresses imposed by connections or anchor bolts.
 - 3. Is suitable for satisfactory full-time operation under full load conditions.
 - 4. Operates within the allowable limits for vibration.
 - 5. Controls, protective devices, instrumentation, and control panels are properly installed, calibrated, and functioning, as designed.
 - 6. Control logic for start-up, shutdown, sequencing, interlocks, and emergency shutdown have been tested and are functioning, as designed.
- B. Co-sign the reports along with the manufacturer's representative and subcontractor.

1.08 TRAINING OF OWNER'S PERSONNEL

- A. Provide at least four (4) hours of training, at agreed upon times, to designated Owners personnel in operation, adjustment, and maintenance of products, mechanical, electrical, instrumentation equipment, and installed items. Utilize manufacturer's representatives to conduct training sessions.
- B. Provide Operation and Maintenance Manual for specific pieces of equipment or systems two (2) weeks prior to training session for that piece of equipment or system.
- C. Satisfactorily complete functional testing before training Owner's personnel.
- E. Schedule training sessions during the hours of Monday – Friday: 7 a.m. – 12 p.m.; and/or 1 p.m.-3:30 p.m.

1.09 OPERATIONAL TESTING

- A. Conduct operational test of the entire facility after completion of operator training. Demonstrate satisfactory operation of equipment and systems in actual operation. Conduct operational test for continuous seven (7) day period.
- B. Immediately correct defects in material, workmanship, or equipment which became evident during operational test.
- C. Repeat operational test when malfunctions or deficiencies cause shutdown or partial operation of the facility or results in performance that is less than specified.

1.10 RECORD KEEPING

- A. Maintain and submit following records generated during start-up and testing phase of project:
1. Daily logs of equipment testing identifying all tests conducted and outcome.
 2. Logs of time spent by manufacturer's representatives performing services on the job site.
 3. ~~Equipment lubrication records.~~
 4. Electrical and instrumentation test results as required in Divisions 16 and 17.

**** END OF SECTION ****

SECTION 01770
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Requirements Included:
1. Close Out Procedures.
 2. Final Cleaning.
 3. Project Record Documents.
 4. Systems Demonstration.

1.02 CLOSEOUT PROCEDURES

- A. Contractor shall notify the Engineer when the project is completed after which City representatives will perform a walk through and develop a list of deficient work items.
- B. Contractor shall then correct all noted deficiencies to the satisfaction of the Engineer after which City Operation and Maintenance representatives will perform a final walk through and submit to the Contractor a final list of deficient work items.
- C. Contractor shall then correct all additional deficiencies to the satisfaction of the Engineer after which a completion report will be prepared by the Engineer.

1.03 FINAL CLEANING

- A. Execute prior to final inspection.
- B. Clean all interior and exterior surfaces; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces. Clean equipment and fixtures to a sanitary condition, clean or replace filters on mechanical equipment. Clean roofs, gutters, downspouts, and drainage systems of any debris. Vacuum inside switchgear.
- C. Clean site; sweep paved areas, rake clean other surfaces.
- D. Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the site.

1.04 PROJECT RECORD DOCUMENTS

- A. Store documents separate from those used for construction.
- B. Keep documents current; do not permanently conceal any work until required

information has been reviewed and recorded.

- C. At Contract closeout, submit documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

1.05 SYSTEMS DEMONSTRATION

- A. Prior to final inspection, demonstrate operation of each system and the entire system to Engineer and City's maintenance staff and instruct City's personnel in operation, adjustment and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction in accordance with Section 01750.

1.06 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, and maintenance materials in quantities specified in each section, in addition to that required for completion of Work including a full set of replacement fuses for all electrical equipment. Coordinate with the Engineer, deliver to Project site and obtain receipt prior to final payment.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

- A. Contractor shall complete all punch list items prior to completing the work identified in this section.

**** END OF SECTION ****

SECTION 01920

TEMPORARY PUMPING SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

- A. **Scope of Work:** The Contractor shall furnish all labor, materials, equipment and incidentals necessary to maintain the existing drainage flow during construction of the pump station. In addition, the Contractor shall be responsible for maintaining power and controls to all pumps and motors. It shall be the Contractor's sole responsibility to insure that the drainage flow is maintained throughout the duration of the contract except during the period when the existing SMUD transformer is removed and the new transformer is installed.

1.02 REFERENCE PUBLICATIONS

NOT USED

1.03 SUBMITTALS

- A. Submit for approval at least 7 days before starting work:
1. Temporary pumping facilities schematic drawing.
 2. Materials list.
 3. Proposed controls for the existing pumps.
 4. Proposed method of supplying electrical power to the existing motors/pumps.
- B. The above submittals will be reviewed in accordance with Section 01330 - SUBMITTALS. No work shall be undertaken by the Contractor until approval by the Engineer is obtained.
- C. The Contractor shall submit a written plan, to the Engineer, detailing how the existing electrical equipment will be kept operational during the construction period. The plan shall show how all pumps will be kept operational during the construction period. The Contractor shall submit these plans within 2 weeks of receiving the Notice to Proceed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The Contractor shall provide all the materials as specified in these specifications in order to keep the sump operational at all times and as directed by the Engineer.

PART 3 EXECUTION

3.01 EXISTING CONDITIONS

- A. Sump 112 is currently supplied with electrical power from an existing pad mounted SMUD transformer as shown on the Plans. The secondary voltage is 480/277 VAC, 4 wire. ~~The Contractor may elect to use the existing SMUD transformers for temporary power of the switchgear.~~

3.02 TEMPORARY ELECTRICAL SITE PLAN

- A. The Contractor shall relocate the existing control building and switchgear to a new location within the facility. The contractor shall install temporary conduit and conductors to power the existing switchgear, PLC, motors, and trash rack motors in order to make the facility fully operational. In addition, the Contractor shall reconnect both SCADA antennas to each radio using the existing conduits and installing new antenna cables and temporary conduits.
- B. The Contractor shall make all necessary arrangements for keeping all pumps and trash rack motors in operation.
- C. The Contractor shall install temporary control systems to control the level of the sump by controlling the starting and stopping of each pump. The existing PLC shall be used to control the level of the sump.
- D. The Contractor shall reconnect both radios to each antenna and maintain telemetry during the construction period. The PLC shall be able to perform the following functions via telemetry from control 12 during the duration of the contract:
 - 1. Indicate Pump status (on/off)
 - 2. Indicate Sump level in inches
 - 3. Control the starting and stopping of each pump
 - 4. Change the on/off level set points of each pump
 - 5. Provide status of other City pump stations

Control 12 is located at 1391 35th Avenue.

- ~~E. The contractor can temporarily relocate the antenna to the maintain SCADA communication to the City.~~

- F. All equipment and materials shall be in accordance with the latest version of the NEC. All work shall be coordinated with Tim Giffin of the City of Sacramento, (916) 808-7997, at least three working days in advance. The existing switchgear and MCCs shall not be removed without prior approval from Tim Giffin of the City of Sacramento.

3.03 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor shall coordinate the temporary pumping plans with the City.
- B. The Contractor is responsible for maintaining the drainage flow, 24 hours a day through the station throughout the duration of the contract, except as noted in section 1.01. This also includes holidays and weekends during the duration of the contract.
- C. The Contractor shall meet with City representatives prior to preparing a temporary pumping system plan to obtain information regarding quantity of flow into the pump station.
- D. The Contractor shall defend and indemnify the City from any and all claims resulting from failure of the temporary pumping system.

END OF SECTION

SECTION 02220

DEMOLITION AND SALVAGE OF MATERIALS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work includes demolition, removal, and salvage where specified of all items indicated on the drawings, or specified herein.
- B. All materials resulting from demolition work, except as otherwise indicated on the drawings or specified herein for re-use by the Contractor or re-use by the City shall become the property of the Contractor.

1.02 AVAILABILITY OF WORK AREAS

- A. Subject to all related Contract stipulations, the contract area will be released to the Contractor, at one time, upon issuance of the Notice-to-Proceed. Unless otherwise directed, the Contractor shall maintain access to and shall not begin demolition of the existing sump electrical facilities until authorized in writing by the Engineer.

1.03 SUBMITTALS

- A. The procedures proposed for the accomplishment of demolition and storage of salvaged materials shall be submitted for approval. The procedures shall provide for safe performance of work, careful removal and disposition of materials specified to be stored, protection of property which is to remain undisturbed, and coordination with other work in progress. The procedures shall include a detailed description of the methods and equipment to be reused for each operation, and the sequence of operations.
- B. Submit schedule for demolition activities.

1.04 SAFETY PROCEDURES AND WORKER PROTECTION

- A. Take all precautions and measures required to protect employees, related trade employees, City employees, residents, and the general public from exposure to energized parts.
 - 1. All personnel authorized for entry into work areas shall be instructed in the proper procedures for high voltage work. In instances where off-line equipment may require removal from high voltage installations, personnel will be instructed and properly supervised for working in the vicinity of high-voltage equipment.

2. All electrical equipment upon which activities are to be performed shall be de-energized and permanently disconnected from any power source prior to commencing any work.
- B. Erect barriers, fences, guard rails, enclosures, chutes, and shoring to protect personnel, structures, and utilities remaining intact.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that areas to be demolished are unoccupied and no longer are in use.
- B. Do not commence work until conditions are acceptable to the City.

3.02 PREPARATION

- A. Contractor shall hold a field meeting at the existing sump site prior to beginning demolition work. Meeting shall cover the Contractors procedures for removal and transportation of salvaged items. Attendees shall include as a minimum: Tim Giffin (916) 808-7997, Vernon Fields (916) 808-5542, and Bruce Baker (916) 808-5651 of the Department of Utilities, Plant Services Division. Contractor shall give attendees forty-eight (48) hours notice in advance of said field meeting.
- B. Remove items scheduled to be salvaged for City, and place in designated storage area.

3.03 DEMOLITION

- A. The Contractor shall remove the existing switchgear, motor control panels, conductors, and conduits as identified on the plans sheets. For the existing conduits to be removed the contractor shall also remove the existing conductors.

Conduits going through concrete walls shall be cut flush with the wall as directed by the Engineer.
- B. Make neat saw cuts a minimum of one inch (1") in depth, around perimeter of Portland cement concrete or asphaltic concrete to be removed, where remaining concrete surface is to be incorporated into new work.

- C. Remove existing exposed conduit and electrical wiring and conduit to be abandoned to structural surface, cut flush, and finish to match existing surfaces.
- D. The Contractor shall remove the existing control building as identified on the plans sheets.

3.04 SALVAGE

- A. The Contractor shall deliver any item to be salvaged to the City's Combined Sewage Treatment Plant, located at 1391 35th Avenue between the hours of 8:00 AM and 3:00 PM. The Contractor shall contact Tim Giffin at (916) 808-7997 or Vernon Fields at (916) 808-5542 to coordinate delivery of these items. All removed conduit and conductors shall become property of the Contractor, unless otherwise directed by the Engineer.

3.05 CLEAN-UP

- A. Debris and Rubbish: Debris and rubbish shall be removed from the limits of work daily to a location approved in advance by the Engineer. Do not allow to accumulate on-site.
- B. Debris Control: Debris shall be removed and transported in a manner as to prevent spillage on streets or adjacent areas. Local regulations regarding hauling and disposal apply.

**** END OF SECTION ****

SECTION 02820

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included

1. Chain Link Fence Fabric and Posts
2. Excavation for Post Bases
3. Concrete Anchorage for Posts
4. Chain Link Gates and Related Hardware

B. Related Work

1. Section 01330: Submittals
2. Section 03300: Cast-in-Place Concrete

1.02 REFERENCE PUBLICATIONS

A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern.

1. Chain Link Fence Manufacturers Institute (CLFMI) Product Manual.
2. ASTM A120 - Black and Hot Dip Zinc Coated (Galvanized) Welded and Seamless Steel Pipe.
3. ASTM A121 - Specification for Galvanized Steel Barbed Wire
4. ASTM C94 - Ready - Mixed Concreté.
5. ASTM C150 - Specification for Portland Cement.
6. ASTM A386 - Zinc coating (Hot-Dip) on Assembled Steel Products.
7. ASTM A123 - Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, and Bars, and Strip.
8. ASTM A392 - Specification for Zinc-coated Steel Chain Link Fence Fabric.
9. CSSS Sections 31 and 10-38 Fencing, Chain Link.
10. ASTM F537 - Specification for Design, Fabrication, and Installation of Fences Constructed of Wood and Related Materials.

11. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.
12. State spec. Section 80-4 - Chain Link Fence.

1.03 SUBMITTALS

- A. Submit for approval in accordance with Section 01330: SUBMITTALS.
- B. Erector Qualifications
 1. List of five chain link fence installations in Northern California. Include job location, name and phone number of Owner's project administrator.
- C. Manufacturer's Data
 1. Framework (rail, post and gate).
 2. Chain Link Mesh and vinyl slats.
 3. Barbed wire and support arms.
 4. Gate hardware.

PART 2 - PRODUCTS

2.01 CHAIN LINK MATERIALS

- A. Conform to CSSS Section 10-38, except as modified herein. For associated items not specified, conform to State spec. Section 80-4, and/or the requirements for Standard Industrial Chain-Link fence in accordance with the CLFMI Product Manual and ASTM F 567.
- B. Fabric: Selvage shall be twisted top and knuckled bottom.
- C. Cap and Support Arm: Combination post cap and barbed wire support arm shall be hot dip galvanized steel sized to post dimension, retained to the posts with powder actuated Hilti or comparable stainless steel fasteners.
- D. Barb Wire: Provide class 3 zinc coated 12.5 gage wire with four point round 14 gage barbs at 5-inch spacing in accordance with ASTM A121.

2.02 CONCRETE MIX

- A. Concrete: Conform to the requirements of ASTM C94, normal Portland cement, 2000 psi @ 28 days, 3 inch maximum slump.

PART 3 - EXECUTION

3.01 CHAIN LINK INSTALLATION

- A. Chain link fence shall be constructed as shown on the Plans and in accordance with City Standard Detail T-90 and CSSS Section 31, except as modified herein. Unless otherwise directed in writing by the Engineer, chain link fences shall be constructed with fabric topped with three stands of equally spaced barbed wire attached to 45-degree post top mounted breakaway arms for a total fence height

as shown on the plans. Provide standard commercial grade locking latches for use with padlocks on all gates, and provide 3/8" diameter U-bolts welded (1/4" fillet weld) to gate posts and gate frame for backup chain and lock. For items not specified herein or in CSSS Section 31, conform to the applicable requirements from State spec. Section 80-4, and/or the requirements for Standard Industrial Chain-Link fence in accordance with the CLFMI Product Manual and ASTM F 567.

- B. All chain link fence fabric shall be supported with a bottom rail, and a top tension wire.
- C. Set post to within 6 inches from bottom of concrete footing. Set top of footing at post 2 inches above finished grade. Slope top of concrete for water runoff.
- D. Unless otherwise approved, fabric is to be fastened to line posts and rails with 9 gauge galvanized tie wires, and to tension wires with 9 gauge hog rings spaced approximately fourteen inches (14") apart.
- E. Position bottom of fabric 2 inches above finished grade.
- F. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- G. Install gates using fabric to match fence. Install 3 hinges per leaf, latch, catches, foot bolts and sockets, retainer and locking clamp. Provide concrete center rest and drop bolt retainers at center of double gate openings.
- H. Install center brace rail on all gate leaves.
- J. Install vinyl slats in the fence fabric for the entire fence. Color to be selected by the Engineer.

****END OF SECTION****

SECTION 03100
CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included

1. Forms shall be designed, constructed, and maintained so as to insure that after removal of forms, the formed concrete will have true surfaces free of offset, waviness or bulges, and will conform accurately to the indicated shapes, dimensions, lines, elevations, and positions.
2. Provide form accessories and openings in forms as required for placement of equipment and materials. Remove forms after concrete has cured.

B. Related work specified in other sections

1. Section 01330: Submittals
2. Section 03300: Cast-in-place Concrete.

1.02 REFERENCE PUBLICATIONS

A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the latest edition of referenced publications in effect at the time of the bid shall govern.

B. American Concrete Institute (ACI) standards:

ACI 301	Specifications for Structural Concrete for Buildings
ACI 347	Recommended Practice for Concrete Formwork
ACI P4	Publication 4 Formwork for Concrete

C. U.S. Department of Commerce, National Bureau of Standards Publications, Product Standards:

PS1	Construction and Industrial Plywood
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D. City of Sacramento Standard Specifications (CSSS):

20-4	Forms for Structures
20-5	Removal of Forms

E. National Forest Products Association (NFPA):

1. National Design Specification for stress grade lumber and its fastening.

F. West Coast Lumber Inspection Bureau (WCLB) Standard:

No. 16	Standard Grading and Dressing Rules for Douglas Fir, Western Hemlock, Western Red Cedar, White Fir, and Sitka Spruce Lumber.
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G. Western Wood Products Association (WWPA): Western Lumber Grading Rules.

1.03 SUBMITTALS

A. Submit for approval in accordance with Section 01330: SUBMITTALS

B. Shop Drawings

1. Formwork: Before starting concrete work, submit drawings of all formwork showing form plywood patterns, formwork, ties, vertical limits of concrete placements, horizontal lifts, and construction joints.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

- A. Plywood: PS 1, B-B Plyform Class 1, EXT-APA, edge-sealed, 5/8" thick when studs are spaced 12" on center and 3/4" thick when studs are spaced 16" on center.
- B. Wood strips for forming reveals, chamfers and quirks: Any close grain hardwood or softwood, free of knots.
- C. Framing lumber: Douglas Fir "Standard" grade, sized to uniform width and depth.
- D. Sheathing: Douglas Fir "Construction" grade boards and sheathing, 10" maximum width.

2.02 FORM ACCESSORIES

- A. Form Ties: Ties shall be adjustable type, arranged to leave no metal within 1" of surface. They shall have no lugs, cones, or other devices that will leave holes larger than 1" diameter in exposed concrete surfaces. Spreaders shall be either type designed for use with approved clamps or separate metal spreaders. Do not use wood spreaders or wire ties.
- B. Form Coatings: Burke Concrete Accessories, Inc.'s "Burke Release", Nox-Crete, or approved equal. Apply per manufacturer's printed instructions.

PART 3 - EXECUTION

3.01 GENERAL

- A. Provisions for work of other sections: Provide openings for mechanical and electrical work and work of other sections. Place items to be incorporated in concrete and support on formwork. Seal forms around openings to prevent concrete seepage.
- B. Design and erection of formwork, shoring and falsework: The design and engineering of all formwork, falsework and shoring, as well as its construction and protection, is the Contractor's responsibility. Conform to ACI 347 unless otherwise directed or approved.
- C. Exposed-to-view concrete: Deflection of facing materials between studs, as well as deflection of studs and walers, shall be limited to 3/64 of an inch or 0.004 times the span length, whichever is the larger, at the midpoint between supports.

3.02 CONSTRUCTION TOLERANCES

- A. Construct forms to provide concrete conforming to dimensions shown, and to tolerance limits listed in ACI 301 "Specifications for Structural Concrete for Buildings".

3.03 INSTALLATION

- A. Installation shall conform to ACI 301, 347, P4 and CSSS 20-3. Design forms for easy removal. Do not pry against face of concrete. Use wooden wedges only. In order that reused forms will not contain patches resulting from alterations, forms for concrete exposed-to-view shall be reused only on identical sections.

Forms will not be used if there is any evidence of surface wear or tear which would impair the quality of the exposed-to-view concrete. Forms shall be thoroughly cleaned and relubricated before reuses. Formwork for exposed-to-view concrete shall be observed continuously while concrete is being placed to

see that there are no changes of elevation, plumbness, or camber. If, during construction, any weakness develops and the falsework shows any undue settlement or distortion, the work shall be stopped, the affected construction removed, if permanently damaged, and the falsework strengthened.

3.04 CONSTRUCTION AND SURFACE FINISH

- A. Forms shall be substantial, true to line and level, sufficiently tight to prevent leakage and shall conform to indicated dimensions. Locate form ties for exposed concrete in straight horizontal and vertical lines and as indicated on Drawings and specified herein. Provide cleanout holes at bottom of forms. Remove debris before concrete is placed. Construct forms for exposed surfaces so that joints in forms are either horizontal or vertical and are located to the pattern indicated.

External corners on all concrete shall be formed with chamfer strips in corners of forms to form bevel at external angles. All form joints in forms for exposed-to-view concrete shall be sealed with specified form tape to prevent leakage. Camber soffits to accommodate anticipated deflections caused by wet concrete and construction loads. Provide positive means of adjustment for shores and struts. Take up settlement as concrete is placed.

3.05 REMOVAL AND REUSE

- A. Removal of forms shall conform to CSSS 20-4 and as specified herein. Remove forms, shoring and bracing carefully to avoid damage to fresh concrete, but not before concrete is capable of self support and support of construction loads. Do not pull tie rods until concrete is hard enough to permit withdrawal without damage to concrete. Pull ties that are entirely withdrawn from wall toward inside face. When forms are removed during specified curing period, cure the concrete as specified in Section 03300.

Regardless of strengths attained by concrete, leave forms in place for following periods when supporting:

1. Vertical surfaces: 3 days minimum
 2. Slabs: 7 days minimum
 3. Beams and Girders: 15 days minimum, but do not remove vertical support until concrete has reached its 28-day strength.
- B. Before reuse of plywood forms, thoroughly clean, sand and recoat them with form coating. Do not reuse plywood that has torn grain, patches, worn edges, damaged phenolic resin covered surfaces, or other defects which would impair texture of finished surface. Other wood forms shall be prepared for reuse by thorough cleaning and recoat with form coating. Repair damaged forms and replace loose or damaged boards.

3.06 MATERIAL APPLICATION

A. Concrete exposed-to-view in completed structures:

1. Exposed-to-view concrete: Use specified "B-B" or better plyform plywood or phenolic resin covered form board.

B. Concealed concrete:

1. Forms for concrete surfaces not visible in completed structure: Plywood, lumber or steel is acceptable. Footings may be poured directly against earth banks where soil conditions are such that vertical banks will remain stable during placing operations. Earth forms at walls are not permitted.

****END OF SECTION****

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION: Provide reinforcing steel as shown on the Plans.

A. Related Work:

1. Section 01330 - Submittals
2. Section 03100 - Concrete Formwork.
3. Section 03150 - Concrete Accessories
4. Section 03300 - Cast-in-Place Concrete.

1.02 REFERENCE PUBLICATIONS

A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of publications at the time of bid shall govern.

B. American Concrete Institute (ACI) Standard

ACI 318	Building Code Requirements for Reinforced Concrete.
ACI SP-66	ACI Detailing Manual.

C. American Welding Society (AWS):

AWS D 12.1	Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction.
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D. City of Sacramento Standard Specifications (CSSS):

Section 10-25	Reinforcing Steel
Section 21	Placing Steel Reinforcement

E. Concrete Steel Reinforcing Institute (CRSI):

1MSP	Manual of Standard Practice(1997)
1SPLBK	Reinforcement Anchorages and Splices(1997)
1DET	Reinforcing Bar Detailing(2000)
1PLACE	Placing Reinforcing Bars(1997)

1.03 SUBMITTALS

A. Shop Drawings:

1. **Reinforcing Steel:** Before starting concrete work, submit shop drawings in accordance with Section 01330-SUBMITTALS. Comply with requirements of ACI 318, ACI SP-66, CRSI 1MSP, CRSI 1SPLBK, and CRSI 1DET. Show bar size, dimensions, bends, placing, and construction joint details. Submit drawing showing locations of any construction joints not shown on the plans. Maximum submittal drawing size shall be 22-inches by 34-inches. Submit type, size, and location of all slab and bar supports. Hooks, lap splices, bends and offsets shall be in accordance with the drawings. Obtain approval before shop fabrication.

B. Certificates of Compliance:

1. Submit Certificate of Compliance stating that reinforcement complies with specified requirements. Reinforcing steel shall be properly identified. Contractor shall bear costs for test of steel by an approved laboratory if the reinforcing steel is not properly identified.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. **General:** Conform to CSSS Section 10-25 except as modified herein. All materials covered by this Section shall be manufactured in the United States.
- B. **Supports for reinforcing bars:** Galvanized steel chairs and accessories or plastic coated units for work exposed to view, weather, or moisture so that finished surfaces will not be marred or stained; use precast concrete only (no metal), suitably sized for load distribution, in slabs-on-grade. Use no supports of wood or other cellulose material. Do not expose supports or accessories to view in architectural concrete.

PART 3 - EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Prior to installation of reinforcing steel work, Contractor shall inspect surfaces to receive work, and arrange for satisfactory correction of defects in workmanship and material that could have adverse affect on reinforcing steel work.

3.02 FABRICATION AND DELIVERY

- A. **General:** Conform to CSSS Section 21 except as modified herein.
- B. **Bending and Forming:** Fabricate indicated size bars into shapes and lengths shown on approved shop drawings by methods not injurious to materials. Do not heat reinforcement for bending. Bars with kinks or bends not in schedule will be rejected.

- C. Marking and shipping: Bundle reinforcement and tag with suitable identification to facilitate sorting and placing, and transport and store at site so as not to damage material.

3.03 INSTALLATION

- A. General: Conform to CSSS Section 21, CRSI 1MSP, and CRSI 1PLACE except as modified herein.
- B. Reinforcement Welding: Where reinforcement welding is approved by the Engineer, perform welding by direct electric arc process, with trained and experienced certified operators. Conform to AWS D12.1. Use low-hydrogen electrodes. Do not tack weld reinforcing bars.
 - 1. Preparation: Clean surfaces to be welded of loose scale and all foreign material. Clean welds each time electrode is changed. Chip burned edges clean before welds are deposited.
 - 2. Characteristics of welds: When brushed with wire brushes, completed welds shall exhibit uniform section, smoothness of welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion with penetration into base metal. Cut out welds, or parts of welds found defective, and replace with proper welds.
- C. Concrete pours: At each location during concrete placing, inspect reinforcement and maintain bars in correct positions. Templates to maintain the correct position of reinforcing may be required. Contractor shall install templates, if required by the inspector, at no additional cost to the City.
- D. Contractor shall receive approval in writing from the Engineer of all reinforcing work prior to ordering concrete for placement.

****END OF SECTION****

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Scope of Work:

1. Unless otherwise directed, provide concrete as specified herein.

B. Related Work:

1. Section 01330 - Submittals
2. Section 03100 - Concrete Formwork.

1.02 REFERENCE PUBLICATIONS:

- A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of publications in effect at the time of bid shall govern.

B. American Concrete Institute (ACI) Standard:

ACI SP-15	Field Reference Manual: Standard Specifications for Structural Concrete with Selected ACI and ASTM references.
ACI 211	Recommended Practice for Selecting Proportions for Concrete.
ACI 301	Structural Concrete for Buildings.
ACI 302	Guide for Concrete Floor and Slab Construction.
ACI 304	Recommended Practice for Measuring, Mixing and Placing Concrete.
ACI 305	Hot Weather Concreting.
ACI 306	Cold Weather Concreting.
ACI 309	Consolidation of Concrete.
ACI 318	Building Code Requirement for Reinforced Concrete, with Commentary.

C. American Society for Testing and Materials (ASTM) Standards:

ASTM C 31	Method of Making and Curing Concrete Test Specimens.
ASTM C 33	Concrete Aggregates.
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 94	Ready Mixed Concrete.
ASTM C 143	Slump of Portland Cement Concrete.
ASTM C 150	Portland Cement.
ASTM C 171	Sheet Materials for Curing Concrete.
ASTM C 172	Method of Sampling Freshly Mixed Concrete.
ASTM C 192	Making and Curing Concrete Test Specimens in the Laboratory.
ASTM C 227	Test for Potential Alkali Reactivity of Cement-Aggregate Combinations.
ASTM C 231	Air Content of Freshly Mixed Concrete by the Pressure Method.
ASTM C 260	Air Entraining Admixture for Concrete.
ASTM C 289	Test of Potential Reactivity of Aggregates.
ASTM C 295	Petrographic Examination of Aggregates.
ASTM C 309	Liquid Membrane Forming Compounds for Curing Concrete.
ASTM D 98	Calcium Chloride.
ASTM D 1785	Poly (Vinyl Chloride) PVC Plastic Pipe, Schedules 40, 80 and 120.

D. City of Sacramento Standard Specification (CSSS):

Section 10	Construction Materials.
Section 20	Concrete in Structures.

1.03 CONDITIONS

- A. Notes: Notes pertaining to concrete on the Plan sheets are a part of these Specifications.
- B. Testing: Comply with the General and Special Conditions.

1.04 SUBMITTALS

A. MANUFACTURER'S DATA

1. Proposed mix designs, including admixtures
2. Curing Material

B. Certificates:

1. Submit Certificate of Compliance that concrete meets the specified requirements.
2. Delivery tickets for all concrete delivered to the project site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland cement: ASTM C150, Type II or Type III.

1. Concrete: Standard gray cement. Use same brand for surfaces not to be painted.

B. Water: Clean and free of substances injurious to concrete.

C. Aggregate:

1. Do not use aggregates that are alkali reactive when tested by ASTM C227, C289, or C295.
2. Unless otherwise noted, maximum coarse aggregate size shall be 1½-inches for walls and slabs greater than or equal to 12-inches thick, and 1-inch for walls and slabs less than 12 inches thick.
3. Provide hard, washed, fine and coarse aggregates conforming to ASTM C33, including requirements for sampling and testing, except that loss after 500 revolutions in Los Angeles machine shall not exceed 40%. Limit material finer than No. 200 sieve to a maximum of 3% of the fine aggregate.

D. Non-shrink grout: Master Builders premixed "Embeco", Burke's "Metallic Grouting Compound"; Sonneborn-Desoto "Ferrolith-G", or approved equal.

E. Curing materials:

1. Liquid curing compound: ASTM C309, Type 1 (Clear) containing a fugitive dye.
2. Sheet material: Double-layered, reinforced, stainproof, waterproofed Kraft paper, ASTM C171, regular type.

F. Admixtures:

1. General: Provide only as indicated below. Submit manufacturer's data for admixtures, and use only those approved by Engineer. Use shall be in

accordance with the manufacturer's recommendations.

2. Water reducing: "Plastocrete", Sika Chemical Corporation; "WRDA with Hycol", W.R. Grace, or approved equal. Conform to ASTM C49A, Type A. Use in all mixes.
3. Retarding: "Plastiment", Sika Chemical Corporation, or approved equal. Use for hot weather concreting only.

G. Concrete overlay bonding materials: Burke Acrylic Bondcrete or equal.

2.02 DESIGN OF MIXES

- A. General: The Contractor shall be responsible to design concrete mixtures resulting in the required 28-day compressive strength and other required characteristics. An approved laboratory shall design all mixes. Comply with ACI 211 "Recommended Practice for Selecting Proportions for Concrete" and ACI 304 "Recommended Practice for Measuring, Mixing and Placing Concrete" to produce plastic, workable mixture suitable for concrete work indicated, which will develop required compressive strengths, as indicated.
- B. Mix for conduit encasement: Concrete mix shall be Class D and contain a minimum of 5 sacks (470 pounds) of Portland cement per cubic yard. The maximum water/cement ratio shall be 0.50. The Contractor shall add red oxide, in the amount of 5 lbs. per cubic yard, to all concrete used for conduit encasement.
- C. Mix for antenna foundations, generator pads, building foundations and housekeeping pads, retaining walls, and footings: Concrete mix shall be Class B and contain a minimum of 6 sacks (564 pounds) of Portland cement per cubic yard. The compressive strength at 28 days shall be 4,000 psi. The maximum water/cement ratio shall be 0.50.
- D. The maximum slump for concrete shall be 4 inches. A tolerance of one inch above the maximum slump will be allowed, provided that the average of all batches is less than the specified maximum slump. Batches of concrete with slumps in excess of those specified will be rejected if their frequency of occurrence is excessive or the Contractor fails to take corrective action to reduce their occurrence. No water shall be added to the approved mix after batching except as approved by the Engineer.
- E. Batching and mixing: Use transit-mixed concrete from approved batch plant. Batching, mixing, and transportation of concrete shall conform to ASTM C94.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Embedded items: Includes installation of work built into concrete such as waterstop sleeves, anchor bolts, wood nailers, reglets, frames and sleeves for piping, conduit and fittings specified under other divisions. Provide facilities and supervision required for installation of inserts specified under other Sections, and perform cutting and reinforcing of forms required to accommodate them. Do not place any concrete until all inserted

items are installed in their proper locations, secured against displacement, cleaned, inspected and approved. Furnish ties and supports necessary to keep embedded items in place when concrete is placed.

- B. **Clean Up:** Remove excess water from forms before concrete is deposited. Remove hardened concrete, debris, and foreign materials from interior of forms and from surfaces of mixing and conveying equipment.
- C. **Wetting:** Prior to placing concrete, wet wood forms sufficiently to tighten up cracks. Wet all other materials sufficiently to reduce suction and maintain concrete workability.
- D. **Earth or Gravel Subgrade:** Lightly dampen subgrade no more than 24 hours in advance of concrete placement, but do not muddy. Reroll where necessary for smoothness and remove loose earth material.
- E. **Screeds (Flatwork):** Set screeds at walls and at maximum of 8-foot horizontal distance between adjacent screeds.
- F. **Weather:** Do not place concrete during rainy weather unless approved measures are taken to prevent damage to concrete. Cure concrete placed during periods of dry winds, low humidity, high temperatures and other conditions causing rapid drying, initially with a fine fog spray of water applied immediately after finishing and maintained until final curing operations are begun. Comply with the following:
 - 1. Hot weather: ACI 305
 - 2. Cold weather: ACI 306
 - 3. Pumping concrete: Maintain close observation of ambient temperature both at pump location and at discharge end. Allow for wide variance of temperature change.

3.02 FLATNESS TOLERANCE FOR FLOOR SLABS

A. SLABS (FLATWORK) - INTERIOR AND EXTERIOR:

- 1. Finish slabs monolithically. Uniformly slope floor slabs to provide positive draining of indicated areas. Special care shall be taken so that a smooth, even joint is obtained between successive pours.
- 2. Finished surfaces shall be true plane surfaces with no deviation in excess of 1/8 inch in 10 feet when tested with a straight edge.
- 3. Replace or repair any slab which fails to meet this standard. If slabs fail to drain as indicated, remove drains and faulty floor section and refinish topping so that it drains according to the Drawings. No deviations will be allowed.

3.03 PLACING

- A. Formed concrete: Place concrete after subgrade, forms, and reinforcement has been approved. Limit free vertical drop in concrete walls or columns to three (3) feet. In other concrete, limit the drop to five (5) feet. Deposit concrete in horizontal layers not more than 18" deep and continue pouring until section is completed. Control rate of pouring and depth of layers so that each layer will be covered within one hour after it is poured. Pour columns to top and allow to settle two (2) hours before additional concrete is placed. Place concrete continuously between pour joints.
- B. Grouting: Grout mix shall be regular concrete mix with ½ the large aggregate omitted. Use to cover the following before additional concrete is placed:
1. Flat form surfaces next to congested steel.
 2. Construction joints.
 3. Top of column and wall footings.
 4. On surfaces where concrete has set.
- C. Vibration and tamping: As concrete is placed in forms, work concrete around reinforcing steel, built-in items and into corners and angles. Extra care shall be given to work architectural concrete around inserts, reveals, quirks, corners and plastic cones of ties to preclude rock pockets, air pockets, and other defects, and to produce sharp corners, edges and smooth surfaces. Provide mechanical vibrators operated by experienced employees for agitating concrete in forms. Vibrate thoroughly within five (5) minutes after layer is placed. Carry vibration well into previous layer. Vibrators shall not be used to transport concrete inside forms. Internal vibrators shall maintain a speed of not less than 7,000 impulses per minute when submerged in concrete. Supplement vibration by suitable methods to eliminate voids along forms for full depth of layer as directed. Do not allow vibrators to strike overlaid plywood surfaces. Do not use vibrators to work concrete along forms. Keep at least one spare vibrator on job at all times while concrete is being placed. Comply with ACI Committee 309 consolidation of Concrete, Committee Report.
- D. Stoppage: Upon completion of a pour and after concrete has partially hardened, wash scum or laitance off surface with stiff brush and stream of water. When work is resumed, brush clean with wire brushes or sandblast, then place fresh concrete.
- E. Pumped concrete: Do not place concrete by pumping without prior written approval of the Engineer.
1. General: Do not use aluminum or aluminum lined pipe. Prevent concrete from contacting aluminum fittings.
 2. Mix: Do not add more water to mix unless approved by the Engineer. Check that the mix design entered on delivery ticket complies with that ordered.
 3. Pumps: Use only piston type pumps. Insure they are reversible. Make a

standby pump available of no less capacity than that in use for operation at the job within one hour's notice.

3.04 CONSTRUCTION JOINTS

- A. The location and design of joints not shown or specified are subject to approval of the Engineer prior to placement of concrete.
- B. Horizontal Joints: Where joints occur in exposed concrete, set smooth painted wood strips in form to provide a straight and level joint in which upper pour laps lower pour. Place concrete level with, but not above top of pour joint strip as shown on Drawings. Allow 24 hours before concrete is placed over horizontal joints. Remove loose material and laitance. Clean by sandblasting, or wire brushing. Allow enough time between placing of adjacent pour sections to provide for initial shrinkage. Horizontal joints will not be allowed in beams, girders and slabs unless otherwise indicated.
- C. Vertical joints: Vertical joints not shown on the Drawings shall be so made and located as to least impair the strength of the structure and shall be approved by the Engineer prior to placement of concrete.

3.05 REPAIRS AND PATCHING

- A. General: Patch defective areas immediately following form removal. Remove honeycombed and other defective concrete to sound concrete, but not less than 1" deep. Make the walls of the cut area perpendicular to the surface. Do not feather out the edges. Dampen the patch area and the adjacent area six (6) inches around the patch area.
- B. Exposed concrete: For exposed concrete prepare a patching mortar of one part portland cement adjusted to match the color of the surrounding concrete and 2-1/2 parts sand with the least water required to produce a workable mass. Rework this mortar until it is the stiffest consistency that will permit placing. Brush the patch area with a bond of neat cement and water paste and apply patching mortar when the water sheen is off the bond. Strike off the mortar slightly higher than the surrounding surface, let set for one hour and finish flush with the surrounding surface. Tie holes shall be cleaned, dampened and filled solid with the above specified patching mortar.

3.06 FINISHING FORMED SURFACES

- A. Finish formed surfaces by removing any and all fins. The tolerances of finished formed surfaces shall conform to ACI 301.

3.07 FLATWORK

- A. General: Place floor slabs on grade in alternate strips. Place each unit against construction joint forms with formed control joints perpendicular to the poured strips. Pour slabs-on-grade against a moist subgrade. Wet the subgrade the day before placing concrete. Moisten subgrade just ahead of concrete as it is placed. Do not place concrete in standing water. Provide new, clean cut, sharp-edged wood headers at construction joints of suspended slabs. Deposit concrete evenly, consolidated with

mechanical vibrators, particularly at side forms, and screed to indicated elevations and contours. Maintain full indicated thickness of slab over all parts of cambered support. Concrete shall be compacted with a grid tamper to eliminate voids and pockets and to produce a uniformly dense slab. Where ground slabs are left to receive deferred finishes, provide protection against contamination from time of placing concrete until time of placing finish. Remove contamination mechanically leaving a clean surface.

B. Joints: Location and detail shall be as indicated. Tooling is required at control and pour joints.

1. Control joints: After concrete surface is screeded, cut concrete with a cutting bar, or other approved tool, approximately 1/4" thick x 2" deep. Form straight clean lines. After slot is formed in stiff concrete, insert 1/8" thick x 1-1/2" strip of tempered hardboard or plastic joint form zip strip. Butt strips neatly to line and flush with concrete surface. Finish slab flush with top of hardboard strips without tooling.
2. Construction joints: Form construction joints with 2" nominal dressed lumber, or approved steel forms. Provide enough stakes to prevent sagging and misalignment under construction loads. Leave forms in place as long as possible and remove without chipping the edge of the slab. Protect the slab edge until the adjacent slab is placed.
3. Expansion joints: Provide sponge neoprene joint filler where shown on the Drawings. Place filler to provide space for sealant as indicated. Seal joints with specified sealant per manufacturer's printed instructions. Thickness of filler material is indicated.

C. SLAB FINISHING

1. Broom Finish: Contractor shall apply a medium broom finish just after final troweling to all flat slabs not specified to receive another finish.
2. Wood float: Where wood float finish is indicated, screed slabs to elevations indicated. Compact with motor driven disk type compactor float and bull float to smooth, even surface. Perform final finishing with wood hand floats to give finished surface uniform, slightly roughened texture.
3. Steel trowel: Where steel trowel finish is indicated, tamp fresh concrete with a grid tamper enough to raise a thin bed of mortar to surface. Before finishing, remove any excess water. Level and compact with motor drive disk type compactor float. Immediately after floating, the surface shall be further leveled and compacted with a motor driven rotary trowel with flat-pitched blades. Final troweling shall be done with steel hand trowel after surfaces have become hard enough to produce a hard, dense, smooth, burnished surface.

3.08 CURING AND PROTECTING

- A. General: Do not use any curing method which will be incompatible with the specified applied finishes.
- B. Initial curing: Begin initial curing with water immediately after the final finishing operation. Keep the concrete continuously wet at least overnight. Use one of the following curing methods:
- C. FINAL CURING:
 - 1. Water or paper curing, mandatory for bridge slabs: Where water curing is used, keep surfaces continuously wet for seven (7) days. Where paper curing is used, keep the paper in place without torn areas for at least ten (10) days. Seal all joints in paper with a suitable waterproof cement or tape.
 - 2. Mandatory hot/dry weather curing: Use water curing for the first 24 hours of the required curing period.
 - 3. Optional curing: Surfaces not specified to receive a mandatory curing method may be cured by water, membrane, or paper curing. Use clear curing compound for all membrane curing and paper curing. Water and paper curing to be as specified above.
- D. Formed surfaces: Wood forms left in place during the final curing period shall be kept tight, wetting if necessary. If forms are removed during the curing period, one of the specified curing methods, as approved by Inspector, shall be applied immediately and continued for the remainder of the curing period.

3.09 MISCELLANEOUS

- A. GROUTING AND DRYPACKING
 - 1. Grout: One (1) part cement, two (2) parts sand and sufficient water that the grout will just flow under its own weight. Water reducing and workable agent may be added at the Contractor's option.
 - 2. Drypack: One (1) part cement, 2 parts sand, with just enough water to bind the materials together.
 - 3. Installation: Dampen surfaces before grouting and slush with neat cement. Force grout into place and rod so as to fill all voids and provide uniform bearing under plates. Provide smooth finish on exposed surfaces and damp cure for at least three (3) days.
- B. Non-shrink grout: Mix and place under structural steel base plates in accordance with manufacturer's printed instructions.
- C. Concrete overlay bonding: The surface of the existing concrete is to be roughened by sandblasting to remove loose material, rust and oils. Sufficient cement matrix should be

removed to expose surface aggregates and to form a roughened surface for bonding. Clean with a high pressure water jet and allow to surface dry. Immediately apply an acrylic bonding agent such as Burke Acrylic Bondcrete at the rate of 200 sq. ft. per gallon and follow with placement of the concrete overlay after a minimum of one hour and after the film is dry to the touch. Install bonding agent in strict accord with manufacturer's instructions.

3.10 QUALITY CONTROL

- A. The Engineer shall be responsible for the routine quality control testing of concrete mixes.
- B. Slump Test: Slump test shall be performed at the job site by the Engineer in accordance with ASTM Test Method C 143.
- C. Compressive Strength Tests: Each day concrete is poured, the Engineer shall mold four concrete test cylinders in accordance with ASTM C31. City shall pay for the service of an independent testing company to cure and test the concrete cylinders in accordance with ASTM C39 and C172 unless samples fail to meet requirements, in which case Contractor shall pay for retesting done to the same requirements. Cylinders shall be tested at 7 days, 14 days, 21 days, and 28 days.
- D. The Contractor shall assist the Engineer in obtaining samples of fresh concrete.
- E. Methods of sampling and testing concrete mixtures shall include but not be limited to the following:

Composite Samples:	ASTM C172.
Specimen Preparation:	ASTM C31.
Compressive Strength:	ASTM C39.
Air content:	ASTM C173 or C231.
Slump:	ASTM C143.
Unit Weight:	ASTM C138

- E. Evaluation and acceptance of concrete and concrete structures shall be in accordance with Chapters 17 and 18 of ACI 301.

****END OF SECTION****

SECTION 13510

PREFABRICATED CONTROL BUILDING

PART 1 - GENERAL

1.01 SCOPE

- A. The Contractor shall provide a prefabricated metal control building for the electrical equipment in accordance with the contractor Drawings and Specifications. The prefabricated building shall be a one compartment structure with floor and suitable for outdoor installation.
- B. The work shall also include removing and delivery of the existing control building to the designated City facility and installing of the new building as shown on the Plans.
- C. Related Work
 - 1. Section 16010 Electrical Work

1.02 SUBMITTALS

- A. Descriptive literature of all materials furnished under this section shall be submitted in accordance with Section 01330 SUBMITTALS of these specifications.
- B. Submittals for the prefabricated control building shall include, but shall not be limited to, the following:
 - 1. Product data: manufacturer's specification, data and installation instructions.
 - 2. Complete shop drawings with fastening and anchor details.
 - 3. Sealant
 - 4. Manufacturer's color samples
 - 5. Provide engineering calculations for the structure as required per UBC and local ordinance requirements; signed by a structural engineer registered to practice in the State of California.
 - 6. Test reports
 - 7. Description of the method of assembly, storage, transportation and installation.

1.03 QUALITY ASSURANCE

- A. Manufacturer shall have experience in the manufacturing and assembly of the metal buildings for a minimum of 10 years.
- B. Manufacturer's Certificate of ISO 9001 Compliance.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with recommended practices listed in the manufacturer's installation and maintenance Manuals.
- B. Store in a clean, dry space. Maintain factory protection or cover with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. (Heat enclosures to prevent condensation).
- C. Handle in accordance with NEMA and manufacturer's written instructions to avoid damaging equipment, installed devices, and finish. Lift only by installed lifting eyes.

1.05 SERVICE CONDITIONS

- A. The prefabricated control building shall be designed and constructed to satisfactorily operate with the following service conditions:
 - 1. Location: outdoor.
 - 2. Ambient temperatures: 0 to 40 degree C
 - 3. Humidity: 95%, non-condensing

1.06 WARRANTY

- A. Manufacturer warrants equipment to be free from defects in materials and workmanship for one year from date of installation or 18 months from date of purchase, whichever occurs first.

PART 2 - PRODUCTS

2.01 REFERENCE STANDARDS

- A. The prefabricated electrical building covered in this section shall be designed and manufactured according to the latest revision of the following standards:
 - 1. ANSI/NFPA 70: National Electrical Code
 - 2. American Institute of Steel Construction (AISC): Specification for the Design, Fabrication and Erection of Structure Steel
 - 3. American Welding Society (AWS): AWS D1.1 Structural Welding Code.
 - 4. Steel Structures Painting Council (SSPC): Painting and Finishing Standards.

2.02 PRODUCT COMPONENTS

- A. Floor: The floor shall be covered with ¾" thermolite fiberboard with an anti-skid finish. The floor shall be manufactured from 12 gauge galvanized steel.
- B. Walls: The walls shall be made with 3" of rigid insulation with an R value of 15. Install ¾" class C white laminated 7-ply plywood over the interior of the wall panels. The wall panels shall be manufactured from 12 gauge galvanized steel.
- C. Roof: The walls shall be made with 3" of rigid insulation with an R value of 15. Install ½" class C white laminated 7-ply plywood over the interior of the roof panels. The roof panels shall be manufactured from 12 gauge galvanized steel.
- C. Paint: The exterior walls and roof shall be power coated with 2 to 3 mil of paint. Paint color to be selected by the Engineer.
- E. Doors: Provide one 38" x 87" door with 2" of insulation. Provide stainless door hinges and pins. Door shall be manufactured out of 12 gauge galvanized steel.
- F. Door hardware – The locks and panic bar shall be fire rated and tested in accordance to ANSI A156.3, 1989, Grade 1. The lock/panic bar shall be Von Duprin 22L-F or approved equal. The panic bar to be mounted inside the door shall be Von Duprin 22EO-F. The matching trim to be mounted outside the door shall be Von Duprin 230L with Mortise cylinder. This cylinder shall fit a City provided core by Best Locks. A key shall be used to open the mortise lock and when the key is removed the mortise lock shall lock automatically. The lever style shall be standard, the finish color shall be dark bronze. The City will provide a construction core and one (1) key for Contractor access during construction.

Provide one zinc plated pop rod to hold door open at 90 and 160 degrees.

Provide EPDM extruded rubber gasket provided a weather tight seal.
- G. Vents: Provide intake and exhaust vents located at the gable ends of the roof with a moisture resistance polyester fiber snap in place filter.
- H. Exhaust fan: Provide a 273 CFM centrifugal ventilation fan rated at 115 VAC with thermostat. Contractor shall connect the exhaust to the new lighting panel as shown on the plans. Contractor shall mount the thermostat to the interior wall and install conduit and conductors to the exhaust fan. Engineer shall determine the location of the thermostat.
- I. Lifting Lugs: Provide four removable lifting lugs.

- J. Sealant: All seams shall be caulked with a 50 year sealant.

2.03 MANUFACTURERS

- A. The prefabricated control building shall be manufactured by PTMW or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in conformance with referenced standards, manufacturer's written instructions, and as shown on the plans.

Completed structure shall be weather resistant, including drainage to exterior for water entering or condensation occurring within wall or roof system.

3.02 FIELD QUALITY CONTROL

- A. The prefabricated electrical building shall be handled in a manner to prevent any avoidable damage to its structural members. Any damage shall be repaired to the satisfaction of the Engineer.
- B. Inspect installed electrical building for anchoring, alignment, and grounding.
- C. Adjust all access doors and operating handles as described in manufacturer's instructions.
- D. Clean interiors of the electrical building to remove construction debris, dirt, shipping materials.
- E. Repaint scratched or marred exterior surfaces to match original finish.

END OF SECTION

SECTION 16010
ELECTRICAL WORK

PART 1 - GENERAL

1.01 SCOPE

- A. This Specification Section covers all electrical work, which consists of furnishing all necessary labor, equipment and materials required for the complete electrical system as specified and as shown on the Plans.
- B. Work Included:
2. Equipment and materials to be furnished and installed by the Contractor under Division 16 shall include the following:
- a. Seismic Restraint for Electrical Equipment (16012)
 - b. Raceway Systems (16110)
 - c. Wire and Cable (16120)
 - d. Main Switchboard (16430)
 - e. Motor Control Center (16480)
 - f. Lighting (16530)
 - g. Miscellaneous Equipment (16922)
 - h. Operational Testing (16950)
 - i. Process Control and Instrumentation Systems (17100)
 - j. RTU/PLC System (17520)

1.02 SUBMITTALS

- A. Descriptive literature for all materials furnished under this section shall be submitted in accordance with Section 01330 **SUBMITTALS** of these specifications.

1.03 CONSTRUCTION POWER

- A. The Contractor shall provide his own temporary construction lighting and electrical power as required in areas where work is being performed.
- B. For maintaining power and controls to the facility see sections Summary of Work, section 01110, part 3.02 and Temporary Pumping Systems section 01920.

1.04 DRAWINGS

- A. The Contractor shall verify all conditions at site, review all measurements to insure adequate space for installation of equipment.

- B. The locations of conduit and equipment, as indicated on the drawings, are in the desired locations. However, locations may be adjusted to meet the electrical and structural conditions as required.
- C. The drawings are essentially diagrammatic to the extent that offsets, bends, pull boxes, conduits, special fittings and the exact locations may not be completely indicated. Furnish and install all conduit and equipment in available locations as required by conditions found at the site and as approved by the Engineer. Carefully study the drawings and premises in order to determine the best methods, exact locations, routes, noting the building obstructions, and etc. for conduit and equipment installation.

1.05 ELECTRICAL WORK CLOSEOUT

- A. Prepare the following items and submit to the Engineer before final acceptance:
 - 1. Copies of all test results as required under this Section 16950.
 - 2. Copies of as-built record drawings and O&M manuals as required under section 01330.
 - 3. Notify the Engineer in writing when installation is complete and that a final inspection of this work can be performed. In the event defects or deficiencies are found during this final inspection they shall be corrected to the satisfaction of the Engineer before final acceptance can be issued.
- B. Electrical and control equipment shall be cleaned both inside and outside.

1.06 COORDINATION WITH SUB-CONTRACTORS

- A. General contractor shall be responsible to provide all sub-contractors with all specifications and drawings that pertain to their work on this project.

1.07 INTERRUPTION OF SERVICES

- A. All electrical services in all facilities of the contract work are to remain operational during the entire contract period. Any interruption of electrical power for the performance of this work shall be made only after consultation with the City and the Superintendent of Plant Operations, and shall be only at such a time and of such a duration as directed.
- B. The contractor shall be responsible for coordination with SMUD for all power requirements.

PART 2 - PRODUCTS

2.01 REFERENCES STANDARDS

- A. Work installed or material used shall comply with latest version of NEC, UL, and other applicable rules and standards of the industry.
- B. Equipment Anchors: Securely anchor electrical equipment. Anchoring shall have the capability of withstanding seismic forces per the 1994 California Code of Regulations, Title 24, Part 2, Section 2312, Seismic Zone 3, with $C_p = 1.0$ and $I = 1.5$. C_p may be two-thirds of the value specified for components mounted on foundations at grade or on floor slabs on earth grade.

2.02 MISCELLANEOUS EQUIPMENT/MATERIALS

- A. The Contractor shall include in his work furnishing and installing of the following:
 - 1. Warning Signs: Unless otherwise shown on the plans, use signs of standard manufacture, #18 gauge minimum steel, baked enamel finish, red letters on white background. Provide warning signs per Title 24, CAC.
 - 2. Fuses: Furnish and install fuses of proper type and rating suitable for equipment protected. Upon acceptance of installation, all fusible disconnect switches shall be equipped with correct fuses.

2.03 SWITCHBOARDS, MOTOR CONTROL CENTERS, AND PLC CABINET INTERNAL WIRING

- A. Interior wiring shall conform to the following:
 - 1. Rubber grommets shall be used where wiring passes through holes in sheet metal unless indicated on the drawing.
 - 2. Wiring shall not be tapped or spliced except at device terminals or on terminal blocks.
 - 3. No more than two terminations shall be made at any one terminal.
 - 4. Each terminal connection shall have a pre-insulated ring-tongue, crimp-type connector, and applied to the wire end with a ratchet type or pneumatic operated power tool.
 - 5. B8, Class B minimum stranding and the wire shall have copper conductors

and shall be minimum #16 for control and minimum #12 for power circuits. Hinge wiring shall be Class D minimum stranding. Solid wire is not allowed on this project.

6. All MCC and PLC cabinet wiring shall be TEW or MTW, unless otherwise specified. All switchboard wiring shall be SIS, unless otherwise specified.

Switchboard wire color shall be gray.

MCC wiring colors shall be as follows:

Neutral	White
Fused Control Power	Red
24 Volt Circuits	Blue
External 120 Volt Circuits	Yellow
Power Circuits before CPT	Black

7. All wiring shall be marked using tags with like numbers on both ends with wire numbers shown on the drawings. Tags using adhesives, tapes, or markers are not acceptable.
8. Tags shall be white heat-shrinkable with thermal transfer printing, three to one shrink ratio, 2 inches long and shall meet UL 224. Raychem Tyco shrink mark heat shrinkable sleeves or equal. Labels shall be readable after heat shrinking.

2.04 NAMEPLATES

- A. Indoor: Laminated phenolic plastic, black front and back, white core, engraved to show white lettering. Use 3/16" high lettering at push button stations, thermal overload switches, receptacles, wall switches, and similar devices, where nameplate is attached to device plate. Use 1/4" high lettering at all other locations, unless otherwise specified or detailed. Engraved lettering shall be uniform block style all upper case.

Nameplates 1 1/2 inches high and smaller shall be 1/16" thick. Nameplates larger than 1 1/2" high shall be 1/8" thick. Edges of nameplates shall be beveled. Nameplates shall be fastened using nickel plated brass, cadmium plated steel or stainless steel screws. Attachment of nameplates with adhesive is not acceptable.

- B. Outdoor: Engraved or embossed stainless steel.
- C. Inscription: If detailed on plans, use inscription exactly as shown; otherwise, describe adequately the function or use of equipment involved.

2.05 PAINTING AND FINISHES

- A. Boxes factory finished as follows:
 - A. Surface Mounted Boxes: One prime coat over galvanizing, one coat of light gray synthetic enamel or lacquer.
 - B. Flush Mounted Boxes: Galvanized only.
- B. A three coat finish consisting of primer, undercoat, and alkyd enamel finish of light gray, ANSI No. 61, shall be applied to all electrical enclosures unless otherwise specified.

~~2.06 HOUSE KEEPING PAD~~

- ~~A. All switchboard and other free standing equipment and panels shall be placed on a 3 1/2" thick concrete house keeping pad as directed by the Engineer. The pad shall be so constructed that after the installation of the panel there shall be 3" in the front and on both sides of the panel and 2" on the back of the panel.~~
- ~~B. The pad shall contain a formed raceway for conduits.~~

2.07 INDICATING LIGHTS, PUSH BUTTONS, AND TERMINAL STRIPS

- A. Indicating lights shall be industrial, weatherproof NEMA 4/4X, transformer type, with LED type lamps, and push to test. Push buttons and terminal strips shall be NEMA style.

2.08 SPARE PARTS

- A. Fuses: 1 carton (3 fuses, minimum) of each fuse used on this project.

2.09 RELAYS, TIMERS, AND SWITCHES

- A. Contacts for all relays, timers, and switches shall be rated for 10 A minimum.

2.10 HAZARDOUS LOCATIONS

- ~~A. Storm water pumping stations: Wet wells that are totally enclosed shall be considered a Class 1 Division 2 location. All work and materials used within the wet well shall meet the requirements of NEC for this type of hazardous location. A combustible gas detector shall be installed within the wet well as shown on the plans, see section 16922 for further requirements.~~
- B. Sewer pumping stations: The wet well of the sewer plant shall be considered a Class 1 Division 2 location. All work and materials used within the wet well shall meet the requirements of NEC for this type of hazardous location. ~~A combustible~~

~~gas detector system shall be installed within the wet well as shown on the plans, see section 16922 for further requirements.~~

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All equipment installed by the Contractor shall operate to the Engineer's satisfaction. The Contractor shall be responsible for, and shall correct by repair or replacement, at his own expense, equipment which, in the opinion of the Engineer has been damaged by faulty mechanical or electrical assembly by the Contractor.
- B. The Engineer reserves the right to require changes in equipment location without incurring additional costs.
- C. Outdoor steel items on this job shall be manufactured from cold rolled low carbon steel. Outdoor steel mounting holes and cutting shall all be finished and then the item shall be hot dipped galvanized conforming with ASTM A123 and A153. Outdoor hardware on this job shall be #316 stainless steel.

END OF SECTION

SECTION 16012

SEISMIC RESTRAINT FOR ELECTRICAL EQUIPMENT

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included.
 - 1. Seismic restraint for new electrical equipment.
- B. Related Work
 - 1. The provisions of Section 16010 of these Specifications shall apply, unless otherwise specified.

1.02 SUBMITTALS

- A. Submit in accordance with Section 01330 **SUBMITTALS** of these specifications.
- B. Submit seismic anchoring calculations with equipment and raceway submittals. Calculations shall be performed by a licensed civil or structural engineer employed by the equipment manufacturer and registered in the State of California.
- C. Submit equipment anchoring methods. Include anchoring locations, anchor types and minimum anchor embedment depths.

PART 2 - MATERIALS

2.01 SEISMIC ANCHORING AND RESTRAINTS

- A. Equipment Anchors: Securely anchor electrical equipment. Anchoring shall have the capability of withstanding seismic forces per the 1994 California Code of Regulations, Title 24, Part 2, Section 2312, Seismic Zone 3, with $C_p = 1.0$ and $I = 1.5$. C_p may be two-thirds of the value specified for components mounted on foundations at grade or on floor slabs on earth grade.

PART 3 - EXECUTION

3.01 EQUIPMENT AND RACEWAYS

- A. Install equipment anchors and raceway supports in accordance with the final shop drawings and manufacturer's recommendations. Properly torque all bolts to the required values.

END OF SECTION

SECTION 16110

RACEWAY SYSTEMS

PART 1 - GENERAL

1.01 SCOPE

- A. This Specification Section covers the furnishing, installing and testing of all wireway, conduit, fittings, boxes, and supports as specified herein, as shown on the Drawings, and as required for a complete electrical installation.
- B. The provisions of Section 16010 of these Specifications shall apply, unless otherwise specified in this Section.
- C. The raceway system shall consist of the types and sizes as required and shall include all rigid steel conduit, flexible conduit, non-metallic conduit, wireway and accessories as required for the embedded and exposed raceway systems.
- D. Conduit accessories shall include Condulet type fittings, expansion and deflection couplings, chase nipples, locknuts, grounding bushings, flexible conduit fittings, supports, materials for sealing openings, and all other devices and materials required to complete the electrical raceway system.

1.02 SUBMITTALS

- A. Descriptive literature for all materials furnished under this section shall be submitted in accordance with Section 01330 **SUBMITTALS** of these specifications.
- B. Submittals for the material and equipment for the Raceway Systems shall include, but shall not be limited to, the following:
 - 1. Catalog cuts showing manufacturer, catalog numbers, dimensions, weights and material for all raceway and accessories, specific items shall be identified on all catalog cuts.
 - 2. Dimensioned shop drawings.
 - 3. Certified test reports prepared by manufacturer.

PART 2 - PRODUCTS

2.01 REFERENCE STANDARDS

- A. Raceway systems supplied under this contract shall be designed, manufactured, and tested in accordance with the latest version of the following standards:

American National Standards Institute (ANSI) Publications:	
C33.92	Flexible Liquid-tight Metal Conduit
C80.1	Rigid Steel Conduit
C80.4	Rigid Steel Conduit Fittings
National Electrical Manufacturers Association (NEMA)	
FB 1	Fittings and Supports for Conduit Cable Assemblies
TC-2 & TC-3	Non-metallic Conduit and Fittings
RN 1	Rigid Steel Conduit PVC jacketed
Underwriters Laboratories Inc.	
UL 514A	Metallic Outlet Boxes, Electrical
UL-870	Wireways, Auxiliary Gutters and Associated Fittings
UL-6	Rigid Metal Electrical Conduit
UL 651	Schedule 40 and 80 Rigid PVC Conduit

2.02 CONDUIT AND CONDUIT FITTINGS

A. Material for the conduit system shall conform to the following:

1. **Steel Conduit:** Steel conduit, couplings, bends and nipples shall be in accordance with ANSI C80.1 and UL-6, hotdip galvanized inside and outside after fabrication and then coated with a bichromate finish. Conduit sizes shall be not less than 3/4 inch IPS. All fittings shall be listed per UL 514.
2. **Flexible Liquid-tight Metal Conduit:** Flexible liquid-tight metal conduit shall be in accordance with ANSI C33.92 and shall be galvanized steel core with a copper bonding conductor between the spiral segments and an extruded synthetic jacket overall to insure a liquid-tight conduit. The conduit shall be 3/4 inch American Brass sealtight Flexible conduit, or equal. Flexible conduit fittings shall be the grounding type and a design approved by the manufacturer for this type of flexible conduit.
3. **Rigid Galvanized Steel Conduit PVC Bonded (RGS/PVC):** Conduit shall conform to the requirements of NEMA RN1, type A40. Plastic coated conduit shall be rigid galvanized steel conduit to which an epoxy acrylic primer and a 40 mil thick polyvinyl chloride coating has been bonded. Bond strength shall exceed the tensile strength of the plastic coat. All elbows shall be factory made and PVC coated. All fittings used with plastic coated conduit shall be

similarly coated with not less than 40 mils of polyvinyl chloride and shall be provided with type #316 stainless steel hardware. Furnish Occidental Coating Company -type OCAL 40, Robroy Industries - type PLASTIBOND, or approved equal. For factory coated conduit, use overlapping PVC sleeves. Sleeves shall extend beyond end of fitting minimum distance equal to nominal diameter of conduit, and shall fit tightly over conduit coating to form a watertight joint. Joints and fittings shall be made tight with strap wrenches. All damage to PVC jacket shall be repaired with four separate applications of PVC paint. Finished patch shall be 0.040 inch minimum thickness. Conduit sizes shall be not less than 3/4 inch IPS.

4. Rigid Polyvinyl Chloride (PVC) conduit: PVC conduit shall be manufactured in accordance with UL 651. PVC conduit shall be Schedule 40 or Schedule 80 high impact polyvinyl chloride, UL listed for direct burial. Minimum size shall be 3/4 inch. Fittings used with PVC conduit shall be PVC solvent weld type.
5. Fittings: Fittings for rigid steel conduit shall be threaded type and shall conform to the requirements of ANSI C80.4. Locknuts shall be extra heavy galvanized steel. Bushings shall be galvanized malleable iron with insulating collars. Grounding bushings shall be locking type and shall be provided with feed-through compression lugs.
6. Locknuts shall be extra heavy electrogalvanized steel for sizes through 2 inches. Locknuts larger than 2 inches shall be electrogalvanized malleable iron. Furnish allied tube and conduit type GRC, Triangle PWC, Inc., type GRS or approved equal.

2.03 SUPPORTS

A. General Requirements:

1. Inserts, hangers, brackets and miscellaneous supports for electrical equipment and conduits must be designed with minimum safety factor of 4, based on ultimate strength of material used. For empty conduits, include weight of 4 Type XHHW copper wires of maximum permissible size.
2. Secure hangers, brackets, conduit straps, supports and electrical equipment by means of toggle bolts on hollow masonry; expansion shields and machine screws or standard preset inserts on concrete or solid masonry; machine screws or bolts on metal surfaces; wood screws on wood construction. Wood or fiber plugs or concrete nails, are not acceptable.
3. All channels, fittings, clamps and accessories shall be hot dipped galvanized after fabrication for outdoor installations, and electro-galvanized for dry indoor installations. In wet or corrosive areas, such as wet wells and sumps, all channels, fittings, clamps and accessories shall be 316 stainless steel.

- B. Support channels steel shall conform to the requirements of ASTM A570. These shall be nominal 1 5/8" x 1 5/8" roll formed low carbon 12 gauge steel. One side of the channel shall have a continuous slot with inturned lips. Double strut shall be two of these welded back to back. Support channels shall be filled with styrofoam to inhibit concrete seepage.
- C. Conduit Supports:
1. Single Conduit Hangers: Steel City #C-149, Elcen Figure 13, Unistrut #J1205 through J1260, or equal, with 3/8" minimum diameter steel rod.
 2. Trapeze Hangers: Steel City #B-900, Elcen Figure 600, Unistrut #P-1000, or equal, channel with 3/8" minimum diameter steel rods and with conduit clamps, as specified below.
 3. Trapeze Conduit Clamps: Steel City #C-105, Elcen Figure 650, Unistrut #P-J111 through P-1124, or equal, for rigid conduit.
 4. Riser Supports: Steel City #C-210, Elcen Figure 39, Unistrut #U991-7 through U991-60, or equal.
 5. Finish
 - a. Hangers, channels, clamps, supports and rods, galvanized, cadmium plated or standard factory paint finish.
 - b. Conduit straps and single hole clamps, galvanized or cadmium plated.
 - c. Steel bolts, screws, nuts and washers, galvanized or cadmium plated.
 6. All conduit supports and hardware mounted inside the wet well shall be 316 stainless steel.

2.04 DUCT AND CONDUIT CAULKING COMPOUND

A. Compounds for sealing ducts and conduit shall have a putty like consistency workable with the hands at temperatures as low as 35 degrees F. and shall not slump at a temperature of 300 degrees F or harden materially when exposed to the air. Compounds shall readily calk or adhere to lean surfaces of asbestos cement, fiber, or plastic duct; metallic conduits or conduit coatings; concrete masonry, or lead; any cable sheaths, jackets, covers, or insulation materials; and the common metals. Compounds shall form a seal without dissolving, noticeable changing characteristics, or removing any of the ingredients. Compounds shall have no injurious effect upon the hands of workmen or upon materials. Contractor shall apply duct seal to all conduits entering the wet well or as directed by the Engineer.

2.05 BOXES AND CONDULET

- A. Boxes and Condulet shall be cast ferrous steel Form 7 with gasketed weatherproof covers and #316 stainless steel hardware for all indoor and outdoor applications. NEMA 4X boxes shall be cast nonmetallic screw hub type with gasketed watertight covers and #316 stainless steel hardware. Each box shall be large enough to accommodate the required number and sizes of conduits, conductors, splices and devices per the NEC. Flush boxes shall have the front edge of box or ring flush with wall or ceiling finish.

2.06 WIREWAY

- G. Surface metal raceway shall be constructed in accordance with Underwriters' Laboratories Standards UL 870 for Wireways, Auxiliary Gutters and Associated Fittings. Every component including lengths, connectors and fittings shall be UL listed.
- B. Surface metal raceway shall be suitable for "lay-in" of conductors.
- C. All sheet metal parts shall be provided with a rust inhibiting phosphatizing coating and gray baked enamel finish. All hardware shall be plated to prevent corrosion. All screws installed toward the inside shall be protected by spring nuts or otherwise guarded to prevent wire insulation damage.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. General Requirements:
 - 1. Install an accessible raceway system for connection of all boxes, panelboards, cabinets, and equipment.
 - 2. All raceway shall be the type and size as shown on the Plans.
 - 3. Make bends for exposed conduit stub-ups completely below the surface. Make stubs vertical and arrange neatly.
 - 4. Where conduits turn up in accessible floor areas or under removable partitions, install coupling flush with finish floor surface (exclusive of floor covering). Provide flush threaded plug in this coupling where conduit is not to be extended.
 - 5. Spare Conduits: For flush mounted panels, run empty conduits from panel to accessible spaces above and below, unless otherwise shown. Install minimum of two 3/4" conduits (one up and one down) for every 3 single pole spare circuit breakers or spaces, or fraction thereof.

6. Running Threads: Running threads shall not be acceptable.
7. All bends and offsets, where required, shall either be made with factory made bends or shall be field bends made with a conduit bender designed specifically for use with the type of conduit to be bent.
8. Minimum size of conduit shall be 3/4 inch. In no case shall the conduit size be smaller than that shown on the drawings.
9. The entire electrical raceway system shall be bonded and form a continuous metallic electrical conductor from service point to every box and shall be terminated with ground bushings connected to the panelboard ground bus per NEC.
10. All conduits which are installed shall be capped during construction to prevent the entrance of foreign material.
11. All conduit installed by the Contractor shall be of the type listed in the "Conduit Installation Table", at end of this section.
12. The maximum number of conduit bends shall be as follows: 90 degrees of conduit bends for up to 300 feet of conduit, 180 degrees of conduit bends for up to 200 feet of conduit, 270 degrees of conduit bends for up to 100 feet of conduit, 360 degrees of conduit bends for 50 feet of conduit or less.
13. Conduit terminating at floors or in cabinets, cubicles, and walls shall be identified by metal tags bearing the conduit number. The tags shall be securely attached to the conduit directly under the terminating bushing on both ends of the conduit.

B. Exposed Conduit:

1. All exposed conduits shall be run in straight lines parallel to column lines, walls or beams. Where conduits are grouped, the bends and fittings shall be installed so as to present an orderly appearance. Unnecessary bending or offsets shall not be acceptable. Conduits shall be kept at least 12 inches away from heating devices or similar equipment.
2. Supports for exposed conduit shall be in accordance with Title 24, CAC.
3. Supports and all hardware inside sump area shall be stainless steel.
4. Support conduits as close to 8 feet intervals as possible and within 1 foot of boxes or changes in direction. Use riser supports with clamps for vertical conduit risers.

5. For single conduit runs, use conduit straps with backplates or suspend from ceiling with single conduit hangers. Single hole malleable iron clamps may be used for horizontal runs on vertical surfaces. Perforated strap (plumber's tape), not acceptable.
6. For multiple conduit runs, group conduits together and support from ceiling by means of trapeze hangers. Wall brackets may be used for conduit runs on vertical surfaces. Clamp each conduit to trapeze or bracket, using conduit clamp.
7. Fasten hanger rods to structural steel members with beam clamps or to concrete inserts set flush with surface. Install reinforcing rod through opening in concrete insert.
8. Exposed conduit shall be tightened securely and shall be supported rigidly in place, and all connections to outdoor boxes shall be watertight. All exposed conduit shall include, where required, the drilling of holes in the bottom and top of enclosures or plates and in the sides of enclosures of switchgear and other electrical equipment. The Contractor shall drill all holes in concrete for installation of expansion anchors for exposed conduit runs.

C. Conduits in Concrete Slabs:

1. Conduits in concrete slabs shall be rigid galvanized steel and may be installed in structural slabs, or in slabs on fill, having a minimum thickness of 4" of concrete around the entire conduit.
2. Conduits will not be permitted to interfere with proper placement of principal reinforcement steel and must be located as directed. In structural slabs, place conduits carefully between upper and lower layers of steel. In prestressed concrete slab construction, place conduits in center of slab and do not support from prestressed steel.
3. Space conduits 8" minimum on centers, except place as wide as possible where they converge at panels or junction boxes.
4. Place conduits running parallel to slab supports (beams, columns, walls, etc.) not less than 12" from such supports.

D. Underground Conduits:

1. Buried Conduit:

- a. Buried conduits shall be a minimum of 24 inches below grade on runs not exposed to vehicular traffic and a minimum of 36 inches below grade when exposed to vehicular traffic. Buried conduits shall be installed per the Conduit Installation Table, see end of section for

table. Backfill shall be compacted to 95%. Paved surfaces disturbed during trenching shall be repaired to pre-construction condition after installation is complete.

- b. All conduits entering or leaving the ground shall be sealed to prevent condensation of moisture inside the conduit. Conduit entrances in the bottom of switchgear, power distribution panels, switchboards, etc., shall project into the enclosure a minimum of three inches to prevent water from entering conduits.
- c. Concrete shall be Class "D" PCC in accordance with section 10-5 of the City of Sacramento Standard Specifications and shall have a compressive strength of 3000 PSI. A red oxide in the amount of 5 lbs. per cubic yard shall be mixed uniformly throughout the concrete.
- d. Contractor to place a 6" wide electrical caution warning tape in trench 12" above concrete as directed by the Engineer.

2. Duct Lines:

- a. Duct lines shall have a continuous slope downward toward pull boxes and away from switchgear with a pitch not less than 4 inches in 100 feet. Install end bells at duct terminations in handholes. Except at conduit risers, changes in direction or more than 5 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 25 feet, sweep bends may be made up of one or more manufacturer's 30 degree curved sections and straight sections. Manufactured risers shall have a minimum radius of 18 inches. The joints of the conduits shall be staggered by rows and layers so as to provide a duct line having the maximum strength. All duct runs shall be placed on an undisturbed excavated soil base wherever possible. Where duct runs pass through backfilled areas, the soil base shall be compacted to 95%.
- b. Duct joints shall be made by brushing a plastic solvent cement on insides of plastic coupling fittings and the outside of duct ends. Each duct and fitting shall then be slipped together with a quick one-quarter turn twist and held in to set the joint tightly.
- c. Plastic spacers as manufactured by the conduit supplier shall be used and shall be located five feet on centers. These spacers shall provide for conduit separation by a minimum of two inches between and four inches on the top, bottom and sides. Wire ties shall be made at each spacer location and shall be securely anchored to prevent conduit flotation during pouring. Duct runs shall be watertight.
- d. All ducts shall be inspected by the Engineer prior to pouring concrete.

He shall inspect for backfill compaction, drainage slope, spacers, flotation ties and conduit condition, joints, and end bells. Concrete shall not be poured until this inspection is complete.

- e. Conduits shall be thoroughly swabbed immediately upon completion of pouring.
- f. After the concrete has set, but before backfilling, a mandrel having a diameter the nominal conduit inside diameter, minus 1/4 inch, and not less than 8 inches long, shall be pulled through each conduit. The mandrel shall be lead covered or painted white to give indication of any protrusion on the inside of the conduit, which might injure the cable sheath. The ends of all conduits shall be suitably plugged, capped and protected from damage during construction.
- g. Ducts shall be stored to avoid warping and deterioration with ends plugged to prevent entry of any water or solid substances. Ducts shall be thoroughly cleaned before being laid. Plastic ducts shall be stored on a flat surface and protected from the direct rays of the sun.
- h. Concrete shall be Class "D" PCC in accordance with section 10-5 of the City of Sacramento Standard Specifications and shall have a compressive strength of 3000 PSI. A red oxide in the amount of 5 lbs. per cubic yard shall be mixed uniformly throughout the concrete.
- i. Contractor to place a 6" wide electrical caution warning tape in trench 12" above concrete as directed by the Engineer.

3. Conduit in Structural Concrete:

Runs of conduit to be embedded in concrete shall be rigidly supported in their proper positions while concrete is being placed. Ends of conduits shall be suitable plugged or capped during construction to prevent the entrance of concrete or other foreign matter. Connections shall be checked for tightness before being embedded.

4. Vertical Penetration of Grade:

- a. All risers penetrating ground shall extend 6 inches above grade.
- b. Conduit entrances in the bottom of switchgear, power distribution panels, switchboards, etc., shall project into the enclosure a minimum of three inches to prevent water from entering conduits.

5. Conduits Crossing Expansion and/or Contraction Joints:

Expansion couplings used in conduit runs crossing expansion or contraction

joints in concrete shall be zinc coated and watertight.

E. Workmanship and Installation Requirements:

1. Where field changes are required, every precaution shall be taken to insure that the change is coordinated with other conduit, structural, and plumbing and piping work. Information shall be obtained regarding the completed raceway runs to insure that there will be no interference when the raceway run is extended or revised. A complete record of such changes shall be made on the Drawings.
2. Conduits shall be cut square, threaded and reamed to remove sharp or rough edges and burrs. No running threads will be allowed. Conduit joints and connections shall be made waterproof and rustproof by application of a non-insulating thread compound, such as white lead or graphite, and zinc sealing material. Each threaded joint shall be thoroughly cleaned to remove cutting oil before the compound is applied.
3. Metallic conduits shall be bent cold to prevent damage to the protective coating. All bending shall be gradual and be done smoothly to permit the pulling on insulated electrical wires and cables without incurring damage to the insulation or sheath. Radius of curvature shall be not less than that permitted by NEC. The number of bends shall not exceed four 90 degree bends between pull points.
4. Conduit shall be rigidly secured to panels and other electrical equipment terminal boxes with locknuts and grounding bushings in such a manner that each system shall be electrically continuous throughout unless otherwise shown on the Drawings.
5. The raceway system shall be installed complete before conductors are installed. Concrete shall be removed from the inside of pull boxes after the forms are removed, and the threads for attaching devices and covers shall be cleaned. As soon as practicable after conduits are installed, conduits shall be swabbed with clean dry rags to show they are clean and dry.
6. To reduce damage to the zinc coating, only strap type wrenches shall be used. All places where the zinc coating is damaged shall be repaired with zinc-rich galvanizing repair compound.
7. Pull boxes, sized in accordance with NEC, shall be installed wherever necessary to avoid overly long straight runs or an excessive number of bends.
8. Raceway shall be installed with necessary fittings and supports.
9. Pull-tape shall be a made out of woven aramid yarns and contain a silicon

lubricate. The pull-tape shall have sequential footage markings and have a minimum tensile strength of 2500 lbs. Furnish and install pull-tape in all empty raceways, unless otherwise noted. Pull-tape shall be Dandy-Line or approved equal.

10. All underground conduits shall be inspected by the Engineer before backfilling the trench.

3.02 OUTLET, DEVICE, PULL AND JUNCTION BOXES

A. Boxes shall be installed as follows:

1. NEMA 3R Indoor and outdoor areas
2. NEMA 4X Where specifically shown on the plans and corrosive areas

B. Set boxes in a rigid manner and support independently of conduit by bar hangers in metal studs, or to solid blocking in frame construction, or fasten directly with wood screws on solid wood framing, bolts and expansion shields on concrete or brick, toggle bolts on hollow masonry units, and machine screws or welded threaded studs on steel work. Do not use powder actuated fasteners on this job. All junction boxes shall be installed with covers accessible after installation.

C. Pull boxes shall be located every 400 feet for straight pulls, 300 feet with every 90 degrees of conduit bends, 200 feet with 180 degrees of conduit bends, 100 feet with 270 degrees of conduit bends and every 50 feet with 360 degrees of conduit bends.

CONDUIT INSTALLATION TABLE

<u>CONDUIT INSTALLATION</u>	<u>CONDUIT TYPE</u>
Exposed Conduit (indoor & outdoor):	Rigid galvanized steel conduit.
Conduit in Concrete Slab:	Rigid galvanized steel conduit.
Underground Conduit:	Rigid galvanized steel PVC coated conduit where the conduit is directly in contact with the earth or schedule 40 PVC conduit with concrete encasement minimum of 4" all around for horizontal runs only.
Conduit in Duct Bank:	Schedule 40 PVC conduit with concrete encasement minimum of 4" all around for horizontal runs only.
Vertical or horizontal sweeps, risers, or stubs into underground boxes:	Rigid galvanized steel PVC coated conduit for entire sweep, underground runs 5' prior to riser or stub, and 6" above finished grade. Conduit 6" above finished grade shall be installed as exposed conduit.
Bottom Entrance of Switchgear, Distribution Panel, MCC, & etc:	Rigid galvanized steel PVC coated conduit.
Side or Top Entrance of Switchgear, Distribution Panel, MCC, & etc:	Rigid galvanized steel conduit.
Conduit Exposed to Corrosive Environment (sewer wet well)	Type 316 stainless steel conduit .
Primary & Secondary of the SMUD Transformer:	Per SMUD standard specifications.
Bottom Entrance From SMUD Transformer to City Main Switchgear:	PVC conduit with concrete encasement minimum of 4" all around.
Motor Conduit Box to Rigid Wireway System:	Flexible liquid tight metal conduit.
Door Switch Sensor to Rigid Wireway System:	Flexible liquid tight metal conduit.

CONDUIT INSTALLATION

CONDUIT TYPE

Conduit From Junction Box
to Outside Building Lights:

Rigid galvanized steel conduit.

Conduit From Junction Box
to Trash Rack Lights:

Flexible liquid tight metal conduit.

Risers or Conduit Stubs Rising
Up From Concrete Duct Bank:

Rigid galvanized steel PVC coated conduit.

Equipment Subject to Vibration

Flexible liquid tight metal conduit.

Notes

1. All acceptable conduit materials are specified in specification 16110 section 2.02 A.
2. Any conduit not covered in the above categories shall be Rigid Galvanized Steel PVC coated.
3. All underground PVC conduits shall be encased in red concrete.
4. Contractor shall place a 6" wide electrical caution warning tape in all trenches 12" above concrete or as directed by the Engineer.

END OF SECTION

SECTION 16120

LOW VOLTAGE WIRE AND CABLE

PART 1 - GENERAL

1.01 SCOPE

- A. This Specification Section covers the furnishing, installing and testing of all wire and Cable required to complete the installation of equipment as specified herein and as shown.
- B. The provisions of Section 16010 of these specifications shall apply, unless otherwise specified in this Section.

1.02 SUBMITTALS

- A. Descriptive literature for all materials furnished under this section shall be submitted in accordance with Section 01330 **SUBMITTALS** of these specifications.
- B. Submittals for the wire and Cable shall include, but shall not be limited to, the following:
 - 1. Submittals will include product data sheets for all cables, of each type and voltage rating, on which work is to be performed under this contract.
 - 2. Certified test reports prepared by manufacturer.

1.03 QUALITY ASSURANCE

- A. Wire and cable of the type and voltage rating shown on the contract drawings shall be of a design which has been in satisfactory use for not less than three years in a minimum of 20 installations. For purposes similar to those intended herein.
- B. Manufacturer shall provide certification that the manufacturer has been fabricating and assembling specified equipment (as described in A above) in his current facility for a minimum of five (5) years.
- C. All materials selected for the manufacture of the hardware shall be the best available for the purpose for which they are used, considering strength, ductility, durability and the best engineering practice.
- D. All cable shall have been manufactured within one year of installation.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Wire and cable shall be delivered complete, in manufacturer's original, unopened protective packaging. Packing materials shall be such as to prevent damage to the materials during transportation and handling.
- B. Wire and cable shall be handled in a manner to prevent damage to the coverings and conductor.
- C. Maintain protective coverings until ready for installation.

PART 2 - PRODUCTS

2.01 REFERENCE STANDARDS

- A. Wire and cable supplied under this contract shall be designed, manufactured, and tested in accordance with the latest version of the following standards:

American Society Testing Materials (ASTM)	
B-8	Concentric-Lay-Stranded Copper Conductors

Insulated Cable Engineers Association (ICEA)	
S-68-516	Ethylene Propylene Rubber Insulation

Underwriters Laboratory (UL)	
UL 20	General Use Snap Switches
UL 486A	Wire Connectors and Soldering Lugs
UL 83	Thermoplastic Insulated Wires
UL 510	Insulating Tape
UL 1072	Medium Voltage Cable

National Electrical Manufacturers Association (NEMA)	
WD-1	General Purpose Wiring Devices

National Electrical Code (NEC)

Institute of Electrical and Electronic Engineers (IEEE)

California Administrative Code (CAC) Title 24

2.02 LOW VOLTAGE WIRING

- A. Low voltage wiring shall be of the size and number shown and shall have the following characteristics. Sizes are indicated by American Wire Gauge (AWG) and minimum size shall be No. 12 AWG for power wiring and No. 14 AWG for control wiring, unless otherwise indicated.
- B. Voltage: 600 V.
- C. Conductors: Annealed copper 98% conductivity. Aluminum conductors are not acceptable.
- D. Conductor Stranding: All Conductors shall be stranded. Solid wire is not acceptable.
- E. Insulation: Thermoplastic insulated wires and cables shall be listed in UL 83. They shall be delivered to the job site in the manufacturer's unopened boxes or reels. Insulation for conductors and cables shall be rated 600 volts and shall be as follows:

Item	Sizes	Insulation
Branch	No. 12 to No. 10	THHN/THWN-2
Grounding	All	TW or bare
Feeders	No. 6 and above	THHN/THWN-2
Cords	No. 12	SO
Wet Locations	All	THWN
Corrosive Locations	All	THHN/THWN-2
VFD Feed to Motor	All	VFD rated, blended composite semiconductive, tray cable rated, UL type TC 90°C. 100% shielding with foil tape & tinned copper braid

- F. Insulation Colors: Insulation shall be continuously colored for the entire conductor length; except that feeders can be phased taped and all insulated grounding conductors must be green.
- G. Instrumentation/Telemetry Cable: Instrumentation and Telemetry Cable shall be multiple-pair, #16 AWG, twisted, overall shielded with PVC jacket. Shield shall be

100% and include #20AWG stranded, tinned copper drain wire. The conductors shall be polyethylene insulated. Manufacturer shall be Belden or equal.

- H. Telephone Cable: Telephone cable shall be 6 twisted pair with standard color code, #22 AWG, solid copper, polyethylene or polypropylene insulation, twisted pairs shall have varying lays, 100% shielded with .008" corrugated aluminum tape with ethylene copolymer coating on both sides, polyethylene jacket, filled with petrolatum-polyethylene gel filling compound, Clifford type BJFA, or equal.
- I. RS-485 Cable: RS-485 cables shall be tinned copper, polyethylene insulated, twisted pair, aluminum-polyester shield. 24 AWG stranded tinned copper drain wire, tinned copper braid shield and a chrome PVC jacket. The cable shall be Belden 9841, or equal.
- J. Ethernet Cables: Ethernet cables shall be CAT-6 compliant Belden model number 7940A or approved equal. Ethernet cables shall not exceed 90 meters in length under any circumstances. Ethernet cables shall be tested by an independent testing company to verify the integrity of the cable and terminations. The Ethernet cables shall be tested for the following:
 - 1. Attenuation (dB/100m)
 - 2. Power sum near-end crosstalk (dB)
 - 3. Power sum attenuation to crosstalk ratio (dB/100m)
 - 4. Power sum equal level crosstalk (dB/100m)
 - 5. Return loss (dB)

All tests shall be conducted at the following frequencies: 1 MHz, 4 MHz, 10 MHz, 25 MHz, 100 MHz, 200 MHz, and 250 MHz. The test results shall be printed out and submitted to the Engineer. All tests shall be compared to the specifications for the Belden 7940A cable. If any cable fails to meet these specifications the Contractor shall remove and replace the cable at their expense and retest the cable. All Ethernet cables shall meet the specifications of the Belden 7940A CAT 6 cable.

- ~~K. VFD rated cable: UL 44, XHHW 2, 600 V conductors, the cable shall have three symmetrically placed grounds to reduce problems associated with Pulse Width Modulated AC drives. Continuous corrugated aluminum sheath 99.5% shall be applied over the assembly. The continuous sheath will be impervious to moisture, liquids, and gases. The cable shall have black PVC jacket, sunlight and oil resistant, per UL 1569. The VFD cable shall be Belden 295XX or approved equal.~~

2.03 COLOR CODE

- A. Color code for three phase circuits shall be ph-A, ph-B, ph-C front to back, left to right and top to bottom. Color code for three phase circuits are listed in phase order. Color code shall be as follows:

120/240 volt power wiring	
Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Ground	Green

480/277 volt power wiring	
Phase A	Brown
Phase B	Orange
Phase C	Yellow
Neutral	White
Ground	Green

Miscellaneous	
Control wiring	Purple
DC Power Wiring	Blue

Signal wiring	
Positive (+)	Red
Negative(-)	Black

2.04 GROUND CONDUCTOR

- A. Grounding electrode conductors shall be sized per NEC 2008 edition, table 250.66, unless otherwise noted on the Plans.
- B. Raceway and equipment grounding conductors shall be sized per NEC 2008 edition, table 250.122, unless otherwise noted on the Plans.

2.05 GROUND RODS

- A. Provide copper-encased steel ground rods at least 3/4 inch in diameter and 10 feet long unless otherwise indicated. Die-stamp each near the top with the name or trademark of the manufacturer and the length of the rod in feet. The rods shall have a hard, clean, smooth, continuous surface throughout the length of the rod. Ground rods shall be provided with precast ground wells.

2.06 WIRING MATERIALS

- A. Compression Connectors: Connectors shall be for use with copper conductors and shall conform to the requirements of UL 486A. Control and signal connectors shall be copper compression type nylon self insulated grip locking spade lugs. Power and grounding lugs and connectors for conductors No. 6 and larger shall be compression types of one piece tubular construction. These power compression connectors shall be copper long barrel terminals with corrosion resistant tin plating. Connectors shall be marked externally with wire size and type. Power connectors shall have NEMA configuration bolt holes on the pad. Connectors shall also have the proper mating compression die index and color code marked on the barrel. Furnish ILSCO #CRA/B-L series or approved equal.
- B. Splice Waterproofing Kits: Splice waterproofing shall be in kit form. Kit shall contain low viscosity polyurethane sealing and insulating material. The component materials of the insulation shall be in exact mixing ratio packages. Kit shall employ a gravity poured method of a pressure injected method. Molds shall be flexible plastic with porous webbing. Molds shall be capable of accommodating odd shape splices. Kit shall be rated 600 V and water submersible. Furnish 3M Scotch cast 2104 and 85 series, or approved equal.
- C. Electrical Tapes: Tapes shall conform to the requirements of UL 510 and be rated: 105 degrees C, 600 V, flame retardant, hot and cold weather resistant. Vinyl plastic electrical tape shall be 7 mil black. Phase tape shall be 7 mil vinyl plastic, color code as specified. Electrical insulation putty shall be rubber based, elastic putty in tape form. Varnished cambric shall be 9 mil cotton tape impregnated with yellow insulating varnish and adhesive backed.
- D. Wire and Cable Markers: Every control and signal conductor shall be tagged with a permanently machine imprinted plastic nylon clip sleeve heat shrinkable or adhesive backed strip type labels protected with a clear plastic heat shrinkable tubing.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Wire and cable shall not be installed in conduit until the raceway system has been completed and cleaned. The equipment and methods for the installation of wire and cable shall insure that no cuts or abrasions in the insulation or protective covering or

kinks in the conductors occur. Cables shall be pulled down grade with the feed in point at point of the highest elevation.

- B. The Contractor shall pull wire and cable into the conduit with sufficient length remaining at the ends to conveniently make connections to all equipment or devices.
- C. Where practicable, the minimum radius to which an insulated conductor shall be bent, whether permanently or temporarily during installation, shall be ten times the diameter over the outer covering for rubber and thermoplastic insulated cable.
- D. Where a lubricant is needed as an aid in pulling wire or cable, a nonconducting lubricant or cable-pulling compound approved by the wire and cable manufacturer and that is not injurious to the sheath or insulation shall be used. 600 V cable lubricants shall be soapstone, graphite or talc which shall be UL listed for thermoplastic insulation. Oil or grease shall not be used for lubrication. Excessive pulling stresses will not be permitted.
- E. Wire and cable shall be continuous, with no splices permitted except in enclosed steel boxes provided for the purpose, or in manholes. Shipping length of power cable shall be equal to a circuit length or summation of various circuit lengths to minimize cable waste.

3.02 INSTALLATION - LOW VOLTAGE WIRING

A. General Requirements:

- 1. Do not use blocks, tackle, or other mechanical means to pull in wires #8 AWG, or smaller. Cable pulling tensions shall not exceed the maximum pulling tension for stranded copper.
- 2. See section 16110 for pull rope/tape requirements.
- 3. Unless otherwise specified or shown, leave at least 9" of free conductor length at each unconnected outlet. The free ends of conductors shall be coiled neatly in outlet box.

B. Splicing and Termination of Conductors:

- 1. Conductors #10 AWG and smaller:
 - a. Twist & solder conductors together to be electrically and mechanically secure.
 - b. Insulate splices, joints and free ends of conductors with insulation equivalent to that of conductors by taping with varnish-cambridge rubber tapes, or with high dielectric strength plastic tape.

2. Conductors #8 AWG and larger:
 - a. Splice and terminate conductors by use of connectors and terminal lug.
 - b. Do not use split bolt type connectors.
 - c. After initial set has been taken, re-tighten all pressure type connectors and lugs.
 - d. Insulate all splices, joints, and free ends of conductors as specified above.
 - e. Where aluminum lug is bolted with steel or copper bolt, use Belleville spring washer and flat washer. Belleville washer, either hardened and tempered steel, tin plated, or stainless steel. Flat washer, mild steel, tin plated, and slightly larger than Belleville washer.
3. Low Voltage Control Wiring: Splice by twisting conductors together so as to be electrically and mechanically secure. Other methods may be used if specifically approved by Engineer.
4. Underground Splices: Conductor and cable splices installed underground in manholes, pullholes and similar locations, shall be made watertight. Install waterproofing after insulating with tape on all splices in junction boxes or handholes. Follow manufacturer's written instructions. As a minimum molds shall be fitted uniformly webbed around the spliced conductors. Insulating and waterproofing material shall then be poured or injected into the mold. Do not allow cables to move until after material has cured one hour at 70 degrees F or eight hours below 70 degrees F.

C. Marking:

1. In addition to color coding, identify circuits as follows:
 - a. The Contractor shall assign to each wire or cable a unique identification number unless a number has been pre-assigned on the Plans.
 - b. Where an identification number has been pre-assigned on the Plans the Contractor shall use that number.
 - c. The same identification number shall be used for conductors having common terminals.
 - d. Identification numbers shall be shown on all As-Built drawings.

- e. Identification numbers shall be located within 3" of wire terminations and shall not be located such that they are concealed in any raceway.
2. Each multiconductor cable shall be assigned a unique identification number. It is required that this cable number shall form part of the individual wire identification number for each conductor in the cable. Cable markers shall be attached to each cable at stub-up locations and at all intermediate pull box locations.

3.03 GROUNDING

- A. Permanently and effectively ground noncurrent metal parts of conduit systems, supports, cabinets, switchboards, equipment cases, motor frames, etc., and system neutral conductors per NEC. Install metal raceway couplings, fittings and terminations secure and tight to insure good ground continuity. Provide grounding bushing and bonding jumper where conduits enter any panel or device, panels with open bottom or where shown on the drawings. Install a ground conductor in each raceway system. Contractor to install Ufer ground per NEC section 250.
- B. Grounding details shown on plans are minimum. If additional equipment, such as ground rods, clamps, conductors, etc., is required, furnish and install same without additional cost to City.
- C. Use ground clamps specifically designed for grounding purposes. Where ground conductor is in conduit, use ground clamp which grounds both conductor and conduit.
- D. Shielded instrumentation cable shall be grounded at one end of circuit only unless explicitly required by manufacturer of instrument or device to be grounded at multiple locations. Single ground point in each circuit shall be at the "receiving" end of the signal carried by the cable.

3.04 PREPARATION FOR OPERATION

- A. The wire and cable shall be properly installed, connected and tested by the Contractor before such equipment will be taken over for operational service.
- B. Identification markers and nameplates shall be properly and accurately installed.
- C. Torquing: Every worker assigned to tightening bolted connections on this job shall be required to have either a torque screwdriver or a torque wrench on site in their tool box. Each crew shall have one of each. All electrical, mechanical and structural threaded connections shall be torqued. Torque connections to the value recommended by the equipment manufacturer. If they are not available, see Section 16950 for torque requirements.

3.05 TESTS AND INSPECTIONS

- A. Insulated wire and Cable Dielectric Tests: After the wiring is installed and all taps and splices are completed, but before making connections to equipment terminals, the cable shall be given insulation tests in accordance with Section 16950 and NEMA and ICEA Standards.
- B. Continuity Tests:
 - 1. After wiring connections to equipment and devices have been made, the circuits shall be tested for continuity. The Contractor shall be responsible for notifying the City Resident Inspector when the wire or cable is ready to be tested, and the Contractor shall conduct the tests as instructed by the Engineer.
 - 2. If a failure is detected, the Contractor shall locate and determine the trouble, make necessary corrections to the installation and retest without additional cost to the City.
 - 3. Connection of the wiring to equipment or device terminal blocks or other connection points and furnishing and installing conductor identification tags at terminals or other connections shall be included as part of the equipment's installation.
- C. All tests shall insure the satisfactory installation, adjustment, operation and performance of all equipment and materials erected and installed under this specification, shall be the responsibility of the Contractor.
- D. The Contractor shall also responsible for furnishing all electrical test equipment, meters, instruments and miscellaneous equipment and perform all work required for the tests.
- E. Test Reports: The Contractor shall furnish the Engineer three copies of certified test reports showing the results of all tests specified herein.

3.06 DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS

- A. Demonstration of the operation of segments of systems shall not be construed as acceptability of the complete system. Acceptance will only be made on satisfactory demonstration of the complete operation of the system as a whole.
- B. If, in the opinion of the Engineer, test results show improper adjustment, operation, or performance of any equipment, and these deficiencies are due to negligence or unsatisfactory installation by the Contractor, the Contractor shall remedy the situation at no additional cost to the city.

END OF SECTION

SECTION 16432

LOW VOLTAGE COMMERCIAL SAFETY SOCKET

PART 1 - GENERAL

1.01 SCOPE

- A. This specification section covers the commercial safety socket and includes coordinating the new electrical hookup with SMUD. The commercial safety socket shall meet EUSERC requirements.
- B. The provisions of Sections 16010 and 16120 of these specifications shall apply unless otherwise specified in this Section.

1.02 ELECTRIC SERVICE COORDINATION

- A. The existing SMUD electric service is 3-phase, 4-wire, 480 V and is feed underground from an existing pad mounted SMUD transformer.
- B. The City is purchasing a new SMUD pad mounted transformer for this facility and the new electrical service will be 3-phase, 4-wire, 480/277 V.
- C. The Contractor shall coordinate the electric service hookup with SMUD such that the service is available to match their schedule (Sacramento Utility District Contact: Jennifer Harris, 916-732-6104).
- D. The Contractor shall furnish and install the underground duct, conductors, SMUD pull box, and transformer pad per the Plans and in accordance with SMUD requirements. SMUD will make all connections at the new transformer.
- E. The Contractor shall make sure that the electrical service phase rotation is A-B-C clockwise.

1.03 SUBMITTALS

- A. Submittals for the commercial safety socket shall include, but shall not be limited to, the following:
 - 1. Catalog cuts showing and identifying manufacturer, catalog numbers, dimensions, weights and material.
 - 2. Assembly drawings of the equipment.
 - 3. Operating and Maintenance Manuals as specified in Section 01330.

4. Dimensioned "as-built" drawings.
5. Certified test reports prepared by the manufacturer.

1.04 QUALITY ASSURANCE

- A. The manufacturer has been fabricating and assembling similar equipment for a minimum of five (5) years.
- B. The commercial safety socket shall be built and labeled by a manufacturer with a UL file listing.

PART 2 - PRODUCTS

2.01 COMMERCIAL SAFETY SOCKET

A. CONSTRUCTION

Enclosure shall be designed for bottom entry of incoming and outgoing conduits. Enclosure shall meet NEMA 3R standards and be constructed as shown on the Plans. The commercial safety socket shall be factory assembled, tested, and subsequently shipped to the job site as a complete operational assembly.

Meter sockets, test block, mounting brackets, test switches and wiring shall be furnished and installed as required by SMUD.

The commercial safety socket shall have a permanent metal identification plate providing the following information: manufacturer, serial number, type and electrical ratings.

B. RATINGS

Provide a commercial safety socket rated for 200 A, 480 VAC, 3 phase, with a 7 jaw socket.

C. IDENTIFICATION

Provide a nameplate with a red background and white lettering indicating the commercial safety socket. Minimum letter size shall be 3/8".

D. MANUFACTURERS

The commercial safety socket shall be manufactured by Eaton model number CH127TB or equal.

PART 3 - EXECUTION

3.01 FACTORY TESTING

- A. The commercial safety socket shall be given manufacturer's standard electrical and mechanical production tests and inspections. The manufacturer shall submit five copies of the test reports to the Engineer for review.

3.02 INSTALLATION AND TESTS

- A. Facilities for SMUD service shall be inspected and approved prior to acceptance of the Contractor's work.
- B. Contractor shall furnish all material and labor including, but not limited to, transportation, loading, lifting, jacking, wiring to completely install the commercial safety socket as shown on the drawings and shall conform with the National Electric Code (NEC).
- C. Refer to Section 16950 for all the testing requirements.

END OF SECTION

SECTION 16480

LOW VOLTAGE MOTOR CONTROL CENTER

PART 1 -- GENERAL

1.01 SCOPE

- A. This Specification Section covers the furnishing, installing and testing of the Motor Control Center as specified herein, as shown on the Drawings, and as required for a complete electrical installation.
- B. The provisions of Sections 16010 and 16120 of these specifications shall apply unless otherwise specified in this Section.

1.02 SUBMITTALS

- A. Submittals for the Motor Control Center shall include, but shall not be limited to, the following:
 - 1. Catalog cuts showing and identifying manufacturer, catalog numbers, dimensions, weights, nameplate data, and material of all components.
 - 2. Assembly drawings with front, side, section views and uprights. Drawings to show location of all accessories.
 - 3. Catalog cuts of specified components.
 - 4. Operating and Maintenance Manuals as specified in Section 01330.
 - 5. Dimensioned as-built drawings.
 - 6. Certified test reports prepared by the manufacturer.
 - 7. Control diagrams

1.03 QUALITY ASSURANCE

- A. The manufacturer has been fabricating and assembling similar equipment for a minimum of five (5) years.
- B. The MCC shall be built and labeled by a manufacturer with a UL file listing. The MCC shall meet UL 845.

PART 2 -- PRODUCTS

2.01 MATERIAL AND EQUIPMENT

- A. The Motor Control Center shall be a 3 phase, 3 wire, 480 volt, free standing, dead front enclosure with either NEMA Class I or II designation and NEMA Type B or Type C-S wiring. For those enclosures containing across the line motor starters the enclosure shall be NEMA 12 construction and labeled as NEMA 12 with no vents. The center shall contain the proper clearances and space for safe operation of the equipment therein. Control voltage shall be 120 VAC.

Motor control centers shall be Allen-Bradley, Eaton "Freedom", General Electric 8000 Line, Square D Model 6I, or approved equal.

- B. The main and generator circuit breakers shall be operated by a toggle type handle and shall have a quick-make, quick-break, over-center switching mechanism that is mechanically trip-free from the handle so that the contacts cannot be held closed against short circuits and abnormal currents. Tripping due to overload or short-circuit shall be clearly indicated by the handle automatically assuming a position midway between the manual ON and OFF positions.

Contacts shall be of non-welding silver alloy.

Each pole shall provide inverse time delay and instantaneous circuit protection, and the minimum interrupting rating shall be as shown on the Plans.

Both the main and generator circuit breakers shall have **adjustable** short time pickup, short time delay, long time pickup, and long time delay settings. **The main and generator breakers shall be a Cutler Hammer HFDE or equal.**

The main and generator circuit breakers shall be pad-lockable as specified in the current edition of the EUSERC standards.

The circuit breaker shall be General Electric, Square D, Cutler Hammer or equal and shall be NEMA rated.

- C. Motor Circuit Protector (MCP) shall be molded case quick make quick break with adjustable instantaneous trip from 700 percent to 1300 percent of the motor full load amperes. The instantaneous trip setting shall also meet the requirements of the latest version of the NEC. The motor circuit protector shall be rated 600 volts with adjustable trip settings. MCP shall be General Electric "map break", Eaton "MCP", or approved equal. The operating handle shall close the MCP when placed in the upward position and open the MCP in the downward position. The handle shall accept multiple padlocks to lock the MCP in the open position. MCP shall be NEMA rated.

MCP1, MCP2, and MCP3 shall be a Cutler Hammer HMCP050 with an adjustable trip range from 150A to 500A or equal. MCP4 and MCP5 shall be an Cutler Hammer HMCP007 with an adjustable trip range from 21A to 70A or equal.

- D. **Circuit Breakers: Circuit Breaker shall be molded case and NEMA rated.** The circuit breakers shall conform to the requirements of NEMA ABI and UL 489 and shall be trip-free, thermal magnetic bolt-on type; connect breakers in uniform phase sequence starting at the top left phase bus; provide full busing and all necessary mounting hardware; use common trip devices not handle ties. Two or three pole breakers shall be common trip units. Each breaker pole shall provide inverse time delay and instantaneous circuit protection. Breakers shall have toggle, quick make, and quick break operating mechanisms. Trip position of the breakers shall be clearly indicated by movement of the operating handles to the center position. Circuit breakers rated to IEC standards shall not be acceptable.
- E. **Panelboard:** Panelboard shall conform to the requirements of NEMA PB-12 and UL-67. Bus shall be copper. Provide quantity and size of branch breakers and spare spaces as shown on the Drawings.
- F. **Magnetic starters shall have auxiliary contacts as required by the Plans including N-O and N-C contacts as indicated on the Plans, plus one each spare N-O and N-C contact.** The combination motor starters shall be drawout-type for size 5 and below. The fixed-type unit assembly shall be constructed so that it can be easily removed from its panel using pull apart terminal strips to the terminal block and withdrawing from the primary bus. Removal of a unit assembly shall be possible without rear access and without disturbing any other unit in the motor control center.
- G. **Each starter unit shall have its own 480 V - 120 V AC control power transformer. It shall have a 120 volt grounded secondary. One secondary fuse and 2 primary fuses shall be provided. Control power transformers shall be sized to accommodate the control devices indicated or as shown on the Plans.**
- H. **Full voltage motor starters shall be sized as indicated on the Plans. The starters shall have the same interrupting capacity as the circuit breakers and power busses.**
- I. **Motor starters shall be designed to NEMA ratings only. Starters designed to IEC ratings shall not be acceptable.**
- J. **Elapsed Time Meter:** Elapsed time meter shall be large panel mounted, non-reset type, capable of reading 99,999.9 hours to the nearest 1/10 hour, rated 120 volts, 60 Hz. Elapsed time meter shall be mounted on the exterior of the section door between 40" and 60" from the bottom of the panel. Elapsed Time Meters shall be Eagle Signal Controls Model # HK410A6 or Engineer approved equal. Meters using push on retaining clips shall not be acceptable.

- K. **Indicating Lights and Lenses:** Indicating lights shall be industrial, waterproof NEMA 4/4X, transformer type, with LED type lamps, and push to test. Lights shall be manufactured by Allen Bradley, Eaton, or approved equal. Mount all indicating lights on front panel of motor control center.

Unless otherwise specified, indicating lights shall be equipped with colored lenses in accordance with the following schedule:

COLOR	FUNCTION	EXAMPLE
White or Clear	Normal Condition	Control power on, status OK
Red	Run, valve closed	Motor running, end of cycle
Green	Ready, valve open	Equipment ready, operating
Amber or Yellow	Abnormal condition	Failure of equipment or status abnormal, fault condition

- L. **Control and Protective Equipment:** Control relays, timers, switches (including contactor auxiliary switches), indicating lights, push buttons, overload relays, fuses, control transformers, terminal blocks and wiring shall be furnished and installed as shown on the drawings. Overload relays shall be sized to trip according to NEC as per data on the motor nameplate and shall be NEMA style. Push buttons shall be NEMA style. Contractor shall test each back spin relay and set per Engineer's requirements.
- M. **Station Service Transformer:** transformer shall be dry type and sized per Plans. All windings of the transformer shall be copper. The transformer shall have NEMA energy efficiency rating.
- N. **Phase Failure and Reverse Phase (PFR) Relay:** Relay shall have single pole-double throw (SPDT) contact which shall operate on power failure, phase loss, or reversal, providing a signal to the telemetry system. Reset shall be automatic. Nominal AC voltage shall be 480V, 3 phase. The phase failure and reverse phase relay for plant voltage monitoring shall be Time Mark Model No. A258B or Diversified Electronics SLA Series, Catalog No. SLA 440 ASA or approved equal. Contractor shall adjust relay to lowest setting before installation.
- O. Provide 150 W electric resistance type strip heater in each vertical section. Voltage shall be 120 V, single phase. Furnish thermostats to control heaters with one thermostat per heater located in its respective section. Thermostats shall have a range of 40 to 80 degrees F and shall have contacts rated 120 volts, 10 amperes continuous, 60 Hz. Provide expanded metal shield for each heater.

P. Busses:

1. The grounding bus shall be 1/4" by 1" copper, hard connected, running the full width of the MCC and located near bottom. Grounding bus shall be bolted to the frame of the MCC and include lugs for equipment grounding conductors.
2. The main horizontal bus shall be silver or tin plated copper located within an isolated compartment. The bus shall be rated as shown on the Plans.
3. The vertical bus in each section shall consist of a single silver or tin plated copper conductor per phase with a current capacity of not less than 600 amperes. The vertical bus shall be completely isolated and insulated with a labyrinth bus barrier, and shall extend the full height of the section wherever possible. The bus shall be rated as shown on the Plans.

Q. Wireways: A separate vertical wireway shall be provided adjacent to each vertical unit, and shall be covered by a hinged door. Each individual unit compartment shall be provided with a side barrier to permit pulling wire in the vertical wireway without disturbing adjacent unit components.

R. Buckets: Buckets shall be removable from the MCC as a unit and have pull apart terminal blocks to allow removal of individual buckets without disconnecting control and instrumentation wiring.

S. Transient Voltage Surge Suppressor (TVSS): The TVSS shall be provided at the load side of the main breaker to protect AC electrical circuits and electronic equipment from the effects of lightning induced voltages, external switching transients and internally generated switching transients.

The TVSS shall have real time audible and visual reporting of unit status, phase loss/protection loss and transient event (alarm and reset & mute) and shall have a surge counter to provide non-volatile event history recording. The TVSS shall be Innovative Technology Model # PTX080-3Y201-SD or approved equal.

The TVSS shall be installed as close to its connection point as possible.

T. Generator Connection: The contractor shall relocate the existing Hubbell Circuit-Lock receptacle and connect as shown on the Plans. The contractor shall connect the existing Hubbell circuit lock receptacle per the manufacturer's recommendations.

U. Digital Power Meter: Digital power meter shall be Electro Industries 3 Phase Digital Multi-Function Power Monitor model number Shark100-60-10-V3-D2-INP10-X or approved equal.

A 3-pole fuse block with neon blown fuse indicator rated 600V, 30A, 200kAIC RMS symmetrical with Class CC fuses shall be provided for the Digital Power Meter as shown on the Plans. The fuse holder shall be Allen-Bradley Catalog #1492-FB3C30-L or equal. A safety cover for each meter shall also be provided.

The digital power meter shall utilize utility grade current transformers (CTs) for measuring current. The CTs shall have an accuracy of 0.3% and shall meet ANSI/IEEE specification C57.13. CTs shall be mounted in such a way as to provide easy access for inspection and maintenance. The CTs shall be landed on terminal blocks. The terminal blocks shall be Marathon Heavy Duty Terminal Blocks 1600 SC series or equal.

~~The Contractor shall call SMUD (916) 732-5390 to make sure the SMUD metering CT ratio and Digital Power Meter CT ratio are the same.~~

PART 3 -- EXECUTION

3.01 FACTORY TESTING

- A. All motor control centers and their components shall be given manufacturer's standard electrical and mechanical production tests and inspections. The tests shall include electrical continuity check, dielectric tests for each circuit, and inspection for proper functioning of all components including controls, protective devices, metering, and alarm devices. The manufacturer shall submit five copies of the test reports to the Engineer for review.

3.02 INSTALLATION

- A. Contractor shall furnish all material and labor including, but not limited to, transportation, loading, lifting, jacking, wiring to completely install Motor Control Center as shown on the drawings and shall conform with the National Electrical Code (NEC).

END OF SECTION

SECTION 16530

LIGHTING

PART 1 - GENERAL

1.01 SCOPE

- A. This specification section covers the furnishing, and installing of lighting fixtures, wiring devices, poles, conduit, wiring and other material for the complete indoor and outdoor lighting as shown on the drawings. Lighting fixtures and hardware shall be installed as shown on the Plans.

1.02 SUBMITTALS

- A. Catalog cuts showing manufacturer, catalog numbers, dimensions, weights and material for fixtures and poles shall be submitted to the Engineer for review in accordance with Section 01330.

PART 2 - PRODUCTS

2.01 REFERENCE STANDARDS

- A. Materials and equipment supplied under this contract shall be designed, manufactured, and tested in accordance with the latest version of the following standard:
1. National Electrical Manufacturers Association (NEMA).
 2. Underwriters Laboratories Inc.
 3. National Electrical Code.

2.02 LIGHTING FIXTURES, DEVICES, AND POLES

- A. Lighting Fixtures shall be complete with ballast, mounting brackets and hardware, lamps, lenses, fixtures wire, and all required accessories as specified and as required by NEC. The lighting fixtures and fixture accessories shall be as shown on the drawings, or approved equal.
- B. Ballasts for high pressure sodium lamps shall be capable of starting and operating the lamp from a nominal 120 volts AC, 60 Hz power source within the limits specified by the lamp manufacturer. The ballast, including the starting aid, shall protect itself against normal lamp failure modes. The ballast shall be capable for operating for six months with the lamp in an open or short circuit condition without significant loss of ballast life. The lamp ballast system power factor shall not drop

below 85 percent for plus or minus ten percent variation in line voltage.

- C. Light Poles shall be anchor base, round, tapered steel, hot dipped galvanized, height as indicated, complete with handhole and gasketed cover, anchor bolts with leveling and locking screws and cover, and grounding connection.
- D. Interior Lighting Fixtures: Fluorescent light fixtures shall be manufactured in accordance with UL standard 935. Ballasts for fluorescent fixtures shall be integral with fixture, high power factor, and electronic.
- E. Light Switches: Switches shall be single pole, specification grade, 277 volt, 3 wire, 20 ampere A.C., ivory in color with stainless steel cover plates. Furnish Hubbell 1221, Leviton 1201-2, or approved equal. **Light switches shall be labeled with nameplates per section 16010.**
- F. GFCI Receptacles shall be ivory, 20 A, NEMA 5-20R furnished with stainless steel plates. Receptacles shall be Leviton #6899, G.E. #TGTR115, Square D #GFDR120, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All lighting poles and fixtures shall be directly grounded to the site grounding system by means of a conductor of a size not less than that required by NEC. If insulated, the ground conductor insulation shall be colored green.
- B. The Contractor shall install all lighting fixtures in accordance with the manufacturer's instructions and recommendations.
- C. All exterior fixtures shall be aligned and directed as shown on the Plans and as directed by the Engineer in order to illuminate the desired area properly. Fixtures shall be directly and rigidly mounted on Contractor provided supporting structures.
- D. Unless otherwise noted on the plans: general use receptacles shall be mounted 18" above the finish floor to device centerline, light switches shall be mounted 48" above finish floor to device centerline.
- E. Prior to acceptance by the City the Contractor shall thoroughly clean the fixtures and lamps.

END OF SECTION

SECTION 16922

MISCELLANEOUS EQUIPMENT

PART 1 - GENERAL

1.01 SCOPE

- A. This Section covers the furnishing and installation of the following equipment: uninterruptible power supply (UPS), magnetic door switch, float switch, solenoid valve, and level transmitter.

1.02 REFERENCE PUBLICATIONS

- A. The equipment covered under this contract shall be designed, manufactured, and tested in accordance with the latest version of the applicable industrial standards.

1.03 SUBMITTALS

- A. Manufacturers' Data:

1. UPS.
2. Magnetic door switch.
3. Float switch
4. Solenoid valve
5. Level Transmitter

- B. Shop Drawings.

- C. Operations and Maintenance Manuals as specified in Section 01330.

1.04 QUALITY ASSURANCE

- A. The manufacturer shall verify that they have been fabricating and assembling similar equipment for a minimum of five (5) years. Manufacturer shall be located in the United States.

PART 2 - PRODUCTS

2.01 MAGNETIC DOOR SWITCH (DS)

- A. Magnetic door switch shall be Sentrol model number 1044TW or approved equal. Color shall be natural (off-white).

2.02 UNINTERRUPTIBLE POWER SUPPLY

- A. The UPS shall provide full power to its connected load as shown on the Plans for a minimum of 30 minutes following loss of primary power and shall be a on-line system which provides continuous, no break power during complete blackouts or momentary interruptions. Transient power surges and dips shall not affect the operation of the devices connected to the UPS.
- B. The UPS shall be rated to provide a minimum of 1000 VA, 900 W at output at 120 VAC at an efficiency of 90%. The UPS shall be a Eaton Powerware Series model number PW9130L1000T-XL or approved equal.
- C. Install UPS as shown on the drawing and provide all necessary wiring. Plug cords and receptacles shall be provided so that the UPS can be readily bypassed with power being obtained directly from the panelboard.
- D. Provide optional ConnectUPS-BD Web/SNMP adapter for the UPS and connect to the Ethernet switch as shown on the Plans.
- E. Total harmonic distortion : Less than 5% on fundamental sine wave.
- F. Battery: Maintenance free.

2.03 FLOAT SWITCH

- A. Float switch shall utilize a weighted Polypropylene float which moves with liquid level to actuate a mercury switch. The Float switch shall have a minimum electrical rating of 300 V, 0.5 A. The float switch shall be a Anchor Scientific Mini-Float SM10, Hydr-O-Matic 3900, Scientific Technologies Inc. FQ series or approved equal.
- B. The float switch shall be secured to its suspension cable, allowing enough cable length for actuation of float. Tie-wrap multiple suspended cables together inside sump with enough play to allow float or other sensor to operate freely. The Contractor shall contact the Engineer to determine the correct elevation for installing the float. The float elevation shall match the elevation of the high level alarm of the facility PLC. Contractor shall install the float per the Engineer's requirements.

2.04 SOLENOID VALVES

- A. All the existing solenoid valves for the motor oilers shall be replaced with 120 Vac, ASCO Red-Hat valves, model number L8262G210 or equal.
- B. Install new Lukenhimer adjustable dripper, or equal, with sight glass after the solenoid valve and adjust to drip 15 drops per minute.

2.05 LEVEL TRANSDUCER

- A. The Contractor shall provide the submersible level transducers as shown on the plans. The submersible level transducer shall provide a 4-20ma output signal and be manufactured from stainless steel. The Contractor shall provide each submersible level pressure transducer with a gland cable seal, aneroid bellows with lightning arrester, and polyurethane cable. Install the aneroid bellows with lightning arrester inside the control panel per the manufacturer's directions.
- B. The Contractor shall order enough cable so there are no splices between each submersible level transducer and the PLC as shown on the plans.
- C. The range of the submersible level transducer shall be set to read 0 to 20 feet of water column (ft H₂O). The engineered units shall read 0 feet to +20 feet.
- D. The submersible level transducer shall be Esterline Series 705 or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall be responsible for the installation of the equipment specified and shall pull all the cables and wires and make all the connections as shown on the Plans. The City will conduct tests to determine its acceptability.

3.02 FIELD TESTING

- A. After finishing all the connections, the Contractor shall cooperate with City during the testing.

END OF SECTION

SECTION 16950

OPERATIONAL TESTING

PART 1 - GENERAL

1.01 SCOPE

A. General

1. Independent test company preoperational testing.
2. Contractor operational testing.

1.02 GENERAL REQUIREMENTS

- A. The Contractor shall engage and pay for the services of an approved independent testing company for the purpose of performing inspections and electrical preoperational tests as specified. The testing company shall provide all material, equipment, labor and technical supervision to perform such tests and inspections. The Contractor shall also perform all mechanical preoperational tests as herein specified.
- B. These tests shall assure that all equipment is operational within industry and manufacturer's tolerances and is installed in accordance with design plans and specifications. The tests and inspections shall determine the suitability for energization and the suitability for Owner acceptance of the Contractor's work.

1.03 FAILURE TO MEET TEST

- A. Contractor shall replace the defective material or equipment and have tests repeated until test proves satisfactory to the Engineer without additional cost to the Owner.

1.04 SUBMITTALS

- A. The Contractor shall submit the following tests to the Engineer:
1. Grounding system test.
 2. Phase rotation test.
 3. MCC device test including MCP and breaker test.
 4. MCC device test, generator receptacle test
 5. 600 volt conductor test.

6. Wiring test.
- B. Three copies of each test mentioned above shall include the following data and be submitted with the Operation and Maintenance Manual:
1. Summary of project, construction contract numbers
 2. Description of equipment tested
 3. Description of test
 4. Test personnel
 5. List of test equipment used and calibration date
 6. Test results, date and weather conditions
 7. Conclusions and recommendations
 8. Appendix, including all test forms

PART 2 - PRODUCTS

2.01 TESTING COMPANY

- A. The testing company shall meet federal OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907. Membership in the International Electrical Testing Association constitutes proof of meeting such criteria. The testing shall be performed by Electro Test, Apparatus Unlimited, Power Systems Testing, Hart Testing, or approved equal.

2.02 TESTING

- A. California Electrical Safety Orders (ESO) and Occupational Safety and Health Act (OSHA): The Contractor is cautioned that testing and equipment shall comply with ESO and OSHA as to safety, clearances, padlocks and barriers around electrical equipment energized during testing.

PART 3 - EXECUTION

3.01 PREOPERATIONAL TESTING

- A. All testing shall conform to International Electrical Testing Association (NETA) Maintenance and Acceptance specifications and shall utilize manufacturer's instruction manuals applicable to each particular apparatus.
- B. Upon completion of the test and inspections noted in these specifications, a label shall be attached to all serviced devices. These labels will indicate date serviced and the service company responsible.

3.02 GROUND RESISTANCE PREOPERATIONAL TEST

- A. Test the entire ground system for ground resistance value. Perform fall of potential method with ground test instrument. Record weather and soil conditions at the time measurements are made. Make ground resistance measurements in normally dry weather, not less than 48 hours after rainfall. The current reference rod shall be driven at least 100 feet from the ground rod or grid under test, and the measurements shall be made at 10 foot intervals beginning 25 feet from the test electrode and ending 75 feet from it, all in direct line between the ground rod, or center of grid and the current reference electrode.
- B. Grounds and grounding systems shall have a resistance to solid earth ground not exceeding 5 ohms.

3.03 PHASE ROTATION PREOPERATIONAL TEST

- A. Check connections to all equipment for proper phase relationship. During this test, disconnect all devices which could be damaged by the application of voltage or reversed phase sequence. Three phase equipment shall be tested for the phase sequence "ABC" front to back, left to right and top to bottom.

3.04 MOTOR CIRCUIT PROTECTOR (MCP) AND CIRCUIT BREAKER PREOPERATIONAL TEST

- A. All MCPs and circuit breakers shall be checked for proper mounting, conductor size and feeder designation.
- B. All MCPs and only breakers 100 amp and above shall be tested. Time current characteristic tests shall be performed bypassing three hundred percent (300%) rated current through each pole separately. Trip time shall be determined. Instantaneous pickup current shall be determined by run up or pulse method. Clearing times should be within 4 cycles or less.
- C. Contact and Insulation Resistance: Contact resistance shall be measured and be compared to adjacent poles and similar breaker. Deviations of more than 50% shall be rejected. Insulation resistance shall be measured and shall not be less than 50 megohms. All trip times shall fall within NETA table values. Instantaneous pickup current levels should be within 20% of manufacturer's published values.
- D. Circuit breakers with adjustable settings shall have all of the settings tested and test results shall be submitted to the engineer. The following settings shall be tested: long time pickup, long time delay, short time pickup, short time delay, and the instantaneous settings.

- E. Circuit breakers with ground fault protection shall be performance tested and test results shall be submitted to the engineer. The testing agency shall verify that the ground protection is connected properly per the manufacturer's recommendations. The testing agency shall test the ground fault pickup and ground delay and submit the test results to the Engineer.

3.05 MCC PREOPERATIONAL TEST

A. Visual and Mechanical Inspection:

1. Inspect for physical damage, proper anchorage and grounding.
2. Compare equipment nameplate data with design plans and starter schedule.
3. Compare overload heaters with motor full load current for proper size.
4. Check torque of bolted connections. Torque connections shall be per manufacturers recommendation or use the following table if the manufactures data is not available:

NOMINAL TORQUE REQUIREMENTS FOR BOLTED BONDS

BOLT SIZE	THREADS /INCH	TORQUE IN/LBS	TORQUE FT/LBS
#8	32	18	
	34	20	
#10	24	23	
	32	32	
1/4"	20	80	6
	28	100	8
5/16"	18	140	11
	20	150	12
3/8"	16	250	20
	24	275	22
7/16"	14	400	33
	20	425	35
1/2"	13	550	45
	20	575	47
5/8"	11	920	76
	10	1,400	116

7/8"	9	1,950	162
1"	8	2,580	215

B. Electrical Tests:

1. Measure insulation resistance of starter phase to phase and phase to ground with the starter contacts closed and the protective device open. Test voltage and minimum acceptable values shall conform to NETA Section 3 "Test Values." Measure insulation resistance of each control circuit with respect to ground.
2. Motor overload units shall be tested by injecting primary current through overload unit and monitoring trip time.
3. Perform control functional tests by initiating control devices to affect proper operation with motor feeder disconnected.

C. Generator Breaker, Interlock and Generator Receptacle Tests:

The generator breaker, the interlock and the generator receptacle shall be tested to insure proper functionality. The City will provide a portable generator of the appropriate size and connection hardware. The Contractor shall demonstrate to the City that the generator breaker, the interlock and the generator receptacle are working properly to run the station loads. The correct power source phase rotation shall be verified (the phase rotation of the City's portable generators are always A-B-C clockwise).

3.06 600 VOLT CONDUCTOR TEST

- A. Megger and record insulation resistances of all 600 volt insulated conductors using a 500 volt megger for thirty seconds. Make tests with circuits installed in conduit and isolated from source and load. Each conductor shall be meggered conductor to conductor and conductor to ground. These tests shall be made on cable after installation with all splices made up and terminators installed but not connected to the equipment.

3.07 WIRING TEST

- A. Verify all wire connections/terminations are per contact drawings or approved changes. Check for proper termination of all wires.

3.08 OPERATIONAL TESTING

- A. After preoperational tests are complete, the Contractor shall conduct overall operational testing of the plant which shall be witnessed by the Engineer and other City personnel. City O&M personnel will assist the Contractor during operational testing.

END OF SECTION

SECTION 17100

PROCESS CONTROL AND INSTRUMENTATION SYSTEMS

PART 1 - GENERAL

1.01 SCOPE

A. The **CONTRACTOR** shall provide the following Instrumentation and Control components in accordance with the Contract Documents. The components shall include, but not be limited to, the following:

1. Instruments specified in Division 17000.
2. Local control stations not provided as components of the specified equipment.
3. All Control Cabinets which are NOT equipped with the PLCs.
4. Fiber optic cabling, area switches (where noted on the drawings), hubs, valve networks, copper cabling, and related equipment.
5. Programmable Logic Controllers (PLC) and/or Remote Terminal Unit (RTU).

The **City** shall perform all PLC and operator interface panel programming.

B. The requirements of this Section apply to all components of the CONTROL SYSTEM unless indicated otherwise.

C. Responsibilities:

1. The **CONTRACTOR**, through the use of a qualified Instrumentation Supplier and qualified Electrical and Mechanical installers, shall be responsible to the City for the supplying, installation, labeling and termination of all instruments to the City furnished control cabinets and consoles.
2. ~~The **CONTRACTOR** shall install all City furnished control cabinets and install City furnished consoles and connect external wires i.e. power and Ethernet.~~
3. Due to the complexities associated with the interfacing of numerous instruments, panels, local controls, PLC I/O devices, it is the intent of these specifications that the Instrumentation Supplier be responsible to the **CONTRACTOR** for the installation and termination of the components to both new and existing devices provided under other sections of this contract.

4. The Instrumentation Supplier shall perform the following work:
 - a. Prepare submittals.
 - b. Design, develop, and electronically draft loop drawings and control panel designs.
 - c. Prepare the test plan and the spare parts submittals.
 - d. Perform setup, bench calibration and loop checks after installation.
 - e. Oversee and certify installation of all devices provided under Division 17.
 - f. Oversee, document, and certify loop testing.
 - g. Provide hardware support during the performance test.
 - h. Prepare record drawings.

1.02 REFERENCE PUBLICATIONS

- A. The equipment covered under this contract shall be designed, manufactured, and tested in accordance with the latest version of the applicable industrial standards.

1.03 SUBMITTALS

- A. Provide submittals in accordance with the Special Provisions. Submittals shall be approved by the Engineer prior to manufacture and shipment.
- B. Provide Operations and Maintenance Manuals as specified in the Special Provisions.

1.04 QUALITY ASSURANCE

- A. The manufacturer shall verify that they have been fabricating and assembling similar equipment for a minimum of five (5) years.

PART 2 -- PRODUCTS

2.01 GENERAL

- A. **Code and Regulatory Compliance:** All work shall conform to or exceed the applicable requirements of the National Electrical Code.

- B. **Current Technology:** All meters, instruments, and other components shall be the most recent field-proven models marketed by their manufacturers at the time of submittal of the shop drawings unless otherwise required to match existing equipment.
- C. **Hardware Commonality:** All instruments which utilize a common measurement principle (for example, d/p cells, pressure transmitters, level transmitters which monitor hydrostatic head) shall be furnished by a single Manufacturer. All panel mounted instruments shall have matching style and general appearance. Instruments performing similar functions shall be of the same type, model, or class, and shall be from a single Manufacturer.
- D. **Loop Accuracy:** The accuracy of each instrumentation system or loop shall be determined as a probable maximum error; this shall be the square-root of the sum of the squares of certified "accuracies" of the designated components in each system, expressed as a percentage of the actual span or value of the measured variable. Each individual instrument shall have a minimum accuracy of plus and minus 0.5 percent of full scale and a minimum repeatability of plus and minus 0.25 percent of full scale unless otherwise indicated. Instruments which do not conform to or improve upon these criteria are not acceptable.
- E. **Instrument and Loop Power:** Power requirements and input/output connections for all components shall be verified. Power for transmitted signals shall, in general, originate in and be supplied by the control panel devices. All power supplies shall be mounted within control panels or in the field at the point of application.

2.02 SPARE PARTS AND SPECIAL TOOLS

- A. The CONTRACTOR shall furnish a list of all spare parts and special tools required to calibrate and maintain all of the instrumentation provided under the Contract Documents.

2.03 FACTORY TESTING

- A. The CONTRACTOR shall provide copies of all factory tests for each piece of instrumentation.
- B. ~~The Contractor shall provide the Engineer with a factory calibration sheet on the flow meter indicating that the flow tube was calibrated at the factory.~~
- C. ~~The Contractor shall provide the Engineer with a factory calibration sheet on the pressure transducer indicating that the pressure transducer was calibrated at the factory.~~

D. ~~The water quality analyzer, PH sensor, and conductivity sensor shall be loop calibrated at the factory as a complete assembly. The analyzer shall be loop calibrated at the factory with the two probes. The loop shall be calibrated using NIST traceable certified reference instruments. The loop calibration shall use the range of values as shown on the Plans. The Contractor shall provide the Engineer with a calibration certificate that includes the following:~~

- ~~1. Model and serial number of each instrument tested~~
- ~~2. NIST report numbers~~
- ~~3. The actual test data~~
- ~~4. Test standards~~
- ~~5. Date and time of the test~~

PART 3 -- EXECUTION

3.01 PRODUCT HANDLING

A. **Tagging:** Each component shall be tagged to identify its location, instrument tag number, and function in the system. A permanent stainless steel or other non-corrosive material tag firmly attached and permanently and indelibly marked with the instrument tag number, as given in the plans, shall be provided on each piece of the instrumentation. Identification shall be prominently displayed on the outside of the package.

3.02 MANUFACTURER'S SERVICES

A. The CONTRACTOR shall furnish the following Manufacturer's services for the instrumentation listed below:

1. Perform factory calibration
2. Oversee installation
3. Verify installation of installed instrument
4. Certify installation and reconfirm Manufacturer's accuracy statement
5. Oversee loop testing, prepare loop validation sheets, and certify loop testing
6. Oversee pre-commissioning, prepare pre-commissioning validation sheets, and certify pre-commissioning
7. Train the OWNER's personnel

B. ~~Manufacturer's services shall be furnished for the following equipment:~~

1. ~~All analyzers~~
2. ~~All probes~~
3. ~~Flow meters~~
- ~~4. Pressure transducer~~

3.03 INSTALLATION

A. **General:**

All instrumentation, including instrumentation furnished under other Divisions, shall be installed under Division 17 and the manufacturers' instructions.

The monitoring and control system configurations indicated are diagrammatic. The locations of equipment are approximate. The exact locations and routing of wiring and cables shall be governed by structural conditions and physical interferences and by the location of electrical terminations on equipment. All equipment shall be located and installed so that it will be readily accessible for operation and maintenance. Where job conditions require reasonable changes in approximated locations and arrangements, or when the City exercises the right to require changes in location of equipment which do not impact material quantities or cause material rework, the CONTRACTOR shall make such changes without additional cost to the City.

All power and signal wires shall be terminated with crimped type lugs.

All connectors shall be water tight.

All wires shall be mounted clearly with an identification tag that is of a permanent and reusable nature.

All wire and cable shall be arranged in a neat manner and securely supported in cable groups and connected from terminal to terminal without splices unless specifically approved by the ENGINEER. All wiring shall be protected from sharp edges and corners.

All mounting stands and bracket materials and workmanship shall comply with requirements of the Contract Documents.

3.04 CALIBRATION

- A. **General:** All devices provided under Division 17 shall be calibrated according to the manufacturer's recommended procedures to verify operational readiness and ability to meet the indicated functional and tolerance requirements.
- B. **Calibration Points:** Each instrument shall be calibrated at 20, 40, 60, 80 and 100% of span using test instruments to simulate inputs. The test instruments shall have accuracy's traceable to National Institute of Testing Standards.
- C. **Factory Calibration:** Instruments which have been factory calibrated shall be examined in the field to determine whether any of the calibrations are in need of adjustment. Such adjustments, if required, shall be made only after consultation with the ENGINEER.
- D. **Field Calibration:** Instruments which were not bench-calibrated shall be calibrated in the field to insure proper operation in accordance with the instrument loop diagrams or specification data sheets.
- E. **Calibration Sheets:** Each instrument calibration sheet shall provide the following information and a space for sign-off on individual items and on the completed unit:
 - 1. Project name
 - 2. Loop number
 - 3. Tag number
 - 4. Manufacturer
 - 5. Model number
 - 6. Serial number
 - 7. Calibration range
 - 8. Calibration data: Input, output, and error at 10 percent, 50 percent and 90 percent of span
 - 9. Switch setting, contact action, and deadband for discrete elements
 - 10. Space for comments
 - 11. Space for sign-off by Instrumentation Supplier and date

12. Test equipment used and associated serial numbers

- F. **Calibration Tags:** A calibration and testing tag shall be attached to each piece of equipment or system at a location determined by the ENGINEER. The CONTRACTOR shall have the Instrumentation Supplier sign the tag when calibration is complete. The ENGINEER will sign the tag when the calibration and testing has been accepted.

3.05 LOOP TESTING

- A. **General:** Individual instrument loop diagrams per ISA Standard S5.4 - Instrument Loop Diagrams, expanded format, shall be submitted to the ENGINEER for review prior to the loop tests. The CONTRACTOR shall notify the ENGINEER of scheduled tests a minimum of 30 days prior to the estimated completion date of installation and wiring of the instrument. After the ENGINEER'S review of the submitted loop diagrams for correctness and compliance with the specifications, loop testing shall proceed. The loop check shall be witnessed by the ENGINEER.
- B. **Control Valve Tests:** All control valves, cylinders, drives and connecting linkages shall be stroked from the operator interface units as well as local control devices and adjusted to verify proper control action, hand switch action, limit switch settings, torque settings, remote control actions, and remote feedback of valve status and position. Control valve actions and positioner settings shall be checked with the valves in place to insure that no changes have occurred since the bench calibration.
- C. **Interlocks:** All hardware and software interlocks between the instrumentation and the motor control circuits, control circuits of variable-speed controllers and packaged equipment controls shall be checked to the maximum extent possible.
- D. **Instrument and Instrument Component Validation:** Each instrument shall be field tested, inspected, and adjusted to its indicated performance requirement in accordance with its Manufacturer's specifications and instructions. Any instrument which fails to meet any Contract requirement, or, in the absence of a Contract requirement, any published manufacturer performance specification for functional and operational parameters, shall be repaired or replaced, at the discretion of the ENGINEER at no additional cost to the OWNER.
- E. **Loop Validation Sheets:** The CONTRACTOR shall prepare loop confirmation sheets for each loop covering each active instrumentation and control device except simple hand switches and lights. Loop confirmation sheets shall form the basis for operational tests and documentation. Each loop confirmation sheet shall cite the following information and shall provide spaces for sign-off on individual items and on the complete loop by the Instrumentation Supplier:

1. Project name

2. Loop number
 3. Tag number, description, manufacturer and model number for each element
 4. Installation bulletin number
 5. Specification sheet number
 6. Loop description number
 7. Adjustment check
 8. Space for comments
 9. Space for loop sign-off by Instrumentation Supplier and date
 10. Space for ENGINEER witness signature and date
- F. **Loop Certifications:** When installation tests have been successfully completed for all individual instruments and all separate analog control networks, a certified copy of all test forms signed by the ENGINEER or the ENGINEER's representative as a witness, with test data entered, shall be submitted to the ENGINEER together with a clear and unequivocal statement that all instrumentation has been successfully calibrated, inspected, and tested.

3.06 PRECOMMISSIONING

- A. **General:** Pre-commissioning shall commence after acceptance of all wire tests, calibration tests and loop tests, and all inspections have demonstrated that the instrumentation and control system complies with all Contract requirements. Pre-commissioning shall demonstrate proper operation of all systems with process equipment operating over full operating ranges under conditions as closely resembling actual operating conditions as possible.
- B. **Pre-commissioning Procedures and Documentation:** All pre-commissioning and test activities shall follow detailed test procedures and check lists accepted by the ENGINEER. All test data shall be acquired using equipment as required and shall be recorded on test forms accepted by the ENGINEER, which include calculated tolerance limits for each step. Completion of all system pre-commissioning and test activities shall be documented by a certified report, including all test forms with test data entered, delivered to the ENGINEER with a clear and unequivocal statement that all system pre-commissioning and test requirements have been satisfied.

- C. **Loop Tuning:** All electronic control stations incorporating proportional, integral or differential control circuits shall be optimally tuned, experimentally, by applying control signal disturbances and adjusting the gain, reset, or rate settings as required to achieve a proper response. Measured final control element variable position/speed setpoint settings shall be compared to measured final control element position/speed values at 20, 40, 60, 80 and 100% of span and the results checked against indicated accuracy tolerances.
- D. **Pre-commissioning Validation Sheets:** Pre-commissioning shall be documented on one of two types of test forms as follows:
1. For functions which can be demonstrated on a loop-by-loop basis, the form shall include:
 - a. Project name
 - b. Loop number
 - c. Loop description
 - d. Tag number, description, manufacturer and data sheet number for each component.
 2. For functions which cannot be demonstrated on a loop-by-loop basis, the test form shall be a listing of the specific tests to be conducted. With each test description the following information shall be included:
 - a. Specification page and paragraph of function demonstrated
 - b. Description of function
 - c. Space for sign-off and date by both the Instrumentation Supplier and ENGINEER
- D. **Pre-commissioning Certification:** The CONTRACTOR shall submit an instrumentation and control system pre-commissioning completion report which shall state that all Contract requirements have been met and shall include a listing of all instrumentation and control system maintenance and repair activities conducted during the pre-commissioning testing. Acceptance of the instrumentation and control system pre-commissioning testing must be provided in writing by the ENGINEER before the performance testing may begin. Final acceptance of the control system shall be based upon plant completion as stated in the General Conditions.

3.09 TRAINING

- A. **General:** The CONTRACTOR shall train the OWNER'S personnel on the maintenance, calibration and repair of all instruments provided under this Contract.
- B. **Instructions:** The training shall be performed by qualified representatives of the equipment manufacturers and shall be specific to each piece of equipment.
- C. **Duration:** Each training class shall be a minimum of 8 hours in duration and shall cover, as a minimum, operational theory, maintenance, trouble shooting/repair, and calibration of the instrument.
- D. **Schedule:** Training shall be performed during the pre-commissioning phase of the project. The training sessions shall be scheduled a minimum of 3 weeks in advance of when the courses are to be initiated. The ENGINEER will review the course outline for suitability and provide comments that shall be incorporated.
- E. **Agenda:** The training shall include operation and maintenance procedures, trouble shooting with necessary test equipment, and changing set points, and calibration for that specific piece of equipment.
- F. **Documentation:** The Contractor shall provide a copy of the training materials utilized during the lesson with all notes, diagrams, and comments.

3.10 ACCEPTANCE

- A. For the purpose of this Section, the following conditions shall be fulfilled before the WORK is considered substantially complete:
 - 1. All submittals have been completed and approved.
 - 2. The instrumentation has been calibrated, loop tested and pre-commissioned.
 - 3. The OWNER training has been performed.
 - 4. All required spare parts and expendable supplies and test equipment have been delivered to the ENGINEER.
 - 5. The performance test has been successfully completed.
 - 6. All punch-list items have been corrected.
 - 7. All record drawings in both hard copy and electronic format have been submitted.

8. Revisions to the OWNER'S Manuals that may have resulted from the field tests have been made and reviewed.
9. All debris associated with installation of instrumentation has been removed.
10. All probes, elements, sample lines, transmitters, tubing, and enclosures have been cleaned and are in like-new condition.

END OF SECTION

SECTION 17520
RTU/PLC SYSTEM

PART 1 - GENERAL

1.01 SCOPE

- A. This Section covers the furnishing, programming, and installation of a Remote Telemetry Unit/Programmable Logic Controller (RTU/PLC) system, antenna cable, and other appurtenances necessary for a complete and operating system. **All items covered in this Specification shall be included as part of this contract. All items covered in this Specification shall be provided by the Contractor.** The RTU/PLC system shall contain a Modicon PLC, I/O modules, power supply, radio transceiver, circuit breakers, fuses, panduit, terminal blocks and all devices necessary for a complete system. **This system shall be mounted on DIN rail inside the service pedestal as shown on the Plans. The City will provide all the programming for the PLC and operator interface panel.** The City will be responsible for providing all necessary work so that the PLC communicates with its regional site. This includes development of SCADA display graphic screens on the master SCADA network.

1.02 REFERENCE STANDARDS

- A. The equipment covered under this contract shall be designed, manufactured, and tested in accordance with the latest version of the following industrial standards:
1. American National Standards Institute (ANSI)/Institute of Electrical and Electronic Engineers (IEEE):
 - a. C37.90.2, Trial-Use Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.
 - b. C62.41, IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
 2. Electronic Industries Association (EIA):
 - a. TIA-232-E, Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange.

- b. 422-A, Electrical Characteristics of Balanced Voltage Digital Interface Circuits.
- 3. National Electrical Manufacturers Association (NEMA):
 - a. ICS 1, General Standards for Industrial Control and Systems.
 - b. ICS 1.1, Safety Guidelines for the Application, Installation and Maintenance of Solid State Control.
 - c. ICS 4, Terminal Blocks for Industrial Use.
 - d. ICS 6, Enclosures for Industrial Controls and Systems.
- 4. National Fire Protection Association (NFPA):
 - a. National Electric Code (NEC).

1.03 SUBMITTALS

- A. Provide four copies of submittals, in accordance with the Special Provisions, for all major components within the RTU/PLC system including the following:
 - 1. Back-pan plans, sections and details. Showing all major components mounted on the back-pan.
 - 2. Internal wiring and terminal blocks.
 - 3. Tabular I/O listing including the following data:
 - a. Each I/O point.
 - b. Name of each I/O device.
 - c. Instrumentation tag number of the I/O device in the Plans.
 - d. RTU/PLC system internal address of each I/O.
 - 4. Antenna and transmission cables.
 - 5. ~~Radio.~~
 - 6. PLC.
 - 7. Power Supply.
 - 8. ~~Antenna.~~

PART 2 - PRODUCTS

2.01 RTU/PLC SYSTEM

- A. RTU/PLC and associated equipment shall be mounted on DIN rail as shown on the Plans. The RTU/PLC system shall contain the following features:
- B. RTU/PLC system grounding and electrical spacing shall be in accordance with NEMA ICS 6.
- C. RTU/PLC shall be wired as defined below:
 - 1. Install all wiring without splicing in panduit raceways as shown on the plans. Size the raceways per the requirements of the NEC. Raceways shall have removable covers.
 - 2. Wire bending space shall be in accordance with Tables 3-7B, C in NEMA ICS 6.
 - 3. Keep AC power lines separate from low-level DC lines, I/O power supply cables, and all I/O rack interconnect cables.
 - 4. Keep AC signal wires separate from DC signal wires.
 - 5. When I/O wiring must cross AC power wiring, it shall only do so at right angles.
 - 6. Allow 2 inches between the I/O modules and any raceway, between the terminal strip and raceway, and between the terminal strip and I/O modules.
 - 7. Bundle and tie down wires in a neat and orderly manner.
- D. The RTU/PLC system shall be grounded as follows:
 - 1. Separate ground wires from power wiring at the point of entry.
 - 2. Minimize ground wire length by locating the ground reference point as close as possible to the point of entry of the plant power supply.
 - 3. Ground all electrical racks or chassis and machine elements to a central ground bus.
- E. RTU/PLC termination requirements:
 - 1. Terminal block markings, mechanical characteristics and electrical

characteristics shall be in accordance with NEMA ICS 4.

2. Make connections to I/O modules by terminating all field wiring to terminals and then installing wiring to each I/O modules as shown on the Plans.
3. Terminals shall facilitate wire sizes 12 AWG and 14 AWG rated for 120 VAC applications.
4. Provide terminal blocks as shown on the Plans and with continuous marking strip.
5. Label each wire within the RTU/PLC system with wire numbers as shown on the Plans.
6. Provide terminals for individual termination of each signal shield.
7. Provide all wiring between the terminal blocks and the PLC components.
8. Field wiring shall not be disturbed when removing or replacing an I/O module.

2.02 RTU/PLC AND INTERFACE MODULES

- A. The programmable logic controllers shall be **Groupe Schneider, Modicon 340 Series**. No other manufacturer shall be permitted as this equipment matches the City's installed base of Modicon PLCs. The City has standardized on Modicon PLCs throughout the City and has an installed base of several hundred units.
- B. **Provide the following Modicon M340 PLC parts**
 1. **One Rack – model number BMX XBP 0800**
 2. **One Processor – model number BMX P34 2020**
 3. **One Power Supply – model number BMX CPS 3020**
 4. **One Discrete Digital Input Module – model number BMX DDI 1603**
 5. **One Discrete Digital Output Module – model number BMX DDI 1602**
 5. **One Analog Input Module – model number BMX AMI 0810**
 6. **One Communication Module – model number BMX NOM 0200**
 7. **One Shielded Cord set – model number BMX FTW 301S**
 8. **One Cord set – model number BMX FTW 301**
- C. **Provide one Magelis Operator Interface panel model number HMISTU855 with adapter cables model numbers XBTZG939 and XBT-Z9711.**

2.03 PERFORMANCE AND DESIGN REQUIREMENTS

- A. The RTU/PLC system shall accomplish the control requirements of the I/O list, Drawings, and Specifications.
- B. The design application and installation of the RTU/PLC system shall conform to NEMA ICS 1.1.
- C. The RTU/PLC system shall operate in ambient conditions of 32 to 140 Degree F temperature and 0 to 95 percent relative humidity without the need for purging or air conditioning.
- D. Input/Output Connection Requirements:
 - 1. Discrete inputs/outputs and analog outputs shall be fused as recommended by the manufacturer:
 - a. Provide blown fuse indication for all fuses.
 - b. Fuses shall be in accordance with module manufacturer's specifications and installed at terminal block.
- E. All RTU/PLC control system components shall be capable of meeting or exceeding electromagnetic interference tests per ANSI/IEEE C37.90.2.
- F. Incorporate the following minimum safety measures:
 - 1. A main circuit breaker shall be placed in the power circuit as a means of removing power from the entire RTU/PLC system. Each power supply shall be protected by its own circuit breaker. Size the breaker as shown on plans.
 - 2. Safe wiring:
 - a. The loss of power or control signal to the equipment shall result in the equipment either shutting down or operating safely.
 - b. Activation of alarms and stopping of equipment shall result from the de-energization of control circuits, rather than the energization of control circuits.
 - c. Shield twisted cables shall be used for low voltage signal wires and shall be placed in conduits segregated for that purpose only. In addition, the cables shall not be placed in the same conduit or bundled with the power cables.

G. Construct RTU/PLC system with high noise immunity to prevent occurrence of false logic signals resulting from switching transients, relay and circuit breaker noise or conducted and radiated radio frequency interference.

H. Operator intervention:

1. Logic system failure shall not preclude proper operator intervention.

I. Power Supply Units:

1. **Provide one regulated 24 VDC power supply rated for 120 W output as shown on the plans. Power supply shall be ABB model number 1SVR 427 034 R0000 or equal.** Power supply shall be connected to provide power to the devices as shown on the Plans.

Provide one regulated 12 VDC power supply rated for 30 W output as shown on the plans. Power supply shall be ABB model number 1SVR 427 032 R1000 or equal. Power supply shall be connected to provide power to the devices as shown on the Plans.

2. ~~Each power supply shall be sized such that it will carry no more than 75 percent of its load as shown on the Plans.~~

3. Provide power supplies to successfully withstand surges in AC power circuits per the wave form, voltage amplitude, current amplitude, and frequency provided in IEEE C62.41.

J. Fuses:

Provide all fuse holders and fuses as shown on the plans.

K. Relays:

Provide eight Idec Relays model number RH1B-ULD-DC24 or equal

2.04 MAINTENANCE MATERIALS

A. Furnish the City with operation and maintenance manuals in accordance with the Special Provisions. Operation and maintenance manuals shall contain information on all components within this specification. The operations and maintenance manuals shall also be provided on a CD in accordance with the Special Provisions.

2.05 RADIO TRANSCEIVERS

- A. The contractor shall relocate the existing radios from the existing PLC system to the new PLC system as shown on the plans.

2.06 DIRECTIONAL ANTENNA FOR RADIO

- A. Provide a two lightning arresters model number Polyphaser Corp. IS-50NX-C2 or approved equal.

2.07 TRANSMISSION CABLE(S)

- A. Supply the transmission cables to connect each radio antenna port (via 50 ohm "Superflex" cable/lightning arrester) with the existing antennas. The cables shall be low-loss foam-dielectric type, ½ inch in diameter, and sufficient length to route each cable from the existing antennas to each lightning arrester (field verify). The transmission cables shall be weatherproof suitable for direct environmental exposure. Use "O" ring seals on all connectors. **The transmission cables shall be Andrew Corp. LDF4-50A.** The cables shall be installed without splices.
- B. **Provide a section of "Superflex" cable between each radio and the lightning arresters. The cables shall be Andrew Corp. FSJ1-50A or equal with factory installed type N connectors.**
- C. Connectors for the transmission cable shall be type N.
- D. The Contractor shall field verify the length of antenna cable required for the project. The cables shall be installed without splices.

2.08 ETHERNET SWITCH

- A. Provide one NTRON 7506GX2 switch or approved equal and one Ethernet Cable. Connect switch as shown on the plans.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall be responsible for the installation of the RTU/PLC system and shall pull all the cables and wires and make all the connections as shown on the Plans or as directed by the Engineer. The RTU/PLC system shall be installed in accordance with manufacturer's written instructions.
- B. The City will perform the following work:

1. Verification of correct installation of RTU/PLC system.
 2. Verification of correct installation, type, and size of wiring terminated from field devices, and to the RTU/PLC system.
 3. Verification of correct connection of all power sources supplied to and from the PLC system.
 4. Verification of I/O terminations and proper device calibrations.
 5. Perform a point to point test of all the PLC functions that are transmitted back to control 12 at the CWTP. Verify that all data points are transmitted back to control 12 and update the control 12 database.
- C. If deficiencies are found in section "B" items 1 through 5 above, the Contractor shall immediately correct the problem at no cost to the City.
- D. The Contractor shall terminate the antenna and signal transmission cables with type N connectors.
- E. The Contractor shall install the lightning protector, copper strap, and instrument grounding. The Contractor shall install a number 6 copper wire to connect the lightning arresters to the ground bus.

3.02 PLC FIELD TESTING

- A. After finishing all the connections, the Contractor shall cooperate with the City during the field testing.
- B. The City will perform the following:
1. Configure radio communication parameters.
 2. Configure radio output power.
- C. The City and Contractor shall perform a point to point test of all wiring between the PLC and field devices.
- D. All devices connected to the digital input card shall be operated to ensure that the PLC recognizes the changed state of each device.
- E. The City will program the PLC to operate all devices connected to the digital output card and then trigger these devices to operate. Any device that fails to operate shall be replaced at the contractor's expense.
- F. All analog devices connected to the PLC shall be calibrated per Section 17100.

Each analog device shall be operated to determine if the PLC recognizes the analog signal.

3.03 DEMONSTRATION

- A. The Contractor shall demonstrate that the RTU/PLC system operates according to Plans and specifications. If defects are found in the hardware or installation Contractor shall fix problems at no cost to the City.

END OF SECTION

