INVITATION FOR BIDS

City of Santa Rosa

FOR CONSTRUCTING

WATER PUMP STATION 9 ELECTRICAL UPGRADES

CITY CONTRACT NUMBER
C02438

ISSUED BY

CAPITAL PROJECTS ENGINEERING DIVISION

CITY OF SANTA ROSA, CALIFORNIA

2024

A T T E N T I O N
Prebid Conference
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STATE OF CALIFORNIA

INVITATION FOR BIDS

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FOR

WATER PUMP STATION 9 ELECTRICAL UPGRADES

City Contract No. C02438

WATER PUMP STATION 9 ELECTRICAL UPGRADES

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CITY OF SANTA ROSA
STATE OF CALIFORNIA

NOTICE TO BIDDERS

➢	For technical questions regarding this project, contact Richela Maeda at (707) 543-3812.
➢	For direct access to plans, specifications and plan holders' lists, go to www.srcity.org/bids and click on Bid/Proposal Opportunities.
➢	For direct access to bid results, go to www.srcity.org/bids. Under Link to Capital Projects, click on Capital Projects Contracts.

- IMPORTANT -

Bid Acceptance Deadline

Sealed bids will be accepted at the Transportation and Public Works Department, 69 Stony Circle, Santa Rosa, California 95401 until 2:00 p.m., October 15, 2024, for Water Pump Station 9 Electrical Upgrades, Contract No. C02438 (Engineer's Estimate: $1,632,000).

Bids tendered after this deadline will not be accepted. The official time clock for accepting bids will be an electric date and time stamping clock, located in the Transportation and Public Works Department, 69 Stony Circle, Santa Rosa, California. In order to be accepted, bids must be received prior to 2:00 p.m. Therefore, a bid stamped in at 1:59 p.m. will be accepted, but one delivered at or after 2:00 p.m. is late and will not be accepted.

Pre-Bid Meeting

Prospective bidders, subcontractors, and material suppliers are invited to attend a pre-bid meeting scheduled to be held at 11:00 a.m., October 1, 2024, at the project site located at 2889 Summerfield Road, Santa Rosa, California. The meeting will commence at the west side of the site along Brookshire Circle.

Prospective bidders, subcontractors, and materials suppliers seeking to arrange a separate visit at the Project site must request permission from the City by contacting, at least three working days in advance, Richela Maeda at rmaeda@srcity.org.

Subcontractor Information; Department of Industrial Relations Registration

Bidders shall provide the names, business addresses and license numbers of all subcontractors listed on bidder's List of Subcontractors. No contractor or subcontractor may be listed on a bid for this public works project unless registered with the Department of Industrial Relations (DIR) pursuant to Labor Code section 1725.5. No contractor or subcontractor may be awarded a contract for this public works project unless registered with the DIR pursuant to Labor Code section 1725.5. This public works project is subject to compliance monitoring and enforcement by the DIR.

Contract Award

This Contract will be awarded to the lowest responsible and responsive contractor possessing the ability to successfully perform under the terms and conditions of the proposed contract, considering such matters as contractor integrity, compliance with public policy, record of past performance and financial and technical resources.

Firms or individuals that develop or draft specifications, requirements, statements of work, or invitations for bids or requests for proposals or quotes may not compete in this procurement.

Project Description/Scope of Work

This project will improve the power supply infrastructure serving the City's Water Pump Station 9 and make other miscellaneous site improvements. Proposed power supply improvement work includes a meter and main switchboard with a primary disconnect, a manual transfer switch pedestal with interlocked breakers for connection of a portable generator, a portable generator connection pedestal, and an automatic transfer switch. The work also includes pump variable frequency drive replacements, generator sub-base diesel fuel tank level transmitter and display improvements, gate and fence modifications, a concrete masonry unit wall, a sump pump and discharge piping, HVAC improvements, flow meter and transmitter replacements, and hardscape restoration. A temporary pump station facility is required for the pump station to be taken out of service.

Contract #: **C02438**

Project Title: **WATER PUMP STATION 9 ELECTRICAL UPGRADES**

Line #	Description	Unit	Quantity
1	Traffic Control	LS	1
2	Water Pollution Control	LS	1
3	Driveway and Walkway	SF	220
4	Double Gate and Fence Replacement	LS	1
5	CMU Wall Extension	LS	1
6	Trench Bracing and Shoring	LS	1
7	Temporary Pump Facility	LS	1
8	Sump Pump and Discharge Piping	LS	1
9	Electrical Room HVAC Replacement	LS	1
10	Pump Room Ventilation Improvements	LS	1
11	Meter/Main Switchboard	LS	1
12	Automatic Transfer Switch	LS	1
13	Manual Transfer Switch	LS	1
14	Portable Generator Pedestal	LS	1
15	75Hp VFD	EA	2
16	300Hp VFD	LS	1
17	Fuel Tank Transmitter and Display	EA	2
18	8" Magnetic Flowmeter & Transmitter Replacement	LS	1
19	18" Magnetic Flowmeter & Transmitter Replacement	LS	1
20	Antenna Removal and Replacement	LS	1
21	General Electrical Work	LS	1

The foregoing quantities are approximate only, being given as a basis for the comparison of bids, and the City of Santa Rosa does not expressly or by implication, agree that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work, as may be deemed necessary or expedient by the Engineer.

Bids shall be made in accordance with the prevailing hourly rate of per diem wages for this locality and project as determined by the Director of the DIR pursuant to Labor Code sections 1770 *et seq*.

Contractor shall be responsible for compliance with the Immigration Reform Control Act of 1986.

If the project requires the employment of workers in any apprenticeable craft or trade, once awarded, Contractor and subcontractors must apply to the Joint Apprenticeship Council unless already covered by local apprentice standards (see Labor Code section 1777.5).

All bids are to be compared on the basis of the Engineer's estimate of the quantities of work to be performed. No bid will be awarded to a contractor who is not licensed in accordance with the provisions of Chapter 9 of Division 3 of the Business and Professions Code. Contractor must hold a Class **A** license for this project.

Project plans, bid and contract forms for C02438 Water Pump Station 9 Electrical Upgrades may be obtained through PlanetBids at www.srcity.org/bids. These documents can no longer be obtained at the Transportation and Public Works Department.

No bid will be accepted unless it is made on the contract bid forms furnished by the Transportation and Public Works Department through PlanetBids. The original of the completed bid forms bearing original signatures must be submitted. A bid will not be accepted unless the bidder registers as a vendor through PlanetBids at www.srcity.org/bids, downloads documents/attachments, and is added to the prospective bidders list for this project. If there is an addendum, bidders must log into PlanetBids and acknowledge the addendum to be eligible for bidding.

The successful bidder will be required to hold a current City of Santa Rosa business tax certificate issued pursuant to Chapter 6.04 of the Santa Rosa City Code before commencing work on this project. For information regarding the business tax, contact Revenue and Collections at (707) 543-3170.

This Project is subject to the Community Workforce Agreement dated July 1, 2023, which is a Project Labor Agreement ("CWA" or "PLA") entered into between City, the North Bay Building and Construction Trades Council ("Council") and its affiliated local Unions that have executed this PLA, and the Contractors and subcontractors that perform work on this Project. Each Contractor and subcontractor must become signatory to the PLA by execution of a *Contractor Agreement To Be Bound* to the PLA in the form of Appendix A to the PLA. A copy of the PLA is available at www.srcity.org/bids. Your attention is directed to the Special Provisions, including, without limitation, Section 2.133A (Bid Forms), Section 3-1.18A (PLA/Community Workforce Agreement – Subcontractors), Section 3-1.20 (Failure to Execute Contract), Section 3.122A (PLA/Community Workforce Agreement – Subcontractors) and Article V of the Contract for additional details associated with the City's PLA requirements.

For any moneys earned by Contractor and withheld by the City of Santa Rosa to ensure the performance of the Contract, Contractor may, at its request and expense, substitute securities equivalent to the amount withheld in the form and manner and subject to the conditions provided in Section 22300 of the California Public Contract Code.

The City of Santa Rosa reserves the right to reject any or all bids and the right to waive minor irregularities or informalities in any bid or bond.

Tracy Duenas (Sep 16, 2024 15:39 PDT)

TRACY DUENAS
Supervising Engineer

Sep 16, 2024
Date

SPECIAL PROVISIONS

General Specifications

CITY OF SANTA ROSA, CALIFORNIA

WATER PUMP STATION 9 ELECTRICAL UPGRADES

1 GENERAL

The work described herein shall be done in accordance with the "Contract Documents," which are the:

1. Special Provisions
2. Project Plans, consisting of 18 sheets entitled Water Pump Station 9 Electrical Upgrates, city file # 2024-0001
3. City of Santa Rosa Design and Construction Standards (City Standards)
4. City of Santa Rosa Construction Specifications for Public improvements (City Specifications)
5. Sections 1-10 of the State of California Department of Transportation Standard Specifications 2015 and Revised Standard Specifications 2015 (collectively, the 2015 Standard Specifications) and Sections 11-134 of the State of California Department of Transportation Standard Specifications 2018 and Revised Standard Specifications 2018 (collectively, the 2018 Standard Specifications) (the 2015 Standard Specifications and the 2018 Standard Specifications are collectively the Standard Specifications), and
6. State of California Department of Transportation Standard Plans 2018 and Revised Standard Plans 2018 (collectively, Standard Plans).

In the event of a conflict in any of these documents, the order of precedence shall be determined by Section 5-1.02 of these Special Provisions.

Whenever the Standard Specifications use the terms State of California, Department of Transportation, Director, Engineer, or Laboratory, the following terms shall be substituted therefor, and any reference to any of the foregoing terms shall be understood and interpreted to mean and refer to such substituted terms as follows:

For State of California - the City of Santa Rosa;

For Department - the City of Santa Rosa Department of Transportation and Public Works or the City of Santa Rosa Water Department;

For Director - the City Engineer of the City of Santa Rosa;

For Engineer - the City Engineer of the City of Santa Rosa or the City Engineer's authorized agents;

For Laboratory – Materials Engineering of the City of Santa Rosa Transportation and Public Works Department, or such other laboratory as may be authorized by the City.

Unless otherwise provided, whenever in these Special Provisions attention is directed to specific provisions in the Standard Specifications, such direction shall not be interpreted as excluding other applicable provisions of the Standard Specifications.

Unless otherwise provided, when sections and subsections of the Standard Specifications are used in these Special Provisions, such use is not exclusive and shall not be interpreted as excluding other

applicable provisions of said sections and subsections but is only intended to add to or modify such sections or subsections.

Unless otherwise provided, full compensation for compliance with these Special Provisions is included in the contract price and no additional allowance will be made to Contractor therefor.
The Standard Specifications are hereby modified to delete any reference or incorporation of provisions providing for or requiring arbitration of claims and disputes arising under this Contract.

2 BIDDING

2-1.03 Registration with DIR: No contractor or subcontractor may be listed on a bid for this public works project unless registered with the Department of Industrial Relations (DIR) pursuant to Labor Code section 1725.5. No contractor or subcontractor may be awarded a contract for this public works project unless registered with the DIR pursuant to Labor Code section 1725.5. This public works project is subject to compliance monitoring and enforcement by the DIR.

2-1.06 Bid Documents: Prospective bidders will be furnished with an Invitation for Bids which will state the location and description of the contemplated public works project and will show the approximate estimate of the various quantities and kinds of work to be performed and materials to be furnished with a schedule of items for which unit prices are requested.

2-1.07 Examination of Project Plans, Specifications, City Standards, Invitation for Bids and Work Site: Prior to submitting a bid, the bidder shall carefully examine the Invitation for Bids, City Standards and the proposed work site. If any person contemplating submitting a bid for this public works project is in doubt as to the meaning of any part of the Contract Documents, or finds discrepancies in or omissions from the Contract Documents, he or she may submit a written request for interpretation or correction to the Engineer. The written request must be received by the Engineer a minimum of **96** hours prior to bid opening. Any interpretation or correction of the Contract Documents prior to bid opening will be made only by written addendum issued by the City. Notification of addenda will be made through PlanetBids. The listed primary contact will receive an e-mail generated by PlanetBids informing them of a recently uploaded addendum. The City will not be bound by any other explanations or interpretations of the Contract Documents.

2-1.08 Approximate Estimate: The quantities given in the Contract Documents are approximate only, being given as a basis for the comparison of bids, and the City does not, expressly or by implication, agree that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount of any class or part of the work or to omit parts of the work, as may be deemed necessary or advisable by the Engineer.

2-1.10 Subcontractors: The Subletting and Subcontracting Fair Practices Act, Public Contract Code sections 4100-4113, inclusive (the "Act") shall apply to all subcontracts in excess of one-half of one percent of the total amount of a bid. The Act requires subcontractors, if used for such work, to be listed in the contractor's bid and prohibits the substitution of subcontractors, except as authorized by the Act. Each bidder shall, with respect to the work of any subcontractor in excess of one-half of one percent of the total amount of the bid, include as part of the bid on the bid form provided:

1. The name, business address and DIR registration number of each subcontractor who will perform work or labor or render services to the Contractor in or about the construction of the work or improvement, or a subcontractor licensed by the State of California who, under subcontract to the Contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the Project Plans or other Contract Documents in an amount in excess of one-half of one percent of the Contractor's total bid; and

2. The portion of the work that will be done by each subcontractor. Only one subcontractor shall be listed for each portion.

The purchase of sand, gravel, crushed rock, batched concrete, aggregate, ready-mixed concrete, and/or any other materials produced and furnished by established and recognized commercial plants, together with the delivery of such materials to the work site by the source of the materials or by recognized commercial hauling companies, is not considered as subcontracting under this section.

2-1.30 Job Site and Document Examination: Access to examine the job site will be made available to all prospective bidders, subcontractors, and materials suppliers upon written request as outlined in the Notice to Bidders.

2-1.33 Bid Document Completion: Any references to Opt Out of Payment Adjustments for Price Index Fluctuations in the Standard Specifications are deleted in their entirety.

2-1.33A Bid Forms: All bids shall be made on bid forms obtained from PlanetBids at www.srcity.org/bids. The bidder shall submit its bid on the original bid forms furnished by the City. Bids submitted on forms other than the forms furnished to the bidder by the City will not be considered.

The bid forms to be submitted at the time of and with the bid are:

1. Unit Price Schedule
2. List of Subcontractors
3. List of Previous Similar Jobs
4. Noncollusion Declaration
5. Bid Bond Affidavit and Bidder's Signature Page
6. Bid Guaranty (Bid Bond or alternate security)
7. Contractor Agreement to be Bound to the PLA

All bids shall give the proposed prices and must bear the original signature of the bidder. Bidders shall fill in all blanks on the bid forms where required. A bid will not be accepted unless the bidder registers as a vendor through PlanetBids at www.srcity.org/bids downloads documents/attachments, and is added to the prospective bidders list for this project. If there is an addendum, bidders must log into PlanetBids and acknowledge the addendum to be eligible for bidding.

2-1.33E Rejection of Bids Containing Alterations, Erasures or Irregularities: Bids may be rejected if they show any alterations of forms, additions not called for, conditional bids, incomplete bids, erasures or irregularities of any kind.

2-1.34 Bidders' Security: All bids shall be presented under sealed cover and shall be accompanied by cash, cashier's or certified check, or by a bidder's bond made payable to the City of Santa Rosa and executed as surety by a corporate surety authorized and admitted to transact a surety business in the State of California in an amount equal to ten percent of the amount of the bid. No bid shall be considered unless such cash, cashiers or certified check, or bidder's bond is enclosed with the bid. Any bidder's bond shall contain provisions for forfeiture consistent with California Public Contract Code section 20172.

2-1.40 Withdrawal of Bid: A bid may be withdrawn prior to, but not after, the hour fixed in the public notice for the opening of bids, provided that a written request to withdraw the bid, executed by the bidder or the bidder's authorized representative, is filed with the Engineer before this deadline. The withdrawal of a bid shall not prejudice the right of a bidder to submit a new bid.

2-1.43 Public Opening of Bids: Bids will be opened and read publicly at the time and place indicated in the Notice to Bidders. Bidders or their authorized agents are invited to be present.

2-1.46 Department's Decision on Bid: Serial bids from the same bidder will not be accepted. This section shall not be interpreted to mean that the same contractor may not be the contractor in one bid and listed as a subcontractor in another bid, provided that no collusion exists.

2-1.48 Competency of Bidders: No bid will be accepted from or contract awarded to a contractor that is not licensed in accordance with the law, that does not hold a license qualifying it to perform work under this contract, to whom a bid form has not been issued by the Engineer, or that has not successfully completed projects of similar character, scope and cost to the proposed project. Bidders will be required to provide a list of previous similar jobs with their bids.

3 CONTRACT AWARD AND EXECUTION

3-1.04 Contract Award: The City reserves the right to reject any or all bids. Bids are required for the entire work described herein. All bids will be compared with the Engineer's estimate of the quantities of work to be completed. Contract award, if any, will be made to the lowest responsible and responsive bidder within thirty days from the date bids are opened.

3-1.05 Contract Bonds: Within ten days after receipt of the Notice of Award, the successful bidder shall provide the following bonds to the City:

a. Performance Bond: A performance bond to guarantee the faithful performance of the terms and conditions of the Contract by Contractor, which shall be executed in a sum of not less than 100% of the Contract price;

b. Labor and Materials Bond: A labor and materials bond (payment bond) in accordance with Part 6 of Division 4, sections 8000 *et seq*. of the California Civil Code, to guarantee against any and all claims of subcontractors or other third parties furnishing labor, materials, or supplies for the Contract, which shall be executed in a sum of 100% of the Contract price; and

c. Material Guaranty Bond: A material guaranty bond (warranty bond) to serve as surety for the guarantee requirements outlined in Section 6-3.01B, which shall be executed in a sum of not less than 50% of the Contract price.

The bond(s) shall be provided in a form acceptable to the City and issued by a corporate surety in good financial standing and authorized and admitted to transact a surety business in the state of California for the purposes and in the amount(s) stated above.

Whenever the financial or legal status of any surety on any such bond(s) is/are unacceptable to the City, it may make a demand to Contractor for further bond(s) or additional surety, not exceeding the sums originally required. Thereafter, no payment shall be made upon the Contract to Contractor or any assignees of Contractor until such bond(s) or additional surety has/have been provided to the City.

3-1.06 Contractor License: Contractor must be properly licensed as a contractor from Contract award through Contract acceptance (Pub Cont. Code § 10164).

3-1.07 Indemnification and Insurance: Indemnification: Contractor shall defend, hold harmless and indemnify City, its officers, agents and employees, 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, 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 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 the performance of or the failure to perform the Contract by 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 such Liabilities are caused in part by a party indemnified hereunder, or such Liabilities are litigated, settled or reduced to judgment; provided, that the foregoing indemnity does not apply to liability for any damage or expense for death or bodily injury to persons or damage to property 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 (excluding Contractor), or (ii) the active negligence of City.

The existence of any of the insurance policies or coverages described in this Contract shall not affect or limit any of City's rights hereunder, nor shall the limits of such insurance limit Contractor's liability to the City hereunder. The provisions of this section shall survive any expiration or termination of the Contract.

Insurance: Contractor shall maintain in full force and effect all of the insurance coverage described in and in accordance with the insurance requirements set forth below. Maintenance of such insurance coverage during the entire performance of the Contract is a material element of the Contract. Failure by Contractor to (i) maintain or renew coverage, (ii) provide notice of any changes, modifications, or reductions in coverage, or (iii) provide evidence of renewal, if necessary, may be deemed a material breach of the Contract by Contractor, whereas the City shall be entitled to all rights and remedies at law or in equity. Notwithstanding the foregoing, any failure by Contractor to maintain required insurance coverage shall not excuse or alleviate Contractor from any of its other duties or obligations under the Contract. In the event Contractor retains or utilizes any subcontractors or sub-consultants in performance of the work, Contractor shall assure that any such subcontractor has first obtained, and shall maintain, all of the insurance coverage requirements herein set forth below.

A. Insurance Requirements: **Insurance Policies:** Contractor shall maintain and keep in full force and effect, the following policies of insurance with minimum coverage as indicated below and issued by insurers with an AM Best rating of no less than A-:VI or a rating otherwise acceptable to the City.

	Insurance	Minimum Coverage Limits	Additional Coverage Requirements
1.	Commercial general liability	$5 million per occurrence $5 million aggregate	Coverage must be at least as broad as ISO CG 00 01 and must include products liability and completed operations coverage which shall continue for a period of three years after acceptance of the work by the City. If insurance applies separately to a project/location, aggregate may be equal to per occurrence amount. Coverage may be met by a combination of primary and umbrella or excess insurance, but umbrella and excess shall provide coverage at least as broad as specified for underlying coverage. Completed Operations Coverage can be provided in the form of an endorsement to Contractor's insurance (at least as broad as ISO Form CG 20 37 04 13. See endorsements below for other Additional Insured Requirements. Coverage shall not exclude subsidence.
2.	Business auto coverage	$3 million	Coverage at least as broad as ISO Form Number CA 00 01 covering any auto (Code 1). Insurance shall cover owned, non-owned and hired autos.

3.	Workers' compensation and Employer's Liability	$1 million	As required by the State of California, with Statutory Limits and Employer's Liability Insurance with limit of no less than $1 million per accident for bodily injury or disease. The Workers' Compensation policy shall be endorsed with a waiver of subrogation in favor of the City for all work performed by Contractor, its employees, agents and subcontractors.
4.	Contractor's pollution legal liability and/or asbestos legal liability and/or errors and omission (if the City determines, in its sole discretion, that the project involves environmental hazards)	$1 million per occurrence or claim $2 million aggregate	If the work involves lead-based paint or asbestos identification/remediation, the pollution liability policy must not contain lead-based paint or asbestos exclusions. If the work involves mold identification, the pollution liability policy must not contain a mold exclusion and a definition of "Pollution" in said policy shall include microbial matter including mold.
5.	Course of construction/ builders' risk	Amount of completed value of project without co-insurance provisions	Required for construction projects over $3 million. The City shall be named as loss payee.

B. Endorsements:

1. All policies shall provide or be endorsed to provide that coverage shall not be canceled by either party, except after prior written notice has been provided to the City in accordance with the policy provisions.
2. Liability policies shall provide or be endorsed to provide the following:
   a. For any claims related to this Contract, Contractor's insurance coverage shall be primary, and any insurance or self-insurance maintained by City shall be in excess of Contractor's insurance and shall not contribute with it. Endorsements at least as broad as 20 01 04 13 or evidence of policy language will be required in non- ISO CGL policies.
   b. **The City of Santa Rosa, its officers, agents and employees are to be covered as additional insureds on the CGL policy**. Additional Insured Endorsements at least as broad as 20 10 04 13 or 20 38 04 13 are required.

C. Verification of Coverage and Certificates of Insurance: Contractor shall furnish City with original certificates and endorsements effecting coverage required above. Certificates and endorsements shall make reference to policy numbers. All certificates and endorsements are to be received and approved by the City before work commences and must be in effect for the duration of the Contract. The City reserves the right to require complete copies of all required policies and endorsements during the duration of the Contract and for a period of three years following City's acceptance of the work.

D. Other Insurance Provisions:

1. No policy required by this Contract shall prohibit Contractor from waiving any right of recovery prior to loss. Contractor hereby waives such right with regard to the

indemnitees.

2. All insurance coverage amounts provided by Contractor and available or applicable to this Contract are intended to apply to the full extent of the policies. Nothing contained in this Contract limits the application of such insurance coverage. Coverage for an additional insured shall NOT be limited to the insured's vicarious liability. Defense costs must be paid in addition to coverage amounts.
3. Self-insured retentions above $10,000 must be approved by the City. At the City's option, Contractor may be required to provide financial guarantees.
4. City reserves the right to modify these insurance requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other special circumstances.

3-1.18 Contract Execution: The fully executed Contract, original bonds and insurance certificates and endorsements required under the Contract shall be delivered to the City within ten calendar days of Contractor's receipt of the Notice of Award.

The Engineer will supply Contractor with up to ten sets of the Invitation for Bids and Project Plans. At least one complete set of the Invitation for Bids and Project Plans shall be kept at the construction site in good condition and made available to the Engineer at all times. Additional copies of the Invitation for Bids and Project Plans will be provided by the Engineer at Contractor's cost.

3.1.18A PLA/Community Workforce Agreement – Subcontractors: Within ten (10) calendar days after receipt of the Notice of Award, a successful bidder must deliver to the City executed *Contractor Agreement(s) to be Bound* to the PLA for all subcontractors subject to the PLA. The form of the *Contractor Agreement to be Bound* to the PLA is included in the Bid Forms and also is located in Appendix A to the PLA (entitled "Community Workforce Agreement"), a copy of which is available at www.srcity.org/bids

3-1.19 Bidders' Securities: Within ten days after the opening of bids, the City will return the bid guarantees to all bidders except the three lowest responsible bidders. The bid guarantees of the three lowest responsible bidders will be retained until the Contract has been fully executed. In the event all bids are rejected, all bid guarantees will be returned to the respective bidders.

3-1.20 Failure to Execute Contract: Contractor's failure to deliver to the City the fully executed Contract within ten calendar days of Contractor's receipt of the Notice of Award shall be cause for the cancellation of the award and the forfeiture of the bid guaranty to the City. If the successful bidder refuses or fails to execute the Contract, the City may award the Contract to the second lowest responsible bidder. If the second lowest responsible bidder refuses or fails to execute the Contract, the City may award the Contract to the third lowest responsible bidder. The refusal or failure by the second or third lowest responsible bidder to deliver to the City the fully executed Contract within ten calendar days of receipt of the Notice of Award to the respective bidder shall likewise be cause for the cancellation of the award and the forfeiture of the bid guaranty of the respective bidder. In its discretion, the City may then re-advertise the project or construct it by day labor.

Contractor's failure to deliver to the City executed Contractor Agreement(s) to be Bound to the PLA for all subcontractors subject to the PLA in accordance with the deadlines and requirements of Section 3-1.18A and 3-1.22A shall also be cause for the cancellation of the award and the forfeiture of the bid guaranty to the City. If the successful bidder refuses or fails to executed Contractor Agreement(s) to be Bound to the PLA for all subcontractors subject to the PLA in accordance with the deadlines and requirements of Section 3-1.18A and 3-1.22A, the City may award the Contract to the second lowest responsible bidder. If the second lowest responsible bidder refuses or fails to executed Contractor Agreement(s) to be Bound to the PLA for all subcontractors subject to the PLA in accordance with the deadlines and requirements of Section 3-1.18A and 3-1.22A, the City may award the Contract to the third lowest responsible bidder. The refusal or failure by the second or third lowest responsible bidder to deliver to the City executed Contractor Agreement(s) to be

Bound to the PLA for all subcontractors subject to the PLA in accordance with the deadlines and requirements of Section 3-1.18A and 3-1.22A shall likewise be cause for the cancellation of the award and the forfeiture of the bid guaranty of the respective bidder. In its discretion, the City may then re-advertise the project or construct it by day labor.

3-1.22 Subcontractors: The successful bidder shall furnish a list of all subcontractors as required under Sections 2-1.10. The list shall include the name, business address, DIR registration number and the state contractor's license number of each subcontractor on the list and the names of the responsible managing employees whose names appear on the subcontractors' licenses.

3-1.22A PLA/Community Workforce Agreement – Subcontractors. In accordance with the deadline set forth in Section 3-1.18A, a successful bidder must deliver to the City executed *Contractor Agreement(s) to be Bound* to the PLA for all subcontractors subject to the PLA. The form of the *Contractor Agreement to be Bound* to the PLA is included in the Bid Forms and also is located in Appendix A to the PLA (entitled "Community Workforce Agreement"), a copy of which is available at www.srcity.org/bids

4 SCOPE OF WORK

4-1.05 Changes and Extra Work: All changes to the Contract shall be made by written change order only.

All extra work shall be recorded by Contractor on a daily report signed by both the City and Contractor. The "daily reports" shall thereafter be considered the true record of extra work performed. A copy of the daily reports will be furnished to Contractor. Contractor is directed to Section 9-1.04 of this Invitation for Bids.

4-1.05C Compensation for Altered Quantities: Payment and compensation for altered quantities shall not conform to the provisions of Section 9-1.06 of the Standard Specifications, except as modified herein.

4-1.07 Value Engineering

4-1.07B Value Engineering Change Proposal (VECP):

Contractor may submit a VECP to reduce any of the following:
1. Total cost of construction
2. Construction activity duration
3. Traffic congestion

Before preparing a VECP, meet with the Engineer to discuss:
1. Proposal concept
2. Permit issues
3. Impact on other projects
4. Project impacts, including traffic, schedule, and later stages
5. Peer reviews
6. Overall proposal merits
7. Review times required by the Department and other agencies

The VECP must not impair the project's essential functions or characteristics, including:
1. Service life
2. Operation economy
3. Maintenance ease
4. Desired appearance
5. Design and safety

The VECP must include:
1. Description of the Contract specifications and drawing details for performing the work and the proposed changes
2. Itemization of Contract specifications and plan details that would be changed
3. Detailed cost estimate for performing the work under the existing Contract and under the proposed change; Determine the estimates under section 9-1.04 of the Standard Specifications
4. Deadline for the Engineer to decide on the changes
5. Bid items affected and resulting quantity changes

The Department is not required to consider a VECP. If a VECP is similar to a change in the Project Plans or City Specifications being considered by the Department at the time the proposal is submitted or if the proposal is based on or similar to plans or City Specifications adopted by the Department before Contract award, the Department does not accept the VECP and may make these changes without VECP payments.

If the Department does not approve a Change Order before the deadline stated in the VECP or other date Contractor subsequently stated in writing, the VECP is rejected. The Department does not adjust time or payment for a rejected VECP.

The Department decides whether to accept a VECP and the estimated net construction-cost savings from adopting the VECP or parts of it.

The Department may require Contractor to accept a share of the investigation cost as a condition of reviewing a VECP. After written acceptance, the Department considers the VECP and deducts the agreed cost.

If the Department accepts the VECP or parts of it, the Department issues a Change Order that:

1. Incorporates changes in the Contract necessary to implement the VECP or the parts adopted
2. Includes the Department's acceptance conditions
3. States the estimated net construction-cost savings resulting from the VECP
4. Obligates the Department to pay Contractor 50 percent of the estimated net savings.

In determining the estimated net construction-cost savings, the Department excludes Contractor's VECP preparation cost and the Department's VECP investigation cost, including parts paid by Contractor. If a VECP providing for a reduction in working days is accepted by the Department, 50 percent of the reduction is deducted from the Contract time.

If a VECP providing for a reduction in traffic congestion or avoiding traffic congestion is accepted by the Department, the Department pays 60 percent of the estimated net savings in construction costs attributable to the VECP. Submit detailed traffic handling comparisons between the existing Contract and the proposed change, including estimates of the traffic volumes and congestion.

The Department may apply an accepted VECP for general use on other contracts.

If an accepted VECP is adopted for general use, the Department pays only the contractor who first submitted the VECP and only for the contracts awarded to that contractor before the submission of the accepted VECP.

If the Department does not adopt a general-use VECP, an identical or similar submitted proposal is eligible for acceptance.

5 CONTROL OF WORK

5-1.02 Contract Documents: In the event of a conflict in any of the Contract Documents, the order of precedence from highest to lowest shall be as follows:

1. Special Provisions
2. Project Plans, consisting of 18 sheets entitled Water Pump Station 9 Electrical Upgrades, city file # 2024-0001
3. City Standards
4. City Specifications
5. Standard Specifications
6. Standard Plans;

5-1.05 Order of Work: The work as shown on the Project Plans and as specified in the Invitation for Bids shall be constructed in a sequence that is satisfactory to and approved by the Engineer.

Contractor shall prepare a work schedule per Section 8-1.02 of the Standard Specifications.

Contractor shall schedule the order of work such that the schedule restrictions described in Section 8-1.04C and 8-1.05 are observed.

Full compensation for the conformance to the requirements of this section is included in the Contract price and no additional allowance will be made to Contractor for this work.

5-1.17 Character of Workers: Attention is directed to Section 5-1.17 of the Standard Specifications which states:

"If a worker appears to the Engineer to be incompetent or acts disorderly or improperly, discharge the worker immediately upon request. Do not employ that worker again on the work."

No additional compensation shall be granted to Contractor in the event City exercises any part of its rights under this section and any and all costs related to such exercise shall be borne by Contractor.

5-1.20 Cooperation with Other Entities: Attention is directed to Section 5-1.20 of the Standard Specifications.

Other construction including but not limited to utility, power, and pipe line relocation, may be in progress by other forces within and adjacent to the project area at the same time work is being performed under this Contract by Contractor. Contractor shall coordinate and cooperate with the forces performing other work, to the end that such forces may conduct their operations with as little inconvenience and delay as possible.

The City has obtained a permit from PG&E to deenergize the service, reconnect the new meter/main switchboard, and re-energize the service. The Contractor shall schedule and coordinate all PG&E work.

Each contractor or other entity performing work at or near the job or material site is responsible to the other for damage to work, persons, or property and for costs due to unnecessary delays.

5-1.20B(4)(a) Offsite Staging Areas and Construction Yards: Attention is directed to Santa Rosa City Code section 20-52.040, Temporary Use Permit.

A Temporary Use Permit shall be obtained for any offsite construction yard on private property to be used for any of the following:

1. Stockpiling of equipment and/or materials;
2. Staging of construction;
3. Placement of work trailers or mobile offices;
4. Storage of trench spoils; or
5. Other construction related activities not specifically enumerated above.

5-1.26 Construction Surveys: Contractor shall carefully preserve all bench marks, grade stakes, and all other survey markers. In the case of willful or careless destruction, Contractor shall bear the cost of replacing the markers.

Contractor shall contact the Engineer directly for coordination of survey staking. Written staking requests must be submitted at least two working days in advance of the date and time stakes are needed.

5-1.27A Examination and Audit: Pursuant to California Government Code section 8546.7, any contract with the City involving expenditures in excess of $10,000 shall be subject to the examination and audit of the California State Auditor for a period of three years after final payment is made to Contractor by City under this Contract. Any such examination and audit will be confined to those matters connected with the performance of this Contract.

5-1.30A Inspection: Contractor shall bear all costs associated with the re-inspection of any defective, rejected or unauthorized work as determined by the Engineer in Engineer's sole discretion. Such costs of re-inspection, including any costs incurred by the City for additional staff time or fees for third-party consultant inspectors, will be deducted from one or more progress payments hereunder.

5-1.36D(a) Property and Facility Preservation: Attention is directed to Section 5-1.36 of the Standard Specifications.

At Contractor's sole expense, all fences, gates, landscaping, drainage ditches, sidewalks, irrigation systems, storm drains and any other facilities that are damaged, removed or destroyed because of Contractor's operations, shall be replaced in accordance with City Standards at a minimum and restored to the same or better condition. Concrete surface treatment and score marks shall match adjacent existing concrete improvements.

5-1.36E Obstructions: Attention is directed to Section 5-1.36 of the Standard Specifications and to the possible existence of underground gas mains, high voltage lines, telephone ducts, storm drains and water and sewers systems, the locations of which are not shown on the Project Plans. The determination of the location of these facilities and the cost of repair or replacement in the event of damage to such facilities are the sole responsibility of Contractor.

Should Contractor alter any public utility or private improvements to facilitate its operations or for its sole benefit, which alteration would not be otherwise required, Contractor shall make whatever arrangements are necessary with the owner or controlling authorities and shall bear all expenses in connection therewith. Any damages to any public utility or private improvement caused by Contractor shall be repaired by Contractor at its sole expense and to the full satisfaction of the Engineer or the controlling authority.

Any subsurface information and data furnished under any part of this Contract are not intended as a representation or warranty but are furnished for information only. It is expressly understood that the City will not be responsible for the accuracy thereof or for any deduction, interpretation or conclusion drawn therefrom by Contractor. The information is made available so that Contractor may have ready access to the same information available to the City and is not part of this Contract.

PRIOR TO STARTING ANY EXCAVATION, CONTRACTOR SHALL (AT LEAST TWO WORKING DAYS IN ADVANCE) CALL UNDERGROUND SERVICE ALERT (USA) toll free at (800) 227-2600 and provide USA with all necessary data relative to the proposed excavation. USA will accept calls and process information to participating agencies who have underground facilities in the area between the hours of 7:30 a.m. and 5:00 p.m. daily, except Saturdays, Sundays, and holidays. Between the hours of 5:00 p.m. and 7:30 a.m., calls will be recorded and then processed after 7:30 a.m. For emergency situations, after hours, and on Saturdays, Sundays and holidays, Contractor shall contact the owner of the affected facility.

Contractor shall coordinate all work with the appropriate City field personnel. When City work forces are required at the job site to perform Contract items of work, Contractor shall give a minimum of two working days advanced notification to the appropriate field office:

Water Division:	(707) 543-4200
Sewer Division:	(707) 543-4200
Street Division:	(707) 543-3880
Survey Division:	(707) 543-3834

5-1.43 Potential Claims and Dispute Resolution: "Claim" means a separate demand by Contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following: (A) A time extension, including, without limitation, for relief from damages or penalties for delay assessed by the City under the Contract; (B) Payment by the City of money or damages arising from work done by, or on behalf of, Contractor pursuant to the Contract and payment for which is not otherwise expressly provided or to which the claimant is not otherwise entitled; or (C) Payment of an amount that is disputed by the City.

Upon receipt of a Claim, the City shall conduct a reasonable review of the Claim and, within a period not to exceed 45 days, shall provide Contractor a written statement identifying what portion of the Claim is disputed and what portion is undisputed, provided, the parties may extend the 45 day time period by mutual agreement.

If the City needs approval from the City Council to provide the claimant a written statement identifying the disputed portion and the undisputed portion of the Claim, and the Council does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a Claim, the City shall have up to three days following the next duly publicly noticed meeting of the City Council after the 45-day period, or extension expires to provide Contractor a written statement identifying the disputed portion and the undisputed portion.

Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the City issues its written statement. If the City fails to issue a written statement, the Claim shall be deemed rejected in its entirety.

If Contractor disputes the City's written response, or if the City fails to respond to a Claim within the time prescribed, Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the City shall conduct a meet and confer conference within 30 days for settlement of the dispute. Within 10 business days following the conclusion of the meet and confer conference, if the Claim or any portion of the Claim remains in dispute, the City shall provide Contractor a written statement identifying the portion of the Claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the City issues its written statement. Any disputed portion of the Claim, as identified by Contractor in writing, shall be submitted to nonbinding mediation, with the City and Contractor sharing the associated costs equally. The City and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the Claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed

portion of the Claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator.

6 CONTROL OF MATERIALS

6-2.01G Source of Supply and Quality of Materials: All materials required to complete the work under the Contract shall be furnished by Contractor and shall be free of hazardous substances.

6-2.01H General: Statistical means will not be used by the City for determination of Standard Specification compliance. Whenever both operating range test results and Contract compliance requirements are specified in these special provisions, the operating range requirements shall apply to the individual test results.

6-2.01I Material Submittals: Upon award of the Contract by City, Contractor shall submit to the Engineer a list of all materials proposed to be used on this project and any supporting documentation and/or samples required and source of supply.

For material listed on the "Engineer's List of Approved Items" which is located in the Sewer and Water sections only of the City Standards, the Engineer shall be provided with the name of the manufacturer and model/part number for all material proposed for this project, unless that item has been replaced as shown on the Project Plans or in the Invitation for Bids.

For all other materials used on this project, regardless of the type of work, Contractor shall provide to the Engineer the name of the manufacturer and model/part number along with supporting documentation and/or samples that will allow the Engineer to determine the material's acceptability.

The Engineer reserves the right to reject any proposed material, whether on the City's "Engineer's List of Approved Items" or not. If the City obtains information indicating that a listed item is not performing satisfactorily or is found to be defective, that item will be rejected and Contractor shall submit a replacement for review at no additional cost to the City.

6-3.01B Material Guarantee: Before any contract is awarded, the bidder may be required to furnish samples of materials and detailed descriptions of equipment to be used in the construction of the project. The materials samples may be subjected to the tests provided for in the Standard Specifications or in this Invitation for Bids to determine their quality and fitness for the project. The successful bidder shall unconditionally guarantee project materials and workmanship for a period of one year from the date of recording of the Notice of Completion. The guarantee shall cover 100% of all costs of repairs within the one-year period, including all costs of labor, materials, equipment, and incidentals. Except as may be otherwise provided in Section 3-1.05, the successful bidder shall provide a surety bond executed by a corporate surety authorized and admitted to transact a surety business in the state of California in the minimum amount of one-half of the Contract price to cover this guarantee.

6-2.03D Quality Assurance: California Test 216 (Relative Compaction) testing will be modified as follows: A mechanical compactor (Ploog Engineering Co. Model M 100 or equivalent) with 10-pound hammer and split compaction molds shall be used in lieu of the specified manual compaction equipment.

California Test 231 (Nuclear Gage Determination of In-Place Density) will be modified as follows: In-place density and relative compaction may be determined on the basis of individual test sites in lieu of the area concept, at the discretion of the Engineer.

6-4 Water Utility

6-4.01A Construction Water: All water required for the performance of the work shall be provided by Contractor. Prior to obtaining water from the City's water system, Contractor shall obtain a Water

Use Permit from the City of Santa Rosa Water Department and rent a hydrant or bridge meter. Contractor is responsible for the cost of all water and the cost of all deposits, permits and fees.

Contractor is prohibited from operating gate valves or fire hydrants on the City system.

The acquisition of water from the City's water system through un-metered hydrants or other facilities is a violation of City ordinance and State law. The use of water from sources other than the City's water system must be approved by the Engineer in advance of the use.

Citations and fines will be levied for violation of these and other utility regulations and deductions will be made from payments consistent with Section 7-1.02A (1) of the Standard Specifications.

6-4.01B Water Utility Notification: Contractors or parties requiring work of any kind by the City of Santa Rosa Water Department forces shall request such services a minimum of 48 hours in advance of the time such services are desired. Work requests which will involve the City of Santa Rosa Water Department forces for more than eight hours or an extensive number of City parts shall be requested a minimum of seven calendar days in advance.

If it is necessary to terminate or disrupt utility service to any customer, Contractor shall make the request for such work by City forces an additional 72 hours (three additional working days for a total of five working days advance notice) in advance of the time such services are desired to allow affected customers a minimum of 72 hours' notice. Contractors who fail to keep field appointments will be billed for scheduled City of Santa Rosa Water Department crew standby time which was used and the Contractor shall bear the costs incurred by the City of Santa Rosa's Water Department for re-notification of customers.

City of Santa Rosa Water Department crews work a 9/80 schedule. This schedule may prohibit shutdowns for tie-ins on alternating Fridays. After hours work or weekend work may be performed if prior authorization from the Engineer is obtained.

Other than the hours specified in this Invitation for Bids, requests by Contractor for after hours or weekend work is to be avoided whenever possible. Any overtime costs incurred by City for such work shall be borne by Contractor.

Interruption of utilities service to commercial customers shall be coordinated with the customer to minimize disruption to the enterprise to the greatest extent practicable. After notification by the Contractor of the need, the City of Santa Rosa Water Department will contact all commercial customers and inform Contractor accordingly.

6-4.01C Water Facility Damage: All damage caused to the City's water system shall be immediately reported to the Engineer.

Damage caused to the City's water system by Contractor's operations shall be repaired by the Contractor at Contractor's sole expense in a manner satisfactory to the City of Santa Rosa Water Department. Such repairs shall not be charged to the City or any City project. All repair work shall be witnessed and approved by the City of Santa Rosa Water Department prior to backfilling the excavation. The City will require re-excavation if backfilling occurs prior to inspection, which costs shall be borne by Contractor.

Contractor is responsible for, at its sole cost and expense, the repair and remediation of damage to property and facilities caused by any of the following circumstances:

1. Contractor fails to make a written request for a markout or begins excavation without providing the City of Santa Rosa Water Department a reasonable opportunity to mark facilities;
2. Contractor destroys markouts;

3. Contractor fails to perform hand digging or probing for utilities near markouts; or
4. Contractor fails to use reasonable caution, regardless of whether markouts are present or clear. Reasonable caution includes any efforts to avoid damaging existing facilities, such as when excavating in the vicinity of water mains.

City may, in its discretion, opt to make the repairs for which Contractor is responsible with its own forces. In such cases, the repairs will be made at Contractor's expense in accordance with the emergency repair rate schedule of the City of Santa Rosa Water Department. The City may make repairs whenever restoration of service requires extraordinary speed or special equipment. Contractor will be billed accordingly and City shall have the right and option to withhold payment hereunder, or a portion thereof, for any such costs billed but not promptly paid by Contractor.

6-4.02 Salvage: All valves, hydrants, and other appurtenances of the water system that are the property of City and removed by Contractor shall be delivered to the City's Municipal Services Center (55 Stony Point Road) unless Contractor has obtained specific written approval from the City of Santa Rosa Water Department to otherwise dispose of the materials.

6-4.03 Trade Names and Alternatives: Material and equipment specifications that identify a particular patent, trade name or manufacturer, may be satisfied through substitute materials and equipment accepted by the City unless specifically noted as sole source equipment necessary to match City Standard. Contractor may offer substitute materials and equipment of equal or better quality to the City. Any such offer shall be made in writing to the Engineer at least four weeks in advance of the time Contractor wishes to order the materials or equipment. Contractor shall include sufficient data which, together with any other information the Engineer may require, will enable the Engineer to determine the acceptability of the materials and equipment. When the substitute materials or equipment necessitate changes to any part of the work, the information shall include drawings and details showing all such changes and Contractor shall perform these changes as a part of any acceptance of substitute materials or equipment. The use of substituted materials and equipment will be permitted only after written acceptance of the materials and equipment by the Engineer. Such acceptance shall not relieve the Contractor from full responsibility for the sufficiency, quality and performance of the substitute materials and equipment.

The City will not, under any circumstances, acknowledge or consider any offers to accept substitute materials or equipment between the dates of public notice of advertisement and the bid opening.

7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

7-1.02A (1) Forfeitures for Health and Safety Violations: Contractor shall comply with all applicable provisions of the Santa Rosa City Code and any failure to do so shall constitute a breach of the Contract. In the event of any violation of the Santa Rosa City Code that may impact public health and safety, including, but not limited to Chapter 17-12, "Storm Water" and Chapter 13-04, "Street Encroachments," City shall have the right to impose a charge against Contractor in an amount equal to $500.00 per violation per day. Prior to the imposition of any charge hereunder, City shall first provide a written notice to Contractor of the violation and setting forth a reasonable period of time for Contractor to cure the violation(s). In the event Contractor fails to cure any such violation within the time provided, City shall have the right, in addition to all other rights and remedies available to City, to deduct and withhold as a permanent forfeiture by Contractor the appropriate amounts from any payment otherwise due Contractor under this Contract.

7-1.02K (2) Wages: Pursuant to Labor Code sections 1770 *et seq*., each laborer or mechanic of Contractor or any subcontractor engaged in work on the project under this Contract shall be paid not less than the hourly wage rate of per diem wages set forth in the prevailing wage rate schedule published by the Director of Industrial Relations, regardless of any contractual relationship which may be alleged to exist between Contractor or any subcontractor and such laborers and mechanics. A copy of the schedule of prevailing wage rates can be obtained online at www.dir.ca.gov or from the Department of Transportation and Public Works at 69 Stony Circle, Santa Rosa.

Any laborer or mechanic employed to perform work on the public works project under this Contract, which work is not covered by any of the foregoing classifications, shall be paid not less than the prevailing wage rate of per diem wages specified herein for the classification which most nearly corresponds to the work to be performed by the worker.

The foregoing specified prevailing wage rates are minimum rates only, and Contractor may pay any wage rate in excess of the applicable rate.

Pursuant to Labor Code Section 1775, Contractor as a penalty to the owner shall forfeit not more than $200.00 for each calendar day, or a portion thereof, for each worker paid less than the prevailing wage rate established by the Department of Industrial Relations for such work or craft in which such worker is employed. The difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which the worker was paid less than the prevailing wage rate shall be paid to each worker by Contractor.

Contractor shall only provide prevailing wage reports upon written request from City.

7-1.02K (4) Apprentices: Contractor agrees to comply with Chapter 1, Part 7, Division 2, sections 1777.5 *et seq*. of the California Labor Code. These sections require contractors and subcontractors to employ apprentices in apprenticeable occupations in a ratio of not less than one hour of apprentice work for each five hours of journeyman work (unless an exception is granted in accordance with Section 1777.5), and the contractors and subcontractors shall not discriminate among otherwise qualified employees as apprentices solely on the ground of sex, race, religion, creed, national origin, ancestry, or color. Only apprentices as defined in Labor Code section 3077, who are in training under apprenticeship standards and who have written apprentice agreements will be employed on public works in apprenticeable occupations. The responsibility for compliance with these provisions is fixed with the prime contractor for all apprenticeable occupations.

7-1.02K(6)(a)(1) Notice to Vendors: Attention is directed to the current OSHA Standards. All equipment, tools and materials which are furnished and/or installed as part of this Contract shall meet or exceed the aforementioned standards in order to be considered acceptable.

7-1.02K(6)(b) Excavation Safety: When the digging or excavation occurs during project construction, Contractor shall:

1. Promptly notify City in writing of the following conditions before any such conditions are disturbed:

    a. Material that Contractor believes may be hazardous waste as defined in Health and Safety Code section 25117 that is required to be removed to a Class I, Class II or Class III disposal site in accordance with provisions of existing law;
    b. Subsurface or latent physical conditions at the site differing from those indicated in the Invitation for Bids; and
    c. Physical conditions at the site of any unusual nature, materially different from those ordinarily encountered and generally recognized as inherent in the type of work under the Contract.

2. The City will investigate the conditions and will issue a change order under the terms of the Contract if it finds that the conditions warrant it.

3. If a dispute arises between City and Contractor as to whether a change order is warranted, Contractor shall not be excused from any scheduled completion date provided for in the Contract but shall proceed with all work to be performed under the Contract.

7-1.02K(6)(b)(1) Trench Excavation Safety Plans: When the estimated cost for the excavation of any trench or trenches five feet or more in depth will exceed $25,000.00, Contractor shall submit to the Engineer in advance of excavation a detailed plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the shoring system standards established by the construction safety orders, or if the trench is anticipated to be greater than 20 feet, the plan shall be prepared by a registered civil or structural engineer.

A permit to do the above described work shall be obtained from the State of California, Division of Industrial Safety. Proof of such permit shall be submitted to the Engineer prior to starting the trench work.

Full compensation for complying with the provisions of this section shall be considered as included in the Contract price and no additional allowance will be made for the work.

7-1.02K(6)(d) Confined Space Safety: Any confined space entry for this project, including but not limited to manhole or water storage tank entry, will require a confined space entry permit pursuant to Cal/OSHA regulations as set forth in title 8 California Code of Regulations (CCR) sections 5157 or 5158. Confined space entry shall have the meaning ascribed in title 8 CCR sections 5157 and 5158. For any confined space entry for construction operations regulated by title 8 CCR section 1502, Contractor shall comply with title 8 CCR section 5158, “Other Confined Space Operations.” For any other confined space operations, Contractor shall comply with title 8 CCR section 5157, “Permit-Required Confined Spaces.”

Attention is directed to the technical specifications in the Special Provisions for information regarding entry to any City maintained confined space. Pursuant to title 8 CCR section 5157, Contractor is required to obtain any available information regarding hazards and operations for any City maintained confined spaces. The City maintained Confined Space Entry Manual is available for viewing at the City of Santa Rosa Water Department or Transportation and Public Works Department office at 69 Stony Circle, Santa Rosa.

Contractor shall immediately inform the Engineer of any previously unidentified hazards confronted or created during confined space entry.

7-1.02L (3) Patents and Royalties: All fees, royalties, or claims for any patented invention, article, process or method that may be used upon or in any manner connected with the work under this Contract shall be paid by Contractor. Contractor and its sureties shall protect and hold harmless City and its officers, agents, and employees from any and all demands made for such fees royalties or claims brought or made by any third party, and before the final payment is made on the account of the Contract, Contractor shall, if requested by City, furnish acceptable proof of a proper release from all such claims and liabilities.

Should Contractor, its officers, agents, or employees, or any one of them be enjoined from furnishing or using any invention, article, material, or plans supplied or required to be supplied or used under the Contract, Contractor shall promptly substitute other articles, materials, or appliances in lieu thereof of equal efficiency, quality, finish, suitability, and market value, and satisfactory in all respects to the Engineer. In the event that the Engineer elects, in lieu of such substitution, to have supplied and to retain and use any such invention, article, materials, or plans as may be required to be supplied by the Contract, Contractor shall pay such royalties and secure such valid licenses as may be requisite and necessary for City, its officers, agents, and employees, or any one of them to use such invention, article, materials, or appliance without being disturbed or in any way interfered with by any proceeding in law of equity on account thereof. Should Contractor neglect or refuse to make the substitution promptly or to pay such royalties and secure such licenses as may be necessary, then in that event the Engineer shall have the right to make such substitutions or City may pay such royalties and secure such licenses and charge Contractor even though final payment under the Contract may have been made.

7-1.02M (3) Mined Materials: California Public Contract Code section 20676 prohibits surface mining operators which are subject to the Surface Mining and Reclamation Act of 1975 (SMARA) from selling California mined construction material to the City unless the operator is identified in a list referred as the **3098 List**. The List, which is maintained by the Department of Conservation's Office of Mine Reclamation (OMR), changes throughout the year and can be viewed at the OMR website: http://www.consrv.ca.gov/OMR/ab_3098_list/index.htm. To confirm whether or not a specific operator is on the List at any given time, Contractor shall call the OMR at (916)323-9198.

7-1.03A Maintaining Traffic: Attention is directed to Sections 7-1.04 of the Standard Specifications and to the following modifications thereof.

If construction is within City owned right-of-way, provisions shall be made for the safe passage of public traffic through the work site at all times consistent with the requirements of Santa Rosa City Code Chapter 13-04.

The Contractor shall install and maintain project identification signs at each end of the project or as directed by the Engineer two weeks prior to any construction activity. City shall furnish the appropriate sign panels upon request from Contractor. To mount the sign panels, Contractor shall furnish and install 4" X 4" posts or mount by other appropriate methods as approved by the Engineer. These sign panels shall be returned to the City Corporation Yard at 55 Stony Point Road after completion of the project.

Two weeks prior to any construction activity, advance notice signs for road closures shall be furnished and installed by Contractor at each end of the project and shall remain in place throughout the duration of the subject closure. Details of panel construction and lettering shall be approved by the Engineer.

Contractor shall furnish, install, and maintain at its expense all barricades, signs, lights, and other devices necessary to adequately warn of any obstructions to the traveled and pedestrian way and provide flaggers as necessary for the safety of public traffic and pedestrians and to provide access to property adjacent to the work site and Contractor shall comply with the Americans with Disabilities

Act of 1990 (42 U.S.C. 12101, *et seq*.) (ADA) and any regulations and guidelines issued pursuant to the ADA.

Contractor shall comply with the current edition of the California Manual of Uniform Traffic Control Devices (CA MUTCD) for all items related to traffic within the work site.

Rain and other occurrences that may cause the suspension or delay of the work shall in no way relieve Contractor of its responsibility to provide traffic control and public access through the work site as specified herein. At all times, Contractor shall keep at the work site such materials, forces and equipment as may be necessary to keep roads, streets, and driveways within the work site open to traffic and in good repair and shall expedite the passage of such traffic, using such forces and equipment as may be necessary.

Should Contractor fail, in the opinion of the Engineer, to provide all the materials, forces and equipment necessary to maintain traffic through the work site as set forth herein, City may take steps necessary to remedy any such failure, including but not limited to causing such work to be performed and/or suspending any further work under the Contract. Any such remedial cost and expense incurred by the City, plus an administrative charge of 15%, shall be immediately due and payable by Contractor and may be deducted from any amounts owed to Contractor hereunder. In the event there are insufficient sums owed to Contractor hereunder to cover the foregoing costs and charges, City shall have the right to pursue any other remedy to recover the same, including but not limited to, proceeding against any surety or bond in favor of City. City's rights under Section 7-1.02 are intended to be in addition to and not in lieu of any charges imposed by City against Contractor under Section 7-1.02A (1) above for violations of the Santa Rosa City Code.

Contractor shall be responsible for informing emergency response agencies operating within the area of the work of obstructions to either public or private roads caused by reason of Contractor's operations hereunder.

Contractor shall make provisions for the safe passage of pedestrians around the project work site at all times.

8 PROSECUTION AND PROGRESS

8-1.01A Assignments: Once awarded, this Contract shall not be transferred, assigned, or sub-contracted, except as herein expressly provided without the prior written consent of the City in the City's sole and absolute discretion. See Section 5-1.12 of the Standard Specifications.

8-1.04C Electrical Materials Start: Notwithstanding any provisions of the Contract, in lieu of the requirement that Contractor begin work within ten days from the date of the Notice to Proceed, as provided in Section 8-1.04B of the Standard Specifications, Contractor shall furnish the Engineer with a statement from the vendor(s) that the order for the materials required for this Contract has been accepted by the vendor(s). The statement shall include the anticipated date that the materials will be delivered to the Contractor. The statement shall be provided to the Engineer within ten days after Contractor receives the Notice of Award.

Contractor shall notify the Engineer in writing of the date that all electrical materials are received and shall begin work no later than November 10, 2025. Contractor may request shutdown of the pump station once all new materials needed to operate the pump station have been received by the Contractor.

Contractor shall diligently prosecute the work to completion before the expiration of:

80 WORKING DAYS

8-1.05 Time: Working days will be counted beginning with the day Contractor begins work or November 10, 2025, whichever occurs first. Unless otherwise directed by the Engineer, Contractor shall not conduct any activities that generate noise earlier than 7:00 a.m. or later than 7:00 p.m.

The Station 9 pump station will only be available to be shut down and taken out of service by City Water Department staff between **November 17, 2025 and March 20, 2026** following Contractor set-up and successful 24-hour operational testing of the temporary potable water pump station facility in accordance with Section 133 and the Project Plans. Contractor may request shutdown of the pump station once all new materials needed to operate the pump station have been received by the Contractor. Contractor shall notify the Engineer in writing of the date that all materials are received.

8-1.10 Liquidated Damages: Contractor hereby agrees that Contractor shall pay to the City liquidated damages for each and every calendar day delay over and above the number of working days prescribed above for finishing the work in the amount shown in Section 8-1.10 of the Standard Specifications.

8-1.13 Contractor's Control Termination: Attention is directed to Section 8-1.13 of the Standard Specifications. City may terminate Contractor's control of the work for failure to include the Federal Requirements in Contractor's subcontracts.

8-1.14. Contract Termination: Attention is directed to Section 8-1.14 of the Standard Specifications.

9 MEASUREMENT AND PAYMENT

9-1.04 Force Account Work: All work done on a force account basis shall be recorded daily on report sheets prepared by Contractor and signed by both the Engineer and Contractor. Such reports shall thereafter be considered the true record of force account work performed during the project. Such reports shall be furnished to the Engineer and a copy retained by Contractor.

All extensions of labor, equipment, and material costs shall be completed by Contractor and submitted to the Engineer within 30 days of the completion of the extra work. Completed and extended extra work reports received later than the times herein prescribed may be deemed invalid and rejected without payment at the discretion of the Engineer.

9-1.07 Payment Adjustments for Price Index Fluctuations: Any references to Opt Out of Payment Adjustments for Price Index Fluctuations in the Standard Specifications are deleted in their entirety.

9-1.16 Progress Payments: Once each month for progress pay purposes, the City will prepare a written estimate of the total amount of completed work and accepted materials purchased by Contractor but not installed. The City shall retain five percent of such estimated value of the completed work and the unused materials and pay Contractor the balance after deducting all previous payments and all sums to be retained under the provisions of the Contract. No such estimate or payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the Contract or when, in the Engineer's judgment, the total value of the completed work since the last estimate is less than $500.00. No such estimate or payment shall be construed to be an acceptance of any defective work or improper materials.

After Contract acceptance, the Engineer will prepare a written proposed final estimate of the proposed final quantities of work completed under the Contract and the value of such work and will submit such estimate to Contractor. The City shall retain five percent of such estimated value of the work done and shall pay to Contractor the balance after deducting all amounts to be retained under the provisions of the Contract.

The City may, at its option and at any time, retain out of any amounts due Contractor sums sufficient to cover any unpaid claims of City or others, provided that sworn statements of all non-City claims shall have been filed with the Director of Finance.

9-1.16E(6) Substitution of Securities for Withheld Amounts: Pursuant to Public Contract Code section 22300, securities may be substituted for any moneys withheld by City to ensure performance under this Contract, provided that substitution of securities provisions shall not be required in contracts in which there will be financing provided by the Farmer's Home Administration of the United States Department of Agriculture pursuant to the Consolidated Farm and Rural Development Act (7 USC sections 1921 *et seq*.), and where federal regulations or policies or both do not allow the substitution of securities. At the request and expense of Contractor, securities equivalent to the amount withheld shall be deposited with the City, or with a state or federally chartered bank as the escrow agent, which shall then pay such moneys to Contractor. The Director of Finance is authorized to execute substitution of securities agreements on behalf of the City. The City will return the securities to Contractor upon satisfactory completion of the Contract as determined by City in its sole discretion and the resolution of all outstanding claims against the securities. Contractor shall be the beneficial owner of any securities substituted for moneys withheld and shall receive any interest thereon.

Securities eligible for investment under this section shall include those listed in Government Code section 16430, bank or savings and loan certificates of deposit, interest bearing demand deposit

accounts, standby letters of credit or any other security mutually agreed to by Contractor and the City, provided that the substituted security is equal to or not less than five percent of the Contract amount.

Security substitutions must be submitted by Contractor and approved by City prior to the time of the first progress payment to be made under the Contract. No other method of substituting securities for retention will be accepted. The security substitution shall be done only upon execution of an agreement satisfactory to City which includes the following provisions:

a. The amount of securities to be deposited;
b. The terms and conditions of conversion to cash in case of the default of Contractor; and
c. The procedure for return of securities upon completion of the Contract.

9-1.17D Final Payment and Claims: The processing of payment of the final estimate shall not be commenced less than 35 days after the date of recording of the Notice of Completion with the County Recorder's Office. Contractor is advised that it takes approximately ten days for a check to be issued following a request for payment.

Contractor shall submit its written statement of all claims for additional compensation under the Contract to the Engineer within 15 days after submission to Contractor of the proposed final estimate.

If Contractor does not file a claim within the 15-day period, or upon Contractor's approval, the Engineer will issue a final written estimate and the City shall pay to Contractor the entire sum due after deducting all previous payments, if any, and all amounts to be retained under the provisions of the Contract.

If Contractor files a claim within the 15-day period, the Engineer will furnish a semi-final estimate and pay the amount due under the semi-final estimate within 30 days. The semi-final estimate is conclusive as to the amount payable except as may be affected by claims and any amount retained. The Engineer shall then consider and investigate such claim and shall make such revision in the final quantities as the Engineer may find to be due and shall then make and issue a final written estimate. The City will pay the amount due, after deducting all previous payments, if any, and amounts to be retained under the provisions of the Contract.

Any and all prior partial estimates and payments shall be subject to correction in the final estimate and payment.

The final estimate shall be conclusive and binding against both parties to the Contract on all questions relating to the performance of the Contract and the amount of work done thereunder and compensation therefor, except in the case of gross error.

9-1.17D (3) Final Determination of Claims: Claims filed by Contractor shall be in sufficient detail to enable the Engineer to determine the basis and amount of the Claims. Contractor shall also furnish reasonable documentation to the City to support Claims. If additional information is required by the Engineer, Contractor shall provide such information to the Engineer no later than the 15th day after receipt of the written request from the Engineer. If the 15th day falls on a weekend, holiday, or day City offices are closed, then the information shall be provided to the Engineer no later than close of the next business day. Failure to submit the requested information to the Engineer within the time specified will be sufficient cause for denying the Claim.

Contractor shall keep full and complete records of the costs and additional time incurred for any work for which a claim for additional compensation is made. The Engineer or any designated Claim investigator or auditor shall have access to those records and any other records as may be reasonably required by the Engineer to determine the facts or contentions in each Claim. Failure to grant access to such records shall be sufficient cause for denying the Claims.

9-1.22 Arbitration: Any references to Arbitration in the Standard Specifications are deleted in their entirety.

Claims submitted by Contractor shall be accompanied by a notarized certificate containing the following language:

Under the penalty of law for perjury or falsification and with specific reference to the California False Claims Act, Government Code sections 12650 *et seq*., and the United States False Claims Act, title 31, United States Code sections 3729 *et seq*., the undersigned,

_____,
(Name)

_____ of
(Title)

_____
(Contractor)

hereby certifies that the claim for additional compensation made herein is supported by a true statement of the actual costs incurred and time expended on this project and is fully documented by records maintained by Contractor.

Dated _____

/s/_____

Subscribed and sworn before me this _____ day of

_____

_____
Notary Public

My Commission Expires _____

Failure to submit the notarized certificate will be sufficient cause for denying the claim.

Any claim for overhead expenses, in addition to being certified as stated above, shall be supported by an audit report of an independent Certified Public Accountant. Any such overhead claim shall also be subject to audit by the City at its discretion.

Any costs or expenses incurred by the City in reviewing or auditing any claims that are not supported by Contractor's cost accounting or other records shall be deemed to be damages incurred by the City within the meaning of the California False Claims Act and the United States False Claims Act.

TECHNICAL SPECIFICATIONS

FOR

PUMP STATION 9 ELECTRICAL UPGRADES

CONTRACT NO. C02438

AUGUST 2024

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

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10 GENERAL CONSTRUCTION

10-3 Mobilization

10-3.01 Description: Mobilization shall conform to the Standard Specifications, and any modifications herein.

Mobilization shall include the obtaining of all permits; moving onto the site of all equipment; and other construction facilities as required for the proper performance and completion of the work. Mobilization shall include demobilization as defined herein.

Mobilization shall include but not be limited to the following principal items:

1. Preparation of Contract by the Contractor.

2. Completion of all tasks and submittal of all documents (bonds, insurance, schedule, etc.) required as conditions of issuing the Notice to Proceed.

3. Obtaining all required permits.

4. Installation of project identification signs per Section 7-1.03A of these Special Provisions. The Contractor shall consult with the Engineer for placement.

5. Installing temporary construction water supply, power, wiring, and lighting facilities, as required.

6. Providing field office trailers if needed by the Contractor.

7. Obtaining and providing all material submittals.

8. Moving onto the site(s) of all Contractor's equipment required for operations.

9. Having all OSHA required notices and establishment of safety programs.

10. Attendance at Pre-Construction Conference of Contractor's principal construction personnel.

Demobilization shall include, but not limited to, removal of all equipment, unused materials, all temporary utilities, job trailers and all temporary communication facilities.

10-5.01 Dust Control: Sweeping, covering stockpiles, applying water, and/or dust palliative, to control dust caused by public traffic is not change order work.

All dust-producing work and unpaved construction sites shall require a minimum watering in the middle and ending of each workday. The frequency of watering shall increase if dust is airborne. Watering shall not produce runoff.

The Contractor shall maintain dust control to the satisfaction of the Engineer, 7 days a week, 24 hours per day.

At the end of each workday, the Contractor shall thoroughly sweep all streets effected by the project to minimize airborne dust.

At the end of each work week, the Contractor sweep all streets in the work zone with a commercial street sweeping truck equipped with a rear pick up broom.

At the Engineer's discretion additional sweeping or watering may be required, including the use of a commercial street sweeping truck equipped with a rear pick up broom, at any time or place.

10-8 Payment: Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for the **various contract items** of work involved and no additional compensation will be allowed therefor.

[Revised: 09/03/19-CDA STD2018]

12 TEMPORARY TRAFFIC CONTROL

12-1 General

12-1.01 General: Construction area traffic control devices shall be installed and maintained in accordance with the applicable sections of these Special Provisions, the Standard Specifications, the current Edition of the California Manual on Uniform Traffic Control Devices (CA MUTCD), the Americans with Disabilities Act (ADA) and as directed by the Engineer.

12-1.03 Flagging Costs: Section 12-1.04, "Payment," of the Standard Specifications is amended to read:

> The cost of furnishing all flaggers, including transporting flaggers, to provide for passage of public traffic through the work under the provisions in Section 7-1.03, "Public Convenience," and Section 7-1.04, "public Safety," shall be considered as included in the contract lump sum price paid for traffic control and no additional allowance will be made therefor.

12-3 Traffic-Handling Equipment and Devices

12-3.01 General: Prior to commencing construction which will affect existing vehicular and pedestrian traffic, the Contractor shall submit for review by the Engineer, Traffic Control Plans on 11" x 17" sheets of paper which contains only information specifically related to work zone vehicular and pedestrian traffic control. If the Contractor proposes to use the current edition of the CA MUTCD published by Caltrans in lieu of a traffic control plan, in specific work operations, they shall submit in writing for consideration which Typical Application Diagram will be used and how it will be applied for each work operation. Traffic Control Plans or proposals shall be submitted for review at least two weeks prior to implementation.

Traffic Control Plans shall contain a title block which contains the Contractor's name, address, phone number, project superintendent's name, contract name, dates and hours traffic control will be in effect, and a space for review acknowledgment.

The content of the Traffic Control Plan shall include, but is not limited to, the following:

1. Show location and limits of the work zone.
2. Give dimensions of lanes affected by traffic control that will be open to traffic.
3. Indicate sign placement, cone placement, and other methods of delineation and reference to appropriate City or Caltrans Standards.
4. Dimension location of signs and cone tapers.
5. Identify side streets and driveways affected by construction and show how they will be handled.
6. Show how pedestrian and bicycle traffic will be handled through the construction site including at the temporary pumping facility area. Pedestrian pathways through the work zone shall be in compliance with the requirements of ADA during and after work hours.
7. Demonstrate how two-way traffic will be maintained.

No work except for installation of project identification signs will be allowed to commence prior to approval of the Work Zone Traffic Control Plans.

12-4 Maintaining Traffic

12-4.01A Maintaining Traffic:

1. The full width of the traveled way shall be open for use by public traffic on Saturday, Sundays and designated legal holiday(s), after 4:00 p.m. on Fridays and the day preceding designated legal holidays, and when construction operations are not actively in progress; unless work has specifically been authorized by the Engineer.
2. The location of traffic control signing, barricades, and other facilities shall be monitored frequently (four to five times per day) by the Contractor to verify their proper location. All traffic signal and other traffic control devices shall be maintained at all times.
3. The Contractor shall conduct these operations so as to cause the minimum obstruction and inconvenience to traffic and to places of business, multiple dwelling units and residences adjacent to the work.
4. When construction activities will prevent vehicle access to individual driveways the Contractor shall notify and receive permission from the affected businesses and residents, and the Engineer or their onsite representative. Attention is directed to Section 7-1.03, "Public Convenience". **Full access shall be provided to all driveways during non-working hours.**
5. At locations where traffic is routed perpendicular to trench excavation, the excavation shall be conducted in a manner to provide a surface reasonably satisfactory for traffic at all times. Substructure installation or construction shall be conducted on only one-half the width of the roadway at a time, and that portion of the roadway being used by traffic shall be kept open and unobstructed until the opposite side of the roadway is ready for use. Upon completion of the rough grading, the surface of the roadbed shall be brought to a smooth, even condition free from humps and depressions and made satisfactory for traffic.

12-4.01A Construction Traffic: The Contractor shall submit a trucking route along with the traffic controls plans for approval by the Engineer. The route must minimize traffic on residential streets that are not part of the project.

Existing pavement damaged by the Contractor's operations and not shown to be replaced shall be replaced at the Contractor's expense, per City Standards and to the satisfaction of the Engineer.

12-4.02 Closure Requirements: Attention is directed to Section 7-1.03, "Public Convenience", to Section 5-1.05, "Order of Work," of these Special Provisions.

Exact locations of Project Identification signs and Advance Notice signs (7-1.03, "Public Convenience") shall be determined in the field by the Engineer.

Lane closures will be permitted between the hours of 8:30 a.m. and 4:00 p.m. only. Only one lane at a time may be closed and no lanes shall be closed at any other hours unless specifically approved by the Engineer. The Contractor shall maintain vehicle access to homes and other properties at all times while work is in progress.

The Contractor shall not park construction vehicles, contractor employee vehicles, stage materials or stockpiles in front of any business or residential driveway access and the Contractor shall maintain access to private parking lots within the block where work is in progress. Construction vehicles shall not be left running for any length of time if parked in front of a business or residential unit.

On identified local/residential streets the Contractor will normally be allowed use of each block (between nearest intersections) for their sole use, without the need to provide 2-way traffic through that block. The Contractor will be required to maintain vehicle access to homes and other properties within the block where work is in progress.

The Contractor shall keep the City of Santa Rosa Fire Department informed regarding the closure of any traveled way. At a minimum, the Contractor shall call the Fire Department at 543-3535 **and** the Communications Center at 543-3666 **daily** to report any traveled way closure. This means immediately upon closure for that day and again immediately after removal of the closure. For closures over multiple days, the daily notification still applies. This requirement does not apply for single lane closures on multiple lane streets.

The Contractor shall notify Santa Rosa City Bus at (707) 543-3922, the local Postal Service at (707) 526-0113 and Recology at (800) 243-0291 5 calendar days prior to any lane closures or restrictions in turning movements.

If the Contractor has been given an approved Traffic Control Plan that includes road closures, they shall maintain vehicular access to homes and other properties where work is in progress within the closure area.

Where necessary, and only after receiving written approval from the Engineer, the Contractor may temporarily suspend curb side parking in their immediate work zone. Notification to businesses and residents shall be hand delivered at least 72 hours prior to construction in the affected areas.

Notification shall be as follows:

1. A notice placed on the front door of each home or business where curb side parking will be suspended and attempt made to notify each business or resident verbally that work will be underway within the block and that curb side parking will be suspended during stated working hours and request that vehicles be parked out of the roadway by 8:00 a.m. Service of notice shall not bar use of cars within the block, as individual plans change and emergencies arise.

2. Type 1 barricades every 50 feet adjacent to the curb where parking will be suspended with a notice posted on the barricade stating specific dates and times that curb side parking will be temporarily suspended. If work will not take place in the posted area, then Contractor shall remove “No Parking” notices.

The Contractor shall maintain vehicle access to all homes and other properties along the work zone. During paving operations, the Contractor will be allowed to temporarily suspend vehicle access to a limited number of driveways when approved by the Engineer. When approved by the Engineer and at least 72 hours prior to suspending access to any driveway, the Contractor shall give both written and verbal notice to the affected businesses and residents and place barricades adjacent to the driveways with posted notices stating the specific dates and times of the suspension for that area. The notice shall also indicate an alternate parking location. Suspension of access to driveway will be permitted only as approved by the Engineer and only between the hours of 8:00 am and 4:30 pm.

Cross streets will require maintenance of at least one-half (1/2) width of each street for traffic purposes, unless a parallel or alternative route is proposed by the Contractor and approved by the Engineer. Flagging will only be allowed between the hours of 8:30 am and 4:00 pm.
Barricades and flaggers shall be positioned to allow safe turns at intersections and curves.

The Contractor shall maintain traffic control as necessary and as directed by the Engineer for any project related operations that require the presence of City Forces. Flaggers, traffic control devices, barricades, signing, etc., shall remain in place for protection of City personnel until such time as all temporary lane delineation or other work required by City Forces is complete.

12-4.04 Temporary Pedestrian Access Routes

12-4.04A(1) Summary: The Contractor is directed to Chapter 6D, Pedestrian and Worker Safety, in the CA MUTCD, the improvement plans and these Special Provisions.

Pedestrians shall be provided with a safe convenient and accessible path that, at a minimum, replicates the most desirable characteristics of the existing sidewalk, path or footpath. At no point along the road shall the sidewalks on both sides of the road be closed at the same time. The sidewalk along the southbound side of Summerfield Road between Carissa Avenue and Shade Tree Lane may be closed during set-up, operation, and removal of temporary pumping.

The Contractor shall construct and maintain temporary pedestrian pathways through the work zone, where required, that shall be in compliance with the requirements of the Americans with Disabilities Act (ADA), and the CA MUTCD.

Pedestrian routes shall not be impacted for the purposes of any non-construction activities such as parking of vehicles or equipment, or stock piling of materials. Pedestrians shall not be led into conflicts with work site vehicles, equipment or operations.

Pedestrian routes shall be open and accessible at the end of the workday unless an alternate ADA compliant route has been approved by the Engineer. The construction of curb ramps and/or long sections of sidewalk do not alleviate the Contractor from this requirement.

12-9 Measurement and Payment

12-9.01 Payment: **Traffic Control** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in **vehicular and pedestrian** traffic control, including but not limited to, temporary traffic control devices, temporary relocation of regulatory signs, project and public notification signs, flagging, barricades, temporary facilities to comply with CA MUTCD Standards for Pedestrian Safety, coordination efforts and any other items necessary for vehicle and pedestrian traffic control not specifically enumerated in the plans or these specifications, and no additional allowance will be made therefor.

[Version: 09/08/19 CDA STD2018]

13 WATER POLLUTION CONTROL

13-1.01A Summary: Water Pollution Control shall be performed in accordance with Section 13, Water Pollution Control, of the Standard Specifications and these technical specifications. In addition, construction activities shall comply with:

1. The current California Water Quality Control Board, North Coast Region Order No. National Pollutant Discharge Elimination System Municipal Storm Water Permit, commonly referred to as the "Storm Water Permit". A copy of the Storm Water Permit is available for review at the City of Santa Rosa Transportation and Public Works Department, 69 Stony Circle, Santa Rosa, CA, and at www.srcity.org/stormwaterpermit.

2. The California Stormwater Quality Association Storm Water BMP Handbook for Construction (CASQA Handbook). BMPs shall be selected, installed and maintained in accordance with the latest edition. A copy of the handbook can be viewed at the City of Santa Rosa Department of Transportation and Public Works office at 69 Stony Circle or downloaded from CASQA, http://www.casqa.org/.

In this technical specification the CASQA Handbook BMP numbers are appended to the associated Standard Specification sections. If a conflict occurs the CASQA Handbook BMP's shall govern.

13-1.01B Definitions: **Construction phase:** The construction phase starts at the start of job site activities and ends at Contract acceptance.

13-1.01C(4)(c) Water Quality Monitoring Reports: The Contractor shall complete and sign the Storm Water Correction Site Inspection form with the City as part of the Storm Water Permit. A copy of the Storm Water Correction Notice is included on the following page:

STORM WATER CORRECTION NOTICE

FAILURE TO CORRECT BY DUE DATE MAY RESULT IN STOP WORK NOTICE!

PROJECT NAME: _____

JOB ADDRESS: _____

PROJECT / PERMIT #: _____ DATE: _____

☐ No storm water deficiencies identified.

I HAVE INSPECTED THIS PROJECT SITE. THE FOLLOWING ISSUES AND DEFICIENCIES HAVE BEEN IDENTIFIED AND REQUIRE CORRECTIVE ACTION:

STORMWATER BMPs:

☐	**Storm Drain Protection:**	Install	Maintain	Replace
☐	**Perimeter Controls:**	Install	Maintain	Replace
☐	**Housekeeping:**	Sweep	Clean	Remove Garbage & Debris
☐	**Stockpiles:**	Cover	Perimeter Controls	Remove
☐	**Debris Bins:**	Cover	Perimeter Controls	
☐	**Tracking:**	Clean-Up	Install Tracking Controls	
☐	**Portable Toilet:**	Secondary Containment Required		
☐	**Concrete:**	Install BMPs for Pumper or Concrete Truck		
		Cover / Maintain Concrete Washout Containers		
☐	**Sediment & Erosion:**	Install Appropriate Controls	Dust Controls	
☐	**Other:**			

***ALL DEFICIENCIES MUST BE CORRECTED PRIOR TO NEXT RAIN EVENT OR NO LATER THAN DUE DATE, WHICHEVER IS SOONER.**

DATE REQUIRED (SEE NOTE*):

INSPECTOR: _____ PH #: (___) _____

CONTRACTOR SIGNATURE: _____ DATE: _____

Inspection Type:

- ▫ **Monthly** (Oct 1st-April 30th)
- ▫ **Pre-Rain** (Sept 1st-Oct 1st)
- ▫ **Deficiency Re-Inspection**
- ▫ **Following First 0.25" Rain** (within 2 business days)

13-2 Water Pollution Control Program

13-2.01C Submittals: The program to control water pollution required to be submitted under this section of the Standard Specifications shall include a spill contingency plan that establishes clean-up procedures that will be followed in the event of a spill of potentially hazardous, toxic, or polluting materials.

13-2.04 Payment: The City pays the Contractor to prepare a Water Pollution Control Program as part of the **lump sum** price paid for **Water Pollution Control**. See Section 13-11.

13-3 Storm Water Pollution Prevention Plan

13-3.01A Summary: This project is exempt from the State Water Resources Control Board General NPDES Permit for the Discharge of Storm Water related to Construction Activities (Construction General Permit), and not required to have a Storm Water Pollution Prevention Plan (SWPPP), therefore Section 13-3, Storm Water Pollution Prevention Plan, of the Standard Specifications does not apply to this project.

13-4 Job Site Management

13-4.03B: Spill Prevention and Control: The Contractor shall also comply with CASQA Spill Prevention and Control (BMP WM-4). If a spill occurs at the construction site and the Contractor does not take immediate and adequate steps to contain and clean up the spill, especially if rain is threatening or if a discharge to a storm drain or creek could occur, the City shall have the right, in its sole and absolute discretion, to clean up the spill using City forces or an independent contractor. The cost of any such cleanup, in addition to recovery of any penalty or fine imposed upon the City, plus an administrative charge of fifteen percent (15%) of the costs incurred by the City, shall be deducted from any amounts owed to the Contractor hereunder.

In the event there are insufficient amounts owed to the Contractor hereunder to cover the foregoing costs and charges, the City shall have the right to pursue any other remedy to recover same, including, but not limited to, proceeding against any surety or bond in favor of the City. The City's rights under this section are intended to be in addition to and not in lieu of any imposed by the City against Contractor for violations of City Code Chapter 17-12, "Storm Water".

13-4.03C(3): Stockpile Management: The Contractor shall also comply with CASQA Stockpile Management (BMP WM-3). Do not block storm water flows.

13-4.03D(1): General: The Contractor shall also comply with Waste Management/CASQA Solid Waste Management (BMP WM-5). The Contractor shall dispose of all trash, rubbish, and waste materials of any kind generated by the Contractor, subcontractor, or any company hired by the Contractor on a daily basis.

13-4.03D(3): Concrete Waste: The Contractor shall also comply with CASQA Concrete Waste Management (BMP WM-8). Ensure the containment of concrete washout areas and other washout areas that may contain pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

13-4.03D(4): Sanitary and Septic Waste: The Contractor shall also comply with CASQA Sanitary and Septic Waste Management (BMP WM-9). Sanitation facilities must be maintained periodically by a licensed service to keep them in good working order and prevent overflows. Portable toilets are required to have secondary containment.

13-4.03D(5): Liquid Waste: Liquid waste includes water generated from excavation dewatering. Minimize transfer piping by locating containers near the excavation to be dewatered while protecting the containers from moving vehicles and equipment.

13-4.03E(1): Water Control and Conservation:
The Contractor shall also comply with CASQA Water Conservation Practices (BMP NS-1 and NS-2).

13-4.03E(3): Vehicle and Equipment Cleaning:
The Contractor shall also comply with CASQA Vehicle and Equipment Cleaning (BMP NS-8).

13-4.03E(4): Vehicle and Equipment Fueling and Maintenance:
The Contractor shall also comply with CASQA Vehicle and Equipment Fueling (BMP NS-9), and CASQA Vehicle and Equipment Maintenance (BMP NS-10).

13-4.03F: Sweeping: The Contractor shall also comply with CASQA Street Sweeping and Vacuuming (BMP SE-7).

13-6 Temporary Sediment Control

13-6.03C Temporary Drainage Inlet Protection: The Contractor shall also comply with CASQA Storm Drain Inlet Protection (BMP SE-10).

13-11 Payment: Full compensation for conforming to the provisions of Section 13 shall be paid for at the contract **lump sum** price for **Water Pollution Control**.

[Revised: 06/19/19 CDA STD2018]

14 ENVIRONMENTAL STEWARDSHIP

14-10 Solid Waste disposal and Recycling

14-10.01 General: The Contractor shall dispose of all Portland cement concrete and asphalt concrete, generated from removal or demolition activities on the project, at a recycler for these materials.

All other excess materials from the project shall become the property of the Contractor and shall be disposed of by him, at his expense.

The Contractor shall maintain awareness of potential signs of soil and groundwater contamination throughout the project limits and shall notify the City immediately upon discovery of any potential soil or groundwater contamination.

14-10.02 Solid Waste Disposal and Recycling Report: Submit a Solid Waste Disposal and Recycling Report prior to final acceptance of work performed under the Contract. Show the types and amounts of project-generated solid waste taken to or diverted from landfills or reused on the project.

Submit a Solid Waste Disposal and Recycling Report prior to Contract acceptance. Show the types and amounts of project-generated solid waste taken to or diverted from landfills or reused on the project.

The Contractor shall provide receipts verifying delivery and approximate quantity (in tons) of the material delivered to a material recycler.

14-10.03 Surplus Materials: The Contractor shall load, haul from the site of work and properly dispose of all surplus excavated material including, but not limited to, rock, concrete, asphalt, debris, and soil. Except as otherwise noted, all material excavated from the work sites shall be the property of the Contractor. None of the surplus materials generated from the work sites shall be disposed of on the work sites. No surplus material shall be placed on nearby streets without written authorization from the Engineer.

The Contractor shall comply with all disposal regulations such as City, County, and/or State permits and licenses, as may be required.

14-10.04 Payment: Full compensation for conforming to this section shall be considered as included in the prices paid for the **various contract items** of work and no additional compensation will be allowed.

[Revised: 09/10/19-CDA STD2018]

15 EXISTING FACILITIES

15-1.03A General: Existing facilities disturbed by construction shall conform to the applicable provisions of Section 5-1.36. All existing active utilities found to reside in excavated areas shall be supported in place with service maintained during construction. The Contractor shall be responsible for any damage caused by the Contractor's operations and any needed repairs shall be completed to the Engineer's satisfaction.

Existing utility trenches and/or structures that are in close proximity to proposed trenches shall be safeguarded in an appropriate manner from damage.

15-1.04 Payment: Full compensation for supporting, removal, and disposal of existing utilities and their appurtenances is considered as included in the contract prices paid for **various contract items** of work and no additional allowance will be made therefor.

15-7 Utility Clearances: *All items noted in this Section shall take place prior to any other construction activities.*

Contractor shall investigate, confirm, and/or determine the exact locations of existing utilities, and verify clearances between existing and proposed utilities at crossings and/or known potential conflicts. The Contractor shall determine elevations and alignments of existing utilities at connection points.

The Contractor shall provide all relevant information in writing to the Engineer immediately upon discovery of any conflict. Any delay in notification to the Engineer may delay direction and/or corrective action and a delay claim due to this reason shall not be considered by the City. The Contractor shall not proceed with any work that is in conflict until direction is provided by the Engineer and shall redirect crews to other contract work. All the information required to be obtained per this Section and any other information not noted but relative to the project shall be provided to the Engineer on a set of Plans when the investigative effort is complete.

15-7.01 Payment: Utility Clearances shall be included in the prices paid for **various contract items** of work and shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in verifying utility clearances, including but not limited to: potholing to verify potential conflicts, grades and alignments of existing facilities to be connected to; excavation; backfill; notification; and coordination and redirection of crews to other contract work *if required*, as specified herein, and no additional allowance will be made therefor.

[Revised: 09/10/19-CDA STD2018]

26 AGGREGATE BASE

26-1.01 General

26-1.01A Summary: Aggregate base shall be Class 2 conforming to and placed in accordance with the requirements of Section 26 of the City Specifications.

Compacting shall commence immediately after spreading of the damp material and before the material has dried sufficiently to allow separation between the fine and coarse particles.

26-1.02 Materials

26-1.02B Class 2 Aggregate Base: The minimum sand equivalent shall be 31 for any individual test.

26-1.03 Construction

26-1.03E Compacting: The surface of the finished aggregate base shall be firm and unyielding. Any visible movement vertically or horizontally of the aggregate base under the action of construction equipment or other maximum legal axle loads shall be considered as evidence that the aggregate base does not meet this requirement.

26-1.04 Payment: Full compensation for aggregate base shall be considered as included in the prices paid for **various contract items** of work and shall include all compensation for furnishing all labor, materials, tools and equipment and doing all the work involved in furnishing and placing the base material as specified, including furnishing, hauling and applying water as specified and directed by the Engineer, and no additional allowance will be made therefor.

[Version: 09/18/19 CDA STD2018]

51 CONCRETE STRUCTURES

51-7 Minor Structures

51-7.01A General: Minor Structures shall be constructed in accordance with Section 51 of the City's Public Storm Drain Standards, Section 51-7 of the Standard Specifications, the Project Plans, and these Technical Specifications. Minor concrete structures are precast drop inlets.

Concrete shall be cured in accordance with Section 90-1.03B of the Standard Specifications.

Minor Concrete shall conform to the provisions of Section 90-2 of the Standard Specifications.

Placing of concrete under water will not be permitted.

51-7.01B Sump Pump Bubble Up Vault: Sump pump bubble up vault shall be a precast concrete catch basin with 9" by 9" inside dimensions with a galvanized steel grate and frame. Vault cover shall be manufactured by Christy Precast or approved equivalent.

51-7.01D Payment: Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for **Sump Pump and Discharge Piping** as described in Section 196 and no additional compensation will be allowed therefor.

[Version: 07/02/19 CDA STD2018]

73 CONCRETE DRIVEWAYS

73-1.01 General: This work shall consist of concrete driveways and walkways. and shall be constructed in accordance with the details and at the location shown on the plans, City Standards, and in conformance to the requirements of Section 73 of the City Specifications, and the Standard Specifications.

Soft or spongy material shall be removed and replaced with suitable material as required by the Engineer.

All new concrete construction joints shall be of the same type as those removed with the existing concrete unless otherwise stated herein or on the plans.

All new concrete shall be dowelled to adjacent existing concrete as shown on the Plans.

All oil, paint, tire marks, and other discoloring due to the Contractor's operations shall be removed form concrete by sandblasting prior to acceptance by the Engineer. Cement mortar will not be an acceptable substitute for sandblasting. Vandalism to uncured concrete surface shall be removed. If it cannot be removed from the surface, then the vandalized concrete shall be removed and replaced to the nearest score-mark.

73-1.02D Color: A colored pigment designed for the integral coloring of concrete shall be added to the concrete mix. The pigment shall contain pure concentrated mineral pigments specifically processed for mixing into concrete and complying with ASTM C979.

The colored pigment shall match the color of the existing concrete as close as possible. The contractor shall submit at least two color options applied in a dosage to produce an equivalent color that matches the adjacent concrete driveway and walkway to remain.

73-3.03 Driveway Construction Driveway and walkway shall be constructed in accordance with the details and at the location shown on the plans and in conformance to the requirements of per Section 73-1.07 of the City Specifications with the following modifications and additional requirements..

All concrete which is to be removed from driveway and walkway areas shall be removed to the nearest transverse score mark across the full width of walkway or construction joint or as directed by the Engineer.

Expansion join material shall be installed full width of driveway or walkway.

Driveways and walkways shall be cured in accordance with the requirements of Section 90-1.03B of the Standard Specifications except that the Contractor may substitute other than pigmented sealer upon approval in writing of such substituted sealer by the Engineer.

73-3.04 Payment: Driveway and Walkway shall be paid for at the contract unit price per **square foot**, which price shall include full compensation for furnishing and applying curing materials, removing discoloring, furnishing all labor, materials, tools and equipment and doing all the work involved in constructing driveway complete in place as specified, including furnishing and placing expansion join filler, dowelling, constructing weakened plane joints, excavating, and backfilling.

[Version: 12/12/2019 CDA STD2018]

80 FENCES AND GATES

80-1.01 General: All fence shall be constructed in accordance with Section 80 of the Standard Specifications, the details as shown on the plans, these Special Provisions, and as directed by the Engineer.

Temporary fencing shall be provided to ensure entire site is secure during all temporary pumping operations.

Where removal of existing fencing is required, temporary fencing shall be put in place to maintain site security and prevent pedestrian access through the Project Site. Upon completion of work, the temporary fencing shall be removed and the fence shall be restored to its original condition. Removal and installation of fence shall take place in the same day.

80-1.08 Materials: Fencing and gate materials shall match existing adjacent fencing. All fencing and gates shall be made of steel conforming to ASTM A787 and ASTM A653 with ductile iron components. All fence and gate materials and components shall be galvanized inside and out and powder-coated to match existing.

Powder coating shall be electrostatically applied to a minimum of 2.5 mils. Powder coat should contain a UV fade inhibitor to resist fading.

Fence and gate posts, rails, pickets, and posts shall be manufactured of square tubing. All posts shall be a minimum of 1/4" thick.

Finials shall match existing adjacent fencing to remain.

Locking mechanism for gate may be preserved and re used or newly replaced.

80-1.09 Construction: Fence construction shall be in accordance with Section 80 of the Standard Specifications, the details as shown on the Plans, these Special Provisions, and as directed by the Engineer.

All posts shall be set in concrete foundations at a minimum of 48” deep and no less than three times the diameter of the posts.

80-1.10 Submittals: Provide shop drawing to indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, architectural design, gates, and schedule of components. Provide sample of power coating.

80-1.11 Payment: **Double Gate and Fence Replacement** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in replacing and reconstructing existing fence post and double gates to match existing adjacent fencing as indicated on the Project Plans, including furnishing and installing post, post assemblies, clearing the line of the fence and disposing of the resulting materials, excavating and backfilling holes, disposing of surplus excavated material, and furnishing and placing concrete footings, and connecting new gate to existing fence post, and replacement of locking mechanism if applicable, and no additional allowance will be made therefor.

[Version: 09/18/19 CDA STD2018]

99 BUILDING MODIFICATIONS

99-1 General

99-1.01 Scope: The work covered by this section of the Specifications consist of furnishing all labor, equipment and materials and performing all operations in connection with the modifications of the pump station building, complete in accordance with the Plans and as specified herein.

The Contractor shall comply with all applicable City of Santa Rosa ordinances, regulations and codes and the currently adopted edition of the CBC for Type VB construction and Group U and Group H3, Division 1 occupancies.

99-1.02 Quality Control: Complete responsibility for management and installation of the building construction work required for this project shall be performed by a qualified Contractor and Sub-contractor(s). The responsibility of the prime Contractor includes, but is not limited to, supervision and coordination of work performed by all suppliers and sub-contractors.

The Contractor shall employ personnel or sub-contractors that are skilled and experienced in the installation of all elements of the building construction work including, but not limited to construction of concrete masonry units, structural steel, standing seam metal roofing, skylights, interior and exterior finish work, and miscellaneous building construction work not shown on the project plans but required to provide a sound and finished product.

99-1.2 Concrete Masonry Unit Construction

99-1.2.01 Description and Materials: Concrete masonry units shall be light-weight Basalite or equal, made with expanded shale aggregate, and conforming to ASTM Specification C90 for Hollow Load-Bearing Concrete Masonry Units.

All concrete block walls shall be constructed of 8"x8"x16" blocks to match existing. The color shall match existing and be subject to approval of the Engineer.

Mortar shall be Type "A" composed of Type I or II portland cement, Hydrated Lime, or Lime Putty and clean well graded, damp mortar sand in the following proportions:

1. Cement, one part; Lime, one-fourth to one-half part; Sand, two-and one-half to three times the sum of the volumes of the cement and lime. All mortar shall be colored to match blocks.
2. Grout shall have 28-day strength of 2,000 psi and shall be composed of one part portland cement; three parts sand; and two parts of 3/8-inch maximum size pea gravel, to which may be added not more than one-tenth part of lime. Sufficient water shall be added to produce consistency for pouring without segregation of the constituents of the grout.
3. All mortar joints shall be tooled to a concave dense surface. The surfaces of the wall shall be true and plumb.

All concrete used in the construction of the structure shall conform to the requirements of Section 90 of the City of Santa Rosa Construction Specifications and using 1-1/2-inch maximum combined aggregate size.

Bar reinforcing steel shall conform to and be placed in accordance with the requirements of Section 52 of the Standard Specifications.

In lieu of the sampling of reinforcing steel, the Contractor shall furnish the Engineer with a

certificate from the supplier of the reinforcing steel stating that the steel delivered complies with the requirements of Section 52 of the Standard Specifications.

99-1.2.02 CMU Submittals: Contractor shall be responsible for submitting each of the following items for the concrete masonry units in a timely manner:

1. Mix designs for all grout prepared by a qualified, reputable testing laboratory.
2. Submit shop drawings for all shapes and sizes of Unit Masonry shown and scheduled on the plans.
3. Certifications of Compliance and test data by concrete masonry unit supplier showing conformance to specified material strengths and properties.
4. Samples: Laid up sections of masonry walls for the Engineer's approval of size, texture and color of block, mortar and joint pattern.
5. Layout of vertical control joints in masonry walls coordinated with structural drawings.

99-1.2.03 Waterproofing: The exterior surface of all concrete masonry unit walls (new and immediately adjacent existing blocks) shall be treated with a clear, penetrating water repellant. The water repellant shall be a clear, one component, penetrating water repellant containing an oligomeric siloxane resin in a mineral spirit carrier. The water repellant shall be Prosoco Exterior Sealer, Thorosiloxane 85, or approved equivalent.

99-1.6 Roof Exhaust Ventilators: The Pump Station Building exhaust ventilators shall comply with the requirements of the HVAC plans and Section 199 herein.

99-1.9 Defective Work and Materials: Work found to be defective, missing or damaged shall be immediately replaced with proper work. Such replaced work and the inspection for same shall be at the expense of the Contractor. All proposals for the repair or replacement of damaged, defective, or missing work to be reviewed by the Engineer.

Straightening of any materials, if necessary, shall be done by a process and in a manner than will not injure the materials.

If defects or damaged work cannot be corrected in the field, the material shall be returned to the shop or new parts furnished. The Contractor shall replace all work at his own expense.

99-5.10 Payment: CMU Wall Extension shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals including but not limited to, CMU blocks, concrete foundation, compaction, excavation, backfill, subgrade preparation, reinforcement, mortar, and grout, complete and in place in accordance with and as required by the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

106 TRENCH BRACING AND SHORING

106-1.01 General: All bracing and shoring shall conform to Section 7-1.02K(6)(b) and Section 7-1.02K(6)(b)(1) of these Special Provisions, Section 7-1.02K(6)(a and b) of the Standard Specifications, and the Division of Industrial Safety Construction Safety Orders which are currently in use.

The Contractor shall provide adequate sheeting, shoring and bracing of trenches and other excavations, and/or equipment method, for the protection of life or limb as required by the State of California Construction Safety Orders, the Safety Regulations of the Federal Occupational Safety and Health Administration and by these Special Provisions.

All safety orders, rules and regulations of Cal/OSHA and/or the Federal OSHA applicable to the work to be done under this Contract shall be obeyed and enforced by the Contractor.

The Contractor shall obtain a permit from Cal/OSHA before starting work if required.

The Contractor shall ensure that employees entering excavations are protected from cave-ins, failure of protective systems, hazardous atmospheres, vehicular traffic, falling loads, and any other hazardous conditions.

The Contractor shall have a competent person on-site who will make daily inspections of excavations, adjacent areas, and protective systems. The competent person will be responsible for ensuring that the protective system is based upon soil classifications, and that it provides the required protection in accordance with CCT, Title 8, and Section 1541.1.

106-1.02 Submittals: At least 15 working days before beginning excavation on a trench 5 feet or more in depth, the Contractor shall submit to the Engineer a detailed plan showing the design of shoring, bracing, sloping or other provisions to be made for worker, adjacent structure, and adjacent utility protection from caving ground hazards.

The plan(s) shall be prepared and signed by a registered Professional Civil or Structural Engineer.

The excavation and shoring analysis for positive shoring systems and design shall be fully coordinated with the dewatering plan.

106-1.03 Execution: Shoring shall be removed in such a manner as to prevent caving at the walls of excavations or damage to piping or other structures. Positive shoring systems shall be incrementally removed as the trench is backfilled. No backfill shall be installed against the shoring system before it is removed.

Excavations shall be so braced and supported that they will be safe, and the ground alongside the excavation will not slide or settle, and all existing improvements of any kind, either on public or private property will be fully protected from damage. If any damage does result to such improvements, the Contractor shall make the necessary repairs or reconstruction at his own expense and as directed by the Engineer.

All excavations shall have barricading, fall protection handrails, and access ladders in accordance with Cal/OSHA requirements.

106-1.04 Payment: Trench Bracing and Shoring shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools,

equipment and incidentals, and doing all the work involved to furnish and install sheeting, shoring and bracing for the protection of adjacent existing improvements, and the protection of life and limb conforming to applicable safety orders, including but not limited to a bracing and shoring plan, securing Cal/OSHA permits, and in accordance with the Project Plans, applicable Federal, State and Local Regulations, permits, and as specified herein, and no additional compensation will be made therefor.

[Version: 4/14/09]

121 NOTIFICATION

121-1.01: The Contractor shall notify the Engineer of any work to be performed on any given workday either on the afternoon of the prior working day or before 8:30 a.m. on the given working day. Any work completed for which the Engineer has not received prior notification of its scheduling MAY NOT BE ACCEPTED FOR PAYMENT.

The Contractor shall provide a written notice of pending construction, and attempt to make personal contact with all businesses and residents in the vicinity of the project 5 working days prior to mobilizing to the site. Should the project be suspended at any time for longer than one week, the Contractor shall once again provide a written notice of pending construction, and attempt to make personal contact with all businesses and residents in the vicinity of the project 5 working days prior to mobilizing to the site. The notice shall inform the recipients of the type of work, the scheduled date(s) and work hours, and the potential impacts for the neighborhood, such as road closures and/or detours. Provide a map for any approved detour. The notice shall inform all recipients that they will be allowed access to their property at all times. The notice shall also request that cars be parked out of the roadway by 7:30am and shall have contact information for the following personnel: Contractor's onsite Supervisor, Contractor's Project Manager, and the City of Santa Rosa's onsite Inspector.

If loading or unloading of equipment and/or materials has the possibility to impact access to private property, the Contractor shall notify and coordinate this work with the business or resident.

The Contractor shall keep the City of Santa Rosa Fire Department, City Bus, Postal Service, Recology and other related City services, informed of any roadway and lane closures in accordance with Section 12-4.02 of these Technical Specifications.

If unanticipated work requires the Contractor to access private property the Contractor shall first notify the business or resident and the Engineer, and all work shall be coordinated through the Engineer or their Representative.

All written notices to residents or businesses shall be submitted to the Engineer for approval prior to distribution. The Engineer shall be allowed two working day s to review notices.

121-3.01 Payment: Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for the **various contract items** of work involved and no additional compensation will be allowed therefor.

[Version: 10/13/14-CDA STD2010]

124 MATERIAL RECYCLING

124-1.01 Description: The Contractor shall dispose of all Portland cement concrete and asphalt concrete, generated from removal or demolition activities on the project, at a recycler for these materials. The Contractor shall provide receipts verifying delivery and approximate quantity (in tons) of the material delivered to a material recycler.

All other excess materials from the project shall become the property of the Contractor and shall be disposed of by him, at his expense.

124-1.02 Payment: Full compensation for material recycling as specified herein shall be considered as included in the contract prices paid for **various items of work**, and no additional compensation will be allowed therefor.

[Version: 11/6/14CDA STD2010]

132 PIPE, APPURTENANCES, AND INSTALLATION

132-1.01 General

132-1.01A Summary: Section Includes the following:

1. Stainless steel piping, valves, fittings, and appurtenances.
2. PVC piping and fittings.
3. Pipe supports.

132-1.01B Submittals: Provide detailed layout drawings showing dimensions and alignment of pipes; location of valves, fittings, and appurtenances; location of field joints; location of pipe hangars and supports; connections to equipment or structures; and thickness and dimensions of fittings and gaskets.

Submit final drawings after layout drawings have been reviewed and accepted by Engineer.

Submit product data for pipe, gaskets, fittings, valves, couplings, solvent cement, and appurtenances.

132-1.01C Piping Layout: Lay out and fabricate piping systems with piping sections as long as possible, while still allowing shipment, so that joints made up in the field are minimized.

Piping design indicated on Drawings illustrates piping layout and configuration and does not indicate the location of every field joint, union, or flexible coupling that may be needed to connect piping sections fabricated in the shop.

Add joints, unions, and flexible couplings in a manner that achieves intent of maximizing size of individual piping sections.

Fabricate piping sections in the shop.

132-1.01D Delivery, Storage, Handling, and Field Assembly: Protect piping materials from sunlight, scoring and distortion. Do not allow surface temperatures on plastic pipe and fittings to exceed 120 degrees Fahrenheit.

Store and handle pipe and fittings as recommended by manufacturer in published instructions.

Assemble shop-fabricated piping in the field using the joints designed into the piping layout.

132-1.02 Pipe and Fittings

132-1.02A Stainless Steel Pipe and Fittings: Stainless steel pipe shall be Schedule 40 with threaded ends unless otherwise noted on the Project Plans. Stainless steel pipe shall be type 316/316L confirming to ASTM A773 and ASME B1.20.1.

Stainless steel fittings, including unions, shall be Class 150 threaded conform to ASTM A351 stainless steel, grade to match the pipe. The end configuration of all fittings shall be threaded with a male or female end as needed to comply with the type of joint or as indicated on the Project Plans.

Threaded joints shall be installed with Teflon tape thread lubricant.

Following shop fabrication of stainless-steel pipe sections, straight spools, fittings and other piping components, pickle and passivate fabricated pieces.

Immerse fabricated pieces of stainless-steel piping in sulfuric acid solution followed by immersion in a nitric-hydrofluoric bath and subsequent wash at the proper temperature and length of time.

Preserve appearance and finish of stainless-steel piping, fittings, and appurtenances by providing suitable protection during handling and installation and until final acceptance of the work.

132-1.02B Flexible Hose: Flexible hose shall be Model GM150SHM180 as manufactured by Hose Master, or approved equivalent.

Flexible hose shall be 12-inches in length or as indicated on the Project Plans.

Hose shall meet the following requirements:

1. Inner corrugated hose and braided cover shall be manufactured of grade 321, 304, or 316 stainless steel.
2. Braded hose dynamic bend radius shall be 12 inches or less for all flexible hose less than 2-inches in diameter
3. Hose ends shall be 304 Stainless Steel MNPT unless otherwise indicated on the Project Plans.

132-1.02C Polyvinyl Chloride (PVC) Pipe and Fittings: PVC pipe shall conform to ASTM D 1785, NSF/ANSI 61, and appendices thereto. PVC pipe and fittings shall be extruded from Type I, Grade 1, Class 12454-B material in accordance with ASTM D 1784.

PVC piping shall be Schedule 80 unless otherwise indicated on the Project Plans. Fittings shall comply with ASTM D 2466 or ASTM D 2467.

Solvent Cement shall comply with ASTM D 2564.

Plastic pipe shall be marked with nominal size, type, class, schedule or pressure rating, manufacturer and all markings required by applicable ASTM and AWWA standards.

132-1.03 Swing Style Check Valves: The body, cap, hinge, and disc shall be manufactured from stainless steel in accordance with API 598, ASME B16.34, ASTM A351, and CF8M.

Swing check valves shall have threaded joints, body with integral seat, hinged disc and allow access to the valve seat without disassembly from the piping.

Check valves shall be manufactured by Crane Valve Company, Lunkenheimer Company, McMaster, or approved equivalent.

132-1.04 Metal Body Ball Valves: Metal body ball valves in stainless steel piping systems shall have stainless steel bodies and threaded ends to match the adjacent piping materials. Ball shall be 316 stainless steel, full port, non-lubricated (self-lubricated) and capable of sealing in either direction. Seats and stem seals shall be manufactured form TFE.

Stem packing shall be manually adjustable while the valve is under pressure. Shafts shall be rigidly connected to the ball by a positive means. The connection shall be designed to transmit

torque equivalent to at least 75 percent of the torsional strength of the shaft. Handles shall be stainless steel with a vinyl grip designed to open and close the valve under operating conditions.

Ball valves shall be suitable for operation between minus 20 and 350 degrees Fahrenheit.

Ball valves shall be manufactured by Apollo Valves as manufactured by Conbraco Industries Inc., SVF Flow Controls Inc., Jamesbury, NIBCO Inc., or approved equivalent.

132-1.05 Pipe Supports: All pipe supports and accessories shall be manufactured from a single manufacture. All equipment supports shall be made from structural grade stainless steel. Pipe supports shall be Unistrut style supports with a minimum depth of 1-5/8" as indicated on the Project Plans.

All support spacing shall meet ANSI/MSS-SP69 requirements for horizontal spacing and meet the most stringent requirements of Plumbing Code.

A minimum of one support is required per the minimum recommended pipe length.

Locate supports immediately adjacent to any change in the direction of pipe. In case of concentrated loads (such as valves) the supports shall be placed as indicated on the Project Plans.

132-1.07 Construction

132-1.03A General: Where not otherwise specified, install piping in accordance with ASTM F 645, or manufacturers published instructions for installation of piping, as applicable to the particular type of piping.

Handling methods and equipment used shall prevent damage to the coating and finish.

Provide molded transition fittings for transitions from plastic to metal pipe. Do not thread plastic pipe.

Locate unions where indicated on the Project Plans and elsewhere where required for adequate access and assembly of the piping system.

Install each type of valve in accordance with manufacturers printed instructions. Install valves with proper orientation of flow direction arrow on valve body.

132-1.03B Field Quality Control: Pressure test piping to 125 pounds per square inch with zero leakage.

132-1.13 Installation of PVC Piping: Solvent weld joints in accordance with ASTM D 2855. Use primer on pressure and non-pressure joints. Do not solvent weld joints when ambient temperatures are below 40 degrees Fahrenheit or above 90 degrees Fahrenheit unless solvent cements specially formulated for these conditions are utilized.

132-1.08 Payment: Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for **Sump Pump and Discharge Piping** as described in Section 196 and no additional compensation will be allowed therefor.

133 TEMPORARY PUMP FACILITY

133-1.01 General: The contractor shall procure equipment and set-up a temporary potable water pump station facility prior to the City's Station 9 pump station facility being taken out of service as indicated on the Project Plans and as specified herein. Temporary pump station facility shall consist of furnishing, installing, and maintaining all equipment, tools, power, piping, and incidentals required to maintain minimum tank levels within the City's upper pressure zone 9 without service interruption. Temporary pump station facility shall be visually inspected daily for any deficiencies or leaks, all of which must be repaired immediately. The Contractor shall provide operation of all temporary facilities and assist the City with maintaining levels and pressures in the system during operation.

Temporary single phase power shall be provided to existing PLC and radio so SCADA indications are maintained during construction.

The Contractor shall provide temporary pump station facility equipment to maintain water flows of 1,600 gallons per day at 405 feet of head.

Suggested temporary pump station facility shown on Project Plans is for bidding purposes only.

Contractor shall maintain pedestrian and vehicular traffic control around the temporary pump station facility work area.

The Contractor shall install an 8-foot fence with access gate, around the perimeter of the temporary pump station facility. Provide sound attenuation panels.

133-1.02 Submittals: The Contractor shall submit a temporary pump station plan for review by the Engineer within 30 days of the notice to proceed and at least 40 working days prior to commencement of temporary pump facility work. The plan must be approved by the Engineer, in writing, before commencing any work that requires shutdown of the Station 9 facility. The Contractor shall notify the Engineer 10 working days prior to commencing with the temporary pumping operation.

The temporary pump station plan submittal shall include the following:

1. Staging area for pumps
2. Number, size, location, manufacturer, type, and method of installation and removal of all pipe, fittings, and valves
3. Pump sizes, manufacturer, age, capacity, and power requirements
4. Information certifying that the pump is intended for use in potable drinking water systems and is new or has only been used in the pumping of potable drinking water
5. Standby power generator size and fuel capacity, if needed
6. Method of noise control for each pump and/or generator
7. Any temporary pipe supports, thrust blocks, and/or anchoring required

133-1.02 Temporary Pump Station System Description: Temporary pump facility shall conform to the requirements as specified in the City of Santa Rosa Water Distribution System Construction Standard Specifications Section 132, the Project Plans, and modifications herein. Temporary pump station system shall consist of furnishing, installing, and maintaining all power, plugs, primary and standby pumps, appurtenances, and piping, fittings, valves, and appurtenances required to maintain minimum tank levels without over pressurizing any portion of the water system.

Pumping shall be done in such a manner as not to damage private or public property or create a nuisance or public menace. The pumped water shall be in an enclosed hose or pipe system that is adequately suitable for potable drinking water and is protected from traffic and shall be redirected to supply the appropriate zone.

100% redundancy is required for all pumps, piping, and power sources. Primary and standby piping systems shall be manifolded to minimize switchover if necessary.

The Contractor shall supply traffic control in accordance with Section 12 of these special provisions.

All components of temporary pumping system including standby pumps, shall be sound-attenuated and shall produce noise emissions less than 60 decibels as measured 50 feet away. All other provisions of the City's noise ordinance shall apply.

The Contractor shall take all necessary precautions including 24 hour manned constant remote monitoring of the temporary pumping system to ensure that minimum tank levels are maintained at all times. Monitoring personnel shall be qualified with a minimum 3 years of experience in temporary pumping operations.

The Contractor shall perform leakage and pressure tests of the temporary pump station set-up prior to actual operation. The pressure and leakage test shall be conducted at one-and-a-half times the maximum pressure the system will experience for a period of two hours. No leakage is permitted during this test.

The Contractor shall perform a 24-hour operational test of the temporary pump station prior to demolition work that would render the existing pump station inoperable. During the operational test, the temporary pumps should operate automatically and at the designed discharge pressure and flow rate. The 24-hour operational test shall occur Monday through Friday. If equipment failure occurs during the operational test, the contractor shall repair or replace failed equipment and begin another 24-hour operational test.

Prior to removal of temporary pumping system, the contractor shall verify that operation of Station 9 has been restored to pre-existing condition and to the satisfaction of the Water Department.

Once approved to do so by the City, Contractor shall immediately remove all components of the temporary pumping facility so traffic can resume normal flow conditions.

133-1.01 Materials: Temporary pumps, pipe, fittings, and valves shall be NSF/ANSI 61 certified for use in potable drinking water systems.

133-1.03 Payment: Temporary Pump Facility shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and doing all the work involved in procuring, submitting, installing, disassembling, and operating temporary pumping systems as described herein, including but not limited to; notification, coordination, installation, operation and removal of all temporary pumping equipment and appurtenances as described herein including standby equipment, sound attenuation, steel plating if required, fencing around temporary pump facility, k-rails, shifting traffic lanes around the temporary pump facility, sidewalk closures, constant continued manned monitoring during temporary pumping operations, testing, cleaning, flushing, disinfecting and all efforts required to return surface conditions to pre-project condition, and any other items necessary for temporary potable drinking water pumping not specifically enumerated in these specifications, and no additional allowance will be made therefor.

196 SUBMERSIBLE SUMP PUMP

196-1.01 General

196-1.01A Summary: Section Includes specifications for submersible sump pumps less than 5 horsepower with an integral float switch.

196-1.01B Submittals: Submit product data for sump pump and sump pump accessories that includes dimensions, materials of construction, and performance information.

196-1.02 Products

196-1.02A Submersible Sump Pumps: Sump pump body shall be manufactured from corrosion-resistant stainless steel. Pump shall be self-supported on legs or a base that allow for adequate suction entrance clearance.

Impeller and casing shall be glass-filled thermoplastic with upper and lower heavy duty ball bearing.

Motor shall be permanently lubricated for extended service life and rated for continuous operation.

All ratings shall be within the working limits of the motor. Sump pump shall have an adjustable integral vertical float switch exterior of the pump body which can be set at various liquid levels.

Pump shall meet the following requirements:

1. Flow capacities: 10 to 15 gpm
2. Maximum head: 18 to 20 feet of total dynamic head at flow capacities indicated above.
3. Maximum solids: 3⁄8" spherical
4. Temperature: 104º F (40º C) maximum liquid temperature
5. Design submergence of 8 feet minimum
6. Discharge size: 1 1⁄2" NPT

Pump Motor shall meet the following requirements:

1. Single phase, 3450 RPM, 60 Hz, 1/3 HP to 1/2 HP, 115 V
2. Built-in thermal overload protection with automatic reset.
3. Permanent-split-capacitor type
4. Class B insulation.
5. Hard coated 400 series stainless steel shaft.
6. Three-pronged plug.
7. 20-foot-long motor cord.

Submersible sump pumps shall be manufactured by Goulds, Liberty, Barnes, PACO (Pacific Pumping Co.), or approved equivalent. Design indicated on the Project Plans is based on Model LSP03 as manufactured by Goulds.

196-1.02 Payment: Sump Pump and Discharge Piping shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to install a complete and working sump pump and discharge piping system including but not limited to sump pump, float, piping, fittings, valves, pipe supports, drilling, coring, modular mechanical seals, grouting, finishing, excavation, bubble up vault, trenching, compaction, and backfill, complete and in place and operating in accordance with and as shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

199 MECHANICAL VENTILATION EQUIPMENT

199-1.01 General

195-1.01A Description:

A. The work in this section includes, but is not limited to, providing all HVAC work as shown and noted on the mechanical/HVAC drawings and specifications, including the following items:
   1. HVAC units and appurtenances
   2. Ducts and appurtenances
   3. Vibration Isolation
   4. Insulation for ducts and piping
   5. Controls & control wiring
   6. Refrigerant piping.
   7. Energy Code Testing, Adjusting and reporting
   8. Commissioning of HVAC systems

B. Work of other sections includes the following:
   1. Line voltage wiring and disconnect switches. The Electrical Contractor will provide all line voltage wiring & conduit, disconnect switches & magnetic starters (except those furnished under this Section as a part of packaged HVAC equipment).
   2. Condensate drainage piping from HVAC equipment.

199-1.02 Codes and Standards:

A. All work and materials shall be in full accordance with the latest adopted edition of the following documents:
   1. California Building Code (CBC)
   2. California Plumbing Code (CPC)
   3. California Mechanical Code (CMC)
   4. California Electrical Code (CEC)
   5. California Fire Code (CFC)
   6. California Energy Code (Title 24)
   7. California Green Building Code (CalGreen)
   8. National Electric Code (NEC)
   9. Americans with Disabilities Act (ADA)
   10. Sheetmetal Contractors and Air Conditioning Contractors' National Association (SMACNA), HVAC Duct Construction Standards and Seismic Restraint Manual.
   11. National Fire Protection Association (NFPA)
   12. Local codes and ordinances

B. Where, in any specific case, different sections of the codes specify different materials, methods of construction or other requirements, the most restrictive shall govern.

199-1.03 Permits:

A. The Contractor shall obtain all permits, licenses and fees that are required to perform the work. Provide the Engineer with the original certificates, permits, licenses and receipts for fees.

199-1.04 Submittals:

A. Submit for approval in digital format (PDF) complete submittals prior to commencing work and prior to ordering any piece of equipment in a single submittal package. Piecemeal submittals may be rejected. Clearly mark all pages with the appropriate equipment mark number and indicate all accessories and optional features and accessories. Items, other than those specified, will not be allowed unless they are approved in writing via the submittal process. Include cut sheets and drawings for the following items in the submittal:

    1. All HVAC components that are a part of the mechanical contract documents.
    2. Drawings for installation details that differ from the details in the contract documents.
    3. Control drawings for all control work that is specified in the mechanical contract documents.

B. All details shown on the drawings are schematic in nature; the Contractor is responsible for determining actual installation requirements. Contractor shall include in his bid all materials and appurtenances for a complete and operable installation. Provide shop drawings for the proposed installation when coordination with other trades is required. The Contractor is responsible for all materials, equipment and appurtenances not reviewed and approved by the Engineer.

C. Upon completion of work, provide one set of reproducible as-built drawings and two operation and maintenance manuals. The operation and maintenance manuals shall be in a binder and contain manufacturers' data, manufacturers' warranties and maintenance instructions for the equipment, fixtures and appurtenances installed. The Contractor is responsible for all materials, equipment and appurtenances not reviewed and approved by the Engineer.

199-1.05 Quality Assurance:

A. Installer Qualifications: Installer shall be trained and certified in the proper installation of HVAC systems by a nationally or regionally recognized training or certification program. Uncertified persons may perform HVAC installation where under the direct supervision and responsibility of a person trained and certified to install HVAC systems.

199-1.08 General:

A. All systems within these specifications shall only be installed by personal trained and certified in accordance with the manufacturer's installation instructions.

B. The locations, sizes, capacities and types of all piping, equipment and appurtenances shown on the plans as existing are approximate and may not have been independently verified. The Contractor shall determine the exact locations, sizes, capacities and types of existing piping, equipment and appurtenances. If necessary use electronic pipe locating devices to locate existing piping below grade. The Contractor shall include in his bid allowances for minor modifications to pipe routing necessitated by actual field conditions.

C. The Contractor shall verify all building dimensions with architectural plans and all site dimensions with civil plans prior to submitting a bid.

D. The submission of a bid or proposal will be construed as evidence that the Contractor has familiarized himself with the plan and building site. Claims made subsequent to the proposal

for materials and/or labor due to difficulties encountered will not be recognized unless these difficulties could not have been foreseen, even though proper examination had been made.

E. Provide Turnkey operation of all mechanical systems described in the plans and specifications. Provide all materials and labor required for complete operational systems, unless specifically noted as provided by others on the plans and specifications; or specifically excluded in the bid. Provide all cleaning, test, balance & commissioning of systems to guarantee proper operation at project completion. Inform the Engineer and General Contractor of the timing of all work to be done and the requirements of other trades so the work can be completed in a timely fashion.

199-2 Products:

199-2.01 Ductwork:

A. Ductwork shall be constructed from galvanized sheet metal in accordance with the latest edition of “SMACNA HVAC Duct Construction Standards”.

B. Exhaust ducts: Snaplok or conductor pipe duct by United McGill Uni-Seal, Mina Metals or approved equal. Wye branches, Laterals and Tap-ins to be conical, tapered body or low loss type. Elbows to be 1.5-radius stamped or gored. Join ducts with beaded sleeve joints attached per SMACNA Standards.

C. Dryer exhaust: Duct to be galvanized iron, longitudinal seam (conductor or snaplok pipe) +4” WC pressure class minimum 26 gauge. Elbows at 90 degree bends at 4” diameter ducts to be long radius type IN-O-VATE LT-90 or equal. Elbows to be either stamped ore segmented with smooth interior seams, or where necessary adjustable elbows (with no more than a 70 degree bend). All joints shall be where interior edges are downstream, no fasteners in the air stream, and joints to be sealed with duct sealer.

D. Flexible Ducting Residential units: Class 0 or Class 1, pre-insulatedm to be used in concealed, conditioned, areas on the supply and return only. 5'-0" maximum length at final connection to outlet. ATCO or approved equal. All connections shall be wrapped with three layers of UL rated duct tape and secured with stainless steel gear clamps or 0.345” (9 mm) heavy duty nylon cable ties, Catamount series 175 or equal by Panduit, or Thomas & Betts, tightened with factory tool.

199-2.02 Duct Insulation and Liner:

A. Duct wrap, unconditioned spaces (communicating with outdoors): Owens Corning SoftR, fiberglass with FRK Foil-facing, 3” thick, type 75, R-8, or approved equal by Certainteed or Knauf.

B. Duct wrap: Owens Corning SoftR, fiberglass with FRK Foil-facing, 1-1/2” thick, type 75, (R-4.2 installed), or approved equal by Certainteed or Knauf.

C. Duct liner, exterior ducts and unconditioned spaces: Owens Corning QuietR type R-8, 2” thick or approved equal by Certainteed or Knauf.

D. Duct liner, ducts in conditioned spaces, where indicated on the Drawings: Owens Corning QuietR type R-4.2, 1” thick or approved equal by Certainteed or Knauf.

E. At all register cans: Owens Corning type 75, minimum 1/2” thick, or approved equal by Certainteed or Knauf.

F. All insulation shall have a flame spread rating of not more than 25 and a smoke-developed rating of not more than 50.

199-2.03 Duct Specialties:

A. Duct joint sealer: Hardcast duct seal 321 or equal by United Mcgill, indoor and outdoor duct sealer, gray smooth finish, water based low VOCs. Up to 10” WG duct pressure rated. Install 20 mil thickness minimum. Where duct sealer is installed outdoors and installed during wet conditions, use Hardcast metal bond.

B. Duct access doors: Elmdor DT series, minimum 24 gauge, double wall construction with insulated and gasketed between panels or approved equal.

C. Duct joint sealant: United McGill Uni-Flex duct sealer, UL 181B-M Listed or approved equal. Apply per manufacturer's instructions. Seal all ducts per SMACNA

D. Duct flex connectors: 24 gage galvanized iron with grip lock seams meeting NFPA 701, 90A & 90B. Indoors, Duro Dyne Excelon #10210 MBX, color white or approved equal. Outdoors, Duro Dyne Durolon #10159 (or #10210 at TDC connectors), color black or approved equal.

E. Turning vanes: Aero-Dyne “Double wall” or Ductmate Industries Prorail, double radius, minimum 26 gauge vanes with 24 gauge siderails or approved equal. Do not install in ducts with smaller dimension less than 11”.

F. Duct tape: Polyken 558CA air duct closure system, 14 mils thick or approved equal. CEC approved.

G. Register cans (at Residential units) shall be type with sealing flange with gasketing.

199-2.04 Adhesives, Sealants, Caulks, Paints, and Coating:

A. All products shall comply with the VOC limits requirements in CalGreen Code section 5.504. If a non conforming product is found in these bid documents, notify the Engineer immediately for an alternate product.

199-2.05 Refrigerant Piping and Insulation

A. Refrigerant Piping: Liquid and suction refrigerant piping shall be type “ACR” copper tubing, hard drawn, with long radius ells (at suction) and silver-brazed joints with SIL-FOS 15 or approved equal. And during all brazing an inert gas (such as dry nitrogen or argon) shall be continuously passed through the system at a flow rate sufficient to maintain an oxygen free environment to prevent the formation of copper oxide scale inside the piping. Where concealed “soft” copper or soft copper line sets can be used.

B. Refrigerant pipe insulation: Armacell AC Armaflex, thickness per CEC Title 24 or approve equal. Covering to be continuous with all seams and joints glued tightly. All fitting shall be cleanly mitered with proper cutting tool. Cover all exposed outdoor piping with continuous PVC jackets, Proto “Lo Smoke” or equal, including all fittings and valves. Insulation shall have a flame spread rating not to exceed 25, a smoke density rating not to exceed 450, and a smoke-developed rating not to exceed 50.

C. Refrigerant pipe supports and clamps:
   1. Superstrut series 1400 “GOLDGALV” metal framing channel or approved equivalent by B-LINE. At insulated pipe provide Armafix insert per specification below. Clamps at uninsulated pipes: Superstrut A-716 or A-717 cushioned clamps or approved equal.
   2. Hanger support: Superstrut C-711F or C-727F felt lined J hanger or approved equal. At insulated pipe provide Armafix insert per specification below.
   3. Insulated pipe supports: Armacell Armafix IPH / NPH insulated pipe hanger with longitudinal seams with self adhering closure strips, 0.27 BTU-in/hr -SF-F thermal conductivity, and 30 mil thick painted aluminum or unpainted stainless steel shell or approved equal. Seams shall be glued tightly to form a continuous vapor barrier.

199-2.06 Controls:

A. Install all low voltage wiring, which is not concealed in any walls or attics, shall be installed in conduit (EMT).

B. Install all Thermostats, switches and controls at elevations shown on architectural drawings. Where not shown on architectural drawings, install devices such that all controls are within 48" of the finished floor. Where possible match centerline of lighting controls in the same room.

199-2.07 Volume Dampers:

A. Galvanized steel minimum 24 gage sleeve, 16 gage blade with Ventlok 638 regulator locking quadrant or approved equal.
   1. At ducts up to 14” round: Greenheck VCDR-50 single blade with locking quadrant or approved equal.
   2. At ducts 16” and larger round: Greenheck VCDRM-50 multi blade with locking quadrant or approved equal.
   3. At rectangular ducts up to 1000 FPM: Greenheck VCD-15/18 with 3V blades or approved equal.
   4. At rectangular ducts 1000 to 2000 FPM: Greenheck VCD-20/20V/23/23V or approved equal.
   5. Control dampers: Greenheck VCD-40/42/43 or approved equal.

199-2.08 Air Filters:

A. Flanders or approved equal by Farr or Camfil. Air filters shall be pleated disposal type with MERV rating per equipment schedule. Provide a minimum of 2 inch where possible.

199-2.09 Other Materials:

A. Other materials not specified, but required for a complete installation, shall be as selected by the Contractor subject to acceptance by the Engineer.

199-3 Execution:

199-3.01 General:

A. Verify that the work of this Section may be completed in accordance with all pertinent codes and regulations, the Construction Documents, approved Submittals, and the manufacturers'

recommendations. In the event of discrepancy, immediately notify the Engineer. Do not proceed in areas of discrepancy until all discrepancies have been resolved.

B. Install all equipment, valves, controls and appurtenances in accordance with manufacturers' instructions. Install all ductwork Per CMC requirements and SMACNA standards.

C. Provide access to all components requiring adjustment. Provide access panels where these components are concealed behind non-accessible construction. Label access panels with description of service.

D. Install ductwork upstream and downstream of fans with as few offsets and elbows as possible. If conditions allow, provide a minimum of 3 fan diameters of straight duct upstream of fan intakes. Do not provide less straight duct upstream and downstream of fans than indicated on the plans without authorization from the Engineer.

E. Cover all duct openings and protect mechanical equipment during construction at time of rough installation and during storage on construction site until final startup all duct and other related air distribution components openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system. And in accordance with the CalGreen section 5.504.3.

F. Provide approved flexible connections between fans and ducts.

G. Duct sizes shown on the Drawings are clear airflow dimensions, inside the insulation.

H. Provide double-thickness turning vanes at all duct elbows 10” or wider unless noted otherwise on plans.

I. Seal all duct seams and joints with approved joint sealant. Seal ducts exposed to weather water tight. Slope top of exterior ducts to shed rain.

J. Install ducts in the locations shown on the plans. If interference with pipes, structure etc. requires a change in duct shape or size, obtain approval from the Engineer before installing duct.

K. Install flexible ducts in afully extended condition free of kinks and maximum sag of 1/2" per foot. Support on 48" centers with 1-1/2" wide galvanized iron strap minimum 24 gauge. All elbows shall be made with a minimum radius of 1.5 times the duct diameter.

L. Where access doors are required in ductwork, for access to internal components, provide doors with an air tight seal. Label access panels with description of service.

M. Provide spin-in fittings at round duct branches from rectangular ducts.

N. Provide a continuous vapor barrier on all chilled water and refrigerant suction pipe insulation. All closed cell insulation shall be glued at all seams and joints.

O. Do not cut into or reduce the size of any load-carrying member without the prior written approval of the Engineer.

P. Provide weather-proof flashing for all piping extending through roofs and walls.

Q. Anchor piping subject to expansion or contraction in a manner permitting strains to be evenly distributed. Provide offsets and expansion compensation devices as required to prevent undue stress on the piping and building components. Allow for pipe expansion of 1 inch per 100 feet.

R. All registers with sheet metal cans shall be internally lined with duct liner.

S. Piping shall be securely held in place by hangers, supports & trapezes. All hangers shall be designed to support the pipe, including fluid and insulation. Provide Pipe Shields Inc. insulated pipe supports or approved pipe saddles where 2" diameter and larger pipe is supported. Install pipe supports to pass freely around pipe insulation. Provide separation between piping and building construction. Suspend ducts with sheet metal straps and hangers from structural building components. Provide seismic bracing per SMACNA / PPIC "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems".

T. Where PVC jackets are installed, PVC jackets shall be continuous, covering all fittings, with water-tight seams. Protect insulation at ends of sleeved pipe with waterproof material.

U. Provide UL listed fire stopping, installed per manufacturer's recommendations, where pipes pass through fire rated construction.

V. Provide nitrogen purge when brazing refrigerant piping.

W. Install duct lining with 100% adhesive coverage and mechanical fasteners per SMACNA standards. Coat all exposed edges of lining to prevent erosion of fiberglass.

X. Install all equipment level.

Y. Do not operate fan coils, air handlers, air conditioning units, etc. without filters.

Z. Do not install thermostats or temperature sensors in locations where they are subject to direct sunlight. Where thermostat or sensor are on exterior or partition walls to unconditioned space, insulate wall with minimum 1” expandable foam and seal around cable at wall.

AA. Install volume dampers or balancing devices on all supply, return, outside, and exhaust air branch ducts or air outlets (even if not shown on drawings). Install dampers or devices so they are easily accessible without crawling through attic or crawl space.

199-3.02 Commissioning, Testing, Adjusting and Reporting:

A. The Contractor shall test and commission all HVAC equipment shown on the Mechanical drawings. Testing and documentation shall be in accordance with manufacture's installation instructions and California Energy Code NRCC-MCH certificate of compliance forms.

B. The Contractor shall coordinate and schedule with the General Contractor, (or Engineer where applicable), controls contractor, other subcontractors and the Engineer as necessary to complete all testing in a timely manner.

C. The Contractor shall submit all completed and signed commissioning documents in one package (in PDF format) to the Mechanical Engineer of Record for review and approval. Any comments and/or corrections shall be addressed promptly, retested, and an updated report

resubmitted for approval prior to completion. Provide an additional copy to the building department official where requested.

D. The Contractor shall perform all the required functional performance testing and checklists, HVAC testing, adjusting and balancing (TAB), and Operation and maintenance (O & M) manuals, systems manuals, systems operations training and inspection reports as required by California Energy Code including NRCC-MCH certificate of compliance forms..

E. The Contractor shall coordinate and schedule with the General Contractor, (or Engineer where applicable), controls contractor, other subcontractors and the Engineer as necessary to complete all testing in a timely manner.

F. The Contractor shall provide written Functional performance testing and TAB reports to the Commissioning Agent (CxA) for approval. The reports shall be dated and signed by the individual responsible for performing these services. Any comments and/or corrections shall be addressed promptly, retested, and an updated report resubmitted for approval prior to completion.

199-3.03 Requirements for Acceptance:

A. Make arrangements with the Engineer and the Building Inspector to observe the Work prior to covering or enclosing the work.

B. Clean all mechanical systems to remove all contaminants. At the completion of work, provide new, clean air filters in all filter banks.

C. Test and balance all air moving systems and hydronic piping systems in accordance with AABC National Standards for Field Measurements and Instrumentation. Testing shall be done by an AABC licensed TAB Contractor or certified NEBB Contractor, design Engineer or equipment manufacturer. Provide test reports for approval. The test reports shall include, but not be limited to the following information:
   1. Operating and nameplate data for all HVAC equipment; including fan speed and motor amps.
   2. Air and water temperature rise across all heating components.
   3. Air and water temperature drop across all cooling components.
   4. Air flow rates for main ducts and outlets.
   5. Maximum, minimum and heating air flow rates through variable volume boxes.
   6. Record ambient temperature and humidity coincident with testing heating and cooling equipment

E. Test the refrigerant piping with Nitrogen to 300 PSIG for 24 hours. If the piping fails the test, repair faulty sections and retest. Provide verification of this test along with the Test and Balance report.

F. Test all control functions and verify that all control features operate as specified. Provide written verification of these tests along with the Test and Balance report.

G. “AS-BUILT” red lined drawings shall be kept on site and updated daily. These updates shall include, but not limited to, any changes to pipe or duct routing.

H. Prior to job completion, submit to the Engineer redlined As-Built drawings in PDF format (color, 200 to 300 DPI resolution).

I. Provide operation and maintenance manuals on all equipment include equipment warranties certificates.

J. Instruct the City on how to operate and maintain all systems that are a part of this Section.

199-4.01 Payment: Electrical Room HVAC Replacement shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to remove and replace the existing wall mounted HVAC unit including, but not limited to, removal and disposal of existing HVAC unit, minor modifications to existing wall openings, new HVAC unit and appurtenances, miscellaneous metals, miscellaneous blocking, flashing, supports, interior finishes, and other building equipment and appurtenances, including necessary touch-ups, repairs, coatings, cutting, patching, and cleaning, complete and in place and operating as shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

Pump Room Ventilation Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to replace existing roof mounted pump room ventilation equipment with new interior wall mounted ventilation equipment including, but not limited to, removal and disposal of existing roof mounted exhaust fan, exhaust hood, fan, ducting, dampers, roof framing members, insulation, roof and roof appurtenances, modifications of existing roof openings, miscellaneous metals, miscellaneous blocking, flashing, supports, interior finishes, new thermostat, and other building equipment and appurtenances, including necessary touch-ups, repairs, coatings, cutting, patching, and cleaning, complete and in place and operating in accordance with and as required as shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

201 ELECTRICAL SYSTEMS

201-1 GENERAL

201-1.01 SCOPE OF WORK

A. The Contractor shall install, ready for use, the electrical system as specified herein and shown on the Contract drawings. This document describes the function and operation of the system and particular components, but does not necessarily describe all necessary devices. All components and devices shall be furnished and installed as necessary to provide a complete operable and reliable system for accomplishing the functions and meeting the performance set forth hereinafter.

B. Furnish all required labor, materials, project equipment, tools, construction equipment, safety equipment, transportation, test equipment, incidentals and services to provide a complete and operational electrical system as shown on the Electrical-Series Contract Drawings, included in these Specifications, or necessary for fully operating facility. See Appendix “B” for “Device Index” for this project.

C. Examine the specification and Drawings for mechanical equipment and provide all circuit breakers, switches, pushbuttons and appurtenances which are not specified to be with the mechanical equipment. Erect all electrical equipment not definitely stated to be erected by others, furnish and install conduit, wire and cable and make connections required to place all equipment in complete operation.

D. It is recommended that the Contractor attend the job walk for the site and shall have accomplished the following:

1. Thoroughly examine existing conditions before submitting their bid proposal to perform any work. Compare site conditions with data given on the plans or in these Specifications. No allowance shall be made for any additional costs incurred by the Contractor due to their failure to have examined the site or to have failed to report any discrepancies to the Engineer prior to bid.
2. It is the Contractor’s responsibility to be fully familiar with the existing utility locations, conditions and local requirements and regulations.
3. 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.

E. Deviations to locations and conduit routing, as shown on the Plans, must first be approved by the Engineer.

1. All plan deviations made by the Contractor shall be reflected on the Contractor supplied “Record Drawings.”
2. All engineering, drafting, and clerical expenses associated with updating the Record Drawings due to any major unauthorized changes shall be the responsibility of the Contractor and shall be deducted from the Contract.

F. The major areas in the scope of work as illustrated on Electrical Contract drawings(sheets 8-17) and Device Index located in Appendix “B”, which includes both the furnishing and installation are:

1. Main Switchboard, and stand alone automatic transfer switch.
2. Manual Transfer Switch Pedestal and portable generator termination box for portable generator connection.
3. Demo existing equipment as shown on Contract Drawings.
4. Replace existing Variable Frequency Drives with Ultra low harmonic drives.
5. Instrumentation and other miscellaneous devices. This includes all wiring and cables.
6. Relocating existing wire, conduits and pullboxes.
7. Modifying existing panelboards as shown on Contract Drawings.
8. Conduits and the field interconnection wiring between the Control Panels, instrumentation, etc. and equipment provided under all other Divisions.
9. Provide all necessary conduits, junction boxes, grounding system, field interconnection wiring, hardware, fittings, and devices to connect the designated equipment and wiring.
10. All necessary miscellaneous shut off, sample, and calibration valves to sensors.
11. Provide trenching, backfilling, and compaction for all underground conduit routes, concrete pads, and pull boxes.
12. Concrete pads and supports for electrical and instrumentation equipment.
13. Remove and dispose of all excess dirt, paving, concrete, and other materials from site work.
14. Modifying existing PLC programming and SCADA.
15. Removal and disposal of existing 8” and 18” flowmeters and transmitters. Installation of new 8” and 18” flowmeters and transmitters.
16. Removal of both antennas from existing mast and replacement of active antenna.

G. Existing site is limited in space. It is the Contractor’s responsibility to provide an electrical and instrumentation package to fit in the allocated space.

H. Contractor shall field verify existing conditions as required to complete the project.

I. It is the Contractor’s responsibility for obtaining PLC, OI, and SCADA configuration software, manuals and disks necessary for the Contractor to program and configure the PLC, OI and SCADA system.

J. The following specifications incorporate specific equipment and devices that are preferred by the City because of their serviceability, to match existing equipment, because of the local availability of labor, parts and materials, or because of the ability of the City to umbrella the equipment under existing maintenance contracts.

K. All electrical work shall conform with the National Electric Code (NEC) 2020 issue. Nothing on the Plans or in the Specifications shall be construed to permit work or materials not conforming to these codes and standards.

L. All panels, panelboards, panelboard transformers, PLC hardware, etc. shall be supplied by one System Supplier. All panels and instrumentation listed in Electrical Section Appendix B-

Device Index shall be supplied by the same System Supplier. This includes, but is not limited to all work necessary to select, furnish, supervise installation, calibrate, program, and place into operation all transmitters, instruments, controllers, alarm equipment, monitoring equipment, and accessories as specified herein.

201-1.02 CODES AND STANDARDS

A. All electrical/instrumentation equipment and materials, including installation and testing, shall conform to the following applicable codes and standards:

1. ANSI - American National Standards Institute, Inc.
2. EIA - Electronics Industries Association.
3. ETL - Electrical Testing Laboratories.
4. FM - Factory Mutual.
5. GO128 - General Order No. 128, Rules for Construction of Underground Electrical Supply and Communication Systems, Public Utilities Commission of the State of California.
6. IEEE - Institute of Electrical and Electronics Engineers.
7. ICEA - Insulated Power Cable Engineers' Association.
8. ISA - International Society of Automation (ISA) Standards (formerly Instrument Society of America.
9. NEC - National Electrical Code, 2020 Edition.
10. NEMA - National Electrical Manufacturers Association.
11. NETA - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, International Electrical Testing Association.
12. NESC - National Electrical Safety Code.
13. NFPA - National Fire Protection Agency & NFPA820
14. OSHA - Occupational Safety and Health Act Standards.
15. UL - Underwriter's Laboratories, Inc.

B. The revisions of these codes and standards in effect on the date of issuance of the Contract Documents shall apply.

C. Codes and standards referenced shall be considered minimum acceptable work.

D. In instances where two or more codes are at variance, the most restrictive requirements shall apply.

E. Nothing on the Drawings or in the Specifications shall be construed to permit work or materials not conforming to the preceding codes and standards.

F. All work shall also be performed in accordance with the State, County, City, and local Utility standards and codes.

G. The Contractor shall furnish without extra charge any additional material and labor which may be required for compliance with these codes and standards, even though the work is not explicitly mentioned in the Specifications or shown on the Contract Electrical Drawings.

H. Amperage listed on the single-line Drawings for motors are per NEC Table 430.250 and may not necessarily match that of the equipment supplied. It is the electrical system supplier and Contractor's responsibility to furnish equipment sized for the motors supplied for this project at no additional cost.

201-1.03 RELATED WORK IN OTHER SECTIONS

A. Provide an electrical system that interfaces to work performed under other Mechanical and Equipment Sections of these Specifications.

B. The following is part of Electrical Section:

1. Section 203 – Electrical System Analysis

201-1.04 ELECTRICAL CONTRACTOR QUALIFICATIONS

A. It is the intent of this Division that the complete responsibility for management and installation of the electrical and instrumentation required for this project be by a qualified Electrical Contractor. This responsibility includes, but not limited to, supervision and coordination of work performed by all suppliers of Electrical Section.

B. Uncertified electricians shall not perform electrical work for which certification is required per Labor Code Section 3099. Electricians shall be required to carry proof of certification on their person at all times. Electricians found on the jobsite without proof of certification will be asked to leave, prohibited from working on-site until proof of certification has been provided and may be reported to the Contractors State License Board (CSLB).

C. Contractor shall provide correspondence to the Engineer showing that all Subcontractors and System Suppliers have been provided with a complete set of bid documents that will be used on this project.

D. The Electrical Contractor shall meet the following minimum qualifications:

1. Has a current C-10 Electrical Subcontractor's License.
2. Has regularly engaged in similar electrical contracting for the Municipal Water and Wastewater Industry.
3. Has successfully performed work of similar or greater complexity on at least two previous projects under one company name and under the present company name.
4. Has all persons performing work as electricians certified by the California Apprenticeship Council per California Labor Code Section 3099.
5. Has been actively engaged in the type of electrical and instrumentation work specified in this Division for a minimum of two years.

E. The City may request a list of five (5) completed projects of similar size and nature for water or wastewater treatment plants or pump stations that the Electrical Contractor has completed:

1. Provide completion dates of projects.
2. References of Owner Representative in charge of project, including contact name and telephone number.

201-1.05 SYSTEM SUPPLIER QUALIFICATIONS

A. General:

1. It is the intent of this Division that complete responsibility in the supplying of the MCC/PLC, and all instrumentation in Appendix "B" Device Index and other equipment required for this project be supplied by one System Supplier. This responsibility includes, but not limited to, all work necessary to select, furnish, program, supervise installation, calibrate, and place into operation all transmitters, instruments, controllers, alarm equipment, monitoring equipment, and accessories as specified herein.
2. The system supplier shall have an on staff project engineer with prior experience on similar sized projects. This project engineer shall coordinate the technical aspects of this project and prepare the submittals and drawings. The system supplier project engineer shall attend all coordination meetings and be on-site when requested by the Engineer.
3. PLC programming shall be made by Tesco Controls (phone 916 395-8800), no equal.

201-1.06 CONTRACT DOCUMENTS

A. The Contract drawings and specifications are intended to be descriptive of the type of electrical system to be provided; any error or omissions of detail in either shall not relieve the Contractor from the obligations thereunder to install in correct detail any and all materials necessary for a complete operational system, at no additional cost.

B. The Contract drawings are generally diagrammatic; exact locations of existing equipment and proposed location for new electrical products shall be verified in the field with the Engineer. Except where special details on drawings are used to illustrate the method of installation of a particular piece or type of equipment or materials, the requirements or descriptions in this Section shall take precedence in the event of conflict.

C. The Contract Electrical elementary, elevation and one-line diagrams are the basis of the electrical system to be provided and are for reference only. It is the Contractor's responsibility to adjust and make minor revisions to the diagrams as necessary for operational system at no additional cost to the City. Additional isolators, relays, wiring, terminal blocks, and appurtenances, shall be provided for an operation system at no additional cost to the City.

D. Location of equipment, inserts, anchors, panels, pull boxes, conduits, stub-ups, and fittings for the electrical system are to be determined by the Contractor and Engineer at time of installation. Contractor shall make minor adjustments to locations of electrical equipment required by existing conditions and coordination with other trades at no additional cost to City.

E. The Conduit and Wire Routing Schedule, wire fill, and number of conduits are based on the best information available.

1. It is the Contractor's responsibility to modify the conduit schedule based upon approved Shop Drawings for the actual equipment. Such modifications in conduit sizes and numbers of conductors shall be at no additional cost to the City, if such changes are the direct result of the approved equipment selected by the Contractor.
2. A copy of the Conduit Schedule and Electrical plans showing conduit routing shall be updated weekly by the Contractor. Progress payments will be withheld if during monthly checks it is found that the Contractor fails to maintain the Conduit Schedule updates.

F. Electrical & instrumentation, conduit & wire lengths shown on Project Plans are approximate. The Contractor is responsible for determining actual lengths for bidding and installation purposes.

G. The Contractor shall examine the architectural, mechanical, structural, civil, electrical and instrumentation equipment provided under other Sections of this Contract in order to determine the exact routing and final terminations for all conduits and cables. The exact locations and routing of cables and conduits shall be governed by structural conditions, physical interferences, and the physical location of wire terminations on equipment. Conduits shall be stubbed up as near as possible to equipment.

H. All equipment shall be installed and located so that it can be readily accessed for operation and maintenance. The Engineer reserves the right to require minor changes in location of equipment, without incurring any additional costs.

I. Provide means to furnish equipment and accessories, do the installation, complete connections, submit documentation, perform start-up, and be responsible for the warranty.

J. Where conduits are shown as "home runs" on the Contract drawings or stated to be furnished, but not explicitly shown, as part of the scope of work; the Contractor shall provide all fittings, boxes, wiring, etc. as required for completion of the raceway system in compliance with the NEC and the applicable specifications in this Section.

K. No changes from the Contract drawings or specifications shall be made without written approval of the Engineer. Should there be a need to deviate from the Contract documents, submit written details and reasons for all changes to the Engineer for favorable review.

L. When existing conduits are to be used, it is the Electrical Contractor’s responsibility to verify conduit size and routing. This includes all potholing or other location methods. Existing conductors and conduits damaged by Contractor during construction shall be repaired or replaced at no cost to City.

M. The resolution of conflicting interpretation of the Contract documents shall be determined by the Engineer.

N. The Contractor shall coordinate with other Suppliers on the project for a complete and operable system.

O. It is the System Supplier's responsibility for obtaining instrumentation transmitter configuration software, manuals and disks necessary for the Contractor to program and configure the instrumentation transmitters. All software and manuals shall be licensed and turned over to the City following construction.

P. The Electrical Contractor shall maintain a separate set of neatly and accurately marked set of Record Documents, consisting of spreadsheets, specifications and full size blue-line Electrical Contract Drawings.

   1. These documents are to be used specifically for recording the as built locations and layout of all electrical and instrumentation equipment, routing of raceways, junction and pull boxes, and other diagram or document changes.

   2. These Record documents shall be kept up-to-date during the progress of the job, with all "change orders", submittal modifications, and construction changes shown and stamped with “As-Built” at end of job.

3. These Record documents shall not be used for daily construction use and shall not contain any mark-ups that are unrelated to as-built corrections.
4. The following lists the record documents shall be as-built by Electrical Contractor:
    a. Electrical Drawings.
    b. Panelboard schedules.
    c. Conduit and Wire Routing Schedule.
        1) A copy of the Conduit and Wire Routing Schedule and Electrical plans showing conduit routing shall be updated weekly by the Contractor. Progress payments will be withheld if during monthly checks it is found that the Contractor fails to maintain the Conduit Schedule updates.
    d. Lighting Schedule.
    e. Duct banks and their routing with offset measurement and indicate changes in depth.
5. The following lists the record documents that shall be as-built by System Supplier to be maintained by Electrical Contractor:
    a. Instrumentation Drawings
    b. Instrumentation Index.
6. Record documents shall be kept current weekly with all "change orders", submittal modifications, and construction changes shown. Record Documents shall be subject to the inspection by the Engineer at all times, progress payments or portions thereof may be withheld if Record Documents are not accurate or current.
7. When documents are changed, they shall be marked with erasable colored pencils using the following coloring scheme:
    a. Additions - red
    b. Deletions - green
    c. Comments - blue
    d. Dimensions – black
8. Show the following on the Electrical Record Contract Drawings by dimension from readily obtained base lines:
    a. Exact location, type and function of electrical and instrumentation equipment and devices.
    b. Precise routing and locations of underground conduits, pullboxes, junction boxes, and appurtenances that make-up the raceway system.
    c. Show the dimensions, location and routing of electrical work, which will become permanently concealed.
    d. Show complete routing and sizing of any significant revisions to the systems shown.
9. Prior to acceptance of the work, the Contractor shall deliver to the Engineer one set of record full size drawings neatly marked accurately showing the information required above.

201-1.07 COORDINATION

A. The Contractor shall coordinate the electrical work with the other trades, code authorities, utilities, and the Engineer; with due regard to their work, and towards promotion of a rapid completion of the project. If any cooperative work must be altered due to lack of proper supervision of such, or failure to make proper provisions, then the Contractor shall bear expense of such changes as necessary to be made in work of others.

B. Manufacturer's directions and instructions shall be followed in all cases where such is not shown on the Contract Drawings or herein specified.

C. The Contractor shall be responsible for coordinating PLC/SCADA design review meetings specified herein.

D. The Contractor shall notify and coordinate with PG&E, AT&T and the Engineer for connections and site modifications.

E. The Contractor shall coordinate with the City, Engineer, and System Supplier to test the entire system.

F. The Contractor shall schedule all the required work with the City, including each shutdown period as indicated in Section 121 and Section 133 of these Specifications. Each shutdown shall be implemented to minimize disruption of the existing operations. The work to be provided under this Contract shall not disrupt any of the existing operations without prior approval.

   1. Contractor shall make provisions for portable generators and automatic transfer switches when areas of the lift station will be without power.

   2. The City reserves the right to delay, change, or modify any shutdown at any time, at no additional cost to the City, when the risk of such a shutdown would jeopardize the operation of system.

   3. Contractor is advised that during change out of existing PLC, demolition of existing conduits, installation of new conduits, etc., Contractor is responsible to keep equipment running for all necessary station operation. The Contractor shall install temporary generators, motor controls, panelboards, power panelboards, wiring, etc. to keep all station equipment powered and automatic controls functional.

G. Schedule within 20 days after award of Contract all service installations and connections with utilities. Delays due to lack of effort by the Contractor which delay the project completion for lack of utility services will not be considered valid and Contract liquidated damages will be assessed.

   1. The Contractor is made aware that once PG&E has conducted the final inspection of their facilities, it may take up to four weeks for the related meter installations and each system to become active. It is expected that the Contractor will schedule their operations accordingly and working days will only be suspended during this timeframe if, in the opinion of the Engineer, all items of work are complete except those that need these active systems for completions.

H. The Contractor shall cease work at any particular point, temporarily, and transfer his operations to such portions of work as directed, when in the judgment of the Engineer it is necessary to do so.

I. Prior to commencing construction, the General Contractor shall arrange a conference with the General Contractor, Electrical Contractor, System Supplier, Resident Engineer & City as well as all equipment and system suppliers vital to the current phase of work. During the meeting, the equipment supplier shall verify types, sizes, locations, installation requirements, controls and diagrams of all equipment furnished. The Equipment and System Suppliers shall, in writing, inform the Engineer that all phases of coordination of this equipment have been covered and if there are any unusual conditions, they shall be enumerated at this time.

J. At the City's discretion, Contractor shall stop work for a period of time (without incurring delay costs) in an event where there is a large storm event and the City had determined they need to continuously monitor the station.

201-1.08 SUPERVISION

A. The General Contractor shall schedule all activities, manage all technical aspects of the project, coordinate submittals and drawings, and attend all project meetings associated with the electrical work.

B. The General Contractor shall supervise all electrical work, from the beginning to completion and final acceptance.

C. The General Contractor shall supervise and coordinate all electrical work to ensure each phase of the project, submittal, delivery, installation, and acceptance testing, etc. is completed within the allowable scheduled time frames.

D. The General Contractor shall be responsible for obtaining, preparing, completing, and furnishing all paper work specified in this Section; which shall include transmittals, submittals, forms, documents, manuals, instructions, and procedures.

201-1.09 INSPECTIONS

A. All work or materials covered by the Contract documents shall be subject to inspection at any and all times by the Engineer. If any material does not conform to the Contract documents, or does not have a favorably reviewed submittal status; then the Contractor shall, within three days after being notified by the Engineer, remove said material from the premises; and if said material has been installed, the entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the Contractor.

B. Work shall not be closed in or covered over before inspection and approval by the Engineer. All costs associated with uncovering and making repairs where non-inspected work has been performed shall be borne by the Contractor.

C. The Contractor shall cooperate with the Engineer and provide assistance at all times for the inspection of the electrical system under this Contract. The Contractor shall remove covers, provide access, operate equipment, and perform other reasonable work that, in the opinion of the Engineer, will be necessary to determine the quality and adequacy of the work.

D. Before request for final inspection is made, the Contractor shall submit to the Engineer in writing, a statement that the Contractor has made his own thorough inspection of the entire project enumerating punch list items not complete and that the installation and testing is complete and in conformance with the requirements of this Section.

E. The City may arrange for a facility inspection by Cal-OSHA Consultation Service at any time. The Contractor shall make the necessary corrections to bring all work in conformance with Cal-OSHA requirements, all at no additional cost to the City.

F. Contractor will be Responsible for any Additional Cost for Overtime, Weekend Overtime or Differential Time, Expenses for Inspection of Defective Work that has to be re-inspected.

201-1.10 JOB CONDITIONS

A. The Contractor shall make all arrangements and pay the costs thereof for temporary services required during construction of the project, such as temporary electrical power and telephone service. Upon completion of the project, remove all temporary services, equipment, material and wiring from the site as the property of the Contractor.

B. The Contractor shall provide adequate protection for all equipment and materials during shipment, storage and construction. Equipment and materials shall be completely covered with two layers of plastic and set on cribbing six inches above grade so that they are protected from weather, wind, dust, water, or construction operations. Equipment shall not be stored outdoors without the approval of the Engineer. Where equipment is stored or installed in moist areas, such as unheated buildings, etc., provide an acceptable means to prevent moisture damage, such as a uniformly distributed heat source to prevent condensation.

C. The normal outdoor, not in direct sunlight, ambient temperature range of the job site will vary between 0 to 110 degrees Fahrenheit. All equipment shall be rated to operate in these temperature ranges or provisions for adequate heating and cooling shall be installed, at no additional cost to City.

D. The jobsite is prone to vandalism and theft. Contractor shall be responsible for securing all materials and equipment against theft and vandalism for the duration of the project.

E. Contractor & Subcontractors shall utilize temporary services during construction of the project.

201-1.11 SUBMITTAL AND DRAWING REQUIREMENTS

A. Electrical submittals shall be submitted by the General Contractor for review by the Engineer per this subsection. They shall be complete giving all details of connections, wiring, instruments, enclosures, materials and dimensions. Standard sales literature will not be acceptable.

B. A copy of the appropriate Specification Sections, with addendum updates included and with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.

   1. Check marks (√) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated and, therefore, requested by the Contractor, each deviation shall be underlined and denoted by a unique number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the Specifications.

   2. The submittal shall be accompanied by a detailed, written justification for each numbered item explaining variance or non-compliance with specifications.

   3. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no review.

C. The electrical submittals shall include but not be limited to data sheets and drawings for each product together with the technical bulletin or brochure. No FAX copies of documents are allowed. The electrical submittals shall include:

   1. Product (item) name used herein and on the Contract Drawings.

   2. The manufacturer's model or other designation.

3. Tag name/number per the drawings or schedules.
4. Index Binder Tab Dividers.
5. Detailed electrical one line, elementary control diagrams showing all wiring requirements for each system.
6. Complete documentation with full description of operation.
7. Complete catalog cuts with full description of equipment. General sales literature will not be acceptable. The part or model number with options to be provided shall be clearly identified. Where more than one item or catalog number appears on a catalog cut, the specific item(s) or catalog numbers(s) proposed shall be clearly identified.
8. Location of assembly at which it is installed.
9. Input-output characteristics.
10. Range, size, and graduations as required.
11. Physical size with dimensions and mounting details.
12. Enclosure fabrication and color.
13. Enclosure layout and elevation drawings to scale.
14. Quantity and quality requirements for electric power, air, and/or water supply.
15. Materials of construction of components.
16. Nameplate schedule.
17. Failure to provide submittals with heavy duty permanent plastic labeled index tabs may be grounds for immediate rejection without review.
18. A complete Bill of Materials list shall be provided at the inside of the front cover.
    a. The Contractor shall provide Bill of Material formatted as shown in Appendix "A." A separate set of Material Listing forms shall be provided for each MCC bucket, control panel and another listing all field equipment.
    b. Generic names or part numbers used by a distributor or Systems House are not acceptable; originating manufacturer's name and part number shall be listed.
19. A separate instrument data sheet shall be provided for each instrument per ISA S20 standards or approved equal. Provide an index with proper identification and cross-referencing of each data sheet.
20. Submit DVD disk copies of all submitted drawing in AutoCAD format.
21. For each resubmittal, provide a copy of submittal comments and a separate letter, on Company letterhead, identifying how each submittal comment has been addressed in the resubmittal.
22. Electronic PDF version of submittals shall be provided with table of contents regardless of hard copy format of submittal. PDF shall be "bookmarked" at each index, subtab, transmittal letter, copy of appropriate check marked Specification Section, bill of materials, copy of submittal comments (for resubmittals), Contractor's response to submittal comments (for resubmittals), drawings, etc. Bookmarks shall be descriptive of actual document, tab, etc. Failure to bookmark PDF or broken bookmarks may be grounds for immediate rejection without review. Bookmarks shall not be out of order; the English description shall match that listed in the Submittal's Table of Contents.
23. Electronic submissions of submittals may be provided for submittals less than 40 pages and without drawings. Submittals equal to or over 40 pages or those that contain drawings

shall be provided in a hardcopy format. Drawings shall be printed at 11 inches by 17 inches. Hardcopy submittals shall be provided in binders as specified herein. The Engineer reserves the right to reject submittals that fail to be organized as described herein.

D. All drawings shall be drawn using AutoCAD, drawn in a professional manner and submitted on 11" x 17" sheets of paper. Shop drawings shall be provided with minimum drafting details as illustrated on the Contract "electrical" series drawings. Diagrams shall carry a uniform and coordinated set of wire colors, wire numbers, and terminal block numbers. The shop drawings shall include:

1. Electrical one-line diagrams detailing all devices associated with the power distribution system. The following applicable information or data shall be shown on the one-line diagram: location, size and amperage rating of bus; size and amperage rating of wire or cable; breaker ratings, number of poles, and frame sizes; standby generator; automatic transfer switch, utility metering, voltage, amperage, number of wires and phases; fault interrupt ratings; ground size and connections; neutral size and connections; power fail and other protective devices; fuse size and type; distribution transformer; panelboard; starters; contactor size and overload range; motor full load amperage of submitted motor and horsepower; rating for miscellaneous loads; etc. Submit a list for each piece of equipment containing the motor voltage, phase and full load amps with one-lines for verification of accuracy of submitted one line drawings.
2. Elementary diagrams shall be provided for all relay logic, power supplies, PLC I/O and other wiring. All elementary diagrams shall be drawn in EMP/EGP format and standards similar to those shown on the Electrical elementary diagrams showing ladder rung numbers and coil and contact cross referencing numbers.
3. Enclosure and Elevation layout diagrams; show all front panel and backpan devices drawn to scale. Show fabrication methods and details; including material of construction, paint color, support and latching mechanisms, fans and ventilation system, and conduit entrance areas.
4. Analog and digital I/O wiring diagrams showing the wiring requirements for each instrument loop. Graphic symbols shall conform with ISA S5.4 drawing standards. A loop diagram shall be furnished for each analog and digital I/O process and all PLC I/O cards. Loop diagrams shall include the following as a minimum:
    a. The loop diagram shall be drawn with sufficient detail to express control philosophy. The diagram shall show all components and accessories of the instrument loop, highlighting special safety and other requirements. These diagrams shall be arranged to emphasize device elements and their functions as an aid to understanding the operation of a system and for maintaining or troubleshooting that system.
    b. A separate drawing shall be prepared for each analog and digital card. Each card shall be arranged on the diagram in the same order as the physical arrangement of the card terminations. All termination points on the diagram shall be shown with the actual equipment identification, device and relay terminal number or letter, and I/O point P&ID English descriptor and tag name. A separate drawing shall be prepared for each card.
    c. Energy sources - electrical power, air supply, pneumatic and hydraulic fluid supply, designating voltage, current, pressure, etc. shall be shown in detail on the diagram. Input and output signals (e.g., 1-5 VDC, 4-20 mA DC, 3-15 psig, etc.), power and instrument supplies to devices (e.g. 120 VAC, 24 VDC, 80 psig, etc.) shall be shown.

d. Engineering units shall be shown on the diagram. Each wire label, equipment identification terminal number or letter and color code shall be shown. Signal and DC polarities shall be shown.
e. All spare wires, cables and termination points shall be shown. All jumpers, grounding, shielding, power supply details shall be shown.

5. Submit drawings of all nameplates and tags, as specified herein, to be used on project. The Engineer has the right to adjust nameplate engraving titles during submittals at no additional cost to the City. Submittal to include the following:
   a. Dimensions of nameplate.
   b. Exact lettering and font for each nameplate.
   c. Color of nameplate.
   d. Color of lettering.
   e. Materials of construction.
   f. Method and materials for attachment.
   g. Drawing showing location of nameplate on each panel.
6. Copying contract drawings and providing them as submittals will be considered unresponsive and the submittal will be rejected without review.

E. Each submittal shall be bound in a three ring binder, which is sized such that when all material is inserted, the binder is not over 3/4 full. Binder construction shall allow easy removal of any page without complete manual disassembly; spiral ring type binders are not acceptable.
   1. Each binder shall be appropriately labeled on the outside spine & front cover with the project name, contract number, equipment supplier's name, specification section(s), and major material contained therein.
   2. An index shall be provided at the inside of the front cover. This index shall itemize the contents of each tab and sub tab section. Also, list the project name, contract number and equipment supplier's name, address, phone number, and contact person on the index page. Index dividers (tabs) shall be provided to separate each section.
   3. All copies shall be clear and legible. Data sheets shall be provided for each instrument, with an index and proper identification and cross-referencing.
   4. Exceptions to the Contract specifications or drawings shall be clearly defined by the equipment supplier.
      a. Data shall contain sufficient details so a proper evaluation may be made by the Engineer. Contractor shall provide separate letter (located in the front of the submittal) detailing specific exceptions to the Contract Specifications or Drawings.
      b. Exceptions that are noted in the marked-up Drawings or Specifications, but not listed on the Exceptions/Clarifications letter, will be considered as non-responsive and not accepted as changes to the Contract Documents.
   5. Request for information (RFIs) shall not be included in submittals. RFIs shall be submitted separately in its individual submittal number.
   6. Resubmittals shall be provided with a copy of the previous submittal comments and a separate letter, on company letterhead, identifying how each submittal comment has been addressed in the resubmittal.
   7. Failure to provide submittals with heavy duty permanent plastic labeled index tabs may be grounds for immediate rejection without review.

F. Field equipment shop documents, panel equipment shop documents, drawings, and bill of materials shall be grouped under separate tabs. Catalog cuts shall be ordered in the same sequence as their corresponding Contract specification subsection.

G. Catalog cuts shall be submitted grouped together by material and not scattered throughout the submittal intermingled with other material cut sheets (i.e. do not submit cut sheet for specific size conduit followed by cut sheet for specific size wire, and then cut sheet for different size conduit and different size wire. Group conduits together, group wires together, etc.)

H. Drawings shall be submitted in a separate hole-punched binder that covers the entire 11" X 17" length of the Drawing:

1. Shop Drawings with less than 20 sheets total in the submittal, may be provided in an 11½-inch by 17½-inch reinforced folder.
2. All Interconnection Drawings or Shop Drawings of 20 sheets or more shall be provided in separate heavy duty three-ring binder to allow drawings to be easily removed. Binder shall be Cardinal D-Ring Easy Open Ledger Binder with locking D-Rings or approved equal.
3. Failure to provide drawing submittal in correct binder format may be grounds for immediate rejection without review.
4. Each drawing title block shall contain the English description name for drawing contents (i.e. Lift Pump No. 1 Interconnect Drawing) and drawing number. All pages and drawings in the submittal shall be numbered sequentially (with no number skipped) in lower right hand corner.
5. Drawings that are "C" or "D" size shall be folded, with the title block visible and placed in reinforced clear plastic pockets.

I. Catalog cuts and drawings shall be submitted for all devices and components in the electrical system.

J. The Supplier shall coordinate submittals with the work so that project will not be delayed. This coordination shall include scheduling the different categories of submittals, so that one will not be delayed for lack of coordination with another.

K. No submittal documents shall be labeled as proprietary. Labeling documents as proprietary will be sufficient cause for rejection of entire submittal. The City reserves the right to copy or duplicate any and all portions of the documents provided for the project including copyrighted documents as desired.

L. Approval of submittals shall not relieve Contractor of their obligation to perform the work in strict accordance with this Contract and the Contract Documents or of their responsibility to provide a complete and reliable system.

M. No material or equipment shall be allowed at the job site until the submittal for such items has been favorably reviewed by the Engineer and marked "No Exceptions Taken" or "Make Corrections Noted."

N. Identify all submittals by submittal number on letter of transmittal. Submittals shall be numbered consecutively and resubmittals shall have a letter suffix. For example:

1. 1st submittal: 1.
2. 1st resubmittal: 1A.

3. 2nd resubmittal: 1B, etc.

O. The equipment specifications have prepared on the basis of the equipment first named in the Specifications. The Supplier shall note that the second named equipment, if given, is considered acceptable and equal equipment, but in some cases additional design, options, or modifications may be required, at no additional cost, to meet Specifications.

P. The decision of the Engineer governs what is acceptable as a substitution. If the Engineer considers it necessary, tests to determine equality of the proposed substitution shall be made, at the Supplier's expense, by an unbiased laboratory satisfactory to the Engineer.

Q. Electrical submittals shall be complete giving all details of connections, wiring, instruments, enclosures, materials and dimensions. Standard sales literature will not be acceptable.

201-2 PRODUCTS

201-2.01 QUALITY

A. It is the intent of the Contract specifications and drawings to secure the highest quality in all materials and equipment in order to facilitate operation and maintenance of the facility. All equipment and materials shall be new and the products of reputable suppliers having adequate experience in the manufacture of these particular items. For uniformity, only one manufacturer will be accepted for each type of product.

B. All equipment shall be designed for the service intended and shall be of rugged construction, of ample strength for all stresses that may occur during fabrication, transportation, erection, and continuous or intermittent operation. All equipment shall be adequately stayed and braced and anchored and shall be installed in a neat and workmanlike manner. Appearance and safety, as well as utility shall be given consideration in the design of details. All components and devices installed shall be standard items of industrial grade, unless otherwise noted, and shall be of sturdy and durable construction suitable for long, trouble free service. Light duty, fragile and competitive grade devices of doubtful durability shall not be used.

C. Products that are specified by manufacturer, trade name or catalog number established a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are favorably reviewed by the Engineer prior to installation.

D. Underwriters Laboratories (UL) listing is required for all substituted equipment when such a listing is available for the first named equipment.

E. When required by the Contract specifications or requested by the Engineer, the Contractor shall submit equipment or material samples for test or evaluation. The samples shall be furnished with information as to their source and prepared in such quantities and sizes as may be required for proper examination and tests, with all freight and charges prepaid. All samples shall be submitted before shipment of the equipment or material to the job site and in ample time to permit the making of proper tests, analyses, examinations, rejections, and resubmissions before incorporated into the work.

F. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without manual resetting or operator interaction when power is restored.

G. Signal transmission from remote or field electric and electronic devices shall be 4-20 mA, sourced by a 12 VDC or 24 VDC loop supply from the panel that is to receive the signal. Nonstandard transmission methods such as impulse duration, pulse rate, and voltage regulated will not be permitted except where specifically noted.

H. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission.

I. It is the System Supplier's responsibility to visit jobsite to collect and document existing conditions and equipment device part numbers in order for all similar called out new equipment to match existing.

201-2.02 NAMEPLATES AND TAGS

A. Equipment exterior nameplates - Nameplate material shall be rigid laminated black phenolic with beveled edges and white lettering; except for caution, warning, and danger nameplates the color shall be red with white lettering. The size of the nameplate shall be as shown on the drawings. No letters are allowed smaller than 3/16". Securely fasten nameplates in place using two stainless steel screws if the nameplate is not an integral part of the device. Epoxy cement or glued on nameplates will not be acceptable.

1. For each major piece of electrical equipment provide a manufacturer's nameplate showing the Contract specified name and number designation, the manufacturer's name, model designation, part number, serial number, and pertinent ratings such as voltage, amperage, # of phases, range, calibration, etc.
2. For each device with a specific identity (pushbutton, indicator, instrument, etc.) mounted on the exterior or deadfront of a piece of equipment provide a nameplate with the inscription as shown in the Contract documents. Where no inscription is indicated in the Contract documents, furnish nameplates with an appropriate inscription providing the name and number of device.
3. For all receptacles and switches (including devices located on Switchboard or MCC), provide a faceplate engraved or stamped with the panelboard and circuit number it is fed from. Also, include on faceplate or on a separate nameplate for each light switch identification use such as "OUTSIDE BUILDING LIGHTS," "PERIMETER LIGHTS," "MCC ROOM," etc.
4. All field instruments and devices shall be labeled with designation shown on P&ID diagrams.
5. All transformers and panelboards shall have nameplates with ½" high letters and be engraved with designations as shown on one-line Drawings.
6. All safety and disconnect switches shall have nameplates with ½" high letters and be engraved with designations as shown on one-line drawings.
7. Underground Pull Box and Vault Cover Identification: Engrave or bead weld pull box covers with minimum 1/4"thickness and 1/2" letters and Covers shall be engraved with designations as shown on Contract drawings or as directed by Engineer.
8. Aboveground Pull Box Cover Identification: 316 stainless steel screws attached stamped 316 stainless steel plate nameplates with 1/2" letters and be engraved with designations as shown on Contract drawings or as directed by Engineer.
9. Provide engraved nameplate at service entrance equipment (red with 1" white lettering) indicating type and location of standby generator per NEC 702.7 (A).

10. Provide engraved nameplate at service entrance equipment per NEC 702.7(B)
11. METERING – Service Equipment Label: Per NEC 110.24 (A) Service equipment shall be legibly marked in field with the maximum available fault current. Field marking shall include date the fault current calculation was performed and be weather & UV rated. Service equipment shall not be hand labeled.
12. All subpanels shall be identified with an engraved phenolic label of the power source location feeding it (i.e. MCC-100, Panelboard LP-1, etc.)
13. Specific equipment fed from more than one feeder shall be properly identified ("Fed from Pedestal and the standby generator") with 1" lettering.

B. Equipment Interior Nameplates - Nameplate material shall be clear plastic with black machine printed lettering as produced by a KROY or similar machine; except caution, warning, and danger nameplates shall have red lettering.
   1. The size of the nameplate tape shall be no smaller than 2" in height with 3/8" lettering unless otherwise approved by the Engineer. Securely fasten nameplates in place on a clean surface using the adhesion of the tape. Add additional clear glue to hold the nameplate securely in place when necessary.
   2. For each device with a specific identity (relay, module, power supply, fuse, terminal block, etc.) mounted in the interior of a piece of equipment provide a nameplate with the inscription as shown in the Contract documents. Where no inscription is indicated in the Contract documents, furnish nameplates with an appropriate inscription providing the name and number of device used on the submittal drawings.
   3. Nameplates shall not be attached to wireway covers or to removable devices.
   4. For all receptacles and switches (including devices located in Control Panel, provide a faceplate printed with the panelboard and circuit number it is fed from.

C. Equipment Tags - When there is no space or it is impractical to attach an engraved phenolic nameplate with screws, as is the case with most field devices and instruments, the Contractor shall attach a tag to the equipment with the same inscriptions as specified above in paragraph A. The tag shall be made from stainless steel material and the size of the nameplate shall be no smaller than 3/8"h x 2"w with 3/16" machine printed or engraved lettering unless otherwise approved by the Engineer. Securely fasten tags in place using 316 stainless steel 0.048 inch diameter wire of the type normally used for this purpose (catalog cut sheet shall be submitted). Stainless steel wire shall be crimp connected. Twisting ends together is not acceptable.

D. Engrave or machine print the tags with inscriptions as approved by the Engineer in the nameplate submittal.

E. Provide temporary labels for all instruments and devices immediately when installed. Temporary labels shall be provided with 1/2" letters minimum and labeled with P&ID tag number.

201-2.03 WIRE

A. This section applies to all wires or conductors used internal for all electrical equipment or external for field wiring. All wires shall be properly fused or protected by a breaker at the amperage rating allowed by the NEC.

B. Material - Wire shall be new, plainly marked with UL label, gauge, voltage, type of insulation, and manufacturer's name. All wire shall conform to the following:

1. Conductors shall be copper, with a minimum of 98% conductivity.
2. Wire shall be Class B stranded.
3. Insulation of all conductors and cables shall be rated 600 volt.
4. Insulation type for conductors smaller than #10 AWG shall be moisture and heat resistant thermoplastic THWN, rated 90 °C in dry locations and 75 °C in wet locations, or approved equal aboveground. Conductors #10 AWG and larger shall be RHW-XLP insulation rated unless otherwise noted 90 °C in dry locations and 75 °C in wet locations.
5. Field wire minimum AWG sizes:
   a. #12 for wires used for individual conductor circuits 100 volt and above.
   b. #14 for wires used for individual conductor circuits below 100 volt.
6. Nonfield or equipment wire minimum AWG sizes:
   a. #14 for wires used for individual conductor circuits 100 volt and above.
   b. #18 for wires used for individual conductor circuits below 100 volt.
7. Instrument wiring:
   a. General: Instrument cables shall have 600V rated insulation and 100% individual shielded twisted pair #18 conductors with drain wire. Single twisted shielded pair (T.S.PR.) cables shall be Belden, or approved equal.

C. Color code - color code of all wire shall conform with the following table:

WIRES COLOR CODE TABLE

DESCRIPTION	PHASE/CODE LETTER	FIELD WIRE WIRE OR TAPE COLOR	NON-FIELD WIRE COLOR
480 V, 3 PHASE	A	BROWN	BROWN
	B	ORANGE	ORANGE
	C	YELLOW	YELLOW
240 V or 208 V, 3P	A	BLACK	-
	B	RED (ORANGE if high leg)	-
	C	BLUE	-

DESCRIPTION	PHASE/CODE LETTER	FIELD WIRE WIRE OR TAPE COLOR	NON-FIELD WIRE COLOR
240 / 120 V, 1 P	L1	BLACK	BLACK
	L2	RED	-
12V POSITIVE	12P	DARK BLUE	DARK BLUE
12V NEGATIVE	12N	BLACK/RED STRIPE	BLACK/RED STRIPE
24V POSITIVE	24P	PINK	PINK
24V NEGATIVE	24N	BLACK/WHITE STRIPE	BLACK/WHITE STRIPE
AC CONTROL		VIOLET	RED (YELLOW FOR FOREIGN CIRCUITS)
DC CONTROL		BLUE	BLUE
NEUTRAL	N	WHITE	WHITE
GROUND	G	GREEN	GREEN
SHIELDED PAIR	+	BLACK	RED
	-	CLEAR (WHITE)	BLACK

1. High leg of open delta shall be colored orange per NEC 110.15.
2. The same color shall be connected to the same phase throughout the panel.
3. All wires shall be properly fused or protected by a breaker at the amperage rating allowed by the NEC.
4. Neutral used for AC Control shall be white.
5. Phase color insulation shall be provided for complete length of #8 wire or smaller; colored phase tape is not allowed on #8 and smaller wire.

D. Wire Marking:

1. Wire identification: All wire terminations including field interconnect as well as wiring interior MCC cubicles, switchboard, panels, equipment, junction panels and boxes shall be identified with machine printed labels. Hand lettered labels are not acceptable and shall be replaced at the Contractor's expense. The wire identification code for all field

interconnect and panel interior wiring, shall be similar to the designations shown on the Contract example drawings.

2. Wire Labels: The labels shall be machine printed with indelible ink, heat shrink type capable of accepting a minimum of 23 machine printed characters per sleeve label by Brady “Bradysleeve” or equal. Labeling shall be neatly installed for visibility and shall be clearly legible. Each wire and conductor shall be labeled with wire label as shown on approved loop, and elementary Drawings. Labels shall not be wrap-around or snap-on type.
3. Where there is insufficient space for labels on locally interconnected neutral wires such as jumpers between adjacent auxiliary relay coil neutral terminals, these labels may be omitted. "Locally" is defined as wires no longer than 8".
4. Wire labels for lighting and receptacles shall be installed and consist of the panelboard and circuit number (i.e., Panelboard “LP1”, circuit breaker #3 would have wire label line “LP1-L3” and neutral “LP1-N3”).
5. Ethernet patch cables shall be labeled with primary devices it is connected to (i.e. “PLC”, “OI”, etc.).
6. All spare wires shall be labeled with equipment number followed by SP1, SP2, etc. (i.e. P11001-SP1 for first spare wire).
7. All control and signal wiring terminations shall have the correct wire label applied prior to making connection.
8. Ethernet patch cables and fiber cables shall be labeled with primary devices it is connected to (i.e. “PLC,” “OI,” “PLC-2,” etc.). Label shall be white plastic with black machine printed lettering as produced by a KROY or similar machine with lettering no smaller than 3/8”. Securely attach to cable with clear tape.

E. SPECIAL PURPOSE WIRING

1. Manufacturer Supplied Cables (MNFR CBL): Cables and wiring for special systems shall be provided by the manufacturer with the equipment and installed per the manufacturer's recommendations.
2. Indoor CAT 6 communication cable meet the following requirements:
    a. TIA/EIA-568-A Category 6 100 MHz specifications.
    b. #24 AWG solid bare copper conductor, 4 twisted pairs.
    c. Thermoplastic Dielectric type.
    d. Shielded bulk cable.
    e. PVC jacket.
    f. Nominal Impedance: 100 ohms.
    g. Nominal capacitance: 20 pf/ft maximum.
    h. UL listed.
    i. Non-plenum usage rated when routed in conduit.
    j. Plenum usage rated when routed in plenum spaces.
3. Generator Lead Cables: Generator lead cable have very flexible Class K (30 awg) stranding with PVC insulation and jacket. Cable shall be rated for 600 volt, 90 deg C. and be oil and gas resistant. Cable shall be Carol Diesel Locomotive Cable or approved equal.

201-2.04 CONDUIT, RACEWAYS, AND WIREWAYS

A. GENERAL - Conduit, raceways, and wireways, wiring methods, materials, installation shall meet all requirements of the NEC, be UL labeled for the application, and meet the minimum following specifications.

1. All wiring shall be installed in conduits, raceways, or wireways when interconnecting equipment and devices.
2. The Contractor shall use special conduit, raceways, wireways, construction methods, and materials as shown on the Contract drawings; which shall take precedence over any general methods and materials specified in this Section.
3. The minimum size conduit shall be ¾-inch unless indicated otherwise on the Drawings or for special connections to equipment. Buried, encased, or conduits located in walls shall be 1-inch minimum.
4. Conduit stubs for future use shall be capped with coupling, nipple, plug and cap and each end identified with conduit labels.
5. Conduits to be abandoned that protrude above graded shall be cut flush and filled with grout
6. Conduits shall not be filled to more than 50% of their total cross – sectional area.
7. Conduit Marking
    a. All conduits and raceways listed in Conduit & Wire Routing Schedule shall have conduit tags at both ends of each conduit segment. This includes all conduits in pullboxes and vaults.
    b. Tag material shall be aluminum with machine stamped lettering. The size of the tag shall be 2” diameter. No letters are allowed smaller than 7/16". Securely fasten tags in place using 316 stainless steel 0.048 inch diameter wire of the type normally used for this purpose (catalog cut sheet shall be submitted). Stainless steel wire shall be crimp connected. Twisting ends together is not acceptable. Engrave the tags with the conduit number as listed in the conduit schedule on the Contract "E"-series Drawings. Labeling shall be neatly installed for visibility and shall be clearly legible.
    c. Prior to encasement, concealment, backfilling of conduits, temporary conduit labels shall be provided at each end of conduit. Temporary conduit labels shall have ½-inch (minimum) lettering at all transition points. After encasement and concealment temporary conduit labels shall be placed at each exposed end.
8. Warning Tapes
    a. Plastic tape shall be colored for particular underground service, 3-inch minimum width, utilize tape made of material resistant to corrosive soil. Tape shall have aluminum backing to facilitate locating it underground using a non-ferrous locator. Use red tape for “Electric” service and orange tape for “Communication” service. Use tape with printed wording listing type of service. Manufacturers and types: Seton, Blackburn, Griffolyn Co., Terra-Tape, Brady or equivalent.

B. Galvanized Rigid Steel Conduit (GRS)

1. Rigid steel conduit, couplings, bends and nipples shall be in accordance with ANSI C80.1 and UL-6.
2. Hotdip galvanized inside and outside after fabrication and then coated with a zinc bichromate finish. Provide threaded type fittings, couplings, and connectors; set screw type and compression type are not acceptable.

3. Minimum trade size - three-quarters inch (¾") unless otherwise shown on Contract Drawings.
4. Conduits entering enclosures shall be fitted with locknut and insulated grounding bushing; O-Z "HBLG", Appleton "GIB", or approved equal. All grounding bushings shall be tied to the grounding system with properly sized bonding conductors per the NEC code.
5. Galvanized rigid steel factory elbows for 90 degree transitions.
6. EMT or IMC is not considered an equivalent to GRS.
7. GRS conduit is allowed only when specifically called out in the “Conduit and Wire Routing Schedule.”

C. Galvanized Rigid Steel Conduit - PVC Coated (GRS-PVC)

1. Standard weight, galvanized rigid steel conduit with a 40-mil thick polyvinylchloride coating bonded to both the outside and urethane interior coating. Conduit shall be hot-dip galvanized conforming to NEMA RN 1. GRS-PVC conduit and fittings to be Robroy Plasti-bond Red or approved equal.
2. Provide PVC coated galvanized rigid steel factory ells for 90 degree transitions.
3. Fittings and boxes shall be stainless steel or galvanized cast ferrous metal with a PVC 40 mils thick coating. Provide threaded-type fittings, couplings, and connectors; set-screw type and compression-type are not acceptable.
4. All junction boxes shall be galvanized with exterior surfaces PVC coated to 40 mils thickness, except where stainless steel boxes are called out.
5. Conduits entering enclosures shall be fitted with locknut and insulated grounding bushing; O-Z "HBLG", Appleton "GIB", or approved equal. All grounding bushings shall be tied to the grounding system with properly sized bonding conductors per the NEC code.
6. Support channel and pipe straps shall be PVC coated. Exposed metal/nuts, all-thread rod shall be 316 stainless steel.
7. PVC coating patching material shall be as provided by the manufacturer.
8. PVC coated Aluminum conduit is not acceptable.

D. PVC Conduit, (PVC-80)

1. Shall be high impact polyvinylchloride suitable for use underground, direct burial and for use with 90 C wires, and shall conform to UL 651. Shall be UL listed and labeled for "direct" burial. PVC-40 is unacceptable.
2. A copper bonding conductor shall be pulled in each raceway and bonded to equipment at each end with approved lugs.
3. Each underground run shall be placed in a trench with a minimum of four (4) inch sand bed evenly compacted on all sides, top and bottom.
4. Bends, elbows, and risers shall be made with galvanized rigid steel (GRS) conduit using threaded adapters. Bond each metallic portion to each other and to equipment connected at each end of conduit run.
5. PVC fittings shall have solvent-weld-type conduit connections.
6. PVC conduit shall be stored on a flat surface and shielded from the sun.
7. PVC conduit shall not be used above grade.
8. PVC-40 conduit shall not be used in place of PVC-80 conduit.

E. Liquid Tight Flexible Metal Conduit - (SEAL TIGHT)

1. Minimum trade size one-half inch (1/2").
2. All flex conduits shall have water tight outer jackets.
3. Connectors:
   a. Non-NEMA 1 or 12 areas: PVC coated metallic with insulated bushings.
   b. NEMA 1 or 12 areas: Metallic with insulated bushings.
4. Flexible conduit lengths shall not be greater than 36 inches.
5. Flexible metallic conduit shall not be considered as a ground conductor, install a separate wire for equipment bonding.
6. Flexible conduit shall only be installed in exposed or accessible locations.
7. Flexible conduits shall be used for conduit coupling to all vibrating and shifting equipment.

201-2.05 DEVICES

A. Fuses

1. Fuses used in circuits 200 VAC and above shall be time- delay type FNQ or approved equal, 13/32" x 1½", and have an interrupting rating of 10,000 AIC at 500 VAC. Fuse holders shall be of the barrier type and rated 600 VAC.
2. Fuses used in 120 VAC shall be time-delay type MDL or approved equal, 1/4" x 1¼", and have a rating of 250 VAC. Fuse-holders shall be of the terminal block type.
3. Fuses used in signal and 24 VDC circuits shall be fast acting type ABC or approved equal, ¼" x 1¼", and have an rating of 250 VAC. Fuse-holders shall be of the terminal block type.
4. Fuses shall be sized in conformance with the NEC.

B. Switches and Pushbuttons

1. Switches (HS) and pushbuttons (HC) for general purpose applications shall be water and oil tight as defined by NEMA 4X, corrosion resistant as defined by NEMA ICS 6-110.58, U.L. listed, standard 30 mm diameter, with round plastic clamp ring. Switches shall be Allen-Bradley 800H, IDEC ITE, or equal.
2. Switches and pushbuttons shall have contacts rated 10 amperes continuous and 600 VAC. Contract blocks shall have IP2X finger-safe protection.
3. Manufacturer's standard size legend plates shall be provided and engraved to specify each switch and pushbutton function. The legend plate color shall be black.
4. Selector switch handles and pushbutton caps shall be black.
5. Selector Switch Positions
   a. Hand-off-auto (HOA) applications shall have the hand position to the left, off in center, and auto in the right position.
   b. On/Off shall have the ON position to the right.
   c. Local/Remote shall have the REMOTE position to the right.
   d. Open-Close-Auto applications shall have the open position to the left, close in center, and auto in the right position.
6. Lockout stop shall be a pushbutton with red cap and pad locking assembly for pushbutton.
7. Potentiometers shall be 10K ohm, single turn, finger safe.

8. Illuminated Switches (HS) for general purpose applications shall be water and oil tight as defined by NEMA 4, U.L. listed, standard 22 mm diameter, with round plastic clamp ring, maintained switch, blue lens. Switches shall be Schneider XB4 with LED lamp module, GE, or equal.

C. Relays and Timers

1. General: Relays and timers shall be provided with N.O. or N.C. contacts as shown on the Contract drawings. All spare contacts shown shall be provided. Contacts shall be rated 10 amps minimum at 120 VAC, 60 Hz unless otherwise stated. Supply power or coil voltage shall be 120 VAC unless shown otherwise on the Contract drawings. Relays and timers shall be designed for continuous duty. All relays shall be U.L. listed. The following is a summary of abbreviations associated with relays and timers:

   CR - Control Relay

   TR - Timing Relay

   PFR - Power Fail Relay

   TDOE - Time Delay On Energization

   TDOD - Time Delay On De-Energization

2. Control Power relays (CR) shall be plug-in type with indicating lights and clear see-through sealed or enclosed housing to exclude dust. Sockets for plug-in relays shall be standard industrial type octal 8 or 11 pin with barrier pressure screw terminals. Provide IDEC Type RR, or approved equal. Two form-C contacts (minimum) shall be provided on each relay.

3. Interposing PLC Control relays (CR) shall be plug-in type with indicating lights enclosed housing to exclude dust. Provide Finder 4C series or approved equal.

4. Time delay relays (TR) on energization or de-energization shall be solid state plug-in relays with a timer adjustable over the range 1 second to 3 minutes unless other ranges are indicated or required. Provide LED timer energized indicator lamp. Sockets for plug-in timers shall be standard industrial type octal 8 or 11 pin with barriered pressure screw terminals. Time delay relays shall be IDEC RTE, SSAC TD, or approved equal.

5. The power fail relay (PFR) shall continuously monitor the three phases for power loss, low voltage, phase loss, and phase reversal. The power fail monitor shall have a drop-out voltage adjustment, an adjustable delay on make time delay (0.2 to 8.0 minutes) and a status indicating LED. Power fail relays shall be Diversified SLJ, Time Mark, or approved equal.

D. Indicating Lights

1. Indicating Lights for general purpose applications shall be water and oil tight as defined by NEMA 4X, corrosion resistant as defined by NEMA ICS 6-110.58, U.L. listed, High intensity multi-chip LEDs, full voltage (unless shown otherwise), standard 30 mm diameter, with round plastic lens and miniature bayonet lamp base. Indication lights shall be Allen-Bradley 800H, IDEC ALD, or approved equal.

2. Manufacturer's standard size legend plates shall be provided and engraved to specify each light's function. The legend plate color shall be black.

3. Indicating lights designated "PTT" shall be provided with a push-to-test switch and wiring.

4. Indicating light type and color of lens shall be as shown on the Drawings or specified in the Contract documents.

E. Circuit Breakers

1. Circuit breakers shall be of the indicating type, providing ON, OFF and TRIPPED positions of the operating handle. Circuit breakers shall be quick-make, quick-break, with a thermal-magnetic (TM) action or Motor Circuit Protectors (MCP) as shown on One-Line Diagrams. Circuit breakers shall be the bolted on type. The use of tandem or dual circuit breakers in a normal single-pole space to provide the number of poles or spaces specified are not acceptable. All multiple-pole circuit breakers shall be designed so that an overload on one pole automatically causes all poles to open. Circuit breakers and motor circuit protectors shall be manufactured by Eaton, G.E., ITE, or approved equal.
2. Each 480 volt or 240V circuit breaker shall have a minimum interrupting capacity of 35,000 amperes. Each 120 volt breaker shall be rated for a minimum 10,000 amperes interrupting capacity. Breakers shall be sized as shown on Drawings and as necessary for the supplied equipment.
3. Fused disconnects shall not be used in place of breakers.
4. All breakers shall be supplied with the correct sized copper only lugs for wire sizes as listed in “Conduit & Wire Routing Schedule”. Provide larger frame breaker or lug adapters as necessary when connecting to the listed oversized wire.

F. Terminal Blocks

1. Control Panel Terminal Blocks
    a. Terminal blocks to be clamp type, 6mm spacing, and 600 volt, minimum rating of 30 amps, and mounted on DIN rail, Entrelec M4/6 colored, Weidemuller or approved equal. DIN rail shall be same type as used for the relays. Install an extra DIN rail on each type of terminal strip with 4 terminals for future additions.
    b. Provide terminal blocks with "follower" plates which compress the wires and have wire guide tangs for ease of maintenance. Terminal blocks which compress the wires with direct screw compression are unacceptable. All power, control and instrument wires entering and leaving a compartment shall terminate on terminal blocks with wire numbers on terminals and on both ends of the wires.
    c. Terminal Tags and Markers: Each terminal strip shall have a unique identifying alphanumeric code at one end (i.e.: TB1, TB2, etc.) and plastic marking strip running the entire length with a unique number for each terminal. On each terminal strip, terminal numbers shall be assigned starting with #1 at one end, incrementing in alphanumerical order (i.e.: 1,2,3,4...). Numbers shall be assigned to all blocks except grounding blocks. Fuse blocks shall be assigned unique tag numbers such as FU1, FU2. No two fuses shall be assigned the same tag number.
    d. Plastic marking tabs shall be provided to label each terminal block. These marking tabs shall have a unique number/letter for each terminal which is identical to the "elementary" and "loop" diagram wire designation. Numbers on these marking strips shall be machine printed and 1/8 inch high minimum.
    e. Terminal blocks shall be physically separated into groups by the level of signal and voltage served. Power and control wiring above 100 volts shall have a separate group of terminal blocks from terminal blocks for wiring below 100 volts, intermixing of these two types of wiring on the same group of terminal blocks is not allowed.
    f. Provide a ground terminal or connection point for each grounding conductor.
    g. Provide a separate common or neutral terminal for every two (maximum) inputs and/or outputs.
2. Power Termination Blocks shall be rated for 600V main power connection. The power termination blocks shall be rated to accept Copper or Aluminum cable rated as shown on

Contract one-line diagrams. The power termination block shall be capable of being mounted anywhere in a termination box. Each termination block shall be provided with lug shield to prevent contact with power connections. The power termination blocks shall be Connectron or approved equal.

G. Boxes

1. Device boxes shall be cast or galvanized steel type with shape and size best suited for the particular application, rated for the location installed, and shall be supported directly to support structure by means of stainless steel screws, anchors, or bolts.
2. Box dimensions shall be in accordance with size, quantity of conductors, and conduit clearances per NEC 314 requirements.
3. Boxes exposed to the weather or in moist locations where GRS-PVC conduits are to be used shall be weatherproof (WP) PVC coated cast type with threaded hubs or stainless steel with watertight Myers hubs.
4. Non-Weatherproof Boxes Surface boxes shall be cast ferrous, deep FD type.
5. Weatherproof Boxes PVC-coated cast ferrous boxes may be used in place of 316 stainless steel boxes, except where boxes contain devices on cover. Boxes shall be deep, FD type. Single gang boxes shall have cast hubs.

H. Switches

1. General purpose switches shall be manufactured in accordance with UL 20. Switches shall be one pole rated, 20 amps, at 277 VAC. Bodies shall be of ivory phenolic compound supported by mounting strap having plaster ears. Switches shall have copper alloy contact arm with silver cadmium oxide contacts. Switches shall have slotted terminal screws and a separate green grounding screw. Furnish Hubbell 1221, Leviton, or approved equal.

I. Receptacles

1. General purpose receptacles shall be duplex and rated 20 amps, 120 VAC, 2 pole, 3 wire grounding, NEMA 5-20R configuration, specification grade, and side wired to screw terminals. Face color shall be brown in industrial areas and white or ivory in finished areas. General purpose receptacles shall be Bryant, Hubbell, or approved equal.
2. GFI (ground fault circuit interrupting) receptacles shall be used for providing power to miscellaneous cord powered equipment. GFI receptacles shall be duplex, 20A, 120V, with "test" and "reset" buttons with shallow design for mounting and standard screw terminals for direct wiring. Receptacles shall be designed, manufactured, and tested to prevent nuisance tripping from voltage spikes, RFI, EMI, or electronic component failures. Chaining multiple receptacles from one GFI unit is not acceptable. GFI receptacles shall be Arrow-Hart "specification grade", Leviton, or approved equal.

J. Device Plates and Covers

1. General purpose device plates and covers shall be anodized aluminum. Plates or covers shall be attached with stainless steel screws. Circuit breaker number and panelboard name shall be stamped on each cover.
2. PVC coated device boxes shall have PVC coated gasketed covers.
3. Weatherproof switch, outlet, and receptacle boxes shall be fitted with gasketed covers rated for wet locations in accordance with NEC 406.9.

4. Weatherproof switch, outlet, and receptacle boxes shall be fitted with cast aluminum gasketed cover rated for wet locations. Each receptacle access cover shall have a gasketed spring door to maintain the weatherproof integrity with plug inserted in accordance with NEC 406.9 for unattended locations. Final decision of type of access cover for specific location shall be per Engineer. Screws and hinge springs shall be 316 stainless steel. Receptacles located outside shall have tumbler key lock.
5. Weatherproof access covers shall be Hubbell, Crouse-Hinds, or TayMac Safety Outlet Enclosures, or approved equal.
6. Receptacle and light switch plates shall be stamped or engraved as specified herein.

201-2.06 ELECTRICAL ENCLOSURES AND BOXES

A. Enclosures and boxes to be wall mounted, minimum 14 gauge, type 316 stainless steel with seams continuously welded & ground smooth, and fast access door latches. A copper ground bus shall be provided in the enclosure. Outer door shall have provisions for locking enclosure with standard padlock. Provide white backpan in box.

B. Provide larger enclosure as required to accommodate the supplied equipment at no additional cost to the City.

C. Provide accessories consisting of breaker to disconnect incoming power, heater, fan, louvers, ground bus, and thermostats.

D. Provide metal data pocket within each enclosure and box to hold as-built drawings.

E. All panel doors shall be installed with ground straps.

F. Panels shall be provided with engraved nameplate identifying name of panel, voltage and location of power source feeding it (i.e. MCC-100, Panelboard LP-1, etc.). Engraved nameplate shall be as specified herein.

G. Enclosure shall be Hoffman, Circle AW or approved equal.

201-2.07 FIELD DEVICES

A. Level Transmitter: The float level transmitter shall be a 4-20 mA linear transmitting device proportional to the level. Float, stem, and mounting material shall be stainless steel suitable for this application. Power supply for transmitter to be 24 VDC. Level transmitter shall be Gems XT-800 series or approved equal.

B. Digital Indicator shall be an electronic, 24VDC, 4-20 mA input, 4-20mA output, 4 digit red LCD display with 1.2" characters. Display intensity shall be adjustable in the field. Unit shall have automatic local minimum and maximum value stored on unit. The indicators shall be scaled in the actual engineering units with the proper range rather than generic units of 0 to 100%. Indicators shall have a NEMA 4X front panel. Temperature operating range shall be from -40° to +65° Centigrade. Provide all necessary power supplies and installation components for a complete and operable system. The indicator shall be Precision Digital PD765, Red Lion, Newport, or approved equal.

C. Magnetic flowmeter:

1. Flange connections shall be ANSI Class 150 as required by mechanical Drawings. Flanges shall be coordinated with Contractor installing piping. Flange shall be slip-on, raised-face, carbon steel.
2. Stainless steel grounding rings shall be provided at both ends of the flow tube when required by the manufacturer. The tube internal liner material shall be polyurethane, unless recommended otherwise by the manufacturer for the application and approved by the Engineer. Electrode material shall be 316 stainless steel and shall be flush type. The meter shall incorporate a high impedance amplifier of 100,000 Megohms or greater, eliminating the need for electrode cleaning systems.
3. The converter electronics shall be mounted remotely as shown on Contract Drawings. The converter shall be microprocessor controlled, utilizing digital signal processing with automatic zero correction to provide a linear 4-20 mA signal proportional to the forward and reverse flow rate specified. Electronics shall provide and control output rated for 120VAC. Rangeability shall be field adjustable over a 100 to 1 range. Field adjustable signal dampening shall be provided. Low flow cutoff shall be provided to eliminate flow transients when no flow is present in the pipe. A rate indicator and totalizer scaled in engineering units shall be provided and shall be viewable on a LCD display(s) through a clear window in the enclosure. The converter shall have self-diagnostics which constantly check for proper operation. If a failure occurs, a fault indication shall be provided to notify the operator of a problem. The converter shall contain a self-test mode to allow theoperator to manually simulate the output 4-20 mA signal to any value between 0% and 100% to check out any driven devices in the loop. The converter shall be rated to operate in an ambient temperature range from -4°F to 131°F.
4. The converter electronics shall be designed for operation from a power source of 120VAC, with a power consumption of less than 24 watts.
5. When converter electronics are shown to be mounted remotely, additional special cabling without any splices (Cabling between flow element and remote mounted flow indicating transmitter; field verify), mounting hardware, and devices necessary to complete the installation shall be provided by the manufacturer at no additional cost to the Owner.
6. Electronics shall be provided in NEMA rated enclosures specified in Instrumentation and Device Index.
7. The meter shall be hydraulically calibrated at a facility located in the United States and the calibration shall be traceable to the National Bureau of Standards. A certified copy of the calibration test results shall be submitted to the Owner prior to shipment of the meter.
8. The accuracy of the complete metering system including flow tube and converter electronics shall be 0.25% of rate over the range settings of 0.033 to 33 feet per second. Variations in temperature, voltage, and frequency within the ranges listed herein shall not affect the accuracy in excess of 0.5% of flow rate. Where shown, the flowmeter shall be accidental submergence proof for forty-eight house under 30 feet of water. Conduits between flowmeter element and electronics shall be sealed to retain submergence rating per flowmeter manufacturer's requirements.
9. Conduit entry shall be 1-2-14NPT.
10. The flow meter shall be Rosemount with converter/indicator 8750W to match City Standard. Model numbers for flowmeter equipment to be verified during submittal review are as follows:
    a. 8” Flowmeter with Transmitter Model: 8750WDMW1A1FPSA080CA1M4G1DA2Q4
    b. 18” Flowmeter with Transmitter Model:8750WDMW1A1FPSA180CA1M4G1DA2Q4

c. Flowmeter Cable Model: 08732-0065-2001 No substitutions will be accepted.

D. SCADA Antenna: Yagi Directional Antenna shall be 150-164 MHz antenna manufactured by Scala, Part # YA7-155/URM, to match City Standard. No substitutions will be accepted.

201-2.08 MAIN SWITCHBOARD

A. General

1. Furnish a free-standing, dead-front type, main switchboard with breakers, and other devices shown on Contract Elevation diagrams. The voltage and amperage rating shall be as shown on Contract Drawings. It shall consist of the required number of vertical sections shown on Contract Drawings bolted together to form a rigid assembly.
2. The switchboard shall comply with the latest applicable standards of NEMA PB-2 and UL Standard 981. The assembly shall bear a UL label.
3. Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished as required. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.
4. The assembly shall be provided with adequate lifting means and shall be capable of being moved into installation position and bolted directly to the floor without the use of floor sills. All necessary hardware to secure the assembly in place shall be provided by the Contractor.
5. The switchboard shall be arranged as shown on Contract Drawings. If the proposed arrangements are significantly different than those shown on the Contract Drawings, then the Contractor shall consult with the Engineer and provide proposed layout and catalog cuts prior to first submittal.
6. The switchboard manufacturer shall cooperate with the Contractor by promptly supplying dimensional or other required information prior to delivery of equipment.
7. The switchboard shall be manufactured by Eaton, Square D, ITT, or approved equal.

B. Construction:

1. The switchboard shall be NEMA rated as shown on Contract Drawing and constructed of code gauge galvanized steel fully finished with two coats of baked grey enamel paint.
2. All sections of the switchboard shall align front and rear with depth as shown on the Drawings. Front access shall allow for installation, maintenance and servicing of all components. Switchboard shall not require back or side access for connection of cables or maintenance.
3. All edges of front covers or hinged front panels shall be formed.
4. All control wire shall be type THWN, bundled and secured with nylon ties. Insulated locking spade terminals shall be provided for all control connections, except where saddle type terminals are provided integral to a device. All current transformer secondary leads shall first be connected to conveniently accessible short circuit terminal blocks before connecting to any other device. All groups of control wires leaving the switchboard shall be provided with terminal blocks with suitable numbering strips. Provide wire markers at each end of all control wiring.

C. Short circuit rating:

1. The complete bus assembly and breakers shall be rated to withstand mechanical forces exerted during short circuit conditions when connected directly to a power source having available fault current listed on Contract one-line Drawings at rated 480 volts.
2. Per NEC 110.24 (A) Service equipment shall be legibly marked in field with the maximum available fault current. Field marking shall include date the fault current calculation was performed and be weather & UV rated. Service equipment shall not be hand labeled.

D. Bussing:

1. All bus bars shall be tin plated copper. Bus sizing shall be based on NEMA standard temperature rise criteria of 65 degrees Celsius over a 40 degrees Celsius ambient (outside the enclosure).
2. A copper ground bus shall be furnished firmly secured to each vertical section structure and shall extend the entire length of the switchboard.
3. All hardware used on conductors shall be high-tensile strength and zinc plated. All bus joints shall be provided with Bellville washers.

E. Main circuit breakers:

1. Each breaker shall be three-pole unit, electrically, and mechanically trip-free power circuit breaker with solid state overcurrent trip device. Breaker arrangement, trip, and frame ratings shall be as shown on Contract single-line diagram.
2. Each breaker shall have a hasp for padlocking the breaker in the OFF position. Each breaker shall be thermal magnetic (TM) type.
3. Tripping devices shall be automatic and self-contained within the breaker frame, and shall not require any external relaying or power supplies.
4. Circuit breakers shall be open frame, Cutler-Hammer, GE or approved equal.

F. Testing:

1. The switchboard shall be completely assembled, wired and tested at the factory. After assembly, the complete switchboard will be tested for operation under simulated service conditions to assure the accuracy of the wiring and the functioning of all equipment. The main bus shall be given a dielectric test of 2200 volts for one minute between live parts and ground and between opposite polarities. A certified test report of all tests shall be submitted to the Engineer for approval.

201-2.09 AUTOMATIC TRANSFER SWITCH

A. Switch Unit

1. The transfer switch unit shall be electrically operated and mechanically held. The electrical operator shall be a single solenoid mechanism, momentarily energized to minimize power consumption and heat generation.
2. ATS types utilizing components of molded-case circuit breakers, contactors, or parts thereof, are not acceptable.
3. The switch shall be true double-throw with inherently interlocked construction. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.

4. Wide contact gaps shall be provided to ensure positive isolation of the normal and emergency power sources.
5. The switch shall be rated to withstand symmetrical short circuit current at the ATS terminals in combination with normal or emergency feeder breakers rated equal to or greater than RMS symmetrical amperes shown on Contract Drawings.
6. The switch shall be fully rated at amperage as shown on Contract Drawing, when mounted in switchboard/pedestal, for switching all types of loads, including induction motors, at the specified amperage and voltage.
7. Switches that are not rated for continuous duty, repetitive switching of all types of loads or transfer between two active power sources, are not acceptable.
8. The main power contacts shall have silver alloy construction with wiping action and shall be protected by arc chutes or arcing contacts.
9. The main contact design shall allow repeated making and breaking of full load current, in a combination of motor and other loads, without damage to the main contacts.
10. All main power contacts and auxiliary contacts shall be mechanically attached to a common actuator shaft.
11. The operating transfer time shall be adjustable time delayed open transition type with intentional load disconnect position for an adjustable period of time when transferring from Source 1 to Source 2 or from Source 2 to Source 1.
12. Silver plated copper shall be used in the construction of the bus work.
13. Inspection of all contacts (movable and stationary) linkages and moving parts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors.
14. All switch and relay contacts, coils, mechanical linkages, and control elements shall be serviceable or removable from the front of the mounted switch and accessory assembly without removal of the switch or assembly from the compartment and without disconnection of the power cables or control wiring.
15. The switch shall have a manual operating handle for maintenance purposes.
16. Screw-type solderless terminals or lugs shall be provided for connecting all external line & load power cables and control wiring. All connections shall be accessible from the front without removal of internal components.
17. A terminal strip shall be provided for terminating all control wiring. Number all terminals with machine printed lettering matching the wire number of the terminated wire.
18. All control wiring shall have permanent identification at each point of connection. Wire identification shall be by machine printed numbered wiring sleeves. Electrically common wires shall have the same wire number. Electrically different wiring shall have unique wire numbers.
19. Control wiring shall be neatly bundled and secured in place by plastic cable ties. Wiring shall be protected with plastic spiral wrap where it is subject to mechanical damage or crosses over to a hinged door.
20. The switch assembly shall be in an enclosure as shown on Contract Electrical Drawings.
21. NEMA 3R rated ATS shall have padlockable outer door and all devices, operator interfaces, controllers, etc. mounted on an inner deadfront door.
22. Top of operator interface (pilot devices / breaker) to be maximum 66” above finished floor.

23. The automatic transfer switch shall be ASCO 7000 series with options to meet specified requirements, to match City Standard. No substitutions will be accepted.
24. Provide copper lugs including grounding lugs of quantity and size for conductors listed in the Conduit and Wire Routing Schedule.

B. ATS Control Panel

1. A control panel shall be provided to direct the operation of the transfer switch. The modules sensing and logic shall be a controlled by a built-in microprocessor. Control panels that do not utilize microprocessor electronics to control the operation of the switch are not acceptable.
2. The transfer switch control panel shall be mounted separately from the transfer switch and shall be supplied with a quick disconnect plug for ease of maintenance.
3. The control panel shall meet or exceed the voltage surge withstand capability in accordance with IEEE Standard 472-1974 (ANSI C37.90a 1974) and the withstand voltage test in accordance with the proposed NEMA Standard ICS1-109.21.
4. The under-voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85% to 100% of nominal and the dropout adjustable from 75% to 98% of pickup setting, both in increments of 1%. These adjustments shall be factory set at 85% dropout, and 90% pickup.
5. The voltage of each phase of the emergency source shall be monitored, with pickup adjustable from 85% to 100% of nominal. This adjustment shall be factory set at 95% pickup.
6. Frequency sensing of the emergency source shall be provided, with pickup adjustable from 90% to 100% of nominal. This adjustment shall be factory set at 97% pickup.
7. The control panel shall include the following field adjustable time delays:
    a. Time delay to override momentary normal source outages, adjustable from 0 to 5 minutes. This adjustment shall be field set to place emergency generator on-line in 10 seconds.
    b. Transfer to emergency time delay for controlled timing of load transfer to emergency, adjustable from 0 to 5 minutes. This adjustment shall be field set to place emergency generator on-line in 2 seconds.
    c. Emergency source failure time delay to ignore momentary transients during initial generator set loading, adjustable from 0 to 6 seconds. Set at 2 seconds.
    d. Retransfer to normal time delay, adjustable 0 to 60 minutes. This adjustment shall be factory set at 5 minutes. The time delay is automatically bypassed if the emergency source fails and normal source is acceptable.
    e. Delayed transition time delay for setting the dead time when all power is removed from the load side of ATS, adjustable 0 to 5 minutes. Set at 5 seconds.
    f. Generator Exercise Timer: Timer provided for operator adjustment of day of week, time of day and run duration for exercising the generator under operating loads by activating the automatic transfer switch. This timer shall be field set by the Contractor with date and time as specified by City. Timer shall be mounted on the ATS outer deadfront door. Timer shall be able to be disabled.
8. Provide full voltage LED type lights with push-to-test feature, in oil-tight units with lenses. Nameplates shall be provided with each light to identify each light's function. Lights indicating when Utility Service is available, when Emergency Service is available, when

MCC is powered from Utility source, when MCC is powered from Emergency source and when load disconnect is active.

9. Two auxiliary contacts shall be provided. One that closes when the switch is in the normal position and one that closes when the switch is in the emergency position. These auxiliary contacts shall be rated 1 amp at 120 volts.
10. Circuitry shall be provided to allow for connection of a remote contact to inhibit transfer to emergency source and/or retransfer to normal source, ignoring the associated timing relays.
11. All adjustments shall be fully field adjustable without the use of tools, meters, power supplies, or special test equipment.
12. Each adjustment resolution shall be settable within minimum increments of 1%.
13. Repetitive accuracy of timer, voltage and frequency settings over a temperature range of –20° C to 70° C shall be within +/-2%.
14. The control panel shall be arranged such that adjustments to time delay settings can be safely made without personal exposure to live parts.
15. The control panel and power terminals shall be completely covered to protect against accidental contact, foreign matter, and tampering.
16. The wire harness for connection of the control panel to the transfer switch shall have sufficient length to reach between the mounting locations shown on the design Drawings.
17. Provide the following displays on the controller display unit with keypad:
    a. Event log to display 99 logged events with the time and date of the event, event type and event reason.
    b. Total number of ATS transfers.
    c. Number of ATS transfers caused by power source failures.
    d. Total number of days ATS has been in operation.
    e. Total number of hours that the normal and emergency sources have been available.
    f. Each phase voltage and amperage.

C. SURGE PROTECTIVE DEVICE

    a. The surge protective device (SPD) shall be rated for use on a 480 VAC, 3 phase system. The nominal line voltage of the SPD shall be 480V with a maximum continuous line voltage of 320V. The maximum transient current the SPD will dissipate will be 75,000 amps. The SPD shall also have a maximum transient energy (8x20 µsec waveform) per phase of 3450 joules. Provide fuses feeding the SPD . Locate SPD so that the indicating lights are viewable without removing panels. Provide NO/NC Form C dry contact rated at 7 amps at 30VDC for monitoring of status of SPD at the PLC. The surge protective device shall be Leviton 3277-DY3, or approved equal.

201-2.10 POWER MONITOR

A. Each digital power monitoring system to be as manufactured by Electro Industries Shark 250, to match City Standard. Power monitor shall display: Voltage (phase A-B, A-C, B-C); current (Phases A, B, & C); power (KW, KVA); power factor, total harmonic distortion and frequency. Monitor shall have 10 amp secondary, multifunction meter only. Provide three (3) external current transformers with rating as indicated on the drawing or sized for incoming service. Provide three (3) external potential transformers (when necessary) with rating as indicated on

the drawing or sized for incoming service. Power monitor shall include communications module and Modbus serial port for connection to existing PLC.

201-2.11 PULL BOXES

A. Underground pull boxes, where shown or required by length of conduit runs, shall be prefabricated concrete type with the size shown on the Drawings or larger to allow for adequate pull area. Extension sections shall be provided as necessary to reach the depth of underground conduits. All boxes shall have galvanized steel hold down bolts and hardware. Boxes located in paved areas or other areas which vehicles may travel shall be H/20 loading rated and have diamond plate steel traffic covers. Steel covers or lids shall be galvanized. Pull box covers shall be bead welded with pull box designation. If the cover cannot be bead welded, the Contractor shall propose other permanent marking options. All underground pull boxes shall have a 12-inch bedding of ¾-inch nominal crushed rock. Pull boxes shall be Christy Concrete Products, Brooks, or approved equal.

201-2.12 ULTRA LOW HARMONIC VARIABLE FREQUENCY DRIVE

A. General:

1. The VFDs shall be suitable for use with any standard NEMA-B squirrel-cage induction motor(s) having a 1.15 Service Factor with a load rating within the capacity of the VFD.
2. VFD enclosures shall be sized to fit in the space allocated as shown on the building floor plans. Larger VFD units will be accepted only if a revised building floor plan showing layout of VFD units drawn to scale with revised conduit routing shown is submitted by Contractor for approval by the Company prior to VFD fabrication.
3. Acceptable VFD Manufacturers for this Contract are as follows: ABB ACQ580 Ultra low harmonic drives to match City standard. Each VFD shall be supplied with wiring shown on Contract Drawings.
4. Drive shall not be at or near the end of product life cycle.
5. Top of operator interface (pilot devices / breaker) to be maximum 66” above finished floor.

B. Basic Features: Each VFD controller shall have the following basic features:

1. VFD shall meet the requirements of UL61800-5-1 (c-UL-us) up to 600V AC.
2. The drive is to be provided with isolated 4-20 mA DC output signal proportional to speed, for remote monitoring of the VFD using a programmable logic controller (PLC).
3. The VFD shall be software programmable to provide automatic restart after any individual trip condition resulting from either under-voltage or over-temperature. For safety, the drive shall shut down and require manual reset and restart if the automatic reset/restart function is not successful within a maximum of three attempts within a short time period.
4. A speed drop feature shall be included which reduces the speed of the drive on transient overloads. The drive is to return to set speed after transient is removed. If the acceleration or deceleration rates are too rapid for the moment of inertia of the load, the drive is to automatically compensate to prevent drive trip.
5. Automatic restart after utility failure.
6. A speed profile feature that includes individual adjustable settings for start, stop, entry, slope, and minimum and maximum speed points.
7. Speed of drive to vary directly with the 4-20 mA input signal from PLC when drive is in auto mode.

8. A critical speed avoidance circuit will be included for selection of two critical speeds with a rejection band centered on that speed. The drive will ignore any speed signals requiring drive operation within the rejection band.
9. VFD parameter set-up with menu driven selection and programming via door-mounted keypad and display unit.
10. The VFD shall be able to determine the motor speed and resume control of a motor which is spinning in either direction without tripping.
11. Provide ambient compensated thermal overload relays, with auxiliary contact for alarm, for inverse time overload on constant speed bypass; and electronic over-current trip, with auxiliary contact for alarm, for instantaneous and inverse time overload on VFD.
12. Use a transistor-based Active Front End as the input rectifier that uses a Selective Harmonic Elimination algorithm, mitigating the harmonics enough to meet IEEE-519-2014 without the need for phase shifting transformers and multi-pulse diode rectifiers. Total current harmonic distortion shall not exceed 5% at the VFD input terminals at full load conditions. AFE rectifier shall be phase rotation insensitive, tolerant of line voltage imbalance up to 10% without affecting the harmonic mitigation or VFD output, and capable of operating the motor at full output with a 10% drop on input voltage.
13. Use an LCL filter assembly to filter up to and including the 50th harmonic to reduce EMI/RFI emissions. The LCL filter assembly shall include Passive Dampening. The drive will provide Active Resonance Detection and Protection to minimize any damage to the drive from supply side resonance. Incorporate phase-to-phase and phase-to-ground MOV protection on the AC input line.
14. Copper lugs shall be provided for wire sizes listed in the Conduit and Wire Routing Schedule.

C. The VFDs shall be of modular design with the following major components:
   1. AC pre-charge module
   2. Roll out LCL filter modules (for large drives)
   3. Roll out line side converter IGBT power modules (for large drives)
   4. Roll out motor side inverters. IGBT power modules (for large drives)
   5. Auto Economizer
      a. An auto economizer feature shall be available to automatically reduce the output voltage when the drive is operating in an idle mode (drive output current less than programmed motor FLA). The voltage shall be reduced to minimize flux current in a lightly loaded motor thus reducing kW usage.
      b. When the load increases, the drive shall automatically return to normal operation.

D. Active front end drives shall be capable of actively monitoring line side (utility) harmonics levels and present a configurable fault or alarm in the event the line side harmonics present a significant impact to the drive reliability. This capability shall be functional at commissioning and actively monitor the utility during operation.

E. Digital programmer/controller –The VFD shall be provided with a door mounted alpha-numeric human interface module (HIM) digital display with keypad to view and adjust the setpoints, parameters, diagnostic, and status indicators. Cable for remote digital programmer/controller shall be supplied. Start/Stop/Jog single function keys from keyboard. The remote controller shall be deadfront door mounted with bezel to provide NEMA 4 rating.

F. Copper lugs shall be provided for the wire sizes listed in the Conduit and Wire Routing Schedule.

G. Provide automatic device configuration option for VFD.

H. System Interfaces: Each VFD controller shall have the following system interfaces:

1. VFD shall be capable of accepting a 4 - 20 mA signal from a Programmable Logic Controller (PLC) for speed control. VFD shall provide a 4 - 20 mA output signal that is proportional to motor speed. VFD shall also be capable of accepting ON - OFF control from PLC.
2. Outputs: The VFD shall provide the following interface outputs via isolated dry contacts as shown on Plans.
    a. Run status indication.
    b. Failure status indication.
3. Inputs: All VFDs discrete control inputs shall have a dry contact interface that does not utilize the external 120 VAC control voltage. Relays shall be added to the 120V control circuit to provide all the necessary dry contacts for this interface, even when it has not been shown on Contract Elementary Diagrams.
4. Ethernet/IP communication port for PLC communication for monitoring and/or control.

I. Module Service Cart: Provide a service cart designed to handle and transport LCL filter modules and power modules. Service cart shall have an adjustable curb height and curb offset/reach. Service cart shall be of the same manufacturer as the VFD drive.

201-2.13 GROUNDING SYSTEM

A. Ground clamps shall be bolt-on type as manufactured by ILSCO type AGC, O-Z Gedney Type GRC, Burndy Type GAR or GP, or approved equal.

B. All ground rod, pipe, and steel plate and buried bond connections shall be made by welding process equal to Cadweld.

C. Ground rods shall not stub up more than 4” in the concrete pad.

D. Provide a 13-inch diameter, 9-inch nominal throat, concrete ground rod box, minimum 12 inches deep, with a cast iron traffic cover embossed or engraved "GROUND."

E. Ground buses shall be provided in all electrical enclosures. Each ground bus shall be sized as shown on the Contract drawings or specified herein. The ground bus shall be adequately sized for the connection of all grounding conductors required per NEC. Screw type lugs shall be provided on all ground busses for connection of grounding conductors.

F. Grounding conductors shall be sized as shown on the Plans or in accordance with NEC table 250.122, whichever is larger.

G. Conduit grounding bushings and locknuts shall be installed on all metallic conduits. Conduit grounding bushings shall be set screw locking type electra-galvanized malleable iron with insulation collar and shall be provided with a feed through compression lug for securing the ground bonding wire.

H. Bonding wires shall be installed on all conduits with grounding bushings, expansion joints and for continuity of raceways transitions. Bonding wires shall be solid bare copper sized and installed per NEC 250.102. Bonding wires at endpoints shall be connected to enclosure ground bus or equipment grounding lug.

I. Each ground bus shall be copper. Screw type fasteners shall be provided on all ground busses for connection of grounding conductors. Ground bus shall be a Challenger GB series, ILSCO D-167 series or approved equal.

J. Attachment of the grounding conductor to equipment or enclosures shall be by connectors specifically provided for grounding. Mounting, support, or bracing bolts shall not be used as an attachment point for ground conductors.

K. All raceway systems, supports, enclosures, panels, motor frames, and equipment housings shall be permanently and effectively grounded.

L. One side of the secondary on all transformers shall be grounded to the ground bus.

M. The system neutral conductor and all equipment and devices required to be grounded by the National Electrical Code shall be grounded in a manner that satisfies the requirements of the National Code.

N. The system neutral (grounded conductor) shall be connected to the system's grounding conductor at only a single point in the system. This connection shall be made by a removable bonding jumper sized in accordance with the applicable provisions of the National Electrical Code if the size is not shown on the Drawings. The grounding of the system neutral shall be in the enclosure that houses the service entrance main overcurrent protection.

O. All receptacles shall have their grounding contact connected to a grounding conductor.

P. Branch circuit grounding conductors for receptacles or other electrical loads shall be arranged such that the removal of a lighting fixture, receptacle, or other load does not interrupt the ground continuity to any other part of the circuit.

Q. Negative side of all VDC power supplies shall be grounded.

201-2.14 GENERATOR CONNECTORS - PANEL

A. 480V Sites: Provide 400A, 600V, 4 wire, silver-plated copper contact, GRN, BK, RED, and BLU, generator male-plug panels with sequential interlocks to ensure ground mates first and breaks last. Panel shall be UL listed and NEMA 3R rated. Provide parallel Cam-Lok male-plug panels where shown. Cam-Lok panels shall be manufactured by Crouse-Hindes or approved equal.

B. Panel shall be provided with permanent operating instructions affixed to panel.

201-2.15 APPLICATIONS PROGRAM AND CONTROL STRATEGIES

A. Provide applications programs in the PLC to implement the control strategies. Note, PLC references the entire PLC, OI, communications module and SCADA system. The Contractor is responsible to provide an application program that meets the intent of the descriptions given along with any additional implementations for a fully operational system at no additional cost to City.

B. PLC Software Configuration: The Supplier shall provide the PLC completely configured and programmed for the monitoring and control of the system. The PLC shall be setup as defined herein. The PLC shall be ready to be placed in operation at the time of factory test. The programming, setup and configuration of the PLC shall be performed by the System Supplier. All programming shall be performed by an application programmer with prior experience on similar PLC projects. City reserves the right to judge if the application programmer assigned to this project is adequate for the task. If the programming performed is deemed inadequate by City, then the Supplier shall provide a qualified application programmer to meet these requirements.

C. The setup details given for the PLC, Operator Interface (OI), communications conversion module and SCADA are intended as guidelines for the Supplier to use to configure the system. The setup details were prepared with the available information on the software package and may not be the best way to accomplish the task. The opposite logic of that shown, is implied that the programmer will include it in the ladder logic. Errors and omissions in these details shall be the System Supplier's responsibility to correct, at no additional cost to City. The System Supplier shall meet the intent of the setup specified, making modifications as necessary to provide an operational system, at no additional cost to the City.

D. The PLC ladder logic applications program and the SCADA OI configuration shall meet the intent of the P&ID on I-Series Contract Drawings and the Control Strategies described herein. The following additional program functions shall be provided (minimum):

   1. Enable/disables and settable time delays for all alarms.
   2. All setpoints, enable/disables, time delays, registers and scaling shall be adjustable from Central SCADA, OI and PLC.
   3. Real Time and historical trends for all analog inputs and digital pump runs or like digital equipment.
   4. Add to Central overview graphic screens all new I/O data.

E. Tagname and I/O point designations shall match those used on the existing SCADA graphic screens and listed in Control Strategies.

F. Coordinate with City to identify existing and spare I/O at each site.

G. Disk copies of existing PLC programs will be supplied by the City to the Contractor during construction for Contractor to utilize for SCADA, OI & PLC programming format. All PLC programs and graphic additions shall match the existing SCADA system look and feel. OI graphic configuration shall be done by System Supplier on existing SCADA computer PC. Setpoints and timer values are to be entered by Contractor via OI. Contractor shall add and modify existing database, historical trends, and Screens to meet the intent of the P&IDs on I - Series Contract Drawings. Pump station shall be controllable from Central.

201-3 EXECUTION

201-3.01 WORKMANSHIP

A. All work in this Section shall conform to the codes and standards outlined herein.

B. The Contractor shall employ personnel that are skilled and experienced in the installation and connection of all elements, equipment, devices, instruments, accessories, and assemblies. All installation labor shall be performed by qualified personnel who have had experience on similar projects. Provide first class workmanship for all installations.

C. Ensure that all equipment and materials fit properly in their installations.

D. Perform any required work to correct improper installations at no additional expense to the City.

E. The Engineer reserves the right to halt any work that is found to be substandard or being installed by unqualified personnel.

201-3.02 ELECTRICAL CONSTRUCTION METHODS, GENERAL

A. All wiring shall be neatly bundled and laced with plastic tie-wraps, anchored in place by screw attached retainer. Where space is available, such as in electrical cabinets, all wiring shall be run in slotted plastic wireways or channels with dust covers. Wireways or channels shall be sized such that the wire fill does not exceed 60%. Wires carrying 100 volts and above shall be physically separated from lower voltage wiring by using separate bundles or wireways with sufficient distance to minimize the introduction of noise, crossing only at 90 degree angles. Tie-wraps shall be T & B TY-RAP's or approved equal.

B. All devices shall be permanently labeled and secured in accordance with subsections labeled “NAMEPLATES AND TAGS.”

C. All field wires and panel wires have wire markers as specified in the “WIRE” subsection.

D. All components associated with a particular compartment's or enclosure's function shall be mounted in that compartment or enclosure.

E. Spacing and clearance of components shall be in accordance with UL, and NEC standards.

F. Wires shall not be spliced except where shown. Devices with pigtails, except lighting fixtures, shall be connected at terminal blocks. Equipment delivered with spliced wires shall be rejected and the Contractor required to replace all such wiring, at no additional cost to the City.

G. No wires shall be spliced without prior approval by the Engineer.

H. Where splices are allowed or approved by the Engineer they shall conform with the following:

1. Splices of #10 and smaller, including fixture taps, shall be with wire caps or approved equal. “Piggys” are not acceptable.
2. Splices of #8 and larger shall be hex key screw two way connectors, with built in lock washers; T & B "Locktite", O-Z type XW, or approved equal, insulated with 3M Scotch Super #88, Plymouth, or approved equal.
3. Splices in underground pullboxes shall be insulated and moisture sealed with 3M "Scotchcast" cast resin splice kits and shall have a date marking for shelf life. Do not use splice kits with a date marking for shelf life that has expired.
4. Wire splicing devices shall be sized according to manufacturer's recommendations.
5. Split-bolt splice connectors are not acceptable.

I. Tapes shall conform to the requirements of UL 510 and be rated: 105 degrees C, 600V, 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 coded as specified. Electrical insulation putty shall be rubber-based, elastic putty in tape form. Varnished cambric shall not be used.

J. Connections to terminals shall be as follows:

1. Use connector or socket type terminals furnished with component.
2. Connections to binding post screw, stud or bolt use:
    a. For #10 and smaller wire, T & B "Sta-Kon", Buchanan "Termend" or approved equal, self-insulated locking forked tongue lug.
    b. For #8 to #4/0 wire, T & B "Locktite," Burndy QA or approved equal lug of shape best suited.
3. Use ratchet type crimping tool which does not release until proper crimp pressure has been applied.
4. Connections for all terminals shall be made with insulation stripped per manufacturer's instructions.

K. Equipment shall be wired and piped by the manufacturer or supplier. Major field modifications or changes are not allowed without the written "change order" authority by the Engineer. When field changes are made, the components, materials, wiring, labeling, and construction methods shall be identical to that of the original supplied equipment. Contractor's cost to replace or rework the equipment to match original manufacturer or supplier methods shall be done at no additional cost to the City.

L. Mating fittings, bulkhead fittings, plugs, lugs, connectors, etc. required to field interface to the equipment and panels shall be provided by the supplier when the equipment is delivered.

M. All electrical and instrumentation factory as-built drawings associated with the equipment shall be provided with the equipment when it is delivered to the job site. Drawings for each piece of equipment shall be placed in clear plastic packets of sufficient strength that will not tear or stretch from drawing removal and insertion.

201-3.03 ELECTRICAL EQUIPMENT, GENERAL

A. Panel cutouts for devices (i.e. indicating lights, switches) shall be cut, punched, or drilled and smoothly finished with rounded edges. Exposed metal from cutouts that are made after the final paint finish has been applied shall be touched up with a matching paint prior to installing device. Do not paint nameplates, labels, tags, switches, receptacles, conductors, etc.

B. All doors shall be fully gasketed with nonshrinkable, water and flame resistant material.

C. Bolts and screws for mounting devices on doors shall be as specified by the manufacturer; otherwise they shall have a flush head which blends into the device or door surface. No bolt or screw holding nuts shall be used on the external surface of the door.

D. No fastening devices shall project through the outer surfaces of equipment.

E. Each component within the equipment shall be securely mounted on an interior cubicle or backpan and arranged for easy servicing, such that all adjustments and component removal can be accomplished without removing or disturbing other components. Mounting bolts and screws shall be front located for easy access and removal without special tools. Access behind the sub panel or backpan shall not be required for removing any component.

F. HARNESS: Where space is available, all wiring shall be run in slotted plastic wire ways or channels with dust covers. If space is not available for wireways, then all wiring shall be neatly bundled and laced with plastic tie-wraps, anchored in place by stainless steel screw attached

retainer. Wire ways or channels shall be sized such that the wire fill does not exceed 60%. Tie-wraps shall be T&B TY-RAP or approved equal.

G. HINGE LOOPS: Where wiring crosses hinged surfaces, provide a “U" shaped hinge loop protected by clear nylon spiral wrap. The hinge loop shall be of sufficient length to permit opening and closing the door without stressing any of the terminations or connections. Spiral wrap shall be Graybar T25N or approved equal.

H. RETAINERS: Wire ways, retainers, and other devices shall be screw mounted with round-head 316 stainless steel screws or mechanically mounted by push-in or snap-in attachments. Glue or sticky back attachment of any type or style shall not be used. Retainers shall be T&B TC series or approved equal.

I. ROUTING: Wires shall be routed in slotted plastic wire-ways with snap covers.

1. Wires carrying 120 VAC shall be separated as much as possible from other low voltage wires and signal cables, and shall be routed only in ducts for 120 VAC. If the power wiring has to cross the signal wiring, the crossing shall be as close to a right angle as possible.
2. Ducts for 24 VDC wiring shall be used for all other wires and cables. Routing of 120 VAC in combined ducts is not allowed without prior written approval of the City.
3. Wires and cable shall be routed along the shortest route between termination points, excepting routes which would result in routing 120 VAC and other wires and cables in the same duct. Wires and cables shall have sufficient length to allow slack and to avoid any strain or tension in the wire or cable.
4. Wires and cables shall be placed in the ducts in a straight, neat and organized fashion and shall not be kinked, tangled or twisted together. Additional wire ducting shall be provided for use by the electrical subcontractor for routing field wires to their landing points in the each electrical and instrumentation panel.
5. Wiring not routed in duct work shall be neatly bundled, treed, and laced with plastic ties. Wiring across door hinges shall be carefully made up and supported to avoid straining and chafing of the conductors or from putting any strain on their terminals.

J. TERMINATIONS: Single wire and cable conductors shall be terminated according to the requirements of the terminal device. All terminations must be made at terminals or terminal blocks. Use of spring or buttsplice connectors is not allowed. Terminal blocks and same equipment type termination wiring shall have wiring terminated with appropriate sized ferrules with insulation collars. Ferrule crimping (full ratcheting) tool with proper sized jigs shall be used per manufacturer’s recommendations.

1. Provide 2” minimum separation between wireway and terminal blocks. Installation of wireways too close to terminal blocks will be required to be completely reworked to the satisfaction of the City.
2. For captive screw pressure plate type terminals, the insulation shall be removed from the last 0.25 inches of the conductor. The conductors shall be inserted under the pressure plate to full length of the bare portion of the conductor and the pressure plate tightened without excess force. No more than two conductors shall be installed in a single terminal. All strands of the conductor shall be captured under the pressure plate.
3. For screw terminals, appropriately sized locking forked spade lugs shall be used. Lugs shall be crimp on type that forms gas tight connections. All crimping shall be done using a calibrated crimping tool made specifically for the lug type and size being crimped.

4. On shielded cables, the drain wire shall be covered with insulating tubing along its full bare length between the cable jacket and the terminal lug or terminal pressure plate.
5. For screwless terminals, wire shall be stripped back and inserted per the manufacturer's instructions. When stripping insulation from conductors, do not score or otherwise damage conductor.
6. Heat shrink shall be placed on ends of shielded cable to cover foil.
7. Additional condulets with terminal blocks shall be supplied for wire termination to devices with leads instead of terminals. (i.e. solenoid valves, level probe, etc.)
8. Terminate all status, control, and analog I/O wiring on terminal blocks, including spares. Provide additional relay, DIN rails, terminal blocks and side panels as required.

K. A ground bus shall be provided in each enclosure or cabinet. It shall have provisions for connecting a minimum of ten grounding conductors. Screw type lugs shall be provided for connection of grounding conductors. All grounding conductors shall be sized as shown on plans or in accordance with NEC Table 250.122, whichever is larger.

L. Minimum wire bending space at terminals and minimum width of wiring gutters shall comply with NEC Tables 312.6 (a) & (b).

M. Future device and component mounting space shall be provided on the door, backpan, and subpanel where detailed on the Drawings. Where no detail is shown, provide a minimum of 25 percent usable future space.

N. Doors shall swing freely and close with proper alignment.

O. Provide larger motor termination boxes as required to accommodate conduit and wires.

P. All conduits entering outdoor panels and enclosures shall use watertight hubs. These hubs shall be located on sides or bottom only. Top entry of outdoor panels or enclosures is not allowed unless specifically shown on Contract Drawings.

Q. All panels and enclosures be delivered with as-built drawings in clear plastic packets within each panel and enclosure.

201-3.04 DELIVERY

A. Contractor shall inspect each electrical and instrumentation item delivered to the jobsite.

B. Contractor shall unpack each item for inspection within two (2) days of arrival.

C. Complete written inventory shall be produced by Contractor and submitted to Engineer within (2) days after arrival on jobsite for record keeping prior to any payment for the item.

201-3.05 DAMAGED PRODUCTS

A. Damage products will not be accepted. All damaged products shall be replaced with new products at no additional cost to the City.

201-3.06 FASTENERS & LUGS

A. Fasteners for securing equipment to walls, floors, and the like shall be 316 stainless steel. The fastener size shall match equipment mounting holes.

B. Stainless steel anchor bolts, ½" minimum size, shall be installed for the Electrical Equipment in the front and back of each section at locations recommended by Electrical Equipment manufacturer.

C. Concrete pad with stainless steel anchor bolts shall be provided for all electrical freestanding equipment.

D. All wall mounted panels or enclosures shall be spaced out from wall by stainless steel unistrut or stainless steel spacers with minimum depth of 1/2".

E. All wire & cable lugs shall be copper; aluminum or aluminum alloy lugs shall not be used. The Electrical Contractor shall supply all lugs to match the quantity & size of wire listed in the conduit & wire routing schedule.

201-3.07 INSTALLATION, GENERAL

A. System:

1. Install all products per manufacturer's recommendations and the Drawings.
2. Contract Drawings are intended to show the basic functional requirements of the electrical system and instrumentation system and do not relieve the Contractor from the responsibility to provide a complete and functioning system.

B. Provide all necessary hardware, conduit, wiring, fittings, and devices to connect the electrical equipment provided under other Sections. The following shall be done by the Contractor at no additional cost to the City:

1. Provide additional devices, wiring, conduits, relays, signal converters, isolators, boosters, and other miscellaneous devices as required to complete interfaces of the electrical and instrumentation system.
2. Changing normally open contacts to normally closed contacts or vice versa.
3. Adding additional relays to provide more contacts as necessary.
4. Installing additional terminal blocks to land wires.
5. Provide larger circuit breakers, conduit and wire, as required for the horsepower of the supplied equipment, when the supplied equipment is larger than that specified, at no additional cost to the City.
6. When generator supplier provides block heaters that do not match Contract Drawings, modify panelboard schedule, circuit breaker sizes, wire sizes, conduit sizes, etc.

C. All programmable devices (except PLC & Operator Interface) shall be programmed, set-up and tested by the Contractor prior to startup at the Contractor system supplier facility. This includes digital displays and instrumentation. Programming and set-up parameters shall be adjusted or changed as directed by the Engineer during start-up and throughout the warranty period, at no additional cost to the City.

D. Coordinate with the City and setup all alarm, process, and operation setpoints.

E. Panels and Enclosures:

1. Install panels and enclosures at the location shown on the Plans or approved by the Engineer.
2. Install level and plumb.

3. Seal all enclosure openings to prevent entrance of insects and rodents.
4. Seal around bottom edge of all pad mounted enclosures to prevent entrance of insects, rodents, dirt, debris, etc.
5. Clearance about electrical equipment shall meet the minimum requirements of NEC 110.26.
6. Box supports shall be located and oriented as directed in field by City.

F. Conduits and Ducts:

1. Bury detectable warning tapes approximately 12 inches below grade above all underground conduit runs of two or more outside of building. Align parallel to and within 3 inches of the centerline of the conduit or duct bank.
2. Care shall be exercised to avoid interference with the work of other trades. This work shall be planned and coordinated with the other trades to prevent such interference. Pipes shall have precedence over conduits for space requirements. Exposed conduits shall be neatly arranged with runs perpendicular or level and parallel to walls. Bends shall be concentric.
3. Install conduit free from dents and bruises.
4. All conduits shall be labeled on all ends; at junction boxes, pull boxes, enclosures, stub-outs, or other terminations.
5. A maximum of three equivalent 90 degree elbows are allowed in any continuous runs. Install pull boxes where required to limit bends in conduit runs to not more than 270 degrees or where pulling tension would exceed the maximum allowable for the cable.
6. Route all above grade outdoor conduits or conduits in rated areas parallel or perpendicular to structure lines and/or piping.
7. Conduits installed outdoor or in NEMA 4X rated areas above grade shall be braced in place with stainless steel Unistrut stanchions or PVC coated clamps with backplates.
8. Duct-taping conduits together is not acceptable. Conduits, installed into concrete pads, shall be installed with a minimum of 2” distance between conduits to allow installation of bushings.
9. Conduit entrances: Seal each conduit entrance from below grade into the Panels, and other electrical enclosures with plugging compound sealant to prevent the entrance of insects and rodents.
10. Special “Soft–Jaw” type pipe clamps shall be used to prevent damage to PVC-coated conduits while field threading, cutting to length, and coupling sections.
11. Conduits shall be painted to match the color of surface attached to as directed by Engineer.
12. All spares shall be mandrelled and have pull ropes installed.
13. Conduits shall be painted to match the color of surface attached to as directed by Engineer.
14. All existing conduits that are reused shall have a mandrel pulled through the entire conduit run to prove the length contains no blockages or obstructions. Mandrelling shall be witness by the Engineer.

G. Conduit and Wire Routing Schedule:

1. Conduit material, wire size, and quantity listed in Schedule take precedence over Electrical Section Specifications.

2. All of the entries for each line in the conduit schedule apply to each conduit when multiple quantity of conduits (quantity of which are indicated by number entered in conduit no. column in schedule) are listed in the schedule.
3. Wire sizes listed are in AWG or Kcmil and are copper conductors.
4. Extra wire was intentionally placed in the “Conduit & Wire Routing Schedule,” which shall be labeled on both ends with a unique wire label. “Spare” to be on separate tag or included in wire label.
5. Contractor to supply and install all conduits and wiring as shown on Utility Engineered Design drawings. Utility primary and secondary conduit and wiring shown in “Conduit and Wire Routing Schedule” is for bid purposes only.
6. All control and signal wiring terminations shall have the correct wire label applied prior to making connection.
7. Conduit entries listed as “GRS-PVC” in the Conduit & Wire Routing Schedule are to be “Galvanized Rigid Conduits with PVC coating” the entire length.
8. Vertical offsets and sloping of conduits are not detailed on plans; the Electrical Contractor shall include in his bid the price for the complete conduit run utilizing the civil and mechanical plans to measure vertical & slope distances.
9. Exposed conduits runs shall not be run directly on the ground. Secure conduits to stainless steel unistrut.

H. Excavation and Back Filling:
1. The Electrical Contractor shall provide the excavation for equipment foundations and trenches for conduits or buried cables.
2. Trenches for all underground utility lines shall be excavated to the required depths.
3. Repave any area that was paved prior to excavation. Backfill and surface all areas as shown on the Drawings or where not shown to the original condition that was present prior to the excavation.
4. Underground conduits outside of structures shall have a minimum cover of 24 inches except for utility conduits depth shall be as required by the governing utility requirements. Back filling shall be done only after conduits have been inspected.
5. Contractor shall uncover any uninspected covered conduit trenches, at no additional cost to City, to verify proper installation.
6. Excavation and back fill conduit trenches shall conform to the requirements of the Earthwork Section of these Specifications, unless modified on plans, and to other entities as required. Backfill shall consist of 3/4 inch class 2 aggregate base material, unless otherwise noted.
7. At all times during the installation of the electrical distribution system, the Contractor shall provide barricades, fences, guard rails, etc., to safeguard all personnel, including small children, from excavated trenches.

I. Wiring, Grounding, and Shielding - It is important to observe good grounding and shielding practices in the generally noisy environment in this application. The shield of shielded cables shall be terminated to ground at one end only (source end), the shield at the other end (receive end) shall be encased in an insulated material to isolate it from ground.

J. Cutting and Patching - The Contractor shall do all core drilling, cutting and patching required to install his work. Any cutting which may impair the structure shall require prior approval by

the Engineer. Cutting and patching shall be done only by skilled labor of the respective trades. All surfaces shall be restored to their original condition after cutting and patching. Paint patched surfaces to match the original color.

K. Seals

1. Seal around all conduits, wires, and cables penetrating between walls, ceilings, and floors in all buildings with a fire stop material. Seal shall be made at both ends of the conduit with a fire-stop putty. Seal shall have a minimum two hour rating. Fire stop sealing shall be International Protective Coatings Flamesafe, or approved equal.
2. Seal around conduits entering outside to inside structures and around bottom of free standing enclosures to maintain watertight integrity of structure.
3. Place conduit seal inside each underground conduit riser into panels and enclosures to prevent entrance of insects and rodents.
4. Conduit entrances: Seal each conduit entrance from below grade into the panel and other electrical enclosures with plugging compound sealant to prevent the entrance of insects and rodents. Conduits between the enclosures shall be sealed with plugging compound sealant on each end. Plugging compound sealant shall be PRC-DeSoto (formerly Courtaulds) Aerospace Semco PR-868 or approved equal.

L. Housekeeping Pads

1. Concrete housekeeping pads are required for all free standing electrical equipment. Housekeeping pads shall be 3-1/2” inches above surrounding finished floor or grade unless otherwise shown and shall be 4 inches (minimum) larger in width on all sides of equipment. The depth of housekeeping pads shall be 18 inches (minimum).
2. Housekeeping pads shall be installed for future units as shown on the Contract Drawings.
3. Housekeeping pad shall be concrete, per City Section 90, with rebar crossway network. The minimum size rebar allowed is #4. Concrete shall be precisely leveled so that equipment set in place will not require shimming.

M. Cleaning and Touch up:

1. Prior to startup and at completion of the work prior to final acceptance, all parts of the installation, including all equipment, exposed conduit, devices, and fittings shall be cleaned and given touch up by Contractor, as follows:
    a. Remove all grease and metal cuttings.
    b. Any discoloration or other damage to parts of the building, the finish, or the furnishings, shall be repaired.
    c. Thoroughly clean any of his exposed work requiring same.
    d. Vacuum and clean the inside of all MCC and electrical and instrumentation enclosures prior to applying power and a second time immediately prior to the final acceptance inspection.
    e. Clean all above and below ground pull boxes, junction boxes, and vaults from all foreign debris prior to final acceptance.
    f. Paint all scratched or blemished surfaces with the necessary coats of quick drying paint to match adjacent color, texture, and thickness. This shall include all prime painted electrical equipment, including enclosures, panels, poles, boxes, devices, etc.
    g. Remove all decals and lettering from both sides of support plates.

h. Repair damage to factory finishes with repair products recommended by Manufacturer.

i. Repair damage to PVC or paint finishes with matching touchup coating recommended by Manufacturer.

201-3.08 ELECTRICAL TESTING

A. GENERAL REQUIREMENTS

1. It is the intent of these tests to assure that all equipment is operational within industry and manufacturer's tolerances and is installed in accordance with design plans and specifications.
2. All equipment setup and assembled by the Contractor shall be in accordance with the design plans and Drawings and the manufacturer's recommendations and instructions and shall operate to the Engineer's satisfaction.
    a. Follow all manufacturer's instructions for handling, receiving, installation, and pre-check requirements prior to energization.
    b. After energization, follow manufacturer’s instructions for programming, set-up and calibration of equipment.
    c. 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 caused by faulty mechanical or electrical assembly by the Contractor.
    d. Necessary tests to demonstrate that the electrical and mechanical operation of the equipment is satisfactory and meets the requirements of these Specifications shall be made by the Contractor at no additional cost to the City.
3. The testing shall not be started until the manufacturer has completed fabrication, wiring, and setup; performed satisfactory checks and adjustments; and can demonstrate the system is complete and operational. Certification of completion of Contractor’s in-house tests shall be submitted prior to scheduling of factory testing.
4. Factory tests shall not be scheduled until submittals associated with the equipment have been approved by the Engineer.
    a. If equipment is significantly different from submittal drawings, this shall be grounds for cancellation and rescheduling of factory tests at no additional costs to City or extension of Contract time.
    b. Engineer reserves the right to postpone the factory test, at no additional cost to the City, until the submittal associated with the factory test has been reviewed by the Engineer and marked "No Exceptions Taken" or "Make Corrections Noted." No extension of Contract time will be allowed.
5. The first Pre-Energization tests shall be performed to determine the suitability for energization and shall be completed with all power turned off and complete prior to the start of any of the Post-Energization Tests. The Electrical Contractor shall have qualified personnel on the job site for all Pre-Energization and Post-Energization tests.
6. All tests shall be witnessed by the Engineer and/or City personnel. The test forms shall be completed by the testing person for field checkout, testing, and calibration of all equipment and instruments.
    a. All filled in test forms shall be given to the Engineer and/or City the day of the test. Fill in two sets of test forms if Contractor wants to keep a copy.

b. All tests shall be documented in writing by the supplier and signed by the Engineer as satisfactory completed. The supplier shall keep a detailed log of all tests that failed or did not meet specifications, including date of occurrence and correction.

c. Completed forms with proper signatures and dates shall be included and become a component of the Operations and Maintenance Manual for each of the respective systems.

7. The Contractor shall notify the Engineer of the Supplier's readiness to begin all factory and field tests in writing (a minimum of ten working days prior to start), and shall schedule system checkout on dates agreed to by the Engineer in order that the testing be scheduled and witnessed.

8. The Contractor shall fill in & submit for approval the “Scheduled Test Request Form” located in Appendix “A” for each requested inspection, factory and field test.

9. The supplier shall submit for approval, the proposed factory & field testing sheets at least 2 weeks prior to the start of the tests. Each testing sheet shall have a title giving the type of test and entry spaces for the name of the person who performed the test, name of the person who witnessed the test, and the date. Tests performed without approved forms shall be retested at no additional cost to City.

10. Separate test procedures in separate binders shall be submitted for approval for the Factory and Field Tests. Testing shall not commence until the test procedures have been reviewed and approved by the Engineer. Tests forms shall be similar to those shown on Appendix “A.”

B. FAILURE-TO-MEET TEST

1. If the results of any of tests are unacceptable to the Engineer, the Contractor shall make corrections and perform the tests again until they are acceptable to the Engineer; these additional tests shall be done at no additional cost to the City.

2. Any system material or workmanship which is found defective on the basis of acceptance tests shall be reported to the Engineer. The Contractor shall replace the defective material or equipment and have tests repeated until test proves satisfactory to the Engineer without additional cost to the City.

C. SAFETY

1. Testing shall conform to the respective manufacturer's recommendations. All manufacturers’ safety precautions shall be followed.

2. The procedures stated herein are guidelines for the intended tests, the Contractor shall be responsible to modify these tests to fit the particular application and ensure personnel safety. Absolutely no tests shall be performed that endanger personal safety.

3. The Contractor shall have two or more personnel present at all tests.

4. Two non-licensed portable radios are to be made available by the Contractor for the testing organization to conduct tests.

5. 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.

6. Field inspections and pre-energization tests shall be completed prior to applying power to equipment.

D. ELECTRICAL FACTORY TEST

1. The System supplier shall conduct a thorough and complete factory test by qualified factory-trained personnel witnessed by Engineer per the criteria specified herein. Factory test shall be held within 150 miles of project location.
2. The “System set-up” for factory testing shall consist of, but is not limited to:
    a. Switchboard
    b. ATS
    c. Transfer switch pedestal
    d. Generator Fuel Tank Level Panel
    e. Any miscellaneous associated electrical equipment.
3. Temporary wiring and equipment shall be setup during these tests to simulate the complete assembled system.
4. The length of the factory testing for the “System setup” shall be a minimum of one (1) working day.
    a. If in the opinion of the Engineer the factory testing is not completed at the end of the working day, the testing shall be extended, at no additional cost to the City or extension in Contract time.
5. All factory tests shall be conducted at the Supplier’s facility. All factory tests shall be completed prior to shipment of any of the “System set-up” to the jobsite. The “System set-up” shall be fully assembled, programmed, and connected as it will be installed in the final configuration. If the “System set-up” is found to be not fully and completely ready for factory testing, the Contractor shall be responsible for paying for the Engineer to return for the factory testing. Factory testing is to ensure that there are no defects. The hardware and software shall be tested for compliance with the plans and Specifications included herein and for the ability to perform the control functions.
6. The testing shall not be started until the manufacturer has completed fabrication, wiring, setup, and programming; performed satisfactory checks and adjustments; factory testing sheets approved by Engineer; and can demonstrate the system is complete and operational.
7. All components of the system setup shall be completely assembled and thoroughly pre-tested by the supplier or manufacturer before start of factory test.
8. Provide a complete clean copy of System Supplier drawings for and the Engineer’s use during Factory Test. These drawings shall reflect the equipment being tested. If the Engineer determines that these drawings do not adequately reflect the actual equipment being tested or differs substantially from the approved equipment submittal, the Engineer reserves the right to cancel the Factory Test as the equipment is found to be not fully and completely ready for factory testing. Equipment that differs substantially from the approved equipment submittal shall be resubmitted. Factory test will be rescheduled after revised submittals have been reviewed by the Engineer and marked "No Exceptions Taken" or "Make Corrections Noted". No extension of Contract time will be allowed.
9. The associated factory tests for each of the factory testing sheets that are to be performed by the supplier and witnessed by the Engineer shall include the following for the “System set-up” as a minimum:
    a. Visual and mechanical Inspections of the panels as follows:
        1) Inspect for physical damage, proper support, and wiring.
        2) Check all starters, breakers, and other components for proper sizes.

3) The Contractor shall fill in test form TF4 located in Appendix “A.”

b. Testing of the Electrical Equipment as follows:

1) Each line of control logic on the elementary or loop diagrams shall be checked. After a line of control logic is tested, the person performing test shall initial the corresponding line on the elementary diagram. When the complete elementary diagram has been checked, it shall be signed and dated by testing person and person witnessing test.

2) I/O points to terminal blocks shall be simulated for the complete checkout of PLC interfaces.

3) The tests, as a minimum, shall simulate all operating conditions including steady state, transients, upsets, startup, shutdown, power failure, and equipment failure conditions (for control logic).

4) Testing of Control as follows:

a) To facilitate testing and system simulation of the “System Set-up”, the Supplier shall connect a separate toggle two position on-off switch to each status and alarm digital input. Three digital multi-meters (minimum +/- 0.2% accuracy) with clip-on leads shall be supplied and utilized during testing for measurement of digital and analog outputs. The supplier shall use simulated input signals to replicate varying field device signals during the factory tests in order to verify the proper functioning of hardware and software.

5) The structured factory tests to be performed by the System Supplier and witnessed by the Engineer shall include the following as a minimum:

a) Control Checkout Tests: Simulate the digital or analog signals (or combination thereof) at the panel field terminals using the test hardware to verify that each control is functional and properly configured. Verify that all parameters (i.e., relay logic operations, relay timing, controller setpoints, etc.) of the control system are defined and operate according to the design documents.

b) Alarm Checkout Tests: Simulate the digital or analog signals (or combination thereof) at the panels using the test hardware to verify that each I/O point is functional and properly configured. Verify that all parameters (i.e., description, engineering units, span, enable/disable, setpoints, runtimes, totalization, logic type, etc.) of the alarms are defined and operate according to the Specifications.

6) Unstructured factory tests are required as part of the factory testing phase. These additional tests shall include any and all unstructured tests as directed by the Engineer. The various unstructured tests shall include, but are not limited to, the following:

a) Verify the correct inventory of hardware, etc. All spare parts shall be included in the inventory.

b) The factory tests, as a minimum, shall simulate all normal and abnormal operating conditions including steady state, change of state, variable changes, fluctuations, transients, upsets, start-up, shutdown, power failure, and equipment failure conditions.

10. The factory test will be considered complete only when the system setup has successfully passed all tests, both structured and unstructured, to the satisfaction of the Engineer and the Factory Test checkout form TF11 has been signed & dated by Engineer. No equipment shall be shipped to jobsite without authorization from the Engineer that the factory test has been completed.

11. Acceptance and witnessing of the factory tests does not relieve or exclude the Contractor from conforming to the requirements of the Contract Documents.
12. The testing personnel shall provide all material, equipment, labor and technical supervision to perform such tests and inspections.
13. During the testing period, under the supervision of the supplier, the Engineer shall have unlimited and unrestricted access to the usage and testing of all hardware and software in the system.
14. The Contractor shall pay all expenses incurred by his personnel, including labor, material, transportation, lodging, daily subsistence, and other associated incidental costs during the factory testing.
15. Faulty and/or incorrect hardware operation of major portions of the system may, at the discretion of the Engineer, be cause for suspension or restarting of the entire factory test, at no additional cost to the City or extension in contract time.
16. The factory test will be considered complete only when the system setup has successfully passed all tests both structured and unstructured to the satisfaction of the Engineer. No equipment shall be installed without authorization from the Engineer that the factory test has been completed.
17. All modifications to drawings and documentation as a result of the factory tests shall be corrected and completed before shipment of drawings with equipment and the submittal and delivery of “operation and maintenance” manuals.
18. Copies of the completed, signed, and witnessed factory testing forms shall be placed in the Operation and Maintenance Manual.

E. ELECTRICAL FIELD TESTS

1. Prior to any field testing, Operation & Maintenance Manuals shall have been submitted by the Contractor and approved by the Engineer.
2. The Contractor shall engage and pay for the services of an approved qualified testing company for the purpose of performing inspections and tests as herein specified. The testing company shall provide all material, equipment, labor and technical supervision to perform such tests and inspections. The Electrical Contractor shall be present on site for all field tests.
3. The Electrical Contractor shall complete and submit “Schedule Test Request Form” as illustrated in Appendix “A” for each electrical field test.
4. Vacuum and clean the inside of all electrical and instrumentation enclosures prior to pre-energization tests and again prior to energization tests.
5. The Electrical Contractor shall be at the jobsite to assist with all Electrical Field Tests.
6. PRE-ENERGIZATION TESTS: These tests shall be completed prior to applying power to any equipment.
    a. INSPECTIONS
        1) Visual and mechanical inspections:
            a) Inspect for physical damage, proper anchorage and grounding.
            b) Compare equipment nameplate data with design plans and starter schedule.
            c) Compare overload setting with motor full load current for proper size.
        2) Performed NETA acceptance testing for each piece of equipment.

3) The Contractor shall compile, by visual inspection of equipment installed for each motor, the following data in neatly tabulated form:
    a) Equipment driven
    b) Motor horsepower
    c) Nameplate amperes
    d) Service factor
    e) Temperature rating
    f) Overload catalog number
    g) Overload current range and setting
    h) Circuit breaker rating
    i) Circuit breaker trip setting, for magnetic only circuit breakers.
4) The Contractor shall fill in, for each piece of equipment, Test Form TF4 located in Appendix “A.”

b. TORQUE CONNECTIONS
1) All electrical, mechanical and structural threaded connections inside equipment shall be tightened in the field after all wiring connections have been completed. Every worker tightening screwed or bolted connections shall be required to have and utilize a torque screwdriver/wrench at all times. Torque connections to the value recommended by the equipment manufacturer. If they are not available, use NEC Annex I for torque values as guidelines.

c. WIRE INSULATION & CONTINUITY TESTS
1) All devices that are not rated to withstand the 500V megger potential shall be disconnected prior to the megger tests.
2) Megger insulation resistances of all 600 volt insulated conductors using a 500 volt megger for 10 seconds. Make tests with circuits installed in conduit and isolated from source and load. Each field 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) Each megger reading shall not be less than 10 Meg-ohms resistive. Corrective action shall be taken if values are recorded less than 10 Meg-ohms. Values of different phases of conductors in the same conduit run showing substantially different Meg-ohm values, even if showing above 10 Meg-ohms shall be replaced.
4) Each instrumentation conductor twisted shielded pair shall have the conductor and shield continuity measured with an ohmmeter. Conductors with high ohm values, that do not match similar lengths of conductors the same size, shall be replaced at no additional cost to the City.
5) The Contractor shall fill in test forms Power and Control Conductor Test Form TF1 and Instrumentation Conductor Test Form TF2 located in Appendix “A.”

d. GROUNDING SYSTEM TESTS
1) Visual and Mechanical Inspection:
    a) Verify ground system is in compliance with Drawings and Specifications.
2) Electrical Tests:

a) Before backfilling trenches, and placement of sidewalks, landscape and paving, measure the resistance of each electrode to ground using a ground resistance tester. Perform the test not less than two days after the most recent rainfall and in the afternoon after any ground condensation (dew) has evaporated.

b) After all individual ground electrode readings have been made, interconnect as required and measure the system's ground resistance.

c) The grounding test shall be in conformance with IEEE Standard 81.

d) Measurements shall be made at 10 feet intervals beginning 25 feet from the test electrode and ending 75 feet from it in a direct line between the system being tested and the test electrode.

e) Point-to-Point: Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points.

3) Test Values:

a) The resistance between the main grounding electrode and equipment ground shall be no greater than five ohms per IEEE Standard 142.

b) Investigate point-to-point resistance values that exceed 0.5 ohms.

c) Plots of ground resistance shall be made and submitted to the Engineer for approval.

4) The Contractor shall fill in Grounding System Test Form TF3 located in Appendix "A."

e. PANELBOARD TESTS

1) Visual and Mechanical Inspection:

a) Inspect for physical damage, proper anchorage and grounding.

b) Compare equipment nameplate data with design plans and panelboard schedules.

c) Compare breaker legend for accuracy.

d) Check torque of bolted connections.

2) The Contractor shall fill in Panelboard Test Form TF5 located in Appendix "A."

f. BREAKER TEST

1) All breakers shall be checked for proper mounting, conductor size, and feeder designation. Operate circuit breaker to ensure smooth operation. Inspect case for cracks or other defects. Check tightness of connection with torque wrench in accordance with manufacturer's recommendations.

2) All breakers 100 amps and above shall be tested. Time current characteristic tests shall be performed bypassing three hundred percent (300%) rated current through each pole separately. Trip amps and time shall be measured. Instantaneous pickup current shall be determined by run up or pulse method. Clearing times should be within four (4) cycles or less. All trip times shall fall within NETA Table values. Instantaneous pickup current levels should be within 20% of manufacturer's published values. Certification stickers, listing date and company who performed the tests, shall be attached to the inside of the breaker compartment door right after the breaker has passed all tests.

3) 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 reported to Engineer. Insulation resistance shall be measured and shall not be less than 50 megohms.

4) At end of test the all breakers trip settings shall be set by Contractor to values listed in protective device coordination study to properly protect equipment.
5) The Contractor shall fill in MCC Device Test Form TF8 and Breaker Test Form TF9 located in Appendix “A.”

7. POST ENERGIZATION TESTS
   a. PANELS AND ENCLOSURE TESTS
      1) During these tests, test all local and remote control operations and interlocks.
      2) Electrical Tests:
         a) Perform operational tests by initiating control devices to affect proper operation.
         b) The Contractor shall fill in Operational Device Checks and Tests Form TF6.
   b. PHASE ROTATION TESTS
      1) 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.
      2) All three phase motors shall be tested for proper phase rotation. Revise wire color codes to indicate correct phase color if wires are swapped.
      3) The Contractor shall fill in Phase Rotation Test Form TF7 located in Appendix “A.”
   c. MOTOR TESTING
      1) Prior to start-up, record low ohm phase to phase and phase to ground readings for future baseline.
      2) Record the amperage draw on all phases of each motor operating under full load. Ensure that these values do not exceed the motor nameplate full load amperage.
      3) Record the voltage between all phases of each motor operating under full load. If the voltage balance is not within plus or minus 5 percent of nominal, request the Utility power company or other responsible party to correct the problem.
      4) The Contractor shall compile, by visual inspection of equipment installed for each motor, the following data in neatly tabulated form and be placed in the O&M manual:
         a) Equipment driven.
         b) Motor horsepower.
         c) Nameplate amperes.
         d) Service factor.
         e) Temperature rating.
         f) Overload catalog number.
         g) Overload current range and setting.
         h) Circuit breaker rating.
         i) Circuit breaker trip setting, for magnetic only circuit breakers.

5) The Contractor shall fill in Motor Test Form TF10, located in Appendix “A.”
6) Additional motor testing requirements per Division 11.

d. PANELBOARD TESTS:
1) Visual and Mechanical Inspection:
a) Inspect for physical damage, proper anchorage and grounding.
b) Compare equipment nameplate data with design plans and panelboard schedules.
2) The Testing Company shall fill in Panelboard Test Form TF5 located in Appendix “A.”

e. INSTRUMENTATION TESTS
1) The Contractor shall provide a minimum of two (2) hours of field acceptance testing for each instrument. If any instrument has not been fully tested during its allotted time, the Contractor shall provide additional hours for finishing testing of the instrument, to be paid by the Contractor.
2) The overall accuracy of each instrument loop shall be checked to ensure that it is within acceptable tolerance.
a) As a minimum, all the tests indicated/specified on the test form TF14 in Appendix "A" shall be performed by the Contractor for each of the instruments listed in Appendix “B” Device Index.
3) Test equipment used for testing shall be of suitable quality so as not to mask performance deficiencies. All test equipment shall be traceable to National Bureau of Standards and have been calibrated within six months of test date.
4) Testing shall be accomplished using simulated inputs only with prior written approval of the Engineer.
5) Calibration stickers shall be supplied for all equipment and instruments. Calibration stickers shall list the following information:
a) Tag number.
b) Calibrated by who (name), firm, city and telephone number.
c) Date calibrated.
d) Calibration range.
e) Comments.

f. CONTROL SYSTEM TESTS
1) All the I/O points for the PLC shall be tested by the System supplier with assistance from Contractor in the field for proper operation of alarms, status, analog, control, autodialer and operator interface (OI) display functions, etc. Where practical, the final element shall be used, i.e. trip the intrusion switch or change levels. Testing shall be accomplished using simulated inputs only when necessary.
2) During this task the System supplier shall have:
a) Qualified field technician with experience in the startup of similar systems with PLC controls, and other field devices.
b) PLC/OI/SCADA programmer for modifying or adjusting all PLC registers and setpoints to tune the system.
c) Test instruments as required.

d) A pair of radios for communication.

e) Portable PC loaded with diagnostic, configuration, programming PLC software. The latest application programs shall have been loaded on the PLC.

3) All SCADA graphics shall be tested during the field tests.

4) Contractor to fill in "I/O Point Checkout Sheet" TF13 located in Appendix "A."

g. PROGRAM PARAMETER RECORD:

1) The Contractor shall fill in "VFD or Soft Starter Program Parameter Record Sheet" TF12 for each VFD provided on this project. These parameter record sheets shall be filled out by a qualified Contractor field technician when power in field is first applied to each VFD. Completion of VFD record sheets shall be witnessed by Engineer and copies provided to Engineer on day records are filled in by Contractor. A copy of all completed VFD parameter record sheets shall be placed in O&M manual.

8. TRIAL OPERATIONS:

a. The entire electrical installation shall be either tested or trial operated to verify Contract compliance. That is, controls, heaters, fans, light switches, convenience receptacles, lights, etc. shall be trial operated. Contractor shall conduct trial operations in the presence of the Engineer and Operations and Maintenance personnel.

F. OPERATIONAL TESTING

1. After all the previous tests in this subsection are complete, the Contractor shall conduct operational testing.

2. The Contractor shall demonstrate operation of each part of the control and instrumentation system to the satisfaction of the Engineer. Tests shall be repeated by the Contractor at no additional cost to the City and at the discretion of the Engineer to resolve whether the system has been demonstrated that it will operate under all modes of operations and varying conditions.

3. For the operational testing the new equipment shall be activated to automatically run for 5 days, Monday through Friday 24 hours a day. During this five day period the City will run the different combinations of the pump control options. If equipment failure occurs during the 5 days of operational testing, the Contractor shall repair or replace the defective equipment and shall begin another 5 day operational test, Monday through Friday 24 hours a day. This shall be continued until the new equipment functions acceptably for 5 consecutive days.

4. The Electrical Contractor, testing firm and System Supplier shall re-visit the jobsite as often as necessary until all field tests, start-up and operation tests are completed and approved.

201-3.09 TRAINING

A. All training sessions shall be held on dates and times agreeable to the City. A total of 6 or fewer City personnel shall be trained.

B. Training sessions shall not take place on dates when field testing is occurring.

C. Acceptable Operation and Maintenance Manuals shall be on site and available when training sessions are implemented.

D. The following training sessions shall be provided:

1. 8 hours – After Operation Testing has started the Contractor shall provide training for instruction of operation and maintenance personnel in the use of all the new control and instrumentation systems. The Contractor shall make necessary arrangements with manufacturer's representative. Provide product literature and application guides for user's reference during instruction.
2. 4 hours – Arc Flash Training: Electrical Engineer, who sealed the Electrical System Analysis, shall train City personnel of the potential arc flash hazards associated with working on energized equipment. Maintenance procedures shall be in accordance with the requirements of NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces and shall be provided in the equipment manuals.
3. 2 hours – “ATS” operating and maintenance procedures by System Supplier.
4. 40 hours (minimum) – “Operator” hands on SCADA and Operator Interface training. Training shall also include training on the new Operator Interfaces.
5. 8 hours (minimum) –"Diagnostic and calibration" training shall demonstrate PLC hardware diagnostic routines, test equipment, PLC communication setup, and test procedures as required to enable the personnel to detect and isolate system faults to the circuit board or module level and to implement repairs by replacing failed circuit boards or modules. Demonstrate uploading and downloading software to make backups and restore programs.

201-3.10 OPERATION AND MAINTENANCE MANUALS

A. Four (4) sets of operating manuals covering instruction and maintenance on each type of equipment shall be furnished prior to completion of the project.

B. These instructions shall provide the following as a minimum:

1. Each set bound in a three ring binder, hard tab separators and organized as specified herein.
2. A complete "Record" set of favorably reviewed electrical submittals as provided under SUBMITTAL AND DRAWING REQUIREMENTS.
3. As-built one-line, elevation, loop, and elementary drawings with all field changes included.
4. A complete list of the equipment supplied, including serial numbers, ranges, options, and pertinent data necessary for ordering replacement parts.
5. Instrument data sheets for all instruments supplied on the project, clearly identifying the instrument tagname, range, part number, serial number, size, etc.
6. Full, technical specifications on each item.
7. Detailed service, maintenance and operation instructions for each item supplied. Schematic diagrams of all electronic devices shall be included. A complete parts list with stock numbers shall be provided on the components that make up the assembly.
8. Record of each motor nameplate data including manufacturer, full part number, size, voltage, amps, service factor, bearings, etc.
9. Record of each breaker and overload heater element including manufacturer, full part number, size, setting etc.
10. Safety precautions and procedures.

11. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
12. Spread sheet listing all setpoints and programmable parameters entered for this project for VFD, HIM, etc.
13. Include all completed and signed test data and forms from factory and field testing.
14. No photo copies are allowed of standard published manuals available from manufacturers, such as for the RTU. All of the manuals shall be originals.
15. All of these sets of O & M Manuals shall be made up of "original" (no copies, PDFs or reproductions) documents. No photo or fax copies are allowed of standard published manuals available from Manufacturers.
16. All completed and signed test data and forms from factory and field tests.
17. Warranty certificate with start dates, duration and contact information.
18. Troubleshooting instructions.
19. Record of all settings or parameters for all programmable devices.

C. At the end of the project these manuals shall be updated to show "as-built or as-installed" conditions.

D. Provide to the City two sets of flash drives (flash drives shall contain all documents in both PDF format and unlocked AutoCAD - DWG format, version 2010 or later):
   1. As-built Contract electrical and instrumentation drawings prepared for this project.
   2. As-built set of all required Drawings for the project.
   3. As-built sets of other computer generated documents prepared for this project, including PLC ladder logic files, and Bill of Materials prepared for this project.
   4. Electronic PDF version of O&M manual. Version format shall follow the hard copy submittal of the O&M, including index, equipment record sheet, warranty information, theory of operation, maintenance instruction, etc. PDF shall be “bookmarked” at each index, subtab, transmittal letter, equipment record sheet, warranty information, theory of operation, maintenance instruction, etc. Failure to bookmark PDF may be grounds for immediate rejection without review. Bookmarks shall be descriptive of actual document, tab, etc. Bookmarks shall not be out of order; the English description shall match that listed in the Submittal’s Table of Contents.
   5. These flash drives shall be the property of the City, for its use on this and future projects.
   6. Label drives with site name using clear plastic with black machine printed lettering as produced by a KROY or similar machine. The size of the nameplate tape shall be with 3/8-inch lettering unless otherwise approved by the Engineer. Securely fasten nameplates in place on the USB drive using the adhesion of the tape.

201-3.11 WARRANTY

A. The Contractor shall have a staff of experienced personnel available to provide service on 2 working days’ notice during the warranty period. Such personnel shall be capable of fully testing and diagnosing the hardware, software and implementing corrective measures.

B. If the Contractor "fails to respond" in 2 working days, the City at its option will proceed to have the warranty work completed by other resources; the total cost (direct and indirect) for these other resources shall be reimbursed in full by the Contractor.

   1. "Fail to respond" shall be defined as: The Contractor has not shown a good faith effort and has not expended adequate resources to correct the problem.

   2. The use of other resources, as stated above, shall not change or relieve the Contractor from fulfilling the remainder of the warranty requirements.

C. The Contractor shall warrant all electrical and instrumentation equipment including video surveillance system, PLC, OI and SCADA software programming for the full warranty period of this contract as specified herein.

D. The Contractor shall provide all labor and material to troubleshoot, program, replace, or repair any hardware or software that fails or operates unpredictably during the warranty period, at no additional cost to the City.

E. Each time the Supplier's repair person responds to a system malfunction during the warranty period, he or she must contact the City Project Manager for scheduling of the work, access to the jobsite, and permission to make repairs. Operation of facilities necessary to test equipment shall only be performed by or under the direction of City staff. City reserves the right at its sole discretion to deny operations requested by the Supplier. A written description of all warranty work performed shall be documented on a field service report to be given to City prior to the repair person leaving job site. This field service report shall detail and clearly state problem, corrective actions taken, additional work that needs to be done, data, repair person name and company.

F. Prior to "final acceptance", the Contractor shall furnish to the Engineer a listing of warranty information for all manufacturers of materials, instruments, and equipment used on the project. The listing shall include the following:

   1. Manufacturer's name, service contact person, phone number, and address.

   2. Material and equipment description, equipment number, part number, serial number, and model number.

   3. Manufacturer’s warranty expiration date.

G. Software support which shall be provided by the Supplier:

   1. Free technical PLC software and hardware configuration phone support for a period of one year after acceptance of project completion. PLC phone support shall be provided directly from the group that configured the PLC. Phone support shall be available between 8 a.m. and 5 p.m. Pacific Standard Time Monday through Friday.

   2. The Supplier shall correct any PLC software configuration error that is discovered within the warranty period, at no additional cost to City. Updated documentation for each "operation and maintenance" manual and two sets of new floppy disks of updated software shall be provided for each correction.

   3. Program changes made by City or under direction of City by others shall not relieve or void Contractor of warranty requirements for parts of software programmed under this Contract.

201-3.12 FINAL ACCEPTANCE

A. Final acceptance will be given by the Engineer after the equipment has passed the "operational testing trial period," each deficiency has been corrected, final documentation has been provided, and all the requirements of design documents have been fulfilled.

B. Upon completion of the project, prior to final acceptance, remove all temporary services, equipment, material, and wiring from the site.

C. At the end of the project, following the completion of the field tests, and prior to final acceptance, the Supplier shall provide the following to the City:

1. Verify Service equipment has been legibly marked in field with the maximum available fault current per NEC 110.24 (A). Field marking shall include date the fault current calculation was performed and be weather & UV rated. Service equipment shall not be hand labeled
2. Listing of warranty information.
3. Each "operation and maintenance" manual shall be modified or supplemented by the Supplier to reflect all field changes and as-built conditions.
4. Four (4) USB drives with copies of all final documentation to reflect as-built conditions.
5. Two sets of all keys for locks supplied on this project. Wire all keys for each lock securely together. Tag and plainly mark with lock number or equipment identification, and indicate physical location, such as panel or switch number.
6. Verify that as-installed drawings have been placed in all new or modified panels in reinforced clear plastic pockets.
7. Resubmit all Electrical System Analysis studies with all calculations rerun, data and graphs updated to reflect as-left conditions. Provide new Arc Flash labels to reflect as-constructed equipment and as-left circuit breaker settings.
8. Record full size drawings neatly marked accurately showing the information required herein

201-4 PAYMENT

A. **Meter/Main Switchboard** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to procure, install, and start-up the meter and main switchboard including, but not limited to, removal and disposal of existing, meter, main breaker, main switchboard, transportation, anchorage, testing, permits, electrical connections, disconnects, breakers, transformers, coordination with utility company (PG&E), and all other related items, complete and in place and operating as shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

B. **Automatic Transfer Switch** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to procure, install, and start-up an automatic transfer switch including but not limited to, transportation, anchorage, testing, permits, electrical connections, disconnects, breakers, automatic transfer switches, power monitor, transformers, surge protective devices, fans, and all other related items, complete and in place and operating as shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

C. **Manual Transfer Switch** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to procure, install, and start-up a manual transfer switch including but not limited to, transportation, anchorage, testing, permits, electrical connections, disconnects, breakers, automatic transfer switches, power monitor, transformers, surge protective devices, fans, and all other related items, complete and in place and operating as shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

D. **Portable Generator Pedestal** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to procure, install, and start-up a portable generator termination cabinet including but not limited to termination box, trenching, conduit, transportation, anchorage, testing, permits, electrical connections, disconnects, breakers, interlock, and all other related items, complete and in place and operating in accordance with and as required for the sites shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

E. **75Hp VFD** shall be paid for at the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to remove and replace existing VFD and line reactor including, but not limited to, modification to existing MCC, transportation, testing, permits, electrical connections, and all other related items, complete and in place and operating in accordance with and as required for the sites shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

F. **300Hp VFD** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to remove and replace existing VFD including, but not limited to, modification to existing MCC, breakers, anchorage, transportation, testing, permits, electrical connections, and all other related items, complete and in place and operating in accordance with and as required for the sites shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

G. **Fuel Tank Transmitter and Display** shall be paid for at the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to procure, install, and integrate new fuel tank transmitter and digital display in an existing back-up generator sub-base diesel fuel tank including but not limited to, continuous level monitoring float, testing, setup, wiring, integration, and all other related items, complete and in place and operating in accordance with and as required for the sites shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

H. **8” Flowmeter and Transmitter Replacement** shall be paid for at the contract **lump sum** price, which shall include full compensation for furnishing all labor, materials, tools, and equipment, and incidentals, and for doing all work involved in replacing an existing 8” magnetic flowmeter and transmitter including but not limited to removal and disposal of existing meter, transmitter, cable, appurtenances, and replacement with a new meter, transmitter, cable, appurtenances, and other work incidental thereto, complete in accordance with the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional allowance will be made therefore.

I. **18” Flowmeter and Transmitter Replacement** shall be paid for at the contract **lump sum** price, which shall include full compensation for furnishing all labor, materials, tools, and equipment, and incidentals, and for doing all work involved in replacing an existing 18” magnetic flowmeter and transmitter including but not limited to removal and disposal of existing meter, transmitter, cable, appurtenances, and replacement with a new meter, transmitter, cable, appurtenances, and other work incidental thereto, complete in accordance with the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional allowance will be made therefore.

J. **Antenna Removal and Replacement** shall be paid for at the contract **lump sum** price, which price shall include full compensation for removal and disposal of one existing antenna, and appurtenances and replacement of a second existing antenna, to include connection to existing cable, and for furnishing all labor, materials, tools, equipment, and incidentals as required by the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor. New antenna will be a Yagi type, model coming from crew.

K. **General Electrical Work** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary and for doing all electrical site work including, but not limited to, trenching; conduit bedding; backfilling; compaction; electrical equipment installation and connections; enclosures; pull boxes; underground conduits and connectors; ground rods and underground grounding connections; receptacles; power feeders; control wire; wiring connections; terminations; transformers; modification to existing electrical equipment; temporary relocation of existing electrical equipment; all necessary control programming, modifications and testing of the City’s SCADA system; spare parts; electrical system analysis; coordination with PG&E and AT&T, and any other miscellaneous and appurtenant electrical site improvement necessary to provide a complete and working electrical and controls system, and cleanup, complete and in place and operating as shown on the Project Plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be made therefor.

APPENDIX "A"

TEST FORMS

Index of Forms:

BILL OF MATERIAL

PROJECT: _____ **DATE** / /

LOCATION: _____ **PAGE** _____

SPECIFICATION SECTION	QTY	DESCRIPTION	MFG.	PART NUMBER	TAG No.

SCHEDULED TEST REQUEST FORM

COMPANY PERFORMING TEST: _____
TESTING PERSONNEL : _____ _____
PHONE NUMBER OF COMPANY: _____
TEST PROCEDURE SUBMITTAL: _____ APPROVED : ___/___/___
SCHEDULED TEST DATE : _____ DATE : ___/___/___

TIME	DESCRIPTION OF TEST
8:00	
9:00	
10:00	
11:00	
12:00	
13:00	
14:00	
15:00	
16:00	

NOTES:

TESTED BY : _____ DATE : ____/____/____
WITNESSED BY: _____

POWER AND CONTROL CONDUCTOR TEST FORM

TEST FORM (TF1)

EQUIPMENT

NAME : _____ LOCATION : _____

CALIBRATION EQUIPMENT DATE: _____

DESCRIPTION _____

CONDUCTOR NUMBER	INSULATION TESTS					
	PHASE TO GROUND			PHASE TO PHASE		
	A	B	C	AB	BC	CA

NOTES:

Record insulation test values in meg-ohms.

TESTED BY : _____ DATE : ____/____/____

WITNESSED BY: _____

INSTRUMENTATION CONDUCTOR TEST FORM

TEST FORM (TF2)

EQUIPMENT

NAME : _____ LOCATION : _____

CALIBRATION EQUIPMENT DATE: _____

DESCRIPTION : _____

CONDUCTOR PAIR NUMBER	CONTINUITY TESTS		INSULATION TESTS		
	CONDUCTOR TO CONDUCTOR	CONDUCTOR TO SHIELD	CONDUCTOR TO CONDUCTOR	CONDUCTORS TO GROUND*	SHIELD TO GROUND

NOTES:

Record continuity test values in ohms.

record insulation test values in meg-ohms.

* With both conductors tied together

TESTED BY : _____ DATE : ____/____/____

WITNESSED BY: _____

GROUNDING SYSTEM TEST FORM

TEST FORM (TF3)

CALIBRATION EQUIPMENT DESCRIPTION : DATE: _____

FALL IN POTENTIAL TEST

MAIN GROUND LOCATION	APPLIED VOLTAGE V	MEASURED POINT 1 VOLTAGE	MEASURED POINT 2 VOLTAGE	MEASURED POINT 3 VOLTAGE	CALCULATED RESISTANCE OHMS

TWO POINTS TESTS

EQUIPMENT NAME	EQUIPMENT #	CIRCUIT #	APPLIED CURRENT	MEASURED VOLTAGE	CALCULATED RESISTANCE OHMS

NOTES:

TESTED BY : _____ DATE : ____/____/____

WITNESSED BY: _____

VISUAL AND MECHANICAL INSPECTION FORM

TEST FORM (TF4)

EQUIPMENT

NAME : _____ LOCATION : _____

NAMEPLATE DATA

MFGR. :	_____	SERIES # :	_____
MODEL # :	_____	U.L. # :	_____
VOLTAGE :	_____	PHASE :	_____
AMPERAGE :	_____	SERVICE :	_____
BUS TYPE :	_____	BUS BRACING:	_____
VERT. BUS :	_____	HORZ. BUS :	_____
GND. BUS :	_____	NEU. BUS :	_____
ENCLOSURE :	_____		_____
	_____		_____

INSPECTION CHECK LIST

ENTER: A-ACCEPTABLE R-NEEDS REPAIR OR REPLACEMENT NA-NOT APPLICABLE

TIGHTEN ALL BOLTS AND SCREWS	_____
TIGHTEN ALL WIRING AND BUS CONNECTIONS	_____
VERIFY ALL BREAKERS AND FUSES HAVE PROPER RATING	_____
CHECK BUS BRACING AND CLEARANCE	_____
CHECK MAIN GROUNDING CONNECTION AND SIZE	_____
INSPECT GROUND BUS BONDING	_____
CHECK EQUIPMENT GROUNDS	_____
CHECK CONDUIT GROUNDS AND BUSHINGS	_____
INSPECT NEUTRAL BUS AND CONNECTIONS	_____
CHECK HEATERS AND THERMOSTATS	_____
CHECK VENTILATION AND FILTERS	_____
CHECK FOR BROKEN OR DAMAGED DEVICES	_____
CHECK DOOR AND PANEL ALIGNMENT	_____
INSPECT ANCHORAGE	_____
CHECK FOR PROPER CLEARANCES AND WORKING SPACE	_____
REMOVE ALL DIRT AND DUST ACCUMULATION	_____
INSPECT ALL PAINT SURFACES	_____
CHECK FOR PROPER WIRE COLOR CODES	_____
INSPECT ALL WIRING FOR WIRE LABELS	_____
CHECK FOR PROPER WIRE TERMINATIONS	_____
CHECK FOR PROPER WIRE SIZES	_____
INSPECT ALL DEVICES FOR NAMEPLATES	_____
CHECK IF DRAWINGS MATCH EQUIPMENT	_____
CHECK ACCURACY OF OPERATION & MAINTENANCE	_____
	_____

TESTED BY : _____ DATE : ____/____/____

WITNESSED BY: _____

PANEL-BOARD TEST FORM

TEST FORM (TF5)

PANEL NAME: _____ LOCATION : _____

NAMEPLATE DATA

MFGR. :	_____	SERIES # :	_____
MODEL # :	_____	U.L. # :	_____
VOLTAGE :	_____	PHASE :	_____
AMPERAGE :	_____	SERVICE :	_____
BUS TYPE :	_____	BUS BRACING:	_____
VERT. BUS :	_____	HORZ. BUS :	_____
GND. BUS :	_____	NEU. BUS :	_____
ENCLOSURE :	_____	MAIN BKR :	_____

CALIBRATION EQUIPMENT DATE: _____
DESCRIPTION :

INSULATION RESISTANCE TESTS - MEGOHMS					
A-GND	B-GND	C-GND			

INSPECTION CHECK LIST

ENTER: A-ACCEPTABLE R-NEEDS REPAIR OR REPLACEMENT NA-NOT APPLICABLE

TIGHTEN ALL BOLTS AND SCREWS	_____
TIGHTEN ALL WIRING AND BUS CONNECTIONS	_____
VERIFY ALL BREAKERS AND FUSES HAVE PROPER RATING	_____
CHECK BUS BRACING AND CLEARANCE	_____
CHECK MAIN GROUNDING CONNECTION AND SIZE	_____
INSPECT GROUND BUS BONDING	_____
CHECK EQUIPMENT GROUNDS	_____
CHECK CONDUIT GROUNDS AND BUSHINGS	_____
INSPECT NEUTRAL BUS AND CONNECTIONS	_____
CHECK FOR BROKEN OR DAMAGED DEVICES	_____
CHECK DOOR AND PANEL ALIGNMENT	_____
INSPECT ANCHORAGE	_____
CHECK FOR PROPER CLEARANCES AND WORKING SPACE	_____
REMOVE ALL DIRT AND DUST ACCUMULATION	_____
INSPECT ALL PAINT SURFACES	_____
CHECK FOR PROPER WIRE COLOR CODES	_____
INSPECT ALL WIRING FOR WIRE LABELS	_____
CHECK FOR PROPER WIRE TERMINATIONS	_____
CHECK FOR PROPER WIRE SIZES	_____
INSPECT ALL DEVICES FOR PROPER LEGEND NAMEPLATES	_____
	_____

CALIBRATION TEST EQUIPMENT PART NO.	DATE CALIBRATED:

TESTED BY : _____ DATE : ____/____/____

WITNESSED BY: _____

OPERATIONAL DEVICE CHECKS AND TESTS FORM

TEST FORM (TF6)

NAME : _____ LOCATION : _____

CUB. #	EQUIPMENT NAME	EQUIP #	LOCAL SITE DEVICE CHECKS AND TESTS							REMOTE SITE DEVICE CHECKS & TESTS		
			SELECTOR SWITCH	INDICATOR LIGHTS	PUSHBUTTON & LOS	METERING & INDICATORS	OVERLOAD RESET	INTERLOCKS & CONTROL	ALARM & STATUS	SELECTOR SWITCH	INDICATOR LIGHTS	PUSHBUTTON & LOS

TESTED BY : _____ DATE : ____/____/____

WITNESSED BY : _____

NOTES:

PHASE ROTATION TEST FORM

TEST FORM (TF7)

EQUIPMENT NAME	EQUIPMENT #	CIRCUIT #	PHYSICAL PHASE LOCATION	PHASE COLOR CODE	MEASURED PHASE ROTATION

NOTES:
Use phase tester to verify all circuits and equipment have a clockwise A-B-C phase rotation.
Physical phase locations: Left to Right - LR or Top to Bottom - TB
Phase color codes: Brown, Orange, & Yellow -BOY
Black, Red, & Blue -BkRBe

TESTED BY : _____ DATE : ____/____/____
WITNESSED BY: _____

MCC DEVICE TEST FORM

TEST FORM (TF8)

MCC # : _____ CUBICLE : _____

EQUIP NAME: _____ EQUIP # : _____

MOTOR DATA		CONTACTOR DATA			
H.P. :		MFGR. :		PART # :	
F.L.A. :		NEMA SIZE :		COIL VOLT :	

CALIBRATION EQUIPMENT DATE: _____

DESCRIPTION : _____ _____

OVERLOAD TESTS

MFGR. : _____ HEATER # : _____ RANGE : _____

PART # : _____ FINAL OVERLOAD SETTING: _____

TEST AMPS	MEASURE TRIP TIME @ TEST AMPS			MFGR LISTED TRIP TIME	AMBIENT COMPENSATION
	PHASE A	PHASE B	PHASE C		

BREAKER TESTS

MRGR. : _____ PART # : _____ FRAME # : _____

CONTACT RESISTANCE TESTS - OHMS			INSULATION RESISTANCE TESTS-MEGOHMS		
PHASE A	PHASE B	PHASE C	A-GND	B-GND	C-GND

MFGR TRIP TIME @300% MIN:_____ BREAKER RATING / RANGE: _____

MFGR TRIP TIME @300% MAX:_____ FINAL BREAKER SETTING: _____

MFGR INST. PICKUP AMPS: _____

TIME-CURRENT TEST					
TRIP TIME IN SECONDS @ 300% AMPS			INSTANTANEOUS TRIP TEST - AMPS		
PHASE A	PHASE B	PHASE C	PHASE A	PHASE B	PHASE C

NOTES:

TESTED BY : _____ DATE : ____/____/____

WITNESSED BY: _____

FACTORY TEST
MCC/CONTROL PANEL CHECKOUT FORM (TF11)

Manufacturer: _____ **Location:** _____

Tel: _____ _____

Test Equipment: Description _____ Calib Date: _____

MCC / Control Panel: _____ **TEST RESULT**

	Pass	Fail
OVERALL PANEL INSPECTION		
1. All front panel and back panel components mounted securely.....	☐	☐
2. All wiring terminated and labeled correctly.....	☐	☐
3. All components, wiring, and labeling accurately reflected on the drawings..	☐	☐
POWER-UP INSPECTION		
1. Voltage levels on load side of circuit breakers.....	☐	☐
2. Voltage levels at the DC terminals of the power supply.....	☐	☐
3. Voltage levels at the DC power distribution terminals.....	☐	☐
POWER DISTRIBUTION AND GENERAL COMPONENT TESTING		
1. Power distribution to the appropriate components.....	☐	☐
2. Operation of the ancillary components such as receptacles, work lights, etc.	☐	☐
CONTROL COMPONENTS CHECKS		
1. Operators (push buttons, selector switches, pilot lights).....	☐	☐
2. Inputs from External Sources.....	☐	☐
3. Outputs to External Sources.....	☐	☐
4. Relay Logic.....	☐	☐
5. PLC I/O and Program Verification.....	☐	☐
6. O/I Display Verification.....	☐	☐

Notes:

1. For relay logic checks, each rung of the elementary or loop diagram is to be highlighted in yellow as they are verified for correct control functions.
2. For PLC I/O and program verification, the control strategies shall be highlighted in yellow as each logic function is tested.

Tested by: _____ **Witnessed by:** _____

Date: _____

BREAKER DEVICE TEST FORM

TEST FORM (TF9)

FEEDER : _____ LOCATION : _____
EQUIP NAME: _____ EQUIP # : _____
EQUIP H.P. : _____ EQUIP KVA : _____

MFGR. : _____ PART # : _____ FRAME # : _____
VOLTAGE : _____ INTERRUPT RATING : _____ CHARACTER CURVE: _____

CALIBRATION EQUIPMENT DATE: _____
DESCRIPTION : _____ _____

CONTACT RESISTANCE TESTS - OHMS INSULATION RESISTANCE TESTS - MEGOHMS

PHASE A	PHASE B	PHASE C	A-GND	B-GND	C-GND

MFGR TRIP TIME @300% MIN : _____ BREAKER RATING / RANGE: _____
MFGR TRIP TIME @300% MAX: _____ FINAL BREAKER SETTING : _____
MFGR INST. PICKUP APMS:

TEST-CURRENT TESTS TRIP TIME IN SECONDS @ 300% AMPS			INSTANTANEOUS TRIP TEST - AMPS		
PHASE A	PHASE B	PHASE C	PHASE A	PHASE B	PHASE C

ADDITIONAL TESTS AND SETTING AS APPLICABLE

	PICKUP		DELAY-TIME		
FUNCTION	RANGE	SETTING	RANGE	SETTING	
LONG TIME					
SHORT TIME					
GROUND FLT.					

NOTES:

TESTED BY : _____ DATE : ____/____/____
WITNESSED BY: _____

VFD OR SOFT STARTER PROGRAM PARAMETER RECORD SHEET

TEST FORM (TF12)

EQUIPMENT

NAME : _____ LOCATION : _____

PARAMETER NUMBER	PARAMETER DESCRIPTION	DEFAULT SETTING	FIELD SETTING

NOTES:

TESTED BY : _____ DATE : ____/____/____

WITNESSED BY: _____

I/O POINT CHECKOUT TEST FORM

TEST FORM (TF13)

I/O TYPE : _____ LOCATION : _____

TEST EQUIPMENT : _____ CAL. DATE : _____

I/O POINT TAGNAME	I/O POINT ADDRESS	TEST INPUT VALUE %			DISPLAY VALUE %			PLC REGISTER VALUE	TEST RESULT FAIL OR PASS COMMENTS	DATE OF CORRECTIVE ACTION
		0	50	100	0	50	100			

NOTES:

TESTED BY : _____ DATE : ____/____/____

WITNESSED BY: _____

INSTRUMENTATION DATA SHEET AND CALIBRATION RECORD TEST FORM (TF14)

Component Description	Manufacturer	Location
	Name	Site
Component Tag Name	Model	Equip
	Serial #	

	Range	Unit
Indicator Range		
Input Range		
Output Range		

Test Equipent	
Description:	
Calibration Date:	

General Notes

1) Attach Calibration Curves for dp Flowmeters

2) Include mounting elevations for level Instruments

3) All entries within solid box to be typed in prior to start of test

Designed Calibration			Measured Calibration		
Input Signal	Output	Eng. Value	Input	Output	Comments

Notes

Tested by (Print Name) Witnessed by (Print Name)

Signature Signature

Date / / Date / /

APPENDIX "B"

DEVICE INDEX

SECTION 201 DEVICE INDEX

E-DWG	P&ID DWG	TAG	NO.		DESCRIPTION	TYPE	SPECIFICATION	MINIMUM NEMA RATING	SIZE	SP / RANGE	UNITS	DWG REF DET MOUNTING	NOTES AND ACCESSORIES	26 05 00 TEST FORM
E18C		LT	955	A	Level Transmitter	Float	201-2.07	6P	-	0-30	in	Tank		TF-13
E18C		LT	955	B	Level Transmitter	Float	201-2.07	6P	-	0-30	in	Tank		TF-13

END OF SECTION 201

203 ELECTRICAL SYSTEM ANALYSIS

203-1.01 GENERAL

203-1.01A Scope Of Work:

A. Provide the following submittals, per Section 16010, for the entire electrical power system including the 208/120V distribution system:
   1. Short Circuit Study
   2. Protective Device Coordination Study
   3. Arc Flash Study

B. Electrical System Studies shall be prepared, stamped and signed by a professional Electrical Engineer registered in the State of California and in accordance with IEEE 242, IEEE 399, ANSI/IEEE C37.13 and IEEE 519.

C. Exceptions / Clarifications
   1. Itemize all exceptions and clarifications to the Contract Documents in a letter (located in the front of the submittal) on Engineer letterhead.
   2. Exceptions that are noted in the study, but not listed on the Exceptions/Clarifications letter, will be considered as non-responsive and not accepted as changes to the Contract Documents.
   3. All exceptions taken from the Drawings and specifications shall be documented with justifications. When noting the exception, list which Drawings or which Specification Subsection number the exception is taken.
   4. Clarification requests shall list which Drawing or Specification Subsection number the clarification is required for.

D. Provide two (2) DVDs at the completion of the project. One DVD will contain the as-built set of studies, reports, settings, etc. The other DVD will contain the original source format of input data used for the PC based computer software, including all SKM files used to create the studies. Provide all setup information used for the computer based study and report.

E. For each resubmittal, provide a copy of submittal comments and a separate letter, on Contractor letterhead, identifying how each submittal comment has been addressed in the resubmittal.

F. When submittals are provided in PDF format, utilize the “Bookmark” feature of the Adobe Acrobat and clearly bookmark locations in the report to locations identified in the Report’s Table of Contents. Bookmarks shall not be out of order; the English description shall match that listed in the Report’s Table of Contents.

203-1.02 Sequencing And Scheduling:

A. It is the responsibility of those performing the electrical system analysis to collect and field verify all data. This includes verifying existing electrical distribution and obtaining all data from the Utility Owner and Vendors necessary for completing the requested studies.
   1. Utilize proposed load data for the Studies obtained from submittals, Utility Owner, Generator manufacturers, field verifications, etc.

2. Include copy correspondence with Utility showing fault data used in report.
3. Include copy correspondence with Generator supplier showing generator data used in report.

B. A complete Protective Device Coordination Study shall be submitted within 60 days after approval of Short Circuit Study.

C. At the completion of the project, all studies shall be resubmitted with all calculations rerun, data and graphs updated to reflect as-left conditions. Provide new Arc Flash labels to reflect as-constructed equipment and as-left circuit breaker settings.

D. When previous electrical system analysis studies are available and provided to the Contractor, it is the Contractor's responsibility to verify the accuracy of the data used and to update it to match existing conditions. Contractor shall assume that electrical system analysis studies are not available.

203-2 Materials

203-2.01 General:

A. Equipment and component titles and numbers used in the Studies shall be identical to the equipment and component titles and numbers shown on the Drawings.

B. Perform Studies using PC based computer software. State program name and version (e.g. version 2.1) in report.

C. Perform complete fault calculations for Utility and generator sources. Equipment shall not be grouped as a single large load; they shall be treated as individual loads. When generators are incorporated into the system, develop two separate networks: one with utility only (no generator attached) and one with generator only (no utility attached)

D. Complete protective device coordination study listing all device settings shall be utilized during start-up of electrical equipment.

E. Provide unique page numbers for every sheet in all Studies. Unique page numbers to be manually placed by Study Owner after printout if study report doesn't assign page numbers.

F. One line diagrams
1. Shall be readable on 11" x 17" paper. One-line diagrams shall be redrawn in AutoCAD on multiple sheets if necessary or as requested by the Engineer.
2. Buses and branches shall have descriptive names matching one line diagram or existing system (i.e. not Bus-0084).
3. Automatic transfer switches (ATSs), Main Switchboards (MSBs), shall not have multiple node buses.
4. Primary and secondary for transformers, Variable Frequency Drives (VFDs), etc. shall be changed to node buses.

G. Multiple scenarios for the short circuit and arc flash reports shall be provided.
1. Maximum available fault current from utility transformer.
2. Generator (when shown) with all motors contributing.
3. Do not combine networks when multiple sites are modeled.
4. All studies shall be repeated with the arc flash reduction switch enabled (where

applicable).

203-2.02 Short Circuit Study:

A. Include the following in the short circuit study:
   1. Cable impedances based on copper conductors.
   2. Bus impedances based on copper bus bars.
   3. Transformer impedances based on tolerances specified in ANSI C57.12.00.
   4. Source date (i.e. cable lengths, sizes, and quantity, for all runs in study, listing of bus loads, etc.).
   5. Utility data:
      a. Size of Utility transformer.
      b. Impedance of Utility transformer.
      c. Primary voltage of Utility transformer.
      d. Fault information on primary side of Utility transformer:
         1) Three phase bolted fault.
         2) X/R ratio (positive sequence).
         3) Line to ground fault.
         4) X/R ratio (zero sequence).
      e. Protective relays (type & settings).
   6. Voltage drop and current flow at each node and load in system.

B. Calculate Short Circuit interrupting duties for an assumed three-phase bolted fault and line-to-ground fault at each of the following locations:
   1. Power transformer's primary
   2. Main Switchboard.
   3. All Motor Control Centers (MCCs).
   4. All panelboards.
   5. All 480V, 3-phase motor and equipment loads.
   6. All 3-phase transformer secondaries.
   7. All 240/208V equipment.

C. Verify:
   1. Equipment and protective devices are applied within their ratings.
   2. Adequacy of switchboard, panelboard and MCC bus bars to withstand Short Circuit stresses.
   3. Adequacy of transformer windings to withstand Short Circuit stresses and over-current.
   4. Cable sizes for ability to withstand normal and fault load currents.

D. Provide the following in the Short Circuit study report:
   1. Calculation methods and assumptions.
   2. Input data.
   3. Short circuit data.
      a. Impedances.
      b. X to R ratios.
      c. Asymmetry factors.
      d. Motor contributions.
      e. Short Circuit kVA.
      f. Symmetrical and asymmetrical line-to-line and line-to-ground fault currents.
      g. Device evaluation including rating of equipment.
      h. Bus evaluation including rating of equipment.

i. Source data, from Electric Utility Owner. Include copy of correspondence with Utility Owner indicating values used.
j. Source data from Generator Supplier (where applicable). Include copy of Generator provided values used.

4. Tabulations of calculated quantities.
5. Results, conclusions and recommendations.
6. One line diagrams of distribution system.
7. Impedance diagram showing the resistances and reactances for all cables of the distribution system.

203-2.03 Protective Device Coordination Study:

A. Provide Protective Device Coordination drawings for each section of distribution system that includes the following:
   1. Graphically diagram displaying coordination time-current curves on conventional log-log curve sheets. Each time-current curve shall have a unique identifier label. This identifier shall be used in the tabulated settings spreadsheet and on the associated one-line diagram.
   2. Time-current curves shall include the following curves (minimum):
      a. Utility relays (phase & ground) and high voltage switchgear relays (phase and ground).
      b. All upstream protective devices and breakers.
      c. All mechanical overloads.
      d. All MCP breaker and associated motor or equipment load. Duplicates of the same sized protective device and motor size may be omitted (i.e., when there are 3 pumps for same application).
      e. All transformers and associated primary and secondary protection.
      f. Unique identifier for each protective device.
      g. Provide separate TCC for phase and ground curves.
      h. TCC for Ground curves shall include the transformer magnetizing inrush currents for all transformers downstream of the circuit breaker. Ground shall clear the inrush currents.
   3. One-line diagram that applies to specific portion of distribution system associated with time-current curves. One-line diagram shall include the following:
      a. Location of each device.
      b. Power and voltage ratings, primary and secondary transformers amperages.
      c. All significant circuit elements such as transformers, cables, breakers, fuses, relays, etc. with their corresponding amperage ratings.
      d. Tag of each branch and node (shall be the same tags used in short circuit study).
      e. Mechanical overload and contactor.
      f. English description, equipment name, HP, and full load amp rating of motors and other 3 phase loads.
      g. Terminate device characteristic curves at a point reflecting maximum fault current to which device is exposed as calculated in short circuit study.
   4. Time current curves shall be provided for all protective devices with adjustable settings.

B. Characteristics plotted on time current curves shall include:
   1. Protective current relays.
   2. Fuses including manufacturer's minimum melts, total clearing, tolerance, and damage bands.

3. Circuit breaker trip devices, including manufacturer's tolerance bands.
4. Transformer full-load currents at 100% and 600%.
5. Motor and equipment full load currents. Motors fed from VFDs and Soft Starters shall have their starting curves adjusted according to inrush currents on the TCC. Motors on TCC shall show the DC offset for VFD and Soft Starter fed pumps.
6. Transformer magnetizing inrush currents.
7. Transformer damage curves.
8. ANSI transformer withstand parameters.
9. Fault currents.
10. Ground fault protective device settings.
11. Other electronic protective devices.

C. Provide the following recommended settings in spreadsheet format in the Protective Device Coordination study report:
1. Relay settings including CT values.
2. Circuit Breakers adjustments:
   a. Long Delay Pickup and Time.
   b. Short Time Pickup and Time.
   c. Instantaneous Pickup and Time.
   d. Ground Pickup and Time.
3. Programmable settings for all electronic devices. Settings for non-current relay settings shall also be provided.
4. Settings shall be given both in amps and seconds as well as the corresponding physical setting (i.e. 30A and setting B on MCP) for device.
5. Identify protective device associated with each curve by manufacturer type, function and part number.

203-2.04 Arc Flash Hazard Study

A. General:
1. Arc flash boundary and incident energy shall be calculated using a PC computer program at all significant locations in the electrical network, including switchgears, switchboards, MCCs, transformers, and other major equipment where work could be performed on energized equipment.
2. Arc flash computation shall include both line and load side of main breaker calculations, where necessary.
3. Document method of calculation.
4. Do not include the motor contribution of motors fed by VFDs in the arc flash hazard study.

B. Safe working distances shall be specified for calculated fault locations based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm2.

C. Study shall include the following:
1. All significant locations in 480 volt, 240 volt and 208 volt systems fed from transformers equal to or greater than 125 kVA.
2. Incident energy and flash protection boundary calculations in spreadsheet format in the Arc Flash Hazard study report.
3. Provide the following incident energy and flash protection boundary calculations in spreadsheet format in the Arc Flash Hazard study report (values shall be calculated for all electrical equipment in the power distribution system):
   a. Arcing fault magnitude
   b. Device clearing time

c. Duration of arc
d. Boundary for:
    1) Arc flash limited shock approach
    2) Limited shock approach
    3) Restricted shock approach
e. Working distance
f. Incident energy at 18 inches (in cal/sq.-cm)
g. Recommendations for arc flash energy reduction for each location having more than 8 cal/sq.-cm. Provide preliminary cost estimate for implementing recommendations.
h. Provide separate spreadsheets for all scenarios listed in subsection 2.01.G. Do not combine the spreadsheet values nor only provide the worst case scenario. Clearly list on each spreadsheet the English description of the Scenario presented.

4. Provide recommendations for the Personal Protective Equipment (PPE) that the City should maintain on site for the level of hazard.
5. Provide recommendations for safety label design that should be posted on electrical equipment.

203-2.05 Study Reports

A. Written reports submitted for approval shall contain:
1. Scope of Studies performed.
2. Explanation of bus and branch numbering system.
3. Report calculations, tabulations and spreadsheets.
4. Selected equipment deficiencies.
5. Results of Studies.
6. Comments, recommendations or suggestions regarding:
    a. Changes and additions to equipment rating and/or characteristics.
    b. Circuit protective devices improperly rated for overload or fault conditions.
    c. Arc Flash protective equipment and safety labels.
7. Tabulation spreadsheet for all protective device settings with the following column entries (minimum):

Device Code	Description	MFR	Type	Plug Trip	Frame	KAIC	Long Time		Short Time		Inst	Ground	
							Amps	Time	Amps	Time	Amps	Amps	Time

B. Stamped, signed and dated by Electrical Engineer registered in the State of California who performed the analysis.

C. Reports are to be updated to reflect as-built conditions and placed in O&M manual, per Section 201 requirements.

203-3 Execution

203-3.01 General:

A. Make minor modifications to equipment settings as required to accomplish conformance with the Short Circuit and Arc Flash Studies.

B. Notify Engineer in writing of any required major equipment modifications.

203-3.02 Field Tests:

A. Provide field testing of protective equipment.

B. Adjust relay and protective device settings according to values established by Coordination Study.

203-3.03 Arc Flash Warning Labels:

A. All Arc Flash warning labels shall meet NEC requirements, OSHA standards and NFPA recommendations.

B. Provide and install 4 in. x 6 in. thermal transfer type labels of high adhesion polyester for each work location analyzed and as required by the NEC for flash protection on power distribution equipment.

C. Each label shall have an orange header with the wording, “WARNING, ARC FLASH HAZARD,” and shall include the following machine printed information:
   1. Location Designation
   2. Nominal system voltage
   3. Arc Flash boundary
   4. Available incident energy and working distance (in inches)
   5. Minimum arc rating of clothing
   6. Site specific level of PPE
   7. Engineering report number, revision number and issue date
   8. Contractor preparing report and contact phone number.

D. Labels shall not be hand labeled.

E. For all areas, Contractor shall post the following:
   1. Working distances
   2. Shock hazard voltage
   3. Shock Approach Boundaries:
      a. Limited
      b. Restricted

F. Provide Arc Flash labels for the each of the following pieces of equipment (including existing):
   1. 480V and applicable 208V panelboards
   2. MCCs
   3. Switchboard
   4. Switchgears
   5. Control Panels
   6. All electrical equipment with an incident energy level greater than 1.2 Cal/cm2.
   7. Where Switchgear, Switchboard, MCC, Panelboard, Distribution Panel, etc. feed multiple circuit breakers from the enclosure, provide separate line and load side Arc Flash Labels for the Main Circuit Breaker.
   8. Provide separate labels at each circuit breaker that has arc flash reduction switches indicating the appropriate values when the switch is enabled.

G. Labels shall be submitted for approval. No labels shall be installed without prior approval by Engineer.

203-3.04 Arc Flash Training:

A. Electrical Engineer, who sealed the Electrical System Analysis, shall train City personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours). Arc Flash training shall not be performed by general or electrical contractor. Maintenance procedures shall be in accordance with the requirements of NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces and shall be provided in the equipment manuals.

203-4 Payment:

A. Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for the various contract items of work and no additional allowances will be made therefor.

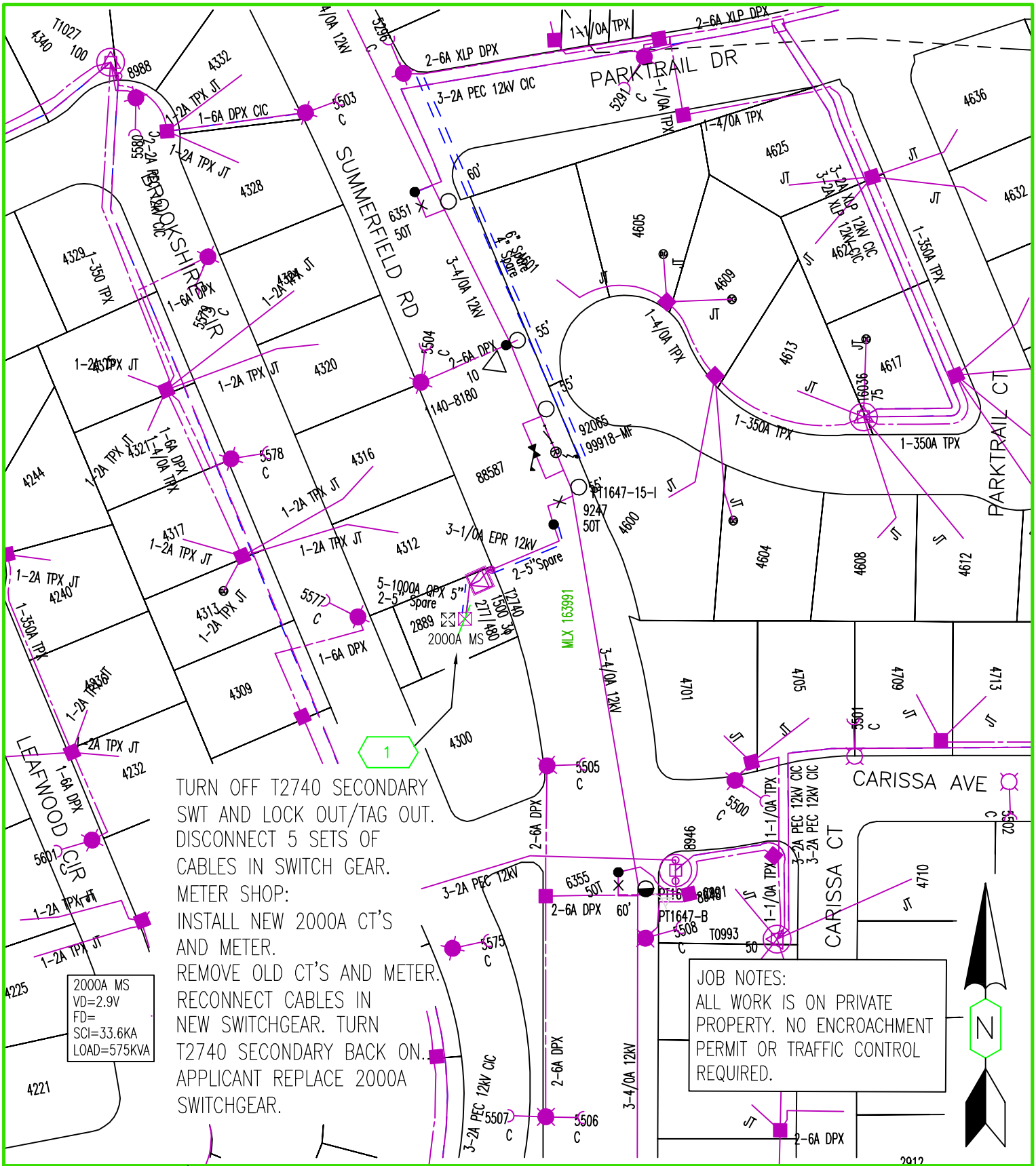
END OF SECTION 203

A - FEES AND PERMITS

All electrical service charges or fees that may be required by Pacific Gas and Electric Company (PG&E) will be paid for by an appropriate City department. The Contractor shall coordinate a pre-construction meeting with PG&E and the City. PG&E construction drawings to deenergize the service, reconnect the new meter/main switchboard, and re-energize the service are included on the next page. The Contractor shall schedule and coordinate all PG&E work.

Full compensation for securing, complying, and the cost of all permits shall be considered as included in the contract prices paid for the various items of work and no additional allowance will be made therefor.

[Version: 2/2/15CDA STD2010]



PRIMARY VOLTAGE: 12 kV	VOLTAGE AREA: 2	EST: KEITH LUA	707-486-9198
LATITUDE: 38.438148	LONGITUDE: -122.6597	ADE: MIKE CHESHARECK	707-327-9083
SOURCE SIDE DEVICE: 9247		SUPV: JAQUELINE ALVARADO	408-747-9217
SUB & CIRCUIT: SANTA ROSA A 1110		REP: MICHAEL MILLER	707-483-9978
DSGN SAG: SSU	RAPTOR ZONE: YES	PLNR: JEFFREY JUNG	0
LOADING AREA: LIGHT	ARRESTER DIST: 3	JPA#: N/A	SCALE: NONE(1"=100')
CORROSION AREA: NON	INSULATION DIST: B	NOTIF: 129035253	DATE: 7/10/2024
EXEMPT EQUIP.INST.: N/A	FIRE AREA: LRA-TIER 1	PM: 35563275	SHEET: 1 OF 1 REV. 0

CONSTRUCTION SKETCH

2889 SUMMERFIELD RD, SANTA ROSA
CONT. BEN BRYANT–707–636–3747

811 Know what's below. Call before you dig.

NO ENVIRONMENTAL ISSUES

GAS CONFLICT: NO

NEAR LOC: NONE

C02438

CITY OF SANTA ROSA

STATE OF CALIFORNIA

WATER PUMP STATION 9 ELECTRICAL UPGRADES

The work to be performed and referred to herein is in the City of Santa Rosa, California and consists of improvements to be constructed in accordance with the provisions of the Invitation for Bids, containing the Notice to Bidders, the Special Provisions, the Project Plan(s), the Bid Forms and the Contract, all of which are by reference incorporated herein, and each Addendum, if any is issued, to any of the above which is also incorporated by reference herein.

TO THE AWARD AUTHORITY OF THE CITY OF SANTA ROSA

The undersigned, as bidder, declares that the only person or parties interested in this bid as principals are those named herein; that this bid is made without collusion with any other person, firm, or corporation; that Contractor has carefully examined the Project Plans, Invitation for Bids and conditions therefor, and is familiar with all bid requirements, that Contractor has examined this Contract and the provisions incorporated by reference herein, and Contractor hereby proposes, and agrees that if its bid is accepted by the City, Contractor will provide all necessary machinery, tools, apparatuses, and other means of construction, and to do all the work and furnish all the materials and services required to complete the construction in accordance with the Contract, the Special Provisions, the Project Plan(s), and Addenda to any of the above as incorporated by reference, in the time stated herein, for the unit prices and/or lump sum prices as follows:

NAME OF BIDDER: _____

Contract #: **C02438**

Project Title: **WATER PUMP STATION 9 ELECTRICAL UPGRADES**

Line #	Description	Unit	Quantity	Unit Price	Total Price
1	Traffic Control	LS	1	$_____	$_____
2	Water Pollution Control	LS	1	$_____	$_____
3	Driveway and Walkway	SF	220	$_____	$_____
4	Double Gate and Fence Replacement	LS	1	$_____	$_____
5	CMU Wall Extension	LS	1	$_____	$_____
6	Trench Bracing and Shoring	LS	1	$_____	$_____
7	Temporary Pump Facility	LS	1	$_____	$_____
8	Sump Pump and Discharge Piping	LS	1	$_____	$_____
9	Electrical Room HVAC Replacement	LS	1	$_____	$_____
10	Pump Room Ventilation Improvements	LS	1	$_____	$_____
11	Meter/Main Switchboard	LS	1	$_____	$_____
12	Automatic Transfer Switch	LS	1	$_____	$_____
13	Manual Transfer Switch	LS	1	$_____	$_____
14	Portable Generator Pedestal	LS	1	$_____	$_____
15	75Hp VFD	EA	2	$_____	$_____
16	300Hp VFD	LS	1	$_____	$_____
17	Fuel Tank Transmitter and Display	EA	2	$_____	$_____
18	8" Magnetic Flowmeter & Transmitter Replacement	LS	1	$_____	$_____
19	18" Magnetic Flowmeter & Transmitter Replacement	LS	1	$_____	$_____
20	Antenna Removal and Replacement	LS	1	$_____	$_____
21	General Electrical Work	LS	1	$_____	$_____

Total: $_____

In the case of any discrepancy between the unit price and the total set forth for the item, the unit price shall prevail; provided, however, that if the amount set forth as a unit price is ambiguous, unintelligible or uncertain for any reason, or is omitted, or in the case of lump sum items, is not the same amount as the entry in the "Total" column, then the amount set forth in the "Total" column for the item shall prevail in accordance with the following:

1. As to lump sum items, the amount set forth in the "Total" column shall be the unit price;

2. As to unit basis items, the amount set forth in the "Total" column shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price.

The Total Base Bid shall be the sum of the "Total" column. In case of discrepancy between the sum of the "Total" column and the amount entered as Total Base Bid, the sum of the "Total" column shall prevail. The bid comparison will be based on the sum of the "Total" column for each bidder.

If this Contract Bid is accepted by the City and the undersigned fails to execute the Contract and to give all the bonds required under the Contract, with a surety satisfactory to the Award Authority of the City of Santa Rosa, within ten calendar days after bidder has received the Notice of Award from the Engineer, then the Award Authority may, at its option, determine that the bidder has abandoned the Contract, and thereupon this bid and the acceptance thereof shall be null and void, and the forfeiture of the security accompanying this bid shall be in accordance with California Public Contract Code section 20172.

The undersigned understands and agrees that the City is not responsible for any error or omissions on the part of the undersigned in making this bid.

The bidder to whom the Contract is awarded agrees to execute the Contract in favor of the City, in the form attached, and to deliver any and all required bond(s) and insurance certificates within ten calendar days from the date of Contractor’s receipt of the Notice of Award. Following the award of the Contract, Contractor shall commence work within ten calendar days from the day authorized in the Notice to Proceed and diligently prosecute the same to completion in accordance with Section 8-1.05.

LIST OF SUBCONTRACTORS

NAME OF BIDDER: _____

The following is a list of each subcontractor who will perform work or labor or render services to the undersigned for the construction of the project in an amount in excess of ½ of 1% of the total amount of this bid.

The undersigned agrees that any portion of the work in excess of ½ of 1% of the total amount of this bid and for which no subcontractor is designated herein will be performed by the undersigned.

SUBCONTRACTOR NAME	SUBCONTRACTOR LICENSE NUMBER	SUBCONTRACTOR DIR REGISTRATION NUMBER	SUBCONTRACTOR BUSINESS ADDRESS	DESCRIPTION OF WORK (ITEM NO.)

LIST OF PREVIOUS SIMILAR JOBS

NAME OF BIDDER: _____

NONCOLLUSION DECLARATION
TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid. The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____ [date], at _____ [city], _____ [state].

NOTE: The above Noncollusion Declaration is part of the Contract Bid. Signing this Bid on the signature portion thereof shall also constitute signature of this Noncollusion Declaration.

BID BOND AFFIDAVIT AND BIDDER'S SIGNATURE PAGE

Accompanying this bid is a guaranty in the form of (Notice: Insert the words "cash $," "Cashier's Check," "Certified Check," or "Bidder's Bond" as the case may be):

_____

in an amount equal to at least ten percent of the total of this bid.

The undersigned further agrees that if Contractor does not execute the Contract and deliver the necessary bonds to the City within the period of time specified in this Invitation for Bids, the proceeds of the security accompanying this bid shall become the property of the City of Santa Rosa, California, and this bid and the acceptance thereof may, at the option of the City, be considered null and void.

The undersigned is licensed in accordance with an act providing for the registration of Contractors, License No. _____, Class _____, expiration date _____.

The undersigned in registered with the Department of Industrial Relations, Registration No. _____.

IMPORTANT NOTICE: If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer, and manager of the corporation; if a partnership, state true name of partnership, also the names of all partners in the partnership; if the bidder is a sole proprietor, state the business name and the proprietor's name in full.

Secretary of State Business Entity Number: _____.

_____

_____

_____

_____

Business Address

_____

Telephone Number

I declare under penalty of perjury that the foregoing is true and correct.

BIDDER'S SIGNATURE: _____

TITLE: _____

DATE: _____

CITY OF SANTA ROSA COMMUNITY WORKFORCE AGREEMENT

CONTRACTOR AGREEMENT TO BE BOUND

The undersigned, as a Contractor or Subcontractor ("Contractor") for the _____ Project, (hereinafter the "Covered Project"), for and in consideration of the award to it of a contract to perform work on said Covered Project, and in further consideration of the mutual promises made in the "City of Santa Rosa Community Workforce Agreement" (hereinafter "Agreement"), a copy of which was received and is acknowledged, hereby:

(1) Accepts and agrees to be bound by the terms and conditions of the Agreement, together with any and all amendments and supplements now existing or which are later made thereto.

(2) Agrees to be bound by the legally established local trust agreements as set forth in Article 17 of this Agreement.

(3) Authorizes the parties to such local trust agreements to appoint trustees and successor trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor;

(4) Certifies that it has no commitments or agreements which would preclude its full and complete compliance with the terms and conditions of the Agreement.

(5) Agrees to secure from any Contractor(s) (as defined in said Agreement) which is or becomes a subcontractor (of any tier) to it, a duly executed Agreement to be Bound in form identical to this document.

The obligation to be a party to and bound by the Agreement shall extend to all work for the Covered Project undertaken by the Contractor.

This letter shall constitute a subscription agreement, to the extent of the terms of the letter.

CONTRACTOR/SUBCONTRACTOR:_____

California Contractor State License No. or Motor Carrier (CA) Permit No.: _____

Name of Authorized Person (print): _____

Signature of Authorized Person: _____

Title of Authorized Person: _____

Telephone Number of Authorized Person:_____

Address of Authorized Person:_____

State Public Works Registration Number: _____

[SIGNATURES APPEAR ON THE FOLLOWING PAGE]

In witness whereof, the Parties have caused this Agreement to be executed as of the Effective Date.

CONTRACT

CITY OF SANTA ROSA

CALIFORNIA

CITY CONTRACT NO. C02438
WATER PUMP STATION 9 ELECTRICAL UPGRADES

This Contract is made and entered into as of _____ at Santa Rosa, California, between the City of Santa Rosa ("City") and _____, of _____, California ("Contractor").

ARTICLE I - For and in consideration of the payment and agreement hereinafter mentioned, to be made and performed by City, and under the conditions expressed in the required bonds hereunto annexed, Contractor agrees that for the benefit of City, at its own cost and expense, to do all the work and furnish all the materials, except such as are mentioned in the Special Provisions to be furnished by City, necessary to construct and complete the work herein described in a good, workmanlike, and substantial manner.

The work embraced herein shall be done in accordance with Sections 1-9 of the State of California Department of Transportation Standard Specifications 2015 and Revised Standard Specifications 2015 (collectively, the 2015 Standard Specifications) and Sections 11-134 of the State of California Department of Transportation Standard Specifications 2018 and Revised Standard Specifications 2018 (collectively, the 2018 Standard Specifications) (the 2015 Standard Specifications and the 2018 Standard Specifications are collectively the Standard Specifications); in accordance with the City of Santa Rosa Construction Specifications for Public Improvements (City Specifications); in accordance with the City of Santa Rosa Design and Construction Standards, (City Standards); in accordance with the State of California Department of Transportation Standard Plans 2018 and Revised Standard Plans 2018 (collectively, Standard Plans), (collectively, "Contract Documents") and in accordance with the Special Provisions hereinabove set forth, all of which are hereby incorporated into and made part of this Contract.

ARTICLE II - Contractor agrees to receive and accept the following prices as full compensation for furnishing all materials and doing all the work contemplated and embraced in this Contract; also for all loss or damages arising out of the nature of the work aforesaid, or from the acts of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered in the prosecution of the work until its acceptance by City and for all expenses incurred by or in consequence of the suspension or discontinuance of work, and for well and faithfully completing the work, and the whole thereof in the manner and according to the Project Plans and Invitation for Bids therefor, and the requirements of the Engineer under them to wit:

ITEM NUMBER	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL
			$ _____	$ _____

TOTAL BASE BID (SUM OF "TOTAL" COLUMN) $ _____

BID ITEMS IN THIS SECTION WILL BE INSERTED UPON AWARD OF THE CONTRACT AND SHALL BE THE SAME AS THOSE BID UPON.

ARTICLE III - City and Contractor hereby promise and agree that Contractor shall provide the materials and do the work according to the terms and conditions herein contained and referred to, for the prices aforesaid, and City hereby agrees to pay for the same at the time, in the manner, and upon the conditions set forth; and the parties for themselves, their heirs, executors, administrators, successors, and assigns, do hereby agree to full performance of the covenants herein stated.

ARTICLE IV - By execution of this Contract, Contractor hereby represents and certifies that Contractor is aware of the provisions of Labor Code section 3700 which require every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and Contractor hereby agrees to comply with such provisions before commencing the performance of the work of this Contract.

ARTICLE V - It is further expressly agreed by and between the parties hereto that the Invitation for Bids, containing the Notice to Bidders including any required Bonds, the Contract Documents, all required *Contractor Agreement(s) to be Bound* to the PLA executed by Contractor and all subcontractors to which the PLA is applicable, and any Addenda are all essential parts of this Contract and are specially referred to and by such reference made a part hereof. In the event of any conflict in the provisions thereof, the terms of said documents shall control each over the other, in the following order:

1. Special Provisions
2. Project Plans
3. City Standards
4. City Specifications
5. Standard Specifications
6. Standard Plans

ARTICLE VI - Contractor agrees to commence work pursuant to this Contract within ten calendar days from the date authorized in the Notice to Proceed and to diligently prosecute the same to completion in accordance with Section 8-1.05 of the Special Provisions.

This Contract shall not be transferred or assigned without the prior written consent of City, which may be withheld by City in its sole and absolute discretion.

If Contractor is a corporation, two corporate officers of Contractor, one from each of the following two groups shall execute this Contract: a) the chairman of the board, president or any vice-president; b) the secretary, any assistant secretary, chief financial officer, or any assistant treasurer. The name and title of the corporate officers shall be printed under the signature.

In witness whereof, the parties hereto have executed this Contract as of the date first written above.

City:

City of Santa Rosa,
a Municipal corporation

By: _____

Title: _____

ATTEST:
By: _____

Title: _____

Approved as to form:

By: _____
Office of City Attorney

Contractor:

Name of Contractor,
Type of entity

By: _____

Name: _____

Title: _____

By: _____

Name: _____

Title: _____