INVITATION FOR BIDS

City of Santa Rosa

FOR CONSTRUCTING

SPRING LAKE LIFT STATION IMPROVEMENTS

CONTRACT NUMBER

C01570

ISSUED BY

CAPITAL PROJECTS ENGINEERING DIVISION

CITY OF SANTA ROSA, CALIFORNIA

2017

A T T E N T I O N
Prebid Conference
See Page 1

City of Santa Rosa

STATE OF CALIFORNIA

INVITATION FOR BIDS

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CONTRACT

FOR

SPRING LAKE LIFT STATION IMPROVEMENTS

Contract No. C01570

SPRING LAKE LIFT STATION IMPROVEMENTS

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BID FORMS

CONTRACT

CITY OF SANTA ROSA
STATE OF CALIFORNIA

NOTICE TO BIDDERS

➢	For technical questions regarding this project, contact Andrew Wilt at (707) 543-4519.
➢	For direct access to plans, specifications and planholders' lists, go to **www.srcity.org/bids** and click on Bid/Proposal Opportunities or call (707) 543-3800.
➢	For direct access to bid results, go to **www.srcity.org/bids**. Under Link to Capital Projects, click on Capital Projects Contracts or call (707) 543-3835.

- 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., May 4, 2017, for Spring Lake Lift Station Improvements, Contract No. C01570. (Engineer's Range: $376,000 - $460,000.)

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 10:00 a.m., April 27, 2017, located at the project site, 5391 Montgomery Drive, Santa Rosa, California.

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.

CITY OF SANTA ROSA
ESTIMATED QUANTITIES
SPRING LAKE LIFT STATION IMPROVEMENTS

Item No.	Description	Quantity	Units
1	TRAFFIC CONTROL	1	LS
2	WATER POLLUTION CONTROL	1	LS
3	GROUNDWATER MANAGEMENT	1	FA
4	SELECTIVE SITE DEMOLITION	1	LS
5	EXCAVATION (F)	232	CY
6	OVER EXCAVATION	40	CY
7	STRUCTURAL FILL (F)	200	CY
8	ROCK LINED SWALE	25	LF
9	EROSION CONTROL	1	LS
10	ASPHALT CONCRETE SURFACE	70	TON
11	REINFORCED CONCRETE SLAB	598	SF
12	CONCRETE VALLEY GUTTER	225	SF
13	CONCRETE MOW CURB	38	LF
14	PRECAST PUMPER CONNECTION UTILITY VAULT	1	LS
15	WET WELL SUCTION CONNECTION	1	LS
16	DRY WELL ENTRY HOIST	1	LS
17	DRIVEWAY AND SIDEWALK	265	SF
18	6' HIGH SECURITY FENCE	20	LF
19	8' HIGH SECURITY FENCE	82	LF
20	WOOD FENCE	62	LF
21	6' HIGH ROLLING GATE	1	EA
22	8' HIGH ROLLING GATE	2	EA
23	6' HIGH WALK GATE	1	EA
24	STABILIZATION FABRIC	500	SY
25	GEOGRID	100	SY
26	1" WATER SERVICE AND HOSE BIB	1	LS
27	TREE PROTECTION AND REMOVAL	1	LS
28	GENERAL ELECTRICAL WORK AND LIGHTING	1	LS
29	ELECTRICAL AND CONTROLS PEDESTAL	1	LS
30	METER PEDESTAL	1	LS
31	25KW DUAL FUEL GENERATOR SET	1	LS
32	GAS PIPING	150	LF
33	FURNISH AND INSTALL 499 GALLON LIQUID PROPANE FUEL TANK	1	LS
34	NATURAL GAS SERVICE	1	LS

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 and the Contractor, or the Contractor's designated Electrical Subcontractor, shall have a C-10 license for this project.

Project plans, bid and contract forms for Spring Lake Lift Station Improvements 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.

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 bonds.

ANDREW ALLEN
Supervising Engineer Date

SPECIAL PROVISIONS

General Specifications

CITY OF SANTA ROSA, CALIFORNIA

SPRING LAKE LIFT STATION IMPROVEMENTS

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 24 sheets entitled Spring Lake Lift Station Improvements, 2016-0004
3. City of Santa Rosa Design and Construction Standards (City Standards)
4. City of Santa Rosa Construction Specifications for Public improvements (City Specifications)
5. State of California Department of Transportation Standard Specifications 2010 (Standard Specifications), and
6. State of California Department of Transportation Standard Plans 2010 (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 Water 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 any and all claims and disputes arising under this contract.

2 BIDDING

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 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.

2-1.31 Examination of Project Plans, Specifications, City Standards, Invitation for Bids and Work Site: Prior to submitting a bid, the bidder shall carefully examine the Project Plans, 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. A copy of such addendum will be mailed or faxed to each Planholder. The City will not be bound by any other explanations or interpretations of the Contract Documents.

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 Guaranty Information and Bidder's Information and Signature
6. Bid Guaranty (Bid Bond or alternate security)

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.

2-1.33B 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.

2-1.33C 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.

2-1.33E 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 Bid Guaranty: 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 Disqualification of Bidders: 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 bidder within sixty 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 one-half 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 one-half 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.

3-1.07 Indemnification and Insurance: Indemnification: Contractor shall defend, hold harmless and indemnify City, its officers, agents and employees, and the Sonoma County Water Agency (SCWA), 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.

Insurance Requirements

A. 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.

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 and without first giving 30 days written notice to the SCWA.
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 or the SCWA 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, and the Sonoma County Water Agency, it 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.

3-1.20 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.

3-1.21 Return of Bid Guarantees: 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.

3-1.22 Subcontractors: The successful bidder shall furnish a list of all subcontractors as required under Sections 2-1.33C & D. 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.

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 conform to the provisions of Section 9-1.06 of the Standard Specifications, except as modified herein.

5 CONTROL OF WORK

5-1.02 Contractor's Copies of 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 24 sheets entitled Spring Lake Lift Station Improvements, 2016-0004
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.

With the exception of trenching, all existing street, street light base, curb and gutter, storm drain, water line, and sewer line work shall be completed before any existing street paving is removed.

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: Contractor is directed to Section 5-1.17 of the Standard Specifications which states:

> "If any subcontractor or person employed by the Contractor shall appear to the Engineer to be incompetent or to act in a disorderly or improper manner, he shall be discharged immediately on the request of the Engineer, and such person shall not again be employed 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 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. Contractor shall grant such forces access to the project area as is reasonable and necessary to transport materials and equipment to the site of operations by the other forces.

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:

a. Stockpiling of equipment and/or materials;
b. Staging of construction;
c. Placement of work trailers or mobile offices;
d. Storage of trench spoils; or
e. Other construction related activities not specifically enumerated above.

5-1.26 Lines and Grades: 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.

5-1.27B 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.

5-1.36A 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, and any other improvements 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 Arbitration: Any references to Arbitration in the Standard Specifications are deleted in their entirety.

6 CONTROL OF MATERIALS

6-2.01 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.

6-3.01 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.

6-3.01A 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.

6-3.05 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:

a. 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;

b. Contractor destroys markouts;
c. Contractor fails to perform hand digging or probing for utilities near markouts; or
d. 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: Unless otherwise specified, 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. Contractor may offer substitute materials and equipment of equal or better quality y 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:

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

   1. Material that the 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;
   2. Subsurface or latent physical conditions at the site differing from those indicated in the Invitation for Bids; and
   3. 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.

b. 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.

c. 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(2)(a) 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.

Except for projects to be performed under a minor contract, 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.

8-1.04B Standard Start: Contractor shall begin work within ten calendar days after the date authorized in the Notice to Proceed and shall diligently prosecute the Contract to completion before the expiration of:

95 WORKING DAYS

8-1.05 Time: Working days will be counted beginning with the day the Contractor begins work or with the tenth day after the date authorized in the Notice to Proceed, whichever occurs first.

Unless otherwise directed by Engineer, Contractor shall not conduct any activities that generate noise earlier than 7:00 a.m. or later than 7:00 p.m.

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.

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. 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 required

by the Engineer to determine the facts or contentions in the claims. Failure to grant access to such records shall be sufficient cause for denying the claims.

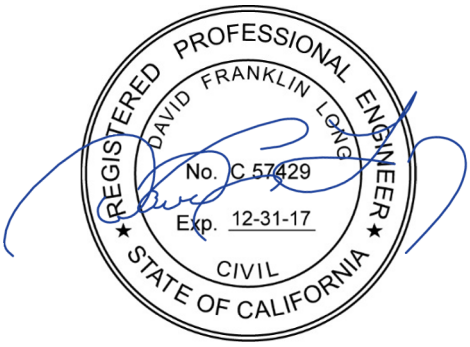
City of Santa Rosa

TECHNICAL SPECIFICATIONS

FOR

SPRING LAKE LIFT STATION IMPROVEMENTS

CONTRACT NO. C01570



Brelje & Race
CONSULTING ENGINEERS

MARCH 2017

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

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

9. 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.

10-3.02 Payment: **Mobilization and Demobilization** shall be included in the prices paid for **various contract items** of work and no additional allowance will be made therefor.

10-5 Dust Control

10-5.01 General: Sweeping per section 10-5.03 shall also be performed to prevent and alleviate dust.

Sweeping, covering stockpiles, applying water, and/or dust palliative, to control dust caused by public traffic is not change order work.

10-5.03 Construction: 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.

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

At the end of each work day the Contractor shall thoroughly sweep all streets in the work zone to minimize airborne dust.

At the end of each work week the Contractor shall 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.

10-5.04 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.

SECTION 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 (CAMUTCD), and as directed by the Engineer.

12-1.03 Flagging Costs: The first paragraph of Section 12-1.03, "Flagging Cost" is amended to read:

> The cost of furnishing all flaggers, including transporting flaggers, to provide for passage of public traffic through the work in Section 7-1.03, "Public Convenience", and Section 7-1.04, "Public Safety", of the Standard Specifications 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 CAMUTCD 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 specifically applied for each work operation. Traffic Control Plans or proposals shall be submitted for review at least two weeks prior to implementation.

The Traffic Control Plan 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 signing, cone placement, and other methods of delineation and reference to appropriate City or Caltrans standard.
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 accommodated through the construction site. Pedestrian pathways through the work zone shall be in compliance with the requirements of ADA during and after work hours.
7. Identify message board locations. A minimum of 2 changeable message boards shall be required. Location shall be determined by the Engineer.

8. 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 Plan.

Proposed staging locations for equipment and materials shall be submitted with the Traffic Control Plans for approval.

12-4 Maintaining Traffic

12-4.01 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 his 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. The Contractor shall notify the Engineer of his planned work and utility service interruption at least five working days in advance to allow time to notify residents and businesses.

4. When construction activities will prevent vehicle access to individual driveways the Contractor shall notify the affected businesses and residents per Section 12-1.03, "Traffic Control", of these Special Provisions. Full access shall be provided to all driveways at all times, except as otherwise specified.

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.

The Contractor shall maintain traffic control as necessary and as directed by the Engineer for any project related operation conducted by City Forces. Flaggers, barricades, delineators, signing, etc., shall be set up and remain in place for protection of City personnel until such time as they are no longer required.

12-4.01A Construction Traffic: Staging of equipment and/or materials shall not take place on Montgomery Drive.

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 not inhibit access to private parking lots. Construction vehicles shall not be left running for any length unless required for project operations.

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 7-1.08, "Maintaining Traffic", to Section 5-1.05, "Order of Work," of these Special Provisions.

Exact locations of Project Identification signs and Advance Notice signs (Section 7-1.08 "Maintaining Traffic") shall be determined in the field by the Engineer.

Two weeks prior to the start of construction, the Contractor shall set up two changeable message boards to notify motorists of the upcoming work and potential traffic delays. The message boards shall continue to be used until all work is completed that may affect traffic. The Contractor shall coordinate with the Engineer for positioning of the message boards and the message displayed. Where necessary for traffic safety the Portable Changeable Message Signs shall be removed from the street at the end of each work day as directed by the Engineer.

Lane closures will be permitted between the hours of 9:00 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 in writing.

When any operation may affect traffic, regardless of length of time, and unless otherwise approved by the Engineer, the Contractor shall maintain a minimum 10 foot wide travel lane with alternating one-way traffic movements controlled by a minimum of two flaggers.

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 Sonoma County Transit at (707) 585-7516, Santa Rosa City Bus at (707) 543-3922, the local Postal Service at (707) 526-0113 and Santa Rosa Recycling and Collection at (707) 586-8234, 5 calendar days prior to any lane closures or restrictions in turning movements.

12-7 Temporary Pedestrian Walkways

12-7.01 Pedestrian Traffic Control: The Contractor is directed to Chapter 6D, Pedestrian and Worker Safety, in the CAMUTCD, 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.

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), the CAMUTCD.

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 work day 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.

Either the existing sidewalk or a temporary pathway, that is in compliance with the above requirements, shall be open and accessible at all times during this project. Detouring pedestrians across Montgomery Drives will not be allowed.

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, preparing traffic control plans, providing, placing, maintaining, and removal of temporary paths and/or ramps, temporary relocation of regulatory signs, changeable message boards, project and public notification signs, flagging, excavation, compaction, furnishing, and placement of asphalt concrete and/or PCC, barricades, toe-rails, hand rails, complying with CAMUTCD 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.

SECTION 13
WATER POLLUTION CONTROL

13-1 General

13-1.01A: 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 California Water Quality Control Board, North Coast Region Order No. R1-2009-0050, National Pollutant Discharge Elimination System Municipal Storm Water Permit, Part 8 – Development Construction Program, Sections 1 through 5, 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.

13-1.04 Payment: Full compensation for conforming to the requirements of Section 13 shall be paid for at the contract **lump sum** price for **Water Pollution Control**, which price shall include full compensation for furnishing all submittals, labor, materials, tools and equipment, and doing all the work involved in water pollution control, and no additional allowance will be made therefor.

Groundwater Dewatering and Discharge will be paid for separately from the lump sum price for Water Pollution Control as indicated in Section 13-4.04 herein.

13-2 Water Pollution Control Program

13-2.01B 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: Water Pollution Control Program shall be paid for as part of the lump sum price for Water Pollution Control.

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 / 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 Contractor hereunder.

In the event there are insufficient amounts owed to 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(2): Material Storage / CASQA Material Delivery and Storage (BMP WM-1)

13-4.03C(3): Stockpile Management / CASQA Stockpile Management (BMP WM-3):
Do not block storm water flows.

13-4.03D(1): 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 / 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 / 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.

Groundwater was not encountered during geotechnical investigations. Free groundwater in the existing on-site groundwater dewatering sump was recorded at approximately 13 feet below the existing ground surface on January 12, 2017. Groundwater levels may change depending on the time of year and the amount of seasonal rainfall.

Groundwater may be encountered during the course of excavation. If it is encountered, the Contractor shall immediately notify the City. The Contractor shall **remove all water** which accumulates in the excavation during the progress of work until the subgrade has been prepared and backfilling has progressed to a sufficient height above static groundwater levels. The Contractor shall have a minimum of two working pumps available for immediate use at all times.

Water accumulated in excavations shall be discharged to the sanitary sewer under the conditions set forth in the discharge permit issued by the City included in these Special Provisions. Said water shall be disposed of in a manner as to cause no injury to public or private property, or be a menace to public health. Sediment shall be removed from water to be disposed of, prior to discharge, by a placing the pump inlet hose into a sump filled with clean gravel, or a perforated

bucket filled with clean gravel. The outlet of the pump shall have a filter sock installed to retain residual sediment.

The discharge shall be monitored to verify the lack of contamination. Periodic samples shall be analyzed by the City's Environmental Compliance Laboratory to confirm the acceptability of the discharge. **If any odor, sheen or other visual discrepancy is noted during excavation or discharge, stop pumping and immediately notify the Engineer.**

Pumped groundwater will not be allowed into any watercourse or storm drain system.

Contractor shall be responsible for constructing, operating and maintaining all necessary features to complete the work including furnishing, installing and maintaining all pumping and other equipment required to dewater any trenches containing water as may be encountered during performance of the work. Dewatering plan for each occurrence shall be approved by the Engineer prior to implementation. At the permanent conclusion of dewatering operations, all dewatering equipment shall be removed from the job site.

13-4.03E(1): Water Control and Conservation / CASQA Water Conservation Practices (BMP NS-1 and NS-2)

13-4.03E(3): Vehicle and Equipment Cleaning / CASQA Vehicle and Equipment Cleaning (BMP NS-8)

13-4.03E(4): Vehicle and Equipment Fueling and Maintenance / CASQA Vehicle and Equipment Fueling (BMP NS-9), and CASQA Vehicle and Equipment Maintenance (BMP NS-10)

13-4.03E(7): Paving, Sealing, Sawcutting, Grooving, and Grinding Activities: As listed in Part 9, sections 4 and 5 of the Storm Water Permit, the following additional BMPs shall be implemented for street paving, repaving, reconstruction, patching, digouts or resurfacing.

1. Restrict paving and repaving activity to exclude periods of rainfall or predicted rainfall unless required by emergency conditions;

2. Install gravel bags and filter fabric or other appropriate inlet protection at all susceptible storm drain inlets and manholes to prevent paving products and tack coat from entering the storm drain;

3. Prevent the discharge of release agents including soybean oil, other oils, or diesel to the storm water drainage system or watercourses;

4. Minimize non-storm water runoff from water use for the roller and for evaporative cooling of the asphalt;

5. Clean equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly

6. Collect liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled, or disposed of properly **13-4.03D(5)**;

7. Collect solid waste by shoveling and vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled, or disposed of properly **13-4.03D(1)**;

8. Cover “cold-mix” asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm **13-4.03C(3);**

9. Cover loads with tarp before haul-off to a storage site, ensuring that trucks are not overloaded;

10. Minimize airborne dust by using water spray during grinding **14-9.03** and**;**

11. Avoid stockpiling soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near storm water drainage system or watercourses **13-4.03C(3)**,

13-4.03F: Sweeping / CASQA Street Sweeping and Vacuuming (BMP SE-7)

13-4.04 Payment: Job Site Management shall be paid for as part of the contract lump sum price for Water Pollution Control.

If groundwater is encountered, **Groundwater Management** will be paid on a **Force Account (FA)** basis up to the contract allowance price and shall include full compensation for furnishing all labor, materials, permits, tools and equipment, for doing all the work involved in providing groundwater management, including, but not limited to, all necessary removal, storage, sediment treatment, pumping equipment, and transportation, for disposal for all groundwater encountered from excavations and trenches at the site, and no additional compensation will be made therefor. Disposal location of groundwater will be determined and directed by the Engineer. The City will pay discharge fees for the necessary disposal of water, if required.

13-6 Temporary Sediment Control

13-6.03C: Temporary Drainage Inlet Protection / CASQA Storm Drain Inlet Protection (BMP SE-10)

13-6.04 Payment: Temporary Sediment Control shall be paid for as part of the contract lump sum price for Water Pollution Control. The contractor shall pay all maintenance costs.

13-7 Temporary Tracking Control

13-7.01A: Temporary Tracking Control / Stabilized Construction Entrance and Exit (BMP TC-1), Entrance Outlet Tire Wash (BMP TC-3): Entrances to the construction site shall be maintained in a condition that will prevent tracking or flowing of potential pollutants offsite. Potential pollutants deposited on paved areas shall be properly disposed of at the end of each working day or more frequently as required by the Engineer.

13-7.03 Construction / CASQA Stabilized Construction Site Entrance / Exit (BMP TC-1)

13-7.04 Payment: Temporary Tracking Control shall be paid for as part of the contract lump sum price for Water Pollution Control. The contractor shall pay all maintenance costs.

13-10 Temporary Linear Sediment Barrier

13-10.02B Temporary Fiber Roll (BMP SC-5): Temporary fiber rolls shall be Type B complying with Section 21-1.02P of the Standard Specifications.

13-10.03F Temporary Silt Fence / CASQA Silt Fence (BMP SE-1)

13-10.04 Payment: Temporary Linear Sediment Barrier shall be paid for as part of the contract lump sum price for Water Pollution Control. The contractor shall pay all maintenance costs.

SECTION 14
ENVIRONMENTAL STEWARDSHIP

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. 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.

14-10.02A(1) Submittals: 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.

14-10.02D 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.

14-11 Hazardous Waste and Contamination

14-11.01 General: Bidder's attention is directed to the fact that the proposed project is located in an area that contains no **known** subsurface petroleum hydrocarbon contamination, based on communications with the Regional Water Quality Control Board.

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. Conditions indicative of contamination may be either visual (staining in soil, sheen on water surface) or olfactory (petroleum hydrocarbon odors.)

Upon the discovery of suspected contaminated materials, the Contractor shall immediately provide 40 hour OSHA-HAZWOPER certified workers in the contaminated area. The Contractor shall also provide a field Site Safety Officer that is also an 8-hour OSHA-HAZWOPER Supervisor trained to directly oversee the contaminated materials removal and handling operation. All workers in this circumstance must have their initial and annual renewal refresher training, medical clearance and personal protection equipment in accordance with 8CCR Section 5192.

Any material excavated from trenches in the project area that exhibit signs of contamination (including, but not limited to staining and/or odor) shall be considered property of the City and shall only be disposed of at the direction of the City. Under such conditions, costs beyond normal disposal costs for uncontaminated material will be paid on a force account basis. Prior to disposal of any excess material from the work site, the Contractor shall submit to the Engineer written authorization for such disposal and entry permission signed by the approved disposal site. The Contractor shall comply with all disposal regulations such as City, County, and/or State permits and licenses, as may be required.

SECTION 15
EXISTING FACILITIES

15-1 General

15-1.03 Construction

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 their 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.

15-2 Miscellaneous Facilities

15-2.02 Remove

15-2.02C Traffic Stripes and Pavement Markings: All traffic stripes, pavement markings or any other traffic marking disturbed by construction shall be removed and replaced in accordance with Sections 84 of the Standard Specifications, City Standards, the Plans and these Special Provisions.

All raised pavement markers disturbed by construction shall be removed and replaced in accordance with Sections 85 of the Standard Specifications, City Standards, the Plans and these Special Provisions.

15-2.02M Irrigation Facilities and Landscaping: Irrigation facilities and landscaping may be encountered during the course of the work. The Contractor shall exercise care during work around existing irrigation and landscaping not specifically noted to be removed. The Contractor shall repair any damage to irrigation or landscaping done by their operations at no additional cost to the City.

Irrigation facilities, landscaping, and other surface structures shall be restored to original condition at no additional cost to the City.

See Section 112 – Tree Protection and Removal for additional information related to existing trees.

15-2.02N Selective Site Demolition: Selective site demolition includes removal, disposal, salvage, reinstallation, and/or temporary installation of specific materials, and miscellaneous mechanical and electrical elements within the limits of work.

Protect and maintain all existing site items and protect them against damage during selective demolition operations. Conduct demolition operations to prevent injury to people and damage to

adjacent facilities, site improvements, and appurtenances that are to remain. Cover and protect equipment that has not been removed.

Dispose of demolished materials promptly and legally; do not allow demolished materials to accumulate at the site.

All hazardous material encountered during site demolition shall be removed from the construction area by qualified personnel, placed in bins or receptacles designated specifically for hazardous materials, and disposed of in accordance with State Law.

Whenever used in this Section or in the Project Plans, the following terms shall have the primary meaning given herein:

1. **Remove and Dispose**: Remove to an approved off site facility and legally dispose of any items noted as such in the contract documents, except those items indicated.
2. **Remove and Salvage**: Items indicated to be removed and salvaged remain the City's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to City's designated storage area.
3. **Remove and Reinstall**: Remove items indicated; clean, replace fluids, inspect seals, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated on the Project Plans.
4. **Existing to Remain**: Protect items indicated to remain against damage during selective demolition. When permitted by the Engineer, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged. If unanticipated mechanical, electrical, or structural elements conflict with the intended function or design is encountered, investigate and measure the nature and extent of the conflict. Submit a written report to the Engineer.

15-2.08 Reset

15-2.08A General: Reset existing City facility boxes and lids to grade. The City will furnish at no cost to the Contractor new material to replace existing boxes and lids that do not comply with current City Standards or damaged prior to Contractor's operations.

15-2.08D Existing Wet Well and Groundwater Sump Covers: Prior to placing concrete, remove and replace existing manhole frames and covers and set to finished grade and provide expansion material as indicated on the Project Plans and in these Special Provisions.

The Lift Station shall remain in operation during the work and facilities must be accessible at all times to City personnel.

Prior to removal and replacement of the existing manhole frames and covers, the Contractor shall submit on and get approval by the Engineer for a method that will prevent any dirt or debris from entering the facilities below. The system must allow urgent access to City personnel and shall remain in place until all work on the frame and cover has been completed and the adjacent surfacing has been completed. Prior to the removal of the system from the lift station facilities, all dirt and debris shall be removed.

15-2.13 Payment: Selective Site Demolition shall be paid for at the contract **lump sum** price, which price shall include all labor, materials, and equipment necessary to remove and dispose of

existing concrete, asphalt pavement, fencing, piping, precast concrete vaults, generator set, propane tanks, electrical, miscellaneous mechanical equipment, protection of existing items to remain, and cleanup, complete in accordance with the Project Plans and as specified herein, and no additional allowance will be made therefor.

Remove and Replace Existing Wet Well and Groundwater Sump Covers shall be included in the contract prices paid for **various contract items** of work, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in removing the existing manhole covers and installing new bolt down covers and appurtenances, including but not limited to, required excavation and backfill, coordination for replacement of covers, and removing silt and debris, as specified herein, and no additional allowance will be made therefor.

Full compensation for repair or replacement of existing landscaping and irrigation facilities damaged during any phase of the work shall be included in the prices paid for **various contract items** of work, and no additional allowance will be made therefor.

15-3 Concrete Removal

15-3.01 General: Concrete removal shall conform to applicable provisions of Section 15-3 of the Standard Specifications and these Special Provisions.

All removed concrete shall become the property of the Contractor and shall be immediately off-hauled. None of the removed concrete shall be dumped or stockpiled on the work site. The Contractor shall dispose of all removed concrete at a recycler for this material. Burying of broken concrete within the limits of the project will not be allowed.

15-3.03 Construction: All removed concrete shall become the property of the Contractor and shall be immediately off-hauled. None of the removed concrete shall be dumped or stockpiled on the work site. The Contractor shall dispose of all removed concrete at a recycler for this material. Burying of broken concrete within the limits of the project will not be allowed.

All concrete which is to be removed shall be removed to the nearest score mark or construction joint as directed by the Engineer unless otherwise noted on Project Plans. The edge of existing concrete to remain shall be neat and free of defects. Saw cutting may be required to achieve this.

Reinforcing steel may be encountered in portions of concrete to be removed and no additional allowance will be made for the removal of such steel.

15-3.04 Payment: Payment for saw cutting, removal and disposal of miscellaneous concrete, sidewalk, curb and gutter, driveway areas, and existing City monuments shall be included in the contract prices paid for **various contract items** of work and no additional allowance will be made therefor.

SECTION 19
EARTHWORK

19-1 General

19-1.01A Summary: Earthwork shall conform to the applicable provisions of Section 19 of the Standard Specifications, with the following modifications and additional requirements. Earthwork shall include all labor, materials, equipment, tools and incidentals and performing all operations necessary to excavate, earth and rock, regardless of character and subsurface condition; prepare foundation and subgrade materials for the placement of other material thereon; transport, place, compact and finish fill materials; mix, blend and moisture condition materials as required; remove and replace unsuitable materials; dewater or otherwise control and remove groundwater in accordance with Section 13 of these specifications; and remove, transport and dispose of surplus and unsuitable excavated material.

Blasting will not be permitted.

19-1.01B Definitions: Whenever used in this Section or in the Project Plans, the following terms shall have the primary meaning given herein:

1. **Excavation or Sub-Excavation** – Removal of native materials below the plane established by the stripping or demolition operations to the lines and grades shown on the Project Plans and from those areas upon which fill materials will be placed or as directed by the Engineer.
2. **Fill or Structural Fill** – Suitable materials meeting the requirements and handled in accordance with these contract documents.
3. **Over-Excavation** – Unforeseen removal of native materials beyond the normal limits of excavation and replacement of the material to the normal lines of excavation with a specified engineered fill, or suitable native materials. Over-excavation limits are not defined on the Project Plans, but are a requirement of encountering unsuitable native materials during excavation that were previously unknown.
4. **Suitable Material** – Material that meets the requirements for fill as described herein.

19-1.01C Geotechnical Report: A copy of the Geotechnical Report entitled "Geotechnical Exploration Report; Spring Lake Estates Sewer Lift Station 5391 Montgomery Drive; Santa Rosa, California," dated July 18, 2013 prepared by LACO Associates, is available to view upon request at the City Public Works Office, 69 Stony Circle, and is NOT considered part of the contract documents. An electronic copy (PDF) of this report and test results may be obtained at the following ftp site (copy exactly as written including the underscores) or via email from the City by request and is ***not*** considered part of the contract documents:

ftp://ftp.ci.santa-rosa.ca.us/pw_customer_service/SpringLakeLiftStationImprovements/

The information contained in the above memoranda was obtained for investigation and design purposes only and is not part of the contract documents. All statements, findings and interpretations in the memorandum are those of LACO Associates. The City makes neither interpretations nor representations as to its accuracy. The Contractor is responsible for any conclusions he may draw from these reports; should he prefer not to assume such risk, he should employ his own experts to analyze available information upon which to base his conclusions, all at no cost to the City.

19-1.01D Protection: Adequate protection measures shall be provided to protect workmen and passers-by at the site. Streets and adjacent property shall be fully protected throughout the operations.

In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job sites, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

Any construction review of the Contractor's performance conducted by the Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, or near the construction site.

Adjacent streets, parking areas, driveways, and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations. Streets shall be swept by a commercial street sweeping machine at least twice each week. This provision may be reduced to once each week, on a week by week basis, when conditions warrant the reduction and with written permission from the Engineer.

Surface drainage provisions shall be made during the period of construction in a manner to avoid creating a nuisance to adjacent areas.

19-1.03 Construction

19-1.03A General: The provisions of Section 19-1.03A of the Standard Specifications shall not apply.

If work has been interrupted by weather, scheduling, or for any other reason, the Engineer shall be notified by the Contractor at least 24 hours prior to the intended resumption of earthwork operations. It may be necessary to re-affirm suitability of placed compacted fill soils or fill materials that have been exposed to adverse weather conditions.

19-1.03E Ditch Excavation: Ditches shall be formed and excavated of the type and at the dimensions indicated on the Project Plans.

19-1.04 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.

19-2.03B Surplus Material: Surplus soil from this project has been approved for disposal at the City's Pond 2 Decommissioning and Grading Project at 35 Stony Point Road Santa Rosa, CA.

The following Pond 2 surplus soil transport and placement conditions shall be adhered to:

1. Material must be free of asphalt concrete; asphalt and soil grindings associated with roadway excavation and reconstruction;
2. Soil beneath asphalt that was previously oiled for paving is not allowed;
3. Sewer, water or storm drain pipe of any kind or type are not allowed;
4. Concrete; metal; rock greater than 6" in size; vegetation; and other deleterious materials are not allowed;
5. The quantity of trucks and the volume of soil deposited in Pond 2 from this project will be tracked. Truck drivers will be required to sign a log and be subject to periodic inspections to insure that only soil from this project is deposited in Pond 2

6. The Contractor shall spread and compact all project soils deposited into Pond 2 to 85% relative compaction and testing will be provided and performed by the City's materials Engineering Laboratory. The cost of compaction testing will be borne by the City.
7. Contractor shall comply with all disposal regulations such as City, County, and/or State permits and licenses, as may be required.
8. Soil disposal shall be limited to Monday through Friday between the hours of 7:00 am and 4:30 pm. Advanced, 48 hour notice is required to the City inspector and Water prior to starting.
9. Pond 2 site access is directly affected by weather conditions. You should anticipate no access during and for some time after rain events, unless wet weather site conditions are met at your expense.
10. The haul route shall be through the City Municipal Service Yard. A 15 MPH speed limit shall be observed at all times with stopping at all crosswalks and stop signs. No trucks shall access the site via any other route.
11. Tracking of material from the disposal location onto any and all paved surfaces near the pond is not allowed. Should tracking become evident sweeping will be required at your cost no later than the end of day. Dust control shall be provided at all times in accordance with Section 10.
12. The Idling limits on In-Use Off-Road Diesel Vehicles in section 2449 (d) (3) in Title 13, article 4.8, chapter 9, California Code of Regulations (CCR) shall be effective and enforceable.

The City shall reserve the right to unconditionally suspend or revoke disposal at any time at no cost to the City.

19-4 Geotechnical Correction Work

19-4.01 General

19-4.01A Summary: Section 19-4 includes specifications for excavation, subgrade preparation, structural fill, materials placement, fill enhancement geotextiles, compaction control testing, general earthwork execution requirements, and disposal of surplus and unsuitable excavated materials.

The provisions of Section 19-5 of the Standard Specifications shall not apply.

19-4.02 Materials

19-4.02A Structural Fill Quality: On-site excavated materials are not suitable for reuse as fill. Fill materials shall be Class 2 Aggregate Base conforming to the requirements of Section 26.

19-4.03 Construction

19-4.03A Excavation: Excavation shall extend downward from the existing ground surface to remove in-situ materials in their entirety to the limits of sub-excavation indicated on the Project Plans. When completed, the average plane of excavated surfaces shall conform to the lines, grades, and limits shown on the Project Plans, and no point shall vary from these designated slopes by more than 0.25 feet measured at right angles to the completed slopes.

All cut slopes shall be periodically examined during and at the completion of excavation by the Engineer, who shall evaluate the excavated soils and determine the need for additional excavation.

Should unsuitable areas of the cut be exposed during excavation, they shall be removed by over-excavation as directed by the Engineer. Over-excavated areas shall be replaced with suitable fill conforming to the requirements of Section 19-4.02A as directed by the Engineer.

Excavation beyond the limits indicated, unless approved by the Engineer as Over-Excavation, will be at the Contractor's expense.

Any materials excavated in the project area that are discovered during construction to exhibit signs of contamination (including, but not limited to staining and/or odor) shall be handled in accordance with Section 14 of these special provisions.

The Contractor shall note that there are street trees near areas intended for excavation. The Contractor's operations, shall be such, so as to insure that existing trees are not damaged.

Where tree roots are encountered during earthwork operations, the Contractor shall cut the roots off six inches below the planned subgrade. Each cut shall be clean with no torn bark or splintered wood remaining on the root and shall be accomplished by use of saw appropriate for the size of the root to be cut.

19-4.03B Subgrade Preparation: After construction observation and authorization by the Engineer, the soils exposed by excavation activities shall be scarified to a depth of at least 8-inches, moisture conditioned to a uniform moisture content determined by the Engineer, and recompacted to not less than 90% relative compaction at a minimum depth of 0.5-foot below the excavation plane.

Following subgrade preparation, stabilization fabric shall be placed as indicated on the Project Plans. Stabilization fabric shall comply with the requirements of Section 88 of these Special Provisions.

19-4.03C Placing and Compacting Fill: Fill should be placed in 8-inch loose lifts, moisture conditioned to a uniform moisture content of 4% above optimum, and compacted to an average 92% relative compaction per ASTM D1557, with no tests less than 90%.

Geogrid reinforcement and subgrade stabilization fabric shall be placed within the fill at the depths and locations indicated on the Project Plans or as directed by the Engineer. Subgrade enhancement materials shall comply with Section 88 of these Special Provisions.

19-4.03D Fill Test Methods and Requirements: Moisture content and compaction testing will be made at random throughout each lift of the fill by performing field density tests taken by the Nuclear Method per ASTM D6938.

Sieve Analysis tests will be made, if required, in conformance with ASTM D422.

All soil evaluations and tests will be performed by the Engineer. Tests will be for the purpose of determining compliance with these Specifications and the frequency and locations of tests will be at the discretion of the Engineer. The Contractor may conduct independent tests for his convenience and control purposes at his sole expense; however, such tests will not be recognized for the purpose of establishing compliance with Specification requirements.

When a density test, or group of tests, indicates that the specified compaction has not been achieved, that portion of the fill shall be reworked until the required density has been attained. Rework may require additional moisture conditioning and compaction or complete removal and replacement.

19-4.04 Payment: **Excavation** shall be paid for at the contract in-place **cubic yard** unit price which shall include all labor, materials, and equipment necessary to excavate to the depths indicated on the Project Plans including, but not limited to excavating, loading, hauling, transportation costs, stockpiling, disposal of excess excavated material, scraping, protecting existing utilities, and other work incidental thereto, complete to the lines and grades shown on and in accordance with the Project Plans and as specified herein, and no additional allowance will be made therefor. Excavation is a **Final Pay Item (F)** as defined in the Standard Specifications. The Contractor shall perform his own calculations based upon his methods of operation and adjust the unit price per cubic yard accordingly.

Over-Excavation shall be paid for at the contract in-place **cubic yard** unit price which shall include all labor, materials, and equipment necessary to over-excavate and fill over-excavations, including but not limited to excavation beyond the limits of sub-excavation indicated on the Project Plans at the direction and as determined necessary by the Engineer in the field, stockpiling, mixing, replacement with approved fill materials, moisture conditioning, and compacting, and no additional allowance will be made therefor. The estimated quantity of Over-Excavation is for bidding purposes only. This quantity may be increased, decreased or eliminated in its entirety based on field condition evaluation by the Engineer, and no adjustment in the contract bid price or other contract items will be made therefor. In the event of an increase or a decrease in the amount of the Engineer's estimated quantity of Over-Excavation, such increase or decrease shall not be considered an alteration in excess of the 25 percent of the contract amount of such items under provisions of Section 9-1.06 of the Standard Specifications and no adjustment of the contract price for Over-Excavation will be made by reason of such increase or decrease.

Structural Fill shall be paid for at the contract in-place compacted **cubic yard** unit price which shall include all labor, materials, and equipment necessary to procure, prepare, and place structural fill, (class 2 aggregate base), to the lines and grades shown on the Project Plans including but not limited to moisture conditioning, scraping, transporting, placing, grading, compacting, subgrade preparation, and other work incidental thereto, complete in accordance with the Project Plans and as specified herein, and no additional allowance will be made therefor. Structural Fill is a **Final Pay Item (F)** as defined in the Standard Specifications. The Contractor shall perform his own calculations based upon his methods of operation and adjust the unit price per cubic yard accordingly.

Rock Lined Swale shall be paid for at the contract price per **linear foot** unit price which shall include all labor, materials, tools and equipment necessary to construct a rock lined swale to the details, lines, and grades shown on the Project Plans including but not limited to grading, placing rock, compacting, subgrade preparation, and other work incidental thereto, complete in accordance with the Project Plans and as specified herein, and no additional allowance will be made therefor.

SECTION 21
EROSION CONTROL

21-1.01 General

21-1.01A Summary: Install permanent erosion control measures as indicated on the Project Plans and as specified in this section of the specifications. Water pollution control measures during the construction period shall be supplied by the Contractor as specified in Section 13.

21-1.02 Materials

21-1.02O Rolled Erosion Control Products: Rolled Erosion Control products shall be Jute Mesh, Type A Netting, or Type A or B Erosion Control Blankets. Turf Reinforcement Mats are not acceptable.

21-1.02P Fiber Rolls: Fiber rolls shall be Type B.

21-1.03 Construction

21-1.03P Fiber Rolls: Install fiber rolls at the perimeter of the site to contain exposed and erodible slopes where installation of rolled erosion control products is not practical, at the locations indicated on the Project Plans, and as directed by the Engineer. Follow Type 1 fiber roll installation and as shown on the Project Plans.

21-1.04 Payment: Erosion 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 the work involved in installing permanent erosion control measures, including but not limited to fiber rolls and rolled erosion control products as shown on the plans and specified herein, and no additional allowance will be made therefor.

SECTION 26
AGGREGATE BASE

26-1.01 Aggregate Base: Aggregate base shall be Class 2 conforming to and placed in accordance with the requirements of Section 26 of the City Specifications, with the following modifications and additional requirements.

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.

26-1.02B Quality Requirements: The minimum sand equivalent shall be 31 for any individual test.

26-1.03D 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 Class 2 Aggregate Base shall be considered as included in the contract prices for various 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, applying water, and compacting, as specified and directed by the Engineer.

SECTION 39
HOT MIX ASPHALT

39-1.01 General:

39-1.01A Summary: (The following shall apply in lieu of Section 39-1.01A)

Section 39-1 includes general specifications for producing and placing HMA by mixing aggregate and asphalt binder at a mixing plant and spreading and compacting the HMA mixture.

For these specifications, Hot Mix Asphalt (HMA) and asphalt concrete shall be the same. A minimum of two weeks prior to the placement of any asphalt concrete, the Contractor shall notify the Materials Laboratory of which asphalt plant will be used to supply the mix. For any job, asphalt concrete shall be supplied from a single plant.

Use Section 39-3 Method construction process of these specifications for HMA production and construction.

39-1.01C Description: Asphalt concrete shall be placed in separate lifts as indicated in Section 39-3.04.

Permanent paving shall not take place until all underground work is finished, except as otherwise noted in these Special Provisions, and the City has given written notice of acceptance to the Contractor.

The basis for compaction approval shall be the attainment of 97% relative compaction and satisfactory surface condition following final rolling. The number of coverage's required shall be the minimum number required to obtain 97% relative compaction.

All longitudinal surface paving joints shall fall on a lane line. Longitudinal Subsurface paving joints shall be offset by at least 6 inches.

No longitudinal vertical drop offs will be allowed between the lanes when the roadway is opened to traffic.

Kraft paper or other bond inhibitor shall be pl.aced under the temporary asphalt taper to facilitate removal when paving operations resume.

Temporary asphalt tapers and associated bond breaker material shall be removed prior to placement of the asphalt concrete surface lift. Where the bond breaker material adheres to the asphalt concrete base course it shall be fully removed with a method, approved by the Engineer that will in no way degrade the quality of the final product.

The Engineer shall provide reference points and cut sheets for the placing of asphalt concrete base and asphalt concrete surface.

The Contractor shall furnish an excavation and paving plan which shall include the following:

1. Requested location for survey staking of reference points
2. Asphalt plant supplying mix including aggregate source
3. Disposal site for spoils
4. Type of trucks and equipment to be used
5. Haul routes through adjacent residential streets

6. Staging locations
7. Sequencing
8. Taper grind locations

A tack coat of SS1 h or SS1 emulsified asphalt shall be applied to the entire asphalt concrete base surface and all existing pavement surfaces immediately in advance of placing the asphalt concrete surface lift. A tack coat shall also be applied to all vertical mating surfaces and conforms to existing pavement, concrete, and construction joints prior to placement of new asphalt concrete surface or base, unless otherwise shown on the Plans. The tack coat shall be allowed to break before placing the subsequent lift of asphalt concrete.

The asphalt concrete base and asphalt concrete surface courses shall be allowed to cool to 160° F at mid depth before the paved area is opened to traffic each day.

At the end of each work day during paving operations the location of all valves, manholes, monuments and any other facility overlaid with asphalt concrete and required to be raised to grade shall be marked in white paint.

39-1.02 Materials:

39-1.02B Tack Coat: (The following shall apply in lieu of Section 39-1.02B)

Tack coat must comply with the specifications for asphaltic emulsion or asphalts. Tack coat shall be diluted SS1 or SS1h. Notify the Engineer if you dilute asphaltic emulsion with water. The weight ratio of added water to asphaltic emulsion must not exceed 1 to 1.

39-1.02C Asphalt Binder: (The following shall apply in lieu of Section 39-1.02C)

Asphalt binder in HMA must comply with the specifications for asphalts.

Asphalt binder to be mixed with aggregate for asphalt concrete surface, leveling and base shall be PG64-16 grade paving asphalt.

The amount of asphalt binder to be mixed with the aggregate shall be specified by the Engineer at the time of paving. Different asphalt binder content may be specified for each lift and each location.

Liquid anti-stripping agent (LAS) shall be added to the asphalt binder at a rate of 0.5% by weight of asphalt binder. The LAS shall be AD-here LOF 65-00 or equivalent, and shall be stored, measured, and blended with the asphalt binder in accordance with the anti-stripping agent manufacture's recommended practice. The LAS can be added at the asphalt plant or at the refinery. When added at the asphalt plant, the equipment shall indicate and record the amount of LAS added. If added at the refinery, the shipping ticket from the refinery shall certify the type and amount of LAS added.

39-1.02E Aggregate: The aggregate grading of the various types of asphalt concrete shall conform to one of the following as directed by the Engineer:

Surface or Leveling Course	¾-inch HMA Type A, or ½-inch Coarse HMA Type A, or ½-inch Medium HMA Type A
Base Course	¾-inch HMA Type A

Aggregate must be clean and free from deleterious substances. Aggregates should be of high abrasion resistance and durability. Excessively soft and friable aggregates are not allowed.

The specified aggregate gradation must be determined before the addition of asphalt binder and includes supplemental fine aggregate.

Choose sieve size TV within each TV limit presented in the aggregate gradation tables.
The proposed aggregate gradation must be within the TV limits for the specified sieve sizes shown in the following tables:

Aggregate Gradation
(Percentage Passing)
HMA Types A

3/4-inch HMA Type A

Sieve sizes	TV limits	Allowable tolerance
1"	100	--
3/4"	95–100	TV ± 5
3/8"	65–80	TV ± 5
No. 4	49–54	TV ± 5
No. 8	36–40	TV ± 5
No. 30	18–21	TV ±5
No. 200	2.0–8.0	--

1/2-inch Coarse HMA Type A

Sieve sizes	TV limits	Allowable tolerance
3/4"	100	—
1/2"	94–100	--
3/8"	70–90	--
No. 4	55–61	TV ± 5
No. 8	40–45	TV ± 5
No. 30	20–25	TV ± 5
No. 200	2.0–8.0	--

1/2-inch Medium HMA Type A

Sieve sizes	TV limits	Allowable tolerance
3/4"	100	--
1/2"	95-100	--
3/8"	80-95	--
No. 4	59-66	TV ± 5
No. 8	43-49	TV ± 5
No. 30	22-27	TV ± 5
No. 200	2.0–8.0	--

Before the addition of asphalt binder and lime treatment, aggregate must have the values for the quality characteristics shown in the following table:

Quality characteristic	Test method	HMA Type A
Percent of crushed particles Coarse aggregate (% min.) One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured face	California Test 205	 90 75 70
Los Angeles Rattler (% max.) Loss at 100 rev. Loss at 500 rev.	California Test 211	 10 45
Sand Equivalent (min.)[a]	California Test 217	50[b]
Fine aggregate angularity (% min.)	California Test 234	45
Flat and elongated particles (% max. by weight @ 5:1)	California Test 235	10

[a] Reported value must be the average of 3 tests from a single sample.
[b]Minimum Sand Equivalent of 45 for asphalt concrete base.

39-1.02F Reclaimed Asphalt Pavement: (The following shall apply in lieu of Section 39-1.02F)

Reclaimed Asphalt Pavement (RAP) may be used at the Contractor's option. If RAP is used, the Contractor shall provide the proposed mix design and the quality control for all HMA that includes RAP, in accordance with the following requirements:

1. Contractor shall provide City with a mix design per California Test 384 for the proposed RAP HMA.
2. As part of City's evaluation of RAP HMA, Contractor and City shall perform bitumen ratio tests on at least six split samples of Contractor's RAP to establish correlation between respective binder ignition ovens.
3. RAP shall be processed from reclaimed Asphalt Concrete pavement only.
4. RAP pile(s) shall be separate from the stacker pile, not intermingled with other materials, and stored on smooth surfaces free from debris and organic material.
5. The project RAP pile shall be processed and mixed, identified, and of adequate quantity for the proposed project. "Live" piles shall not be permitted.
6. Contractor shall sample the RAP pile and determine the bitumen ratio (using same binder ignition oven used in #2 above) and provide the test results to the City at least one week prior to producing RAP HMA.
7. A minimum of three samples shall be tested for bitumen ratio for RAP pile of 1500 tons, or portion thereof.
8. RAP pile shall be mixed such that individual bitumen ratio test results of RAP pile so not vary more than +/- 0.5%.
9. During RAP HMA production, RAP shall be sampled by the Contractor off of the belt (into the batch plant), per method established by the City, and samples provided to the City.
10. Bitumen ratio of RAP sampled off of the belt shall be 4.0% minimum, as determined by City binder ignition oven. City shall select binder content for RAP HMA mix per Specifications.

11. RAP content shall be no more than 20% by dry aggregate mass in the HMA. If proposing a change in the RAP content, the Contractor shall notify the Engineer. If the content changes more than 5%, the Contractor shall submit a new mix design.
12. Moisture content of RAP pile shall be 4.0% maximum, and shall be tested the day prior to the day of paving and tested/monitored during each day of HMA production.
13. RAP pile(s) shall be protected from exposure to moisture.
14. RAP HMA shall comply with all the specifications for HMA.
15. If batch mixing is used, RAP shall be kept separate from the vergin aggregate until both ingredients enter the weighhopper or pugmill. After introduction to the pugmill and before asphalt binder is added, the mixing time for the virgin aggregate and RAP shall not be less than five seconds. After asphalt binder is added, the mixing time shall not be less than 30 seconds.
16. If continuous mixing is used, the RAP shall be protected from direct contact with the burner flame with a device such as a shield, separator, or second drum.
17. If any of the above criteria are not satisfied, or if the RAP HMA test result determined by the City are inconsistent, RAP HMA production shall stop for City projects until the issue(s) are corrected.

39-1.03 HOT MIX ASPHALT MIX DESIGN REQUIREMENTS:

39-1.03A General: (The following shall apply in lieu of Section 39-1.03A)

The mix design process consists of performing California Test 367 and laboratory procedures on combinations of aggregate gradations and asphalt binder contents to determine the OBC and HMA mixture qualities. The results become the proposed JMF.

The Engineer reviews the aggregate qualities, mix design, and JMF and verifies and authorizes the JMF.

You may change the JMF during production. Do not use the changed JMF until it is authorized. Perform a new mix design and submit a new JMF submittal if you change any of the following:

1. Target asphalt binder percentage
2. Asphalt binder supplier
3. Combined aggregate gradation
4. Aggregate sources
5. Substitution rate for RAP aggregate of more than 5 percent
6. Any material in the JMF

39-1.03E Job Mix Formula Verification: (Delete Section 39-1.03E)

39-1.03G Job Mix Formula Acceptance: (The following shall apply in lieu of Section 39-1.03G)

You may start HMA production if Engineer approves the JMF

39-1.05 Acceptance Criteria: (The following shall apply in lieu of Section 39-1.05)

HMA acceptance is specified in Section 39-3 Method Construction Process.

39-1.06 Dispute Resolution: (The following shall apply in lieu of Section 39-1.06)

Work with the Engineer to avoid potential conflicts and to resolve disputes regarding test result discrepancies.

39-1.08 Production:

39-1.08A General: (The following shall apply in lieu of Section 39-1.08)

Produce HMA in a batch mixing plant or a continuous mixing plant. Proportion aggregate by hot or cold feed control.

Before production, the HMA plant must have current qualification under Department's Materials Plant Quality Program.

During production, with approval of the Engineer, you may adjust hot or cold feed proportion controls for virgin aggregate and RAP.

39-1.09 Subgrade, Tack Coat, and Geosynthetic Pavement Interlayer:

39-1.09B Subgrade: The subgrade to receive asphalt concrete or asphalt concrete base shall not vary more than 0.05 – foot above or below the grade established by the Engineer.

39-1.11 Transporting, Spreading, and Compacting: Prior to loading HMA, the bed of the haul vehicle shall be clean and free from all soil, sand, gravel and other deleterious substances.

When spraying release or other parting agents in the bed of the haul vehicle, the minimum amount necessary to moisten the surface shall be used. In no instance will the parting agent be allowed to accumulate in the bed of the vehicle.

All haul vehicles shall be equipped with tarps which are in working order. Tarps shall be used on haul vehicles unless prior approval is obtained from the Laboratory.

The HMA shall be deposited from the haul vehicle into the hopper of the paving machine.
The practice of depositing the HMA on the roadbed in a windrow and subsequently using a pick-up machine to deposit the material in the hopper of the asphalt paver shall not be allowed.

39-1.12 Smoothness:

39-1.12A General: Determine HMA smoothness with a straightedge.

The completed surfacing shall be thoroughly compacted, smooth and free from ruts, humps, depressions or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the asphalt concrete by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations or other objectionable marks in the asphalt concrete shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

39-1.15 Minor Hot Mix Asphalt: (Delete Section 39-1.15)

39-3 Method Construction Process:

39-3.01 General: Section 39-3 includes specifications for HMA produced and constructed under the Method construction process.

39-3.02 Acceptance Criteria:

39-3.02A Testing: The Laboratory acceptance testing requirement for Sand Equivalent shall be 50 (minimum) for asphalt concrete and 45 (minimum) for asphalt concrete base. The Los Angeles Rattler acceptance testing requirement shall be 10% maximum (loss at 100 rev.).

The micro-deval abrasion loss of the aggregates should conform to asphalt concrete industry standards.

Asphalt concrete shall have a minimum tensile strength ratio (TSR) of 70, and a minimum dry tensile strength of 100 pounds per square inch, based on California Test Method 371.

At any time during the first 12 months from the time of placement of the asphalt concrete, the surface shall be visually inspected by the Laboratory. If signs of stripping of binder from aggregate or loss of aggregate is apparent, the Laboratory will core the asphalt concrete surface. The core samples will be tested for TSR. Asphalt concrete with a TSR less than 70 shall be remediated as required by the Engineer.

39-3.03 Spreading and Compacting Equipment: (The following shall apply in lieu of Section 39-3.03)

Compaction rollers shall be double-drum vibratory rollers and shall be operated at a maximum speed of 135-feet per minute (approximately 1.5 mph). Double drum-vibratory rollers shall have a minimum frequency of 2400 Vibrations per Minute (VPM) and the amplitude shall be field-adjustable.

39-3.04 Transporting, Spreading, and Compacting: Asphalt concrete shall not be placed on any roadbed until all utility construction beneath the roadbed has been completed.

No asphalt concrete shall be placed within thirty (30) minutes of sunset, as established by weather bureau, except as otherwise authorized by the Engineer.

Asphalt concrete or asphalt concrete base shall not be placed during rainy weather or on a wet surface. Asphalt concrete shall not be placed when the atmospheric temperature is below fifty (50) degrees Fahrenheit or conditions indicate it will drop below fifty (50) degrees Fahrenheit before the material can be satisfactorily compacted. Asphalt concrete base shall not be placed when the atmospheric temperature is below forty (40) degrees Fahrenheit or conditions indicate it will drop below forty (40) degrees Fahrenheit before the material can be satisfactorily compacted. Material that cannot be placed in compliance with these requirements will be rejected.

The compacted thickness of asphalt concrete layers shall be as directed by the Engineer. The normal minimum and maximum compacted lift thickness for asphalt concrete surfacing are 0.17’ to 0.25’ respectively. The normal minimum and maximum compacted lift thickness for asphalt concrete base are .025’ and 0.50’ respectively.

The temperature of the Asphalt Concrete shall be specified by the Engineer. Unless lower temperatures are specified by the Engineer, all mixtures shall be spread, and the first coverage of initial or breakdown compaction shall be performed, when the temperature of the mixture is not less than 250°F at mid-depth, and all breakdown compaction shall be completed before the temperature of the mixture drops below 200°F at mid-depth. Additional rolling equipment shall be required or the rate of spread shall be reduced to permit compliance with this requirement.

The basis for approval shall be the attainment of 97% relative compaction and satisfactory surface condition following final rolling. The number of coverages required shall be the minimum number required to obtain 97% relative compaction.

39-5 Measurement: Asphalt concrete and asphalt concrete base will be measured by weight. The quantity to be paid for shall be the combined weight of the mixture.

All weights shall be supported by State Certificates of Weights and Measures furnished by the Contractor.

39-6 Payment: **Asphalt Concrete Surface** shall be paid for at the contract price per **ton**, which price shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in placing asphalt concrete surface including overlays, tack coats, compacting, saw cutting, and any other work required for permanent paving and no additional allowance will be made therefor.

Payment Adjustment for Price Index Fluctuations shall be increased or decreased for the asphalt binder contained in the permanent trench paving complying with the required criteria per Standard 9-1.07.

Full compensation for furnishing weigh master's certificates shall be considered as included in the prices paid for the contract items in Section 39A of these Special Provisions, and no additional allowance will be made therefore.

[Revised: 11/20/14 Lab STD2010]

SECTION 39A
ASPHALT CONCRETE TRENCH PAVING

39A-1.01 Description: Asphalt concrete surfacing and asphalt concrete base and the placing thereof shall conform to the requirements of the Standard Specifications, Section 39 of the City Specifications and these Special Provisions.

39A-2.01 Asphalts: Temporary paving on all utility trenches and any other excavated areas shall be ½-inch maximum, medium grade aggregate hot mix asphalt concrete installed a minimum of two inches thick placed each day over the work.

Temporary paving around edges of steel plates shall be a ½-inch maximum, medium graded aggregate hot mix asphalt concrete.

The amount of asphalt binder to be mixed with the aggregate will be specified by the Engineer at the time of paving. Different asphalt binder content may be specified for each lift and each location.

Cutback shall not be stockpiled or used anywhere on the job site.

The quantity of asphalt concrete used for temporary trench paving shall not be included in the calculation for asphalt price index adjustment described in Section 9-1.07, Payment Adjustments for Price Index Fluctuations, of the Standard Specifications.

39A-5.01 Spreading Equipment: When trench width is three feet or less, the asphalt concrete used for trench paving may be deposited directly from the haul vehicle into the trench. The asphalt shall then be raked smooth prior to compaction.

39A-5.02 Compacting Equipment: Compaction of all asphalt concrete trench paving shall be accomplished by use of a double-drum vibratory roller as specified in Section 39 of these Special Provisions.

39A-6.01 General Requirements: Areas outside of reconstruction or overlay limits shall receive permanent trench paving per City STD-215, the modified detail on the Plans or as specified herein. The Engineer may require additional paving beyond the minimum dimensions shown in STD-215.

Areas requiring permanent trench paving per City STD-215 shall have a minimum A.C. thickness of 0.25' for Residential/Local, 0.35 feet for Collector/Transitional or 0.45' for Arterial/Regional/ Industrial.

The Contractor shall provide compaction of backfill and base material as the job progresses. Any temporary paving shall be removed for final trench paving. Unpaved trenches shall be covered with skid resistant steel plates (with a coefficient of friction of 0.35 or greater per CTM342), capable of sustaining normal (H20) traffic loads without shifting or bouncing and shall be secured per Caltrans requirements. Plates that have areas where the skid resistant material is missing shall not be used and must be removed from the job site. Hot mix asphalt concrete shall be placed and compacted around all edges of steel plates with a sufficient width and gradual slope in order to provide a smooth transition to existing pavement. The Contractor shall only be allowed to plate one lateral trench at a time.

Temporary and permanent asphalt trench paving shall be even and smooth riding.

The Contractor shall monitor and maintain all temporary paving to the satisfaction of the Engineer.

Asphalt concrete used for temporary trench paving shall be removed and disposed of in accordance with the Standard Specifications, Section 5-1.20B(4).

Any existing manholes or valves that are encountered within the trench paving limits must be adjusted to grade per the requirements of Section 15 of these Special Provisions. The Contractor is responsible for all coordination with the various utility company owners and their representatives, as well as the cost to adjust the various utilities to grade.

39A-6.03 Compacting: Compaction shall be in accordance with Section 39-6.03 of the City Specifications, reprinted here for clarity.

The basis for approval shall be the attainment of 97% relative compaction and satisfactory surface condition following final rolling. The number of coverages required shall be the minimum number required to obtain 97% relative compaction.

39A-8.02 Payment: Full compensation for sawcutting, grinding, and excavation of the existing asphalt pavement for final trench paving, shall be considered as included in the prices paid for the various contract items of work and no additional allowance will be made therefor.

Full compensation for furnishing and installing asphalt concrete surface mix for permanent trench paving shall be considered as included in the prices paid for the various contract items of work and no additional allowance will be made therefor.

Full compensation for furnishing and installing temporary asphalt trench paving shall be considered as included in the prices paid for the various contract items of work and no additional allowance will be made therefore.

SECTION 51
CONCRETE STRUCTURES

51-1.01 General

51-1.01A Summary: Precast concrete structures, reinforced concrete slabs, concrete valley gutters, concrete mow curbs, and other minor concrete structures shall be constructed in accordance with Section 51 of the Standard Specifications, Section 90 of these Special Provisions, the details and requirements shown on the Project Plans, these Special Provisions, and as directed by the Engineer.

Concrete curbs, gutters, sidewalks, and driveways shall be constructed in accordance with the requirements of Section 73 of the City Specifications, these Special Provisions, and the Standard Specifications.

Concrete shall conform to the provisions of Section 90 of the Standard Specifications and meet the requirements shown on the Project Plans.

Concrete shall be cured in accordance with Section 90-1.03B(2) or 90-1.03B(5) of the Standard Specifications.

The use of Rapid Setting Concrete (RSC) is not allowed.

51-1.01E Depth of Footings: The elevations of the bottoms of concrete structures shown on the plans shall be considered as approximate only, and the Engineer may order, in writing, such changes in elevations as may be necessary to secure a satisfactory foundation.

The Contractor shall be responsible for any additional costs incurred should he elect to fabricate materials or do other work prior to the final determination of the bottom elevations of concrete structures.

51-1.02 Materials

51-1.02A General: All concrete used on this project shall be as specified in Section 90-1.01D(2) of these Special Provisions.

51-1.02E Colored Concrete: For exposed visible concrete, a colored pigment designed for the integral coloring of concrete shall be added to the concrete mix as indicated in Section 73-1.01E of these Special Provisions.

51-1.02J Precast Vault Structures: Precast concrete vaults shall have clear inside plan dimensions as designated on the Project Plans and shall be of sufficient depth to provide a minimum of 6 inches clearance between bottom of pipe flanges and finished vault floor. Provide 12” x 12” x 12” sump with aluminum frame and grate cast into corner of concrete vault floor. Bottom of sump shall have a 3/4" drain hole.

Precast structures and covers shall be designed to withstand AASHTO H-20 Traffic Loading. Vault walls shall be a minimum of 6 inches thick with reinforcing steel sufficient to withstand loads imposed by complete burial in saturated soil. Vault floor shall be a minimum 4 inches thick.

Vaults shall be furnished with a two-leaf hinged, hydraulic-assisted aluminum cover. Each leaf of the cover shall permit full opening of the vault. Cover shall be furnished with suitable hardware to secure the leaves in the closed position. Leaves shall open parallel to the long side of the vault.

Provide an 8" wide by 12" thick concrete collar around vault cover if cover is not cast into box. Edges shall be protected from site construction.

The vault shall be bedded on a 12 inch layer of 1-1/2" clean drain rock. It is the Contactor's responsibility to ensure that precast structures are laid and bedded on sound materials, existing and new. Any field conditions that may affect grade shall be brought to the attention of the Engineer prior to installation.

Joints between vault sections, space around pipe penetrations and lifting holes shall be filled with grout and finished flush with the walls of the structure.

Precast concrete vault structures shall be Christy Concrete Products "R" Series Pit or equal.
Top of precast structures shall be set accurately to the elevations shown on the project plans.

51-1.02K Reinforcement: Rebar reinforcement shall comply with Section 52 of the Standard Specifications.

51-1.02L Hydrophilic Waterstop: Hydrophilic waterstops shall be embedded in concrete and spanning control, expansion, and/or construction joints to create a continuous diaphragm to prevent fluid migration as indicated on the Project Plans.

Waterstops shall be non-bentonite comprised of a combination of chloroprene rubber and chloroprene rubber modified to impart hydrophilic properties. Waterstops shall have a delay coating to inhibit initial expansion due to moisture present in fresh concrete.

Follow approved manufacturer's written recommendations for installation. Waterstops shall come with an adhesive backing that allows adequate holding strength during concrete placement.

Hydrophilic waterstops shall be Sika Hydrotite Type CJ or approved equal.

51-1.02M Flexible Expansion Joint Spacer and Filler Material: Flexible expansion joint material shall be designed as a backing material for use in either horizontal or vertical applications where expansion and contraction movements must be accommodated to relieve stress and pressure in concrete. Expansion joint spacer and filler material shall be composed of a synthetic closed-cell structured foam and shall not absorb water.

Material shall be easily compressible and recover to a minimum of 95% of its original thickness following compression to 50% of its original thickness in accordance with ASTM D545.

Material shall be furnished in sheets a minimum of 48" in length and width.

Position material against existing concrete, at interrupting objects or columns, and against abutting structures before concrete placement as indicated on the Project Plans. Material shall be held in place with the use of a sealant prior to pouring concrete to prevent floating.

Flexible expansion joint spacer and filler material shall be Cremar Flexible Foam Expansion Joint material as manufactured by W. R. Meadows or an approved equal.

51-1.03 Construction

51-1.03D(3) Concrete Placed Under Water: (Delete Section 51-1.03D(3)) Placing of concrete under water will not be permitted.

51-1.03E(1) General: Backfill material placed against concrete shall conform to the requirements of fill in Section 19, or be control density fill, as indicated on the Project Plans, or approved by the Engineer.

51-1.03F Ordinary Surface Finish: Concrete shall be finished in accordance with Section 51-1.03F of the Standard Specifications.

51-1.23 Payment: Reinforced Concrete Slab shall be paid for at the contract **square foot** price which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved in constructing the Reinforced Concrete Slab complete in place as shown on the plans and indicated herein. The work shall generally include, but not be limited to forming, furnishing and placing expansion joint filler, rebar reinforcement, and any other work required, and no additional allowance will be made therefor.

Concrete Valley Gutter shall be paid for at the contract **square foot** price which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved in constructing the Concrete Valley Gutter complete in place as shown on the plans and indicated herein. The work shall generally include, but not be limited to forming, furnishing and placing expansion joint filler, constructing weak plane joints, rebar reinforcement, and any other work required, and no additional allowance will be made therefor.

Concrete Mow Curb shall be paid for at the contract **linear foot** price which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved in constructing the Concrete Mow Curb complete in place as shown on the plans and indicated herein. The work shall generally include, but not be limited to forming, furnishing and placing expansion joint filler, constructing weak plane joints, rebar reinforcement, and any other work required, and no additional allowance will be made therefor.

Precast Pumper Connection Utility Vault 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 incidentals, and doing all work involved for in constructing the Precast Pumper Connection Utility Vault complete in place as shown on the plans and indicated herein. The work shall generally include procurement, placement, and construction of a standard precast utility vault and hinged cover, including, but not limited to, excavation, removal of excavated material, compaction, concrete removal, miscellaneous metal, frames, covers, grate, supporting existing utilities, furnishing and placing bedding and backfill, rebar reinforcement and concrete, and any other work necessary to construct the Precast Pumper Connection Utility Vault, and no additional allowance will be made therefor.

SECTION 71
SANITARY SEWER SYSTEM

71-1.01 General: All sub-sections shall conform to Section 71 of the City Standards and these Special Provisions.

71-1.02 Description: This work consists of installing a new wet well suction connection and lift station shutdown requirements for the installation of temporary power and controls for temporary lift station operation during other portions of the work including, but not limited to the geotechnical remediation work. All sanitary sewer system components and related items shall be constructed in accordance with these Special Provisions, the Plans, the City Standards and the latest version of the Standard Specifications, any deviation must first be approved in writing by the Engineer.

71-1.03 Planning: The Contractor shall submit written shutdown requests, identifying all construction activities, dates and duration of shutdowns with an advanced notification as indicated in Section 121. Shutdowns shall take place only after the Engineer's written approval. Shutdown operations will be performed by City personal only. Unless otherwise approved by the Engineer the shutdowns shall be scheduled for mid-week during normal working hours, and shall be limited to 4 hours per shutdown operation. A maximum of 2 shutdowns shall occur.

Construction operations during the 2 shutdowns shall consist of the following:

1. First shutdown. Relocation of the existing electrical cabinet and reconnection of wet well controls and dry well power for temporary lift station operation as indicated on the Project Plans. Prior to the first shutdown, the new PG&E meter pedestal must be installed and operational, and the temporary conduits must be installed.

2. Second shutdown. Switchover from the existing relocated electrical cabinet supplying temporary lift station operation to the new permanent lift station electrical pedestal.

Contractor is responsible for all spills caused by lift station shutdown operations.

71-1.02 Materials:

71-1.02A Piping Materials and Coatings: Wet well suction connection shall be constructed of fusion bonded, epoxy lined and coated carbon steel pipe. Steel pipe shall be electrically butt-welded straight seam, spiral-seam or seamless pipe conforming to ANSI/AWWA C200. Fusion bonded epoxy coating shall conform to the requirements of ANSI/AWWA C213. Coating shall extend to the end of all pipe sections. Special pipe connections and appurtenances shall also be coated except for threaded fasteners and flange faces. Supplier shall furnish to the City an affidavit that all materials and work furnished comply with the applicable requirements of this standard. Coatings shall be inspected and tested for thickness and pin holes. Any coating imperfections shall be repaired at the Contractor’s expense. There shall be no welding of carbon steel pipe after the application of the epoxy coating, except at welding flanges attached to the pipe specifically for welded connections. Steel pipe shall be schedule 40.

Exposed piping and fittings shall be painted green to match existing. Contractor shall submit manufacturer's literature for coating products. Contractor shall provide color samples of all paint. Each color must be approved before it is used.

Exterior Fusion-Bonded Epoxy Coated Metal Coating System shall be equivalent to the following:

Finish: Tnemec – 3.0 to 5.0 mils DFT.

All coatings, primers, and paint products shall be as manufactured by Tnemec, Devoe, Kelly Moore, or approved equivalent, and shall be the system recommended by the manufacturer for the type and exposure of the surface to be coated and that meets the requirements of the performance criteria and systems specified herein. No request for substitution will be considered which decreases the film thickness designated and/or the number of coats specified.

A field touch up kit compatible with the coating provided shall be on site with manufacturer's instructions for use if needed, and shall be given to the City when work is complete. Rattle-can touch-ups will not be allowed.

All hardware shall be grade 316 stainless steel unless otherwise noted. An anti-seize compound shall be used on all threads.

71-1.02A Dry Well Entry Hoist: The dry well entry hoist shall be man-rated to a minimum working load of 350 pounds. The hoist system shall be capable of pivoting 90 degrees in 2 directions, allowing the entrant to be moved away from the dry well entrance. All components shall be constructed of 6061-T6 aircraft grade aluminum and powder coated "light to medium grey".

Dry well entry hoist equipment shall be manufactured by UNI-HOIST Safety Equipment or an approved equal. The equipment shall consist of a Mast Assembly (Model Number UH504-18), Center Post Assembly (UH502CD), Floor Mount (NUS100), pulley, and any other accessories necessary to supply a complete confined space entry retrieval system.

Dry well entry hoist shall be anchored with the size and number of stainless steel anchor bolts as recommended by the manufacturer. Epoxy anchors used to install entry hoist shall be inspected by a special inspector prior to and during installation.

71-1.12 Payment: Temporary Lift Station Operation shall be included in the contract prices paid for **various contract items** of work, which prices shall include doing all the work required to operate the lift station during construction including but not limited to, controls, electrical, planning, coordination, scheduling, lift station shutdown assistance, and related appurtenances not specifically enumerated on the plans or in these specifications and no additional allowance will be made therefor.

Wet Well Suction Connection 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 in installing the new wet well suction connection, cleaning, pipe, fittings, cam lock fitting, wet well penetration, grouting, sealing, paints, hardware, support brackets, and miscellaneous appurtenances as specified in these Special Provisions, as shown on the Project Plans, and no additional compensation will be made therefor.

Dry Well Entry Hoist 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 in installing the new dry well entry hoist, anchorage, cleaning, pipe, fittings, cam lock fitting, wet well penetration, grouting, sealing, paints, hardware, support brackets, and miscellaneous appurtenances as specified in these Special Provisions, as shown on the Project Plans, and no additional compensation will be made therefor.

SECTION 73
CONCRETE CURBS AND SIDEWALKS

73-1.01A Summary: This work shall consist of curbs, gutters, sidewalks, driveways, island paving, curb ramps, and gutter depressions and shall be constructed in accordance with the details and at the location shown on the plans and in conformance to the requirements of Section 73 of the City Specifications, and Standard Specifications.

73-1.01E 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 be Davis Colors color #860, applied in a dosage of 1/3 pound per 94 pound sack of cement (approximately 2 pounds per cubic yard of concrete for a 6 sack mix), or L. M. Scofield color #SG860 applied in a dosage to produce an equivalent color, or an approved equal.

73-1.03 Construction:

73-1.03G Finish: Concrete shall have an ordinary surface finish in accordance with Section 51-1.03F of the Standard Specifications.

73-3.03 Construction

73-3.03A Sidewalk and Driveway Apron: Sidewalk and driveway apron shall be constructed in accordance with the details and at the location shown on the plans and in conformance to the requirements of Section 73 of the City Specifications, the City Standards, and these special provisions.

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

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

Tree roots encountered in the subgrade shall be pruned only as directed by the Engineer. Pruning shall be accomplished by use of sharp tools appropriate for the size of root to be cut. Each cut shall be cut clean with no torn bark or splintered wood remaining on the root. At no time shall roots be pulled on by excavating equipment.

Sidewalk and driveway apron shall be cured in accordance with the requirements of Section 90-1.01 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.

All oil, paint, tire marks, and other discoloring caused by the Contractor's operations shall be removed from all concrete surfaces, whether new or existing. Cement mortar will not be an acceptable substitute for sandblasting. Vandalism to the 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 scoremark.

73-2.04 Payment: Driveway and Sidewalk shall be paid for at the contract 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 driveways and sidewalks complete in place as specified and indicated on

the Project Plans, including forming, furnishing and placing expansion joint filler, constructing weakened plane joints, rebar reinforcement, excavating, foundation preparation, foundation materials, and backfilling.

SECTION 80
FENCES

80-1 General

80-1.01 General: All fences 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.

Security fencing and gates shall consist of steel chain link mesh fabric and steel posts, both vinyl clad. Security fences and gates shall be constructed per Caltrans Standard Plan A85 with modifications as shown on the Project Plans and as modified herein.

Security fencing and gates shall be 8 feet high with privacy slats, or 6 feet high “anti-climb” mesh at the locations show on the Project Plans. The security fence shall be constructed per the details indicated on the Project Plans.

80-3 Chain Link Fences

80-3.02 Materials

80-3.02A General: Security Fence and Gate materials shall conform to Section 80-3 of the Standard Specifications, the details shown on the Project Plans, and as modified herein.

80-3.02B Posts, Braces and Framework: All security fence posts, gate frames, and rails shall be steel pipe galvanized and vinyl clad according to the specifications of AASHTO Designation M-111 and shall conform to the following dimensions and weights:

Component	O.D.	Min. Wt. per L.F.
Terminal and Corner Posts	4"	9.12
Gate Posts	3-1/2"	7.58
Line Posts	2-3/8"	3.65
Top Rails/Braces	1-5/8"	2.27
Gate Frames	1-5/8"	2.27
Pipe Tracks	1-5/8”	2.27

Line post spacing shall not exceed ten foot centers. All line and corner posts shall be a minimum of 11 feet in length and gate posts a minimum of 12 feet in length.

All terminal and corner posts shall be truss braced from a first line post to the bottom of the terminal post with a 3/8" galvanized truss rod assembly.

80-3.02C Security Fence and Gate Fabric: Security Fence and Gate fabric shall be galvanized steel fabric conforming to the specifications of AASHTO Designation M-181. The fabric shall be #9 gauge, Type IV, Class B bonded vinyl-coated, black. Fabric shall be woven into approximately a one inch mesh for security fencing without privacy slats and two inch mesh for security fencing with privacy slats.

80-3.02E Slats: Privacy slats shall be double walled self-locking HDPE which are “pre-woven” into the chain link fence fabric. Privacy slat color shall match the color of the vinyl coatings indicated in Section 80-3.02F.

80-3.02F Vinyl Coating: The strength of the bond between the coating material and the steel of the bonded vinyl-coated chain link fabric or posts shall be equal to or greater than the cohesive strength of the polyvinyl chloride (PVC) coating material and comply with ASTM F668, Class 2b. The color of the vinyl coatings shall be black in compliance with ASTM F934.

80-3.03 Construction

80-3.03A Erection: Security Fence and Gate construction shall be in accordance with Section 80-3 of the Standard Specifications, the details shown on the Project Plans, these Special Provisions, and as directed by the Engineer

The security fence and gates shall be installed by skilled and experienced fence erectors to the lines and grades furnished by the Engineer. Line posts for the security fence shall be set in concrete foundations a minimum of 36" deep and gate and corner posts a minimum of 48" deep. Concrete foundations shall be no less than three times the diameter of the posts.

80-3.04 Payment: 6' High Security Fence shall be paid for at the contract price per **linear foot**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in constructing the 6' chain link security fence in place, complete as shown on the Project Plans, and as herein specified including all necessary concrete and accessories.

8' High Security Fence shall be paid for at the contract price per **linear foot**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in constructing the 8' chain link security fence in place with privacy slats, complete as shown on the Project Plans, and as herein specified including all necessary concrete and accessories.

80-4 Wood Fences

80-4.01 General: New wooden fence shall be constructed to match the existing adjacent wood fencing to remain. Contractor shall connect to existing fencing and make repairs to existing adjacent fencing sections as necessary to furnish a sound installation as required and at no additional cost to the City.

80-4.02 Materials: Materials shall be free from loose knots, cracks, and other imperfections. All wood used for fence construction shall be construction heart S4S grade redwood unless otherwise noted. All fence posts shall be pressure treated Douglas Fir No.1 and approved for in ground use per UBC, latest edition.

All hardware shall be galvanized or otherwise protected for corrosion resistance.

Wood fence coating system shall be equivalent to the following:

Prime: Kelly Moore 255 Acry-Shield 100% Acrylic Exterior Wood Primer – 2.0 mils DFT.

Finish: Two Coats of Kelly Moore 1245 Acry-Shield 100% Acrylic Exterior Low Sheen Paint – 1.5 to 2.0 mils DFT per coat. Color shall match existing fence.

80-4.04 Payment: Wood Fence shall be paid for at the contract price per **linear foot**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in constructing the wood fence in place, complete as shown on the Project Plans, and as herein specified including all necessary concrete.

80-10.01 Gates: Gates shall be placed in the locations shown on the project plans, or as determined in the field by the Engineer.

Sliding gates shall comply with ASTM F1184 and be constructed per the details and with the clear openings indicated on the Project Plans. All gate frame joints shall be welded. Sliding gates shall be provided with the locking attachment shown on the Project Plans.

Manway gates shall be provided with catch and locking attachment of an approved design that will not rotate around the latch post. Gate hinges shall provide a 90 degree (minimum) opening. All fittings shall be hot dip galvanized.

80-10.04 Payment: 6' High Rolling Gate shall be paid for at the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in constructing a 6' high rolling gate in place , complete as shown on the Project Plans and as specified herein.

8' High Rolling Gate shall be paid for at the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in constructing an 8' high rolling gate in place with privacy slats and appurtenances, complete as shown on the Project Plans and as specified herein.

6' High Walk Gate shall be paid for at the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in constructing a walk gate in place complete as shown on the Project Plans and as specified herein.

SECTION 88
GEOSYNTHETICS

88-1 General

80-1.01A Summary: The geosynthetics shall be placed at the locations indicated on the Project Plans, as directed by the Engineer, and in conformance with Section 88 of the Standard Specifications.

88-1.02D Geotechnical Subsurface Reinforcement:

88-1.02D(1) General: Geosynthetics used for geotechnical subsurface reinforcement shall be either geotextile soil stabilization fabric or geogrid as indicated on the project plans.

Soil stabilization fabric shall meet or exceed the following specifications:

Quality characteristic	Test method	Minimum Average Roll Value (MARV)
Grab Tensile Strength	ASTM D4632	290 lbs
Grab Tensile Elongation		10%
Trapezoid Tear Strength	ASTM D4533	100 lbs
Puncture Resistance	ASTM D6241	900 lbs
Apparent Opening Size	ASTM D4751	40-70 US Std. Sieve
Permittivity	ASTM D4491	0.05 sec^{-1}

Soil stabilization fabric shall be Mirafi 600-X, GeoTex 315ST, Carthage Mills FX-66, TerraTex, or an approved equivalent.

Geogrid shall be an integrally formed, polypropylene, bi-axial geogrid with a positive mechanical interlock load transfer mechanism meeting the following specifications:

Quality characteristic	Test method	MARV
Aperture Dimensions	Measured (Nominal)	1.0 x 1.3-inch
Minimum Rib Thickness		0.05 x 0.05-inches
Tensile Strength @ 2% Strain	ASTM D6637 Method A	410 lbs / ft
Tensile Strength @ 5% Strain		810 lbs / ft
Ultimate Tensile Strength		1,310 lbs / ft
Junction Efficiently	ASTM D7737	93%
Resistance to Long Term Degradation	EPA 9090	100%
Resistance to UV Degradation	ASTM D4355	100% @ 500 Hours

Geogrid shall be Tensar Biaxial BX1200 or an approved equivalent.

88-1.03 Construction: Geosynthetics shall be installed in full-length sections with 3-foot overlapping seams per the manufacture's written installation guide.

Staking or other appropriate measures shall be taken to prevent movement or shifting of the geosynthetics during installation and subsequent fill placement. Fill placed on geosynthetics shall be done in a manner that does not disrupt the placement of the geosynthetics or the basement soil.

88-1.04 Payment: Stabilization Fabric shall be paid for at the contract price per **square yard**, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and doing all the work involved in placing stabilization fabric, and no additional allowance will be made therefor.

Geogrid shall be paid for at the contract price per **square yard**, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and doing all the work involved in placing geogrid, and no additional allowance will be made therefor.

Quantities of geosynthetics to be paid for shall be computed on the basis of the exact amount of area covered in the field.

SECTION 90
CONCRETE

90-1.01 General

90-1.01A Summary: All concrete shall conform to Section 90 of the Standard Specifications, and any modifications herein or on the Project Plans.

90-1.01C(6) Mix Design: The proportions of the water, sand and aggregate shall be regulated so as to produce a plastic, workable and cohesive mixture. All materials required and the procedure of mixing shall conform to the provisions of Section 90 of the Standard Specifications and any modifications herein. Hand mixing of any amount of Portland cement concrete must first be approved by the Engineer.

The Contractor shall submit a separate mix design for each type of concrete used for approval by the Engineer prior to placement.

90-1.01D(2) Cementitious Material Content: Concrete shall contain a minimum of 564 pounds of cementitious material per cubic yard. The amount of cement by weight of the specified cementitious material shall be 75 to 85 percent unless otherwise approved by the Engineer.

90-1.01D(5) Compressive Strength: The 28 day compressive strength of Concrete shall be 4,000 pounds per square inch (psi) or greater.

90-1.01D(6) Curing Compound :

The Contractor shall submit on any proposed material and method used to cure concrete. Concrete shall be cured per Section 90-1.03B of the Standard Specifications, and any modifications contained herein or on the Project Plans. Pigmented curing compound or any other material that will leave a noticeable residue shall not be allowed.

90-1.02E(2) Chemical Admixtures: An admixture shall not be used to reduce the amount of cementitious material content.

90-1.04 Payment: Full compensation for Concrete shall be considered as included in the prices paid for the **various contract items** of work, which price shall include furnishing all labor, materials, tools and equipment, and doing all work involved in forming, placing and curing Concrete and no additional allowance will be made therefor.

SECTION 99
WATER SYSTEM

99-1 General: All sub-sections shall conform to Section 99 of the City Specifications and these Special Provisions.

99-1.01A Materials: All materials used shall be lead free per California Health & Safety Code Section 116875.

Per U.S. et al., ex rel. Hendrix v. J-M Manufacturing Co., Inc., et al., Case No. ED CV-06-0055-GW (C.D. of CA), the City of Santa Rosa is not currently accepting C900 or C905 PVC pipe manufactured by J-M Manufacturing Co. or JM Eagle for installation on City projects.

The Contractor shall use a single manufacturer for each of the following items supplied for this project unless otherwise approved by the Engineer:

- Pipe
- Fittings
- Valves

99-1.02 Pipe: Tracer wire shall be installed on all water pipe and HDPE tubing unless otherwise specified. Tracer wire shall be 12 AWG solid copper wire with a blue type UF 60 mil insulation that is designed for use in the detection of underground utilities.

99-1.03A High Density Polyethylene (HDPE) Water Service Tubing: All HDPE water service tubing shall be blue in color, copper tubing size (CTS) SDR9, and conform to both AWWA C901 and ASTM D2737, and shall be either PE3608 – 200psi tubing or PE4710 – 250psi tubing.

99-1.11 Excavation, Backfill, and Resurfacing: Excavation, backfill and resurfacing shall conform to all applicable City Specifications and Standards, and any modifications herein and/or on the Project Plans.

99-1.15C HDPE Water Service and Hose Bib: The Contractor shall install a new "property side" water service with above ground hose bib at the location shown on the Project Plans, including removal, disposal and replacement of landscaping. Water service laterals shall be installed with a minimum horizontal clearance of 3 feet from gas laterals.

Property side water service shall be installed per California Uniform Plumbing code, all applicable City Standards, and any modification here in and/or on the Project Plans. All brass material shall be wrapped with an approved waterproof pipe wrap. The wrap shall extend a minimum of 4 inches beyond any exposed brass.

Water service tie-ins to existing backflow device shall be made at the below grade elbow of the device with either a copper sweat fitting or brass threaded fitting as required to connect and match sizes.

Water service riser pipe and hose bib shall be brass. Piping shall be wrapped with a 10mil tape, and hose bib shall be quarter turn ball valve type with a lockable handle.

If existing backflow device piping is galvanized, connection material shall be brass.

Areas of lawn removed for the water service shall be re-sodded after trench compaction.

Submittals are required on all material used for water service tie-ins. Plastic or galvanized dresser type couplers will not be considered as acceptable material.

99-3.01 Payment: 1" Water Service and Hose Bib shall by paid for at the contract **lump sum** price, which shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved, including but not limited to: excavation and disposal of excavated material, placing and compacting all required bedding and backfill, HDPE water service pipe, valves, couplings, fittings, hose bib, hose bib riser pipe, above ground insulation, form through concrete slab, hose bib support pipe, straps, quarter turn hose bib, restoration/reconstruction of landscaping/irrigation, and any other work required for constructing the 1" water service and hose bib not specifically enumerated in the City Standards, these Special Provisions or on the Plans, and no additional allowance will be made therefor.

SECTION 106
EXCAVATION BRACING AND SHORING

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, and Section 71.02K(6) of the Standard Specifications, and the Division of Industrial Safety Construction Safety Orders which are currently in use.

The Contractor shall take all necessary measures to protect the workers and adjacent areas and structures from the hazards of the trenching or excavation operations.

Full compensation for work in this section shall be considered as included in the prices paid for the various contract items of work and no additional allowance will be made therefor.

SECTION 112
TREE PROTECTION AND REMOVAL

112-1.01 General: The following requirements shall apply to any contractor who works on any property upon which a protected tree is located.

Protected tree means any tree, including a Heritage tree, designated to be preserved on the plans, or as directed by the Engineer. Heritage tree is any of the trees listed under Section 17-24.010 of the City of Santa Rosa Tree Ordinance.

112-1.02 Scope: Before the start of any clearing, excavation, construction or other work on the site, every protected tree shall be securely fenced off at the protected perimeter. Protected perimeter shall be either the root zone or other limit as directed by the Engineer. Such fences shall remain continuously in place for the duration of all work undertaken in connection with this project. The area so fenced off shall not be used as a storage area, altered, or disturbed except as may be permitted under this section.

If any of the site work encroaches upon the protected perimeter of a protected tree, special measures shall be utilized as approved by the Engineer to ensure that the roots obtain oxygen, water, and nutrients as needed. Any excavation, cutting, filling, or compaction of the existing ground surface within the protected perimeter, if authorized by the Engineer, shall be minimized and subject to such conditions as may be imposed by the Engineer. No significant change in existing ground level shall be made within the drip line of the protected tree except as directed by the Engineer and as shown on the plans. No burning or use of equipment with an open flame shall occur near or within the protected perimeter. All brush, earth, and other debris shall be removed in a manner which prevents injury to the protected tree.

No oil, gas, chemicals, or other substances that may be harmful to trees shall be stored or dumped within the protected perimeter or any other location on the site from which such substances might enter the protected perimeter.

Underground trenching for utilities shall avoid major support and absorbing tree roots of protected trees. If avoidance is impracticable, tunnels shall be made below the roots. Trenches shall be consolidated to serve as many units as possible. Trench within the drip line of the tree shall be avoided and only be done at the approval and direction of the Engineer.

No concrete or asphalt paving shall be placed over the root zones of protected trees. No artificial irrigation shall occur within the root zone of oaks.

No compaction of the soil within the root zones of protected trees shall occur.

112-1.03 Payment: Tree Protection and Removal 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 the work involved in implementing and installing tree protection measures, tree removal, and tree pruning as indicated on the Project Plans and as specified herein, and no additional allowance will be made therefor.

[Version: 4/14/09]

SECTION 121
NOTIFICATION

121-1.01: The Contractor shall notify the Engineer of any work to be performed on any given work day 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.

Prior to mobilization to the site, and any time City Operations personnel are needed for more than a four hour period, the Contractor shall notify the City in writing **a minimum of ten working days** in advance to provide the City Operations personal time to make sewer system and/or crew scheduling adjustments.

One day prior to any operation that may impact ingress and/or egress to the Sonoma Valley Ranger Station Maintenance Facility located at 5390 Montgomery Drive (across the street from the project site), the Contractor shall provide written notice, and attempt to make personal contact with personnel at the Maintenance Facility.

121-1.02: Contractor Submittals General: Within fifteen (15) days following notification and award of the contract, the Contractor shall submit to the Engineer for approval all material that he proposes to furnish and install, this list shall include all material suppliers, mix designs, mechanical equipment, and electrical equipment proposed for use on the project. If applicable, the list shall be complete as to name of the manufacturer, size and catalog number, and shall be supplemented by such other data as may be required, including detailed scale drawings, and manufacturer's cut sheets.

In addition, the traffic control plan shall be submitted per Section 12.

Provide one (1) electronic copy of the above data submittal to the Engineer for checking and/or approval. Each submittal package shall have a cover page stating the following: Project name, contract number, the sequential submittal number, and a table of contents for the rest of the package. Each attached page shall be sequentially numbered. It is acceptable to provide the submittal data in multiple submittal packages. Submittal package shall be completely rejected if cover page and page numbering is not followed.

In addition, within fifteen (15) days following notification and award of the contract, the Contractor shall provide a contract schedule and “sequence of operations” plan.

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.

SECTION 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: 4/14/09]

SECTION 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 Project Plans. 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 (E-Series) Project Plans, included in these Special Provisions, or necessary for fully operating facility. See Appendix "B" of this Section for "Device Index" for this project.

C. Examine the specification and Project Plans 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 a pre-bid site visit is requested to 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 Project Plans or in these Special Provisions. 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 Project Plans and measurements at the site.

E. Deviations to locations and conduit routing, as shown on the Project 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 will be deducted from the Contract.

F. The major areas in the scope of work as illustrated on E-series Project Plans and Device Index located in Appendix “B” of this Section, which includes both the furnishing and installation are:

1. Meter Pedestal, Pedestal, Automatic Transfer Switch (ATS) and associated hardware.
2. Processor Logic Controller (PLC), Operator Interface, (OI) hardware, and programming for controlling the pumps remotely, and other miscellaneous devices. The Contractor is to provide all configuration, programming, integration and setup of the local PLC (L3000), OI and remote SCADA system. Reuse existing autodialer.
3. Panelboard and panelboard transformer.
4. Generator System.
5. Instrumentation and other miscellaneous devices. This includes all wiring and cables.
6. Relocating existing wire, conduits and pullboxes.
7. Demo existing Control Panel in Drypit and replace with new termination cabinet. Extend conduits as required.
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.

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. This section of the Special Provisions 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) 2017 issue. Nothing on the Plans or in these Special Provisions 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 of this Section 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, 2017 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 Project Plans or in these Special Provisions 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 these Special Provisions or shown on the E- Series Project Plans.

H. Amperage listed on the Project Plan 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 Special Provisions.

B. The following is part of Electrical Section:

1. Section 203 – Dual Fuel Generator Set

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 submit the proposed Electrical Subcontractor and System Supplier with a complete set of bid documents that will be used on this project.

D. If the Contractor, Electrical Subcontractor, and System Supplier listed in bid documents are deemed not qualified by the City, they will have their bid rejected at the City's sole discretion and the next qualified bidder selected.

E. The Electrical Subcontractor 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.

F. During the bid review period, 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 Section that complete responsibility in the supplying of the MCC/PLC, and all instrumentation in Appendix "B" Device Index of this Section and other equipment required for this project be supplied by TESCO as the only 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. TESCO 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 TESCO project engineer shall attend all coordination meetings and be on-site when requested by the Engineer.
   3. System Supplier shall be TESCO (phone 916 395-8800) to match City Standard.

201-1.06 CONTRACT DOCUMENTS

A. The Project Plans and these Special Provisions 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 Project Plans 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 Project Plan 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 these Special Provisions 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 Project Plans 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 of these Special Provisions.

K. No changes from the Project Plans or these Special Provisions shall be made without written approval of the Engineer. Should there be a need to deviate from the Project Plans

or these Special Provisions, 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 Project Plans and these Specifications 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, Special Provisions, and full size blue-line Electrical (E-Series) and Instrumentation (I-Series) Project Plans.

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. E-Series Project Plans.
    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. I-Series Project Plans

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 (E-Series) Record Project Plans 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 Project Plans 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 Project Plans or indicated in these Special Provisions.

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

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

E. The Contractor shall schedule all the required work with the City, including each shutdown period as indicated in Section 71 and Section 121 of these Special Provisions. 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.

F. 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.

G. 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.

H. Prior to commencing construction, the Contractor shall arrange a conference with the Contractor, Electrical Contractor, System Supplier, 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.

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

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

D. The 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 Project Plans and these Special Provisions shall be subject to inspection at any and all times by the Engineer. If any material does not conform to the Project Plans and Special Provisions, 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. 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 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 these Special Provisions 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 these Special Provisions.
2. The submittal shall be accompanied by a detailed, written justification for each numbered item explaining variance or non-compliance with these Special Provisions.
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 Project Plans.
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 and interconnection 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. Interconnection diagrams.
18. Failure to provide submittals with heavy duty permanent plastic labeled index tabs may be grounds for immediate rejection without review.
19. 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" of this Section. 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.
20. 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.
21. Submit DVD disk copies of all submitted drawing in AutoCAD format.
22. 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.

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 "electrical" series Project Plans. 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 E-series 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. Interconnections diagram shall show for each piece of equipment all wiring between all devices, panels, cabinets, terminal boxes, control equipment, motor control centers and any other devices and equipment. An interconnection diagram shall be furnished for each electrical and instrumentation system, even if one was not shown explicitly on the Project Plans. Interconnection diagrams shall be prepared for all conduits listed in the

"Conduit and Wire Routing Schedule". Each interconnection diagram shall show the following as a minimum:

a. Interconnect drawings shall be prepared for all equipment by the System Supplier.
b. The diagrams shall be utilized by the electrician during all phases of installation and connection of all conductors to ensure coordination of equipment interconnects.
c. The diagrams shall show wiring as field labeled at the end of the project when as-builts are submitted.
d. Each wire labeling code as actually installed shall be shown. The wiring labeling code for each end of the same wire must be identical.
e. All device and equipment labeling codes shall be shown.
f. Interconnections shall be shown point to point with identified lines. Diagrams of the wireless or wire schedule type are not acceptable. Bundled wires shall be shown as a single line with the direction of entry/exit of individual wires clearly shown. Interconnect diagrams shall not be combined with loop or elementary diagrams.
g. All terminations points on the diagram shall be shown with the actual equipment identification terminal number or letter. This identification of terminations includes terminal blocks, junction boxes, all devices, computer I/O points, etc.
h. Diagrams shall include raceway numbers, raceway size, raceway type, cable numbers, wire color code, and wire numbers.
i. Each wire size, and cable size and color code shall be shown. Each conduit with the conduit label and conduit size and wire fill shall be shown. Wire and cable routing through conduits, wireways, manholes, handholes, junction boxes, terminal boxes and other electrical enclosures shall be shown with the appropriate equipment labels. All spare wires, cable, and termination points shall be shown. Cable shields shall be shown.
j. Labeling codes for terminal blocks, terminals, wires, cables, panels, cabinets, instruments, devices, and equipment shall be shown. Place "øA" and "øB" label next to each breaker to identify phase connected to.
k. Schematic symbols shall be used for field devices, showing electrical contacts. Signal and DC circuit polarities shall be shown.
l. The diagrams shall show all other contract and supplier drawing numbers, for reference, that are associated with each device that is interconnected.
m. Attached to each interconnect, a copy of all the support documents used in preparing interconnects shall be submitted. This includes current issues of panel schematics, elementary diagrams, panelboard schedules, conduit schedules, one-line diagrams, connection diagrams, terminal block diagrams, submittals, Project Plans, vendor drawings and all other data used to develop the interconnection diagram as noted in the "Reference Documents" corner of interconnect drawings.
n. Interconnects shall include list of all applicable reference drawings, request for clarifications, field instructions and change orders. All deletions and additions of equipment, wire and cables shall be clearly shown.
o. Field wiring shall not start before the interconnection drawing has been submitted by the Contractor and approved by the Engineer.
p. Do not show the same wires or jumpers, or panel wiring on both the connection and interconnection diagrams. All jumper, shielding, and grounding termination details

not shown on the connection diagrams shall be shown on the interconnection diagrams.

q. Interconnection diagrams shall be submitted and approved by Engineer for each electrical and instrumentation system. The Contractor shall not pull in any wires into conduits that do not have approved interconnects. If the Contractor pulls in wire without Engineer approval of associated Interconnect drawings, the Contractor will not be reimbursed for labor for re-pulling in wires even if there was an error in wire fill or sizing. Also, if the Contractor pulls in wire without Engineer approval of associated Interconnect drawings, then all progress payments related to field wiring for that particular area of work will be withheld until approved Interconnect drawings are in use.

r. All interconnection diagrams shall be prepared by a System Supplier under the supervision of or by a State of California Registered Electrical Engineer and shall bear that Engineer's professional stamp and signature for all Interconnection drawings submitted for approval including as-builts and those used in the field installation. All deletions and additions of equipment, wire, and cables shall be clearly shown. Interconnects shall include list of all applicable reference drawings, request for clarifications, field instructions, and change orders. Failure to provide backup references or signed and stamped drawings may be grounds for immediate rejection.

s. Example format of Interconnection diagram is shown on "E" Series Project Plans or may be obtained from the Engineer.

t. All Interconnection wires listed in the conduit schedule for each conduit shall be shown only on one interconnect drawing. Interconnect drawings submitted with wiring of a single conduit run separated onto multiple interconnect drawings will be rejected without review. A single conduit run with wiring shown on separate interconnect drawings will be allowed only after written approval is given by the Engineer for each conduit run prior to submitting the associated interconnect drawings.

u. Only field wiring between MCCs, Panelboards, Control Panels, and other electrical and instrumentation devices or equipment shall be shown on interconnection drawings. No internal panel wiring shall be shown on interconnect drawings except jumper or other wiring to be installed in field by Electrical Contractor.

v. Interconnect Drawings along with the corresponding support documents shall be submitted in a separate submittal package. Interconnect drawings submitted with non interconnect drawing packages will be rejected. The latest support documents shall be obtained by system supplier from Contractor for all non-Electrical Section instruments, panels, and equipment, and included with interconnect drawing submittal. Support documents shall have their submittal number marked in upper right hand corner.

w. Interconnect drawings shall be prepared for all equipment by the System Supplier.

x. Provide a notes section on each interconnect drawing. In the note section, list any variances from the conduit schedule indicated on the Project Plans or these Special Provisions as necessary for completing the interconnections. Change orders regarding wire fill, conduit schedule and errors in plans regarding conduits and wires will not be processed until interconnect drawings have been received for such work.

y. The field electrician shall mark-up all interconnection diagrams during installation to show accurate as-built wiring, conduits runs, terminations, etc.

z. The system supplier shall be responsible to collect all information necessary to complete each interconnection drawing. This includes making field trips to collect all terminal connection data for new and existing, panels, switchboards, panelboards, instruments, equipment and electrical panels.

aa. An index of drawings shall be provided with each Interconnection submittal listing the unique drawing number and the description of the interconnect drawing (e.g. Drawing 4321-IC1004 Pump 1004 Interconnect Drawing).

bb. Provide conduit and interconnect drawing cross reference indexes. Interconnect Conduit Index shall list all conduits listed in the Conduit & Wire Routing schedule and its associated Interconnection Drawing number. An Interconnection Drawing Index shall list all Interconnection drawings and the conduits shown on that specific drawing. These two indexes shall be at the front of all interconnection drawing submittals.

cc. Interconnection submittals that contain more than two motor control panels/centers shall have heavy duty dividers with permanent plastic labeled index tabs separating each group of drawings.

6. 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.

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 Project Plans or these Special Provisions 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 Project Plans or these Special Provisions.

b. Exceptions that are noted in the marked-up Project Plans or these Special Provisions, but not listed on the Exceptions/Clarifications letter, will be considered as non-responsive and not accepted as changes to the Project Plans or these Special Provisions.

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 specification subsection.

G. 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.

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

I. 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.

J. 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.

K. 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.”

L. 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.

M. The equipment specifications have been prepared on the basis of the equipment first named in these Special Provisions. 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 these Special Provisions.

N. 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.

O. 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 Project Plans and these Special Provisions 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 Project Plans or these Special Provisions 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 Project Plans. 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 name and number designation indicated on the Project Plans or these Special Provisions, 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 on the Project Plans or in these Special Provisions. Where no inscription is indicated on the Project Plans or in these Special Provisions, furnish nameplates with an appropriate inscription providing the name and number of device.

3. For all receptacles and switches, 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 the Project Plans 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 the Project Plans or as directed by Engineer.

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 on the Project Plans or indicated in these Special Provisions. Where no inscription is indicated on the Project Plans or indicated in these Special Provisions, furnish nameplates with an appropriate inscription providing the name and number of device used on the submittal drawings.

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. The tag shall be attached to the equipment with stainless steel wire of the type normally used for this purpose. SST 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)	-

DESCRIPTION	PHASE/CODE LETTER	FIELD WIRE WIRE OR TAPE COLOR	NON-FIELD WIRE COLOR
	C	BLUE	-
240 / 120 V, 1 P	L1	BLACK	BLACK
	L2	RED	-
5V POSITIVE	5P	VIOLET	VIOLET
5V NEGATIVE	5N	BLACK/WHITE	BLACK/WHITE
12V POSITIVE	12P	PINK / WHITE	PINK / WHITE
12V NEGATIVE	12N	BLACK/WHITE	BLACK/WHITE
24V POSITIVE	24P	PINK	BLUE
24V NEGATIVE	24N	BLACK	BLUE
AC CONTROL		VIOLET	RED (YELLOW FOR FOREIGN CIRCUITS)
DC CONTROL		BLUE	BLUE
DC COMMON		GRAY	-
NEUTRAL	N	WHITE	WHITE
GROUND	G	GREEN	GREEN
SHIELDED PAIR	+	RED	RED
	-	BLACK	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 Project Plans.
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, elementary and interconnect 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. All spare wires shall be labeled with equipment number followed by SP1, SP2, etc. (i.e. P11001-SP1 for first spare wire).
6. All control and signal wiring terminations shall have the correct wire label applied prior to making connection.

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 Project Plans; 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 Project Plans 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". The tag shall be attached to the conduit with 316 stainless steel wire of the type normally used for this purpose. SST wire must be crimp connected. Twisting ends together is not acceptable. Engrave the tags with the conduit number as listed in the conduit schedule on the "E"-series Project Plans. 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.

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 the Project Plans.
4. Conduits entering enclosures shall be fitted with 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 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 switches for hand-off-auto (HOA) applications shall have the hand position to the left, off 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 30 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 Project Plans. 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 Project Plans. 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 Project Plans or specified these Special Provisions.

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 the Project Plans 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. MOTOR STARTER

1. Motor starters (M) shall be magnetically operated, electrically held, full voltage, non-reversing, except as shown on the Project Plans. NEMA sizes shall be as required for the horsepower of the supplied equipment. Contactors shall be UL rated and listed. Motor starters shall be Allen-Bradley Bulletin 509 to match City Standard.
2. Each motor starter shall have a 120 volt operating coil rated for continuous operation.
3. Auxiliary contacts shall be provided as shown on the Project Plans or as required. Each motor starter shall be furnished with a minimum of two spare auxiliary contacts in excess from those shown to be used. Auxiliary contacts shall be convertible, in the field, from normally open to normally closed, or vice versa.
4. Starters shall have adjustable bi-metallic overload relays. Adjustable overload relays shall be adjustable for trip point and for automatic or manual reset. Each overload shall be ambient compensated with a visible trip indicator. Each overload shall be ambient compensated and shall trip on 600% of full load current in less than 6 seconds. Each overload relay shall have a test trip pushbutton built-in and an adjustable calibrated trip with indicating dial. Starters shall have 3 overload relays. Each overload relay shall have a normally closed holding contact and a normally open isolated contact for overload shutdown. Motor Overloads shall be Allen-Bradley or approved equal.

G. ELAPSED TIME METER

1. Elapsed time meters (ETM) for general use shall be nonresettable with 0.0 to 99,999.9 hour readout, permanently lubricated synchronous motor drive, nominal 2-1/2” square two-hole surface mount housing, screw terminals, and rated at 120 VAC, at 60 Hz. Elapsed time meters shall be Cramer 635, Reddington, or approved equal.

H. 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 the Project Plan 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.

I. 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.

J. 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.

K. 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.

L. 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 406.8.
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 406.8 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 CONTROL PANEL

A. Control Panel shall consist of the PLC system, power supply, enclosure, and other devices for a complete and operational system.

1. New Tesco L3000 liquid level controller (LLC) with Operator Interface no equal as shown on the I-series Project Plans. L3000 to be programmed by System Supplier as described herein.

    a. Group all telemetry tables together for future efficient data transfer to SCADA Central. Submit proposed communications data tables in Excel format for approval by City.

    b. All wiring from the PLC I/O terminals shall be wired to interface terminal blocks, including all spares, as shown on Project Plans to match the I/O of the City's Standard PLC, Program Configuration and I/O wiring.

2. PAPERLESS CHART RECORDER

    a. The Paperless recorder shall be a fully microprocessor based unit with all setup parameters programmable from a full keypad and displayed on a SVGA Touchscreen. The paperless recorder shall have inputs to record 20 channels (minimum) of process variables, 400MG standard memory, compact flash, 12 alarm outputs, RS-232C serial interface, math and report function, USB interface and 120VAC power.

    b. Chart recorder shall be Yokogawa DX20 match City Standard.

3. Reinstall existing autodialer and flowmeter transmitter in new Control Panel. Coordinate with City for configuration.

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

B. Miscellaneous Devices:

1. Lights, switches, pushbuttons, terminal blocks etc. to match those specified under Devices subsection.

2. Connection between Ethernet Port and Ethernet hub shall be made with Cat 5 patch cable. Patch cable shall be 4 pair stranded PVC cable with HI-FLEX conductors. Length shall be 5 feet minimum. Color of cable shall be red.

3. RFI filters to be for power line radio frequency protection, Eaton Aegis series AGPH 12015 to match City standard.

4. Receptacle to 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.

5. DC power supplies to be linear type and rated per the Project Plans at 24VDC and 12VDC, Power One to match City Standard.

6. Isolator shall provide complete isolation of the 4-20 mA output signal from the input signal and isolator power supply. Each isolator shall have all solid state circuitry mounted in a plug-in module. The 4-20 mA output signal shall be capable of driving a 600 ohm load. Both accuracy and linearity shall be +/- 0.10% of span. The isolator shall be powered as shown on the Project Plans. Each isolator shall be as manufactured by AGM Electronics, Action Instruments, or approved equal.

7. Intrusion bypass pushbutton (blue) shall be Allen-Bradley 800H, IDEC ITE, or approved equal.
8. BATTERIES AND CHARGER:
    a. Batteries shall be sealed, rechargeable lead acid type, containing no liquid. The batteries shall be completely maintenance free, requiring no additional water or electrolyte. An internal lead dioxide system shall eliminate danger of permanent cell reversal and resulting loss of ability to recharge.
    b. Batteries shall not be affected by memory or previous use history. Each battery shall be maintenance-free, non spillable. Each battery shall have a minimum 36 ampere-hour capacity at a nominal 12 VDC.
    c. The charger shall provide dual rate charging, automatically switching between fast and float rates. The charger shall be specifically designed to match the battery rating and size. The float charge shall be low rate so that the batteries can be left on charge continuously. The charger shall have a fast charging rate that will fully recharge a discharged battery in 24 hours or less. Battery and charger shall be rated operate in a temperature range to 122 degrees Fahrenheit.
    d. Batteries shall be Power-Sonic PG-12V-35Fr to match City Standard. Charger/Regulator shall be Power-Sonic PSC-124000A.
    e. DC-DC converter shall be Rhino PSP series 12VDC to 24VDC, 1A to match City Standard.
9. Future device and component mounting space shall be provided on door, backpan, and subpanel where detailed on the Project Plans. Where no detail is shown, provide a minimum of 10 percent usable future space.

201-2.07 FIELD DEVICES

A. Bubbler System

1. A complete air system consisting of an air compressor assembly, controls, and associated hardware matching existing City Standard. The air control system shall be of the pressure transmitter type which operates from the level back pressure of compressed air through air tubing from an air pipe connected to the existing system installed in the wet well.
2. The pressure transmitter shall incorporate a high-accuracy capacitance sensor. With this sensor, process pressure is transmitted through the isolating diaphragm and fill fluid to the sensing diaphragm in the center of the capacitance cell. Capacitor plates on both sides of the sensing diaphragm detect its position. The differential capacitance between the sensing diaphragm and the capacitor plates shall be directly proportional to process pressure. Pressure transmitter shall be provided with LCD of pressure value. The pressure transmitter shall be Rosemount to display match City standard.
3. Each calibration valve assembly shall have integral stainless steel block and bleed valving. Valve shall have a non-rotating tip stem and a fully back-seated bonnet. Block and bleed valve shall be Hex HB59 (phone 800-543-7311) or approved equal.
4. Provide air flowmeter 0-5.2SCFH, with adjustable steel valve, tantalum float, stainless steel fittings and valve, latching inductive ring sensor King Instruments 7430 with inductive ring sensor to match City Standard.

5. The air system shall utilize 1/4" diameter polyethylene tubing, Imperial Paraflex #44P-Black or an approved equal. All valves and fittings for tubing shall be brass, Eastman Poly-Flo, Swagelok or approved equal.
6. Air sensing tube to wet well shall be run in conduit as shown on plans. Reconnect sensing tube to existing connection in Dry Pit.
7. Wiring and piping of the air compressor assembly shall be so arranged that the unit is easily removed without removing any other equipment.
8. All miscellaneous pneumatic system accessories shall be furnished and installed by the Contractor to provide the operations specified herein and shown on the Project Plans.

B. Intrusion System

1. Doors - Each intrusion door switch shall have a wide gap magnetic sensor with S.P.D.T. contacts mounted in a rugged steel housing with a 3 foot stainless steel armored cable for wiring to a junction box. Intrusion door switches shall be Sentrol 2507-A or approved equal.

C. Photocell

1. Photocell shall be heavy duty, multi-voltage rated, 1800W, twist-lock photocell with built in surge arrestor. Photocell shall operate to turn light on at dusk and off at dawn. Photocell shall be NEMA 3R rated, 3 prong, UL listed, Rated for operating temperature of -40F to 158F. Photocell with matching receptacle shall be Defiant or approved equal.

D. Float Switch

1. The level switch shall utilize a Buna-N level with slosh shield that moves with liquid level to actuate a SPST (single pole, single throw) NC switch. The switch contact shall open with rising level. The level switch shall have a minimum electrical switch rating of 20 VA at 120 VAC. The level switch shall have an operating temperature range of -40o to +180oF. The level switch shall be suspended by PVC cable of sufficient length to reach bottom of the sump and have a weighted collar. The level switch shall be a Gems LS-750, or approved equal.

201-2.08 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, and thermostats. Provide metal data pocket within each enclosure and box to hold as-built drawings.

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

201-2.09 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 Project Plans 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.

201-2.10 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 Project Plans 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 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 Project Plans. 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.

201-2.11 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 the Project Plans.
6. The switch shall be fully rated at amperage as shown on the Project Plans, 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 the E-Series Project Plans.
21. The automatic transfer switch shall be ASCO 7000 series with options to meet specified requirements, to match City Standard.

22. 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 Project Plans.
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.

201-2.12 SURGE PROTECTIVE DEVICE

A. The surge protective device shall be rated for use on a 3 phase system at voltage shown on the Project Plan One Line diagram. The transient current the surge protective device shall dissipate 160,000 amps minimum per phase. Provide fuses feeding the surge protective device. Locate surge protective device so that the indicating lights are viewable without removing panels. The surge protective device shall be Liebert to match City Standard.

201-2.13 PANELBOARD

A. The Contractor shall furnish a panelboard of the type indicated on the E-series Project Plans and these Special Provisions. Panelboard to be provided with breakers shown on the Project Plans. Panelboard with a 240V high-leg (stinger) shall not be used.

B. The panelboard shall comply with the applicable sections of UL, NEC, W.U.E.S.S.C., OSHA and NEMA and shall be manufactured by Westinghouse, Square D, ITT or approved equivalent.

C. Provide a machine typed circuit directory on inside of panelboard of door breaker identification when panelboard is delivered to site. Update the panelboard legend at end of project to reflect as-built conditions.

201-2.14 POWER MONITOR

A. Each digital power monitoring system to be as manufactured by Electro Industries Shark 200, to match City Standard. Power monitor shall display: Voltage (phase A-B, A-N, B-N); current (Phases A, B); power (KW, KVA); power factor, total harmonic distortion and frequency. Monitor shall have 10 amp secondary, multifunction meter only. Provide two (2) external current transformers with rating as indicated on the drawing or sized for incoming service. Provide two (2) external potential transformers (when necessary) with rating as indicated on the drawing or sized for incoming service. Power monitor shall include 9600 BPS, RS485, Modbus serial port for connection to LLC.

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 Project Plans 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. Display of all analog values.
3. High and Low alarms for all new analog values to match existing format.
4. Scaling to engineering values of all variables:
    a. Level in 1/10s resolution.
5. Transducer out-of-range fail alarms.
6. All setpoints, enable/disables, time delays, registers and scaling shall be adjustable from Central SCADA, OI and PLC.
7. Sequential start time delay between similar equipment and pumps.
8. Real Time and historical trends for all analog inputs and digital pump runs or like digital equipment.
9. 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. 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 Project Plans. Pump station shall be controllable from Central.

201-2.16 RADIO SYSTEM

A. Radio Modem

1. Each radio shall have the following features:
    a. Interfaces: RS-232 series (DB-9) and SMA (female) antenna connection.
    b. Rx = 153.4475, Tx = 158.2425
    c. Transmitter Frequency Stability 1.5 ppm
    d. Carrier Output Power 1-5W
    e. Tx Current < 2.6A @ 13.3V
    f. Rx Current < 220mA @ 13.3V
2. The radio unit shall meet the following general requirements:
    a. Input Power: 10-16 VDC
    b. Indicators: LEDs for power status, Run, CS, Rx Rd
3. The radio unit shall meet the following physical requirements:

a. Temperature Range: -30 to 60° C
b. Antenna cable: SMA, female

4. Provide new 24VDC power supply sized for double the radio required power for each radio if the power supply is undersized.
5. Radio Modem shall be Data Radio Integra-TR to match existing system.
6. Radio shall be programmed by Contractor with parameters provided by City.

B. Antenna

1. Each antenna system shall be furnished and installed complete and functional for the intended use. An antenna system shall include but not be limited to, antenna, antenna pole, antenna tower, mounting hardware, lightning arrestor, and coaxial cables with connectors.
2. Antenna system shall be meet the following specifications:
   a. Antenna shall be installed and supported as shown on the Project Plans. Support members shall have sufficient strength to withstand local wind conditions and shall be protected from sun exposure and corrosive chemical damage.
   b. Support hardware such as clamps, orientation mounts, and offset brackets shall be steel protected with a hot dip galvanized finish or stainless steel. Clamps and mounts shall be heavy duty in order to transfer the full antenna load to the support tower or mast. Bolts and screws shall be stainless steel.
   c. The site radio antenna shall be vertically polarized, directional type, 50 ohm impedance, SCALA model to match City Standard.
3. Transmission Cable
   a. Provide 50 Ohm, weatherproof coaxial cable from lightning arrestor to antenna. The coax cable shall have a corrugated outer conductor of copper, copper-clad aluminum inner conductor with foam dielectric. The coax cable shall be jacketed for corrosive environment and ultra-violet exposure. The coax cable shall be superflexible, with a minimum bending radius of 5 inches. The cable shall be installed as one continuous length from the antenna to the flange mounted lightning arrestor. Use LMR600DB coax cable to match City Standard.
   b. A backpan mount antenna lightning “N” connector arrestor shall be furnished on the antenna coaxial transmission line. The lightning arrestor shall be grounded to the panel ground bus with a #8 AWG or larger bonding wire. The lightning arrestor shall be a PolyPhaser VHF 50 HN or approved equal.
   c. Provide miscellaneous hardware such as grounding kits, hanger kits, and feed through assemblies.
   d. The cable shall be carefully installed to prevent damage to the jacket and routed with a minimum bending radius of 8 inches.
   e. Provide connector weatherproofing kits for outdoor exposed connectors and grounding strap attachments. All mating connectors that are exposed to weather shall be wrapped with a sealing material designed to protect against water and dirt entry into the connectors.

C. Antenna systems shall be meet the following specifications:

1. Antennas shall be installed and supported as shown on the Project Plans. Support members shall have sufficient strength to withstand local wind conditions and shall be protected from sun exposure and corrosive chemical damage.
2. Support hardware such as clamps, orientation mounts, and offset brackets shall be steel protected with a hot dip galvanized finish or stainless steel. Clamps and mounts shall be heavy duty in order to transfer the full antenna load to the support tower or mast. Bolts and screws shall be stainless steel.

201-2.17 DISCONNECT SWITCHES

A. Switches shall be provided with the voltage, and amperage rated as shown on the one-line and other Project Plans. Switches shall be provided with fuse holder with fuses sized as required by the mechanical equipment when shown on the Project Plans. All switches shall be UL labeled.

B. Switches to be NEMA rated as indicated on the Project Plans.

C. The operating handle shall be capable of being padlocked in the “ON” and "OFF" positions. The operator shall be a positive, quick-make, quick-break mechanism. Disconnects shall be of the enclosed knife blade type.

D. Switches shall be provided with defeatable door interlocks that prevent the door from opening when the operating handle is in the "ON" position. Handle position shall clearly indicate whether the switch is in “ON” or “OFF”. Operating handle shall be an integral part of the enclosure frame and in no way part of the door or cover.

E. Equipment ground kits shall be furnished for each switch.

F. Disconnect switches shall be Square D, Cutler-Hammer, or approved equal.

201-2.18 GENERATOR RECEPTACLE

A. Generator receptacle to be a 1 phase, 3 wire, 3, pole, 240VAC, 100A, Crouse-Hinds Arktite, 100A cast aluminum receptacle with spring door, reverse interior –S22, and 100A feed through 15° back box junction box (2” NPT) to match City Standard. Provide matching plug.

201-2.19 TELEPHONE

A. Basic telephone with 10 number speed dial memory, lighted keypad, receiver volume control, flash & redial button and 7 foot line cord. Telephone shall be wall mountable.

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 Project Plans. 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 the Project Plans.

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 Project Plans.
2. The Project Plans 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.

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. 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.
2. Install conduit free from dents and bruises.
3. All conduits shall be labeled on all ends; at junction boxes, pull boxes, enclosures, stub-outs, or other terminations.
4. 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.
5. Route all above grade outdoor conduits or conduits in rated areas parallel or perpendicular to structure lines and/or piping.
6. 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.
7. 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.
8. 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.
9. 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.
10. Conduits shall be painted to match the color of surface attached to as directed by Engineer.
11. All spares shall be mandrelled and have pull ropes installed.
12. Conduits shall be painted to match the color of surface attached to as directed by Engineer.
13. 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 these Electrical Section Special Provisions.

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 & 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 Project Plans 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 Special Provisions, 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 Project Plans.
3. Housekeeping pad shall be Class “A” concrete 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 the Project Plans and these Special Provisions.

2. All equipment setup and assembled by the Contractor shall be in accordance with the Project Plans 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 Special Provisions 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” of this Section 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” of this Section.

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 Motor Control Center, disconnect switches, Control Panel, PLC, PLC with SCADA Software HMI screens, and any miscellaneous associated electrical equipment.
3. Temporary wiring and equipment shall be setup during these tests to simulate the complete assembled system.
4. PLC/OI/SCADA programmer shall be present during the entire Factory Test for modifying or adjusting all PLC registers, SCADA application and setpoints to test the system.
5. 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.
6. 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 Project Plans and these Special Provisions and for the ability to perform the control functions.
7. 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.

8. All components of the system setup shall be completely assembled and thoroughly pre-tested by the supplier or manufacturer before start of factory test.
9. 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.
10. 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" of this Section.
    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) The Contractor shall complete each test and fill in the I/O test form TF13 located in Appendix "A" of this Section.
        5) 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.
        6) 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 Special Provisions.

7) 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.

11. 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.
12. Acceptance and witnessing of the factory tests does not relieve or exclude the Contractor from conforming to the requirements of the Project Plans or these Special Provisions.
13. The testing personnel shall provide all material, equipment, labor and technical supervision to perform such tests and inspections.
14. 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.
15. Spare I/O for the system shall also be tested during this test period.
16. 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.
17. 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.
18. 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.

19. 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.
20. 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, Interconnection Drawings and 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” of this Section for each electrical field test.
4. The Electrical Contractor shall be at the jobsite to assist with all Electrical Field Tests.
5. 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” of this Section.

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” of this Section.

d. GROUNDING SYSTEM TESTS

1) Visual and Mechanical Inspection:

a) Verify ground system is in compliance with the Project Plans and Special Provisions.

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" of this Section.

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" of this Section.

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” of this Section.

6. 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” of this Section.

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” of this Section.

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” of this Section.

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" of this Section shall be performed by the Contractor for each of the instruments listed in Appendix “B” Device Index of this Section.

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 of this Section."

7. TRIAL OPERATIONS:

a. The entire electrical installation shall be either tested or trial operated to verify compliance with the Project Plans or these Special Provisions. 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 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, elementary and interconnection 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 DVDs (DVDs shall contain all documents in both PDF format and unlocked AutoCAD - DWG format, version 2010 or later):

1. As-built electrical and instrumentation drawings prepared for this project.
2. 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.
3. 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 “bookmarked” to at each index and subtab listed in O&M.
4. These disks shall be the property of the City, for its use on this and future projects.

201-3.10 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 a period of one (1) year from date of final acceptance. Standard published warranties of equipment which exceed the preceding specified length of time shall be honored by the manufacturer or supplier.

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.

201-3.11 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. Listing of warranty information.
2. Each "operation and maintenance" manual shall be modified or supplemented by the Supplier to reflect all field changes and as-built conditions.
3. Two (2) DVD disk copies of all final documentation to reflect as-built conditions.

D. Prior to final acceptance submit each key with matching duplicate. 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.

201-4 PAYMENT

A. **General Electrical Work and Lighting** shall be paid for at the contract **lump sum** price, which price shall include full compensation for funishing all labor, material, tools, equipment, and incidentals, and doing all the work involved in providing a complete and working electrical system, including, but not limited to, miscellaneous enclosures, pull boxes, lighting, underground conduits and conductors, ground rods and underground grounding connections, receptacles, power feeders, control wire, wiring connections, all necessary control programming, modifications and testing to the City's SCADA system, and all other miscellaneous work, complete and in place as specified herein and in accordance with the Project Plans and as specified in these Special Provisions, and no additional compensation will be made therefor.

B. **Electrical and Control 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, and for doing all the work involved in furnishing, installing, testing, and starting up the electrical and control pedestal for the Spring Lake Lift Station Site, including but not limited to, anchorage, transportation, testing, permits, electrical connections, temporary relocation of the existing electrical and control pedestal, removal and disposal of the existing electrical and control pedestal, controls equipment, bubbler level equipment, automatic transfer switch, 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. **Meter Pedestal** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, fees, and coordination for installation and testing of a new PG&E electrical meter pedestal, including but not limited to, anchorage, transportation, testing, permits, electrical connections, 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.

SECTION 201 APPENDIX "A"

TEST FORMS

Index of Forms:

Bill of Material
Schedule Test Request Form
TF1 Power and Control Conductor Test Form
TF2 Instrumentation Conductor Test Form
TF3 Grounding System Test Form
TF4 Visual and Mechanical Inspection Form
TF5 Panelboard Test Form
TF6 Operational Device Checks and Tests Form
TF7 Phase Rotation Test Form
TF8 MCC Device Test Form
TF9 Breaker Device Test Form
TF10 Motor Test Form
TF11 Factory Test Checkout Form
TF13 I/O Point Checkout Test Sheet
TF14 Instrument Data Sheet and Calibration Record

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 : _____

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 : _____

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)

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 :	_____

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	_____
	_____

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

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TESTED BY : _____ DATE : ____/____/____

WITNESSED BY : _____

NOTES:

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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 :	

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: _____

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 _____

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: _____

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: _____

MOTOR TEST FORM

TEST FORM (TF10)

EQUIPMENT
NUMBER : _____ NAME : _____

NAMEPLATE DATA - FIELD RECORDED

MANUFACTURER	MODEL #	SERIAL #	FRAME #

H.P.	R.P.M	F.L.A	VOLTS	PHASE	FREQ.	P.F.	S.F.
CODE	N.E.M.A.	INSUL.	ENCLOSR.	DUTY	DESIGN		

INSULATION TESTS PHASE TO GROUND MEG-OHMS			MOTOR FRAME GROUNDING SYSTEM TEST			MOTOR HEATER	MOTOR THERMAL
			APPLIED	MEAS.	CALC.	MEAS.	TRIP
A	B	C	VOLTS	AMPS	OHMS	AMPS	TEST

MOTOR TESTS - MEASURED VALUES

AMPERAGE			VOLTAGE			POWER	
A	B	C	AB	BC	CA	FACTOR	WATTAGE

NOTES:
VOLTAGE, AMPERAGE, POWER FACTOR, & WATTAGE SHALL BE RECORDED WITH A TRUE RMS METER.

TESTED BY : _____ DATE : ____/____/____
WITNESSED BY: _____

FACTORY TEST
MCC/CONTROL PANEL CHECKOUT FORM (TF11)

Manufacturer: _____ **Location:** _____

Job No.: _____

Tel: _____ **Fax:** _____

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: _____

I/O POINT CHECKOUT TEST FORM

TEST FORM (TF13)

I/O TYPE : _____ LOCATION : _____

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		

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 / /

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SECTION 201 APPENDIX "B"
DEVICE INDEX

SECTION 201 -APPENDIX "B" 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	201 TEST FORM
E-22	I-2	FCS	1611	Field Control Station	SS	201-2.05.B	4X	-	-	-	E-12 B		-
E-22	I-2	FCS	1612	Field Control Station	SS	201-2.05.B	4X	-	-	-	E-12 B		-
E-21	I-2	FE	1671	Flow Element	Mag	Existing	-	-	-	-	-		-
-	I-2	FI	1672	Flow Indicator	Vane	201-2.07.A	-	-	0.52-5.2	SCFM	PANEL		TF-14
-	I-2	FSL	1672	Flow Indicator	Roto	201-2.07.A	-	-	0.99	SCFM	PANEL		TF-14
-	I-2	FIT	1671	Flow Indicating Transmitter	Mag	Existing	-	-	0-400	GPM	PANEL		TF-14
E-22	I-2	LSHH	1651	Level Switch	Float	Existing	-	-	-	FT	-		TF-7
E-22	I-2	LSH	1652	Level Switch	Float	201-2.07.D	-	-	-	-	E-11 H		TF-13
-	I-2	LIT	1651	Level Indicating Transmitter	Press	201-2.07.A	-	-	34.60	FT	PANEL		TF-7
-	I-2	TSH	1611	Temperature Switch	N.C.	Existing	-	-	-	-	Motor		TF-7
-	I-2	TSH	1612	Temperature Switch	N.C.	Existing	-	-	-	-	Motor		TF-7
-	I-3	ZS	1691 A~D	Position Switch	N.C.	201-2.09.B	-	-	-	-	Panel Door		TF-7

** END OF SECTION 201 **

SECTION 202
ELECTRICAL SYSTEM ANALYSIS

202-1 GENERAL

202-1.01 SUBMITTALS

A. Provide the following submittals, per Section 201, for the electrical power system including the 208/120V distribution system:

1. Short Circuit Study.
2. Arc Flash Study.

B. All 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 Project Plans and these Special Provisions in a letter (located in the front of the submittal) on company 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 Project Plans and these Special Provisions 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 Project Plan or Special Provision Section number the clarification is required for.

202-1.02 SEQUENCING AND SCHEDULING

A. It is the responsibility of those performing the electrical system analysis to collect and field verify all data. This includes obtaining all data from the serving Utility for this project & other vendors necessary for completing the required studies and field verifying existing data.

B. 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

202-2 PRODUCTS

202-2.01 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.

D. Utilize proposed load data for the Study obtained from submittals, Utility Company and field verifications.

E. Complete protective device coordination study listing all device settings shall be utilized during start-up of electrical equipment.

F. It is the Contractor's responsibility to obtain the required information from the Utility Company, Generator supplier and vendors necessary for completing the requested studies.

G. Contractor shall provide two sets of CDs containing all of the electrical system analysis studies, including all SKM files or Contractor generated files used to develop the study for the City's use.

H. Provide unique page numbers for every sheet in all Studies. Unique page numbers to be manually placed by Study Company after printout if study report doesn't assign page numbers.

I. Provide one line diagrams showing names of protective devices, buses and branches. Buses shall have descriptive names (i.e. not Bus-0084)

202-2.02 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. Main Switchboard.
2. All Motor Control Centers (MCCs).
3. All panelboards
4. All 480V, 3 phase motor and equipment loads 1HP and larger. Grouping loads are not acceptable.
5. 3 phase transformer secondaries.
6. 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 Company.
4. Tabulations of calculated quantities.
5. Results, conclusions, and recommendations.
6. One line diagram of distribution system
7. Impedance diagram showing the resistances and reactances for all cables of the distribution system.

8. Two studies (minimum) – one for worst case scenario and one for actual equipment operating.
9. Calculations for maximum and minimum contributions of fault current magnitude. The minimum calculation shall assume the minimum motor load. Conversely, the maximum calculation shall assume a maximum contribution from the Utility and shall assume motors to be operating under full-load conditions. The Study shall also calculate the fault current using in-rush current values.

202-2.03 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.

B. Safe working distances shall be indicated or noted 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 arc 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 protection
         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.
   4. Provide recommendations for the Personal Protective Equipment (PPE) that City personnel should maintain on site.

5. Provide recommendations for safety label design that should be posted on electrical equipment.
6. Spreadsheet summarizing incident energy and flash protection boundary list Arc Flash Boundary in inches on label. No fractional distance in feet.

202-2.04 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 Short Circuit & Arc Flash 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.

202-3 EXECUTION

202-3.01 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.

C. Provide two (2) CDs at the completion of the project. One CD shall contain the as-built set of studies, reports, settings, and other pertinent information. The other CD will contain the original source format of input data used for the PC based computer software. Provide all setup information used for the computer based study and report.

202-3.02 FIELD TESTS

A. Provide field testing of protective equipment.

202-3.03 ARC FLASH WARNING LABELS

A. All Arc Flash warning labels shall meet NEC requirements, OSHA standards and NFPA recommendations.

B. Provide and install 3.5 in. x 5 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. Engineering report number, revision number and issue date
6. Minimum arc rating of clothing
7. Site specific level of PPE

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:

1. 480V and applicable 208V panelboards
2. MCCs
3. Switchboard
4. Control Panels
5. Generator
6. All electrical equipment with an incident energy level greater than 1.2 Cal/cm2.

G. Labels shall be submitted for approval. No labels shall be installed without prior approval by Engineer.

202-3.04 ARC FLASH TRAINING

A. The Supplier shall train City personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours). 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.

202-4 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.

SECTION 203
DUAL FUEL GENERATOR SET

203-1 Description: This section of these Special Provisions describes the minimum requirements for a pad mounted, standby duty, single-phase dual fuel generator, accessories, and all materials necessary for backup power generation at the Spring Lake Lift Station as shown on the Project Plans and as specified in these Special Provisions.

Incidental parts which are not shown on the Project Plans or specified in these Special Provisions and which are necessary to complete the work shall be furnished and installed as though such parts were shown on the Project Plans or specified in these Special Provisions.

In the event of apparent conflict between the Project Plans, Standard Specifications, and these Special Provisions, the requirement determined by the Engineer which will give the greatest protection or best installation shall govern.

Bidder shall examine carefully the site of the proposed work, the Project Plans, Standard Specifications, and these Special Provisions before submitting his bid.

All equipment shall be complete and operational to the satisfaction of the Engineer at the time the work is accepted.

203-2 Rules and Regulations: All electrical equipment shall conform to the standards of the National Electrical Manufacturers Association. All material and work shall conform, where applicable, to the requirements of the National Electrical Code; the California Administrative Code, Title 24, Part 3, Basic Electrical Regulations, Title 24, Part 5, California Plumbing Code; the International Building Code and the Uniform Building Code. Generators shall meet the emissions requirements of the Bay Area Air Quality Management District (BAAQMD).

203-3 Equipment List and Drawings: Within 15 days following notification and award of the contract, the Contractor shall submit to the Engineer for approval a listing of all equipment and material which he proposes to furnish and install, which shall include all material identified on the Project Plans or in these Special Provisions. The list shall be complete as to name of manufacturer, size and catalog number of unit, and shall be supplemented by such other data as may be required, including detailed scale drawings, manufacturer's cut sheets, structural attachment details, anchorage calculations certified by a professional engineer licensed in the State of California, and wiring diagrams. At least five copies of the above data shall be submitted to the Engineer for checking and/or approval.

203-4 Substitution: In these Special Provisions, one or more makes of materials or methods have been specified for use in this installation. This has been done to establish the standards of quality, workmanship, finish, and design required, but other materials or methods equal in design, required quality, workmanship, finish, and guaranteed performance will be accepted. This implies no right on the part of the Contractor to use materials or methods other than those specified, unless approved as equal in writing by the Engineer.

The decision of the Engineer shall govern as to what is equal to the item specified, but the burden of proof as to the equality of the proposed material or method shall be upon the Contractor. If the Engineer considers it necessary, tests to determine the quality of the proposed materials shall be made, at the expense of the Contractor, by an unbiased laboratory satisfactory to the Engineer.

203-5 Generator Unit

203-5.01 Engine:

A. The generator set shall be manufactured by one of the following:
   1. Kohler
   2. Cummins Power Systems, Cummins/Onan
   3. MTU Onsite Energy / Stewart and Stevenson
   4. No alternates will be accepted

B. Vendor Qualifications:
   1. The engine, generator, and major items of auxiliary equipment shall be manufactured by U.S. manufacturers currently engaged in the production of such equipment.
   2. Vendor facilities shall be within 50 mile radius of the project site.
   3. Shall offer 24hr/7 day per week emergency service with 1 hour on-site.
   4. Shall employ multiple factory-trained technicians authorized to perform diagnostics and repair for the entire generator set (engine and alternator).
   5. Reliable California firm carrying an adequate inventory of repair parts and maintenance consumables for both the engine and generator in the State.
   6. Shall offer the availability of rental generator sets.

C. The unit shall meet all local and Environmental Protection Agency (EPA) emission standards at a Tier 4 level and noise requirements at final inspection. The manufacturer shall provide an EPA certified engine-generator unit for emergency applications. Submit proof that engine-generator unit is EPA certified.

D. Emissions Permits Required from the Bay Area Air Quality Management District (BAAQMD): Pay permit fees and obtain “Permit to Construct” and “Permit to Operate” (in the City’s name) from BAAQMD (phone number (415) 771-6000):
   1. Provide engine emissions data sheets demonstrating compliance with the current standards of the BAAQMD.
   2. Obtain “Permit to Construct” application forms from BAAQMD, and fill in all information pertaining to emissions and engine-generator set. Forward original copy of partially completed application to Engineer. Engineer shall forward to City’s Project Manager to complete remaining portion of application and return to Contractor.
   3. Contractor shall pay for and obtain BAAQMD approval, and shall forward original copy of the “Permit to Construct” to Engineer prior to approval or delivery of engine-generator set.
   4. Contractor shall install engine-generator set in compliance with conditions in permit, pay any remaining fees, and obtain field approval of BAAQMD inspector. Contractor shall forward original copy of the “Permit to Operate” to Engineer.

E. Product Description: Natural gas / propane 4-cycle natural aspiration, radiator and fan-cooled, spark-ignition internal combustion engine.

F. Fuel System: Natural gas / liquid propane gas dual fuel feed with mixing valves and automatic changeover system.

G. Engine speed: 1,800 rpm.

H. Safety Devices: Engine shutdown and engine start lockout on high water temperature, low oil pressure, over speed, low coolant level, and engine over crank. Limits as selected by manufacturer.

I. Engine Starting: DC starting system with positive engagement, voltage of starter motors in accordance with manufacturer's instructions. Furnish remote starting control circuit with MANUAL-OFF-REMOTE selector switch or pushbuttons on engine-generator control panel.

J. Engine Jacket Heater: Thermal circulation-type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F (32 degrees C), and suitable for operation on 120-Volt, single-phase power supply.

K. Radiator: Radiator using glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 105 degrees F (40 degrees C). Radiator airflow restriction 0.5 inches of water (1.25 Pa) maximum.

L. Engine Accessories: Dry fuel filter, lube oil filter, intake air filter, lube oil cooler, engine-driven water pump. Furnish water temperature gauge, and lube oil pressure gauge on engine-generator control panel.

M. Mounting: Heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails. Furnish unit with suitable spring-type vibration isolators. Provide mounting bolts sized for 2013 California Building Code seismic requirements, site class D.

N. Emissions shall meet the minimum emission limitations for NOx, CO, and POC as published in the BAAQMD Best Available Control Technology Guidance Document 96.3.4 for Natural Gas Fired Emergency Engines. Emission factors (controlled and uncontrolled) shall be provided to the BAAQMD for air permitting purposes.

203-5.02 Generator:

A. Product Description: NEMA MG1, single-phase, re-connectable, brushless permanent magnet (PM)-excited alternator with skewed stator and amortisseur rotor windings skewed for smooth voltage waveform.

B. Rating: 25kW, 120/240 volt single-phase, 3-wire, 60 Hz at 1,800 rpm.

C. Insulation: NEMA standard (MG1 22.40 and 16.40) for class H and be vacuum impregnated with epoxy varnish to be fungus resistant per MIL I-24092.

D. Temperature Rise: 125 degrees C standby.

E. Enclosure: NEMA MG1, open drip proof.

F. Stator Winding Pitch: 2/3

G. The generator shall be rated for delivering output KVA at rated frequency and power factor, at any voltage not more than 5% above or below rated voltage.

H. The generator shall be capable of sustaining at least 300% of rated current for at least 10 seconds.

I. The generator set shall meet all requirements for NFPA 110 Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit; component level type tests will not substitute for this requirement.

J. The engine generator unit shall be listed to meet UL 2200 or submit to an independent third party certification process to verify compliance as installed.

203-5.03 Voltage Regulation:

A. Furnish generator-mounted volts per hertz exciter-regulator to match engine and generator characteristics, with voltage regulation plus or minus 1 percent from no load to full load. Furnish manual controls to adjust voltage drop, voltage level (plus or minus 5 percent) and voltage gain.

203-5.04 Governor:

A. Product Description: Electronic Isochronous governor to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes. Equip governor with means for manual operation and adjustment.

203-5.05 Engine Generator Set Control:

A. Product Description: Microprocessor-based digital control system, designed to provide governing, voltage regulation, metering, protective relaying, automatic starting, monitoring, and control functions for the generator unit.

B. Control System shall be designed to allow local monitoring and control of the generator unit and remote monitoring and control as described in these Special Provisions.

C. Control panel system shall be mounted on the generator unit. The control shall be vibration isolated from the rest of the engine / generator set unit. The controls shall be UL508 labeled.

D. Control voltage shall be 12 or 24 volts DC. Control system shall withstand DC surge voltage produced by the battery-charging alternator operating at full load when the battery bank is disconnected. Generator set governing, voltage regulation, protection, and control equipment shall be capable of proper operation within the typical battery voltage levels.

E. All switches, lamps and meters shall be oil-tight and dust-tight, and the enclosure door shall be gasketed.

F. All switches shall be provided with fully illuminated backlit labels, and all metering shall be individually lighted to allow for easy reading of functions in a completely dark room.

G. All adjustments to the control system shall be made from the front of the generator set control panel, with the aid of a digital readout display integral to the equipment. No rotary pots shall be acceptable for any function of the control system provided for the generator set.

H. Control equipment shall contain a system of diagnostic LEDs to assist in analyzing proper system function.

I. The entire generator set control system as supplied shall be capable of being directly monitored and controlled by a personal computer connected to the control for monitoring, diagnosis, service, and adjustment of the system via an RS232 port on the control.

J. The generator set mounted control shall include the following features and functions:
   1. Three- (3) position selector switch or independent pushbuttons labeled RUN/OFF/AUTO. In the RUN position the generator shall automatically start, and accelerate to rated speed and voltage. In the OFF position the generator shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
   2. Red “mushroom-head” push-button EMERGENCY STOP switch. Depressing the emergency stop switch shall cause the generator set to immediately shut down and be locked out from automatic restarting. Reset of the control shall require reset of the emergency stop switch and the control system.
   3. Pushbutton RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
   4. Push-button PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off several minutes after the switch is depressed or after the switch is depressed a second time. Lamps shall be LED type.
   5. Push-button LAMP TEST switch. Depressing the lamp test switch shall cause all the alarm and status lamps on the panel to be lighted, and cause the digital display panel to sequentially display all the alarm and status messages in the control system.

K. Emergency Generator Control Panel shall be NEMA 250, Type 1 generator-mounted control panel enclosure with engine and generator controls and indicators. Furnish provision for padlock and the following equipment features:
   1. Frequency Meter: 45-65 Hz range, digital display preferred (or 3.5-inch dial).
   2. AC Output Voltmeter: digital display preferred (or 3.5-inch dial), 2 percent accuracy, with phase selector switch.
   3. AC Output Ammeter: digital display preferred (or 3.5-inch dial), 2 percent accuracy, with phase selector switch.
   4. Output voltage adjustment.
   5. Push-to-test indicator lamps, one each for low oil pressure, high water temperature, over speed, and over crank.
   6. Engine Start/Stop selector switch or pushbuttons.
   7. Engine running time meter.
   8. Oil pressure gauge.
   9. Water temperature gauge.
   10. Auxiliary Relay: Three Pole Double Throw (3-PDT) operates when engine runs with contact terminals pre-wired to terminal strip.
   11. Additional visual indicators and alarms in accordance with by NFPA 110.
   12. Remote Alarm Contacts: Factory-wired SPDT contacts to terminal strip for extending each alarm function to a Control Panel or PLC for remote indication, in accordance with NFPA 110.
   13. High Battery voltage alarm.
   14. Low Battery voltage alarm.
   15. System ready.
   16. Anticipatory high water temperature.
   17. Anticipatory low oil pressure.
   18. Low coolant temperature.
   19. Switch in Off Position alarm.
   20. Over crank alarm.
   21. Emergency Stop alarm.
   22. High Water temperature alarm.
   23. Over speed alarm.
   24. Low Oil Pressure alarm.

25. Line power available.
26. Generator power available.
27. Lamp test and horn silence switch.

L. Alarms: Provide wiring and conduit between ATS and engine-generator alarm points for a complete operating system. Provide display windows with 3/8-inch engraved black letters on white background for each annunciated alarm. Provide at least one spare blank window for future use.
   1. Engine Run
   2. Engine Trouble
   3. Engine Over speed shutdown
   4. All other critical shut down function as recommended by the EG unit manufacturer
   5. Spares

M. Power Source: 120-VAC. Provide 20 amp, single pole, circuit breaker in nearest switchboard or panelboard. Provide conduit and wire from power source.

203-5.06 Generator Set and Engine Control Functions:

A. The control system provided shall include cycle cranking system, which allows for user selected crank time, rest time, and number of cycles. Initial setting shall be 3 cranking periods of 15 seconds each, with 15 second rest period between cranking periods.

B. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled and the engine protection parameters for engine oil pressure and engine temperature shall be reduced to proper levels to reflect the lower engine operating speed.

C. The control system shall include the engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this Special Provisions.

D. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit the exhaust smoke while the unit is starting. The control system shall automatically adjust governor gain and stability settings to compensate for engine performance variation related to engine temperature.

E. The control system shall include time delay start (adjustable 0-100 seconds) and time delay stop (adjustable 0-30 minutes) functions. Indicators shall be provided to reflect that the time delays are in operation, and the time remaining for completion of the time delay period.

F. The starting control logic shall check for engine rotation at each signal for the engine starter to run. If the engine rotation is not present when the starter is operating, a “fail to crank” alarm and shutdown shall be indicated on the generator set control panel.

G. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature that is capable of discriminating between failed sender or wiring components, and an actual engine failure conditions.

H. Generator set start contacts shall be rated 10 amps at 32 VDC.

I. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is outside manufacturer specified tolerances. During engine starting, the low voltage limit shall be disabled, and the system shall conduct a battery capacity

test. A ‘weak battery” alarm shall be initiated if the starting/control battery does not pass this test.

203-5.07 Outdoor Sound Attenuating Enclosure:

A. The outdoor weather-protective, sound attenuating, rodent proof enclosure shall be designed to allow full-load operation of the generator set, and all of its accessories shall be sized for the exact unit being furnished. Adequate metal screening shall be installed at all engine-generator unit openings to prevent rodents from entering the enclosure.

B. Enclosure shall be reinforced steel having access to control panels and service points with hinged and removable doors and panels. Door latches shall be lockable and flush-mounted.

C. Enclosure shall have a factory applied fade-, scratch-, and corrosion-resistant “light grey” powder baked industrial coating rated for heavy-duty durability in harsh conditions. Coating system shall be rated for a minimum 600 hour salt spray exposure test per ASTM B117. Rattle-can touch-ups will not be allowed. If needed, coating touch-up procedure and materials shall be approved by the coating and enclosure manufacturer(s).

D. Enclosure roof shall have a positive chamber for moisture runoff. The exhaust and discharge outlets shall be supplied with rain guards to prevent moisture from entering the enclosure. Engine and air exhaust shall be discharged vertically from the enclosure.

E. Walls of the enclosure shall be a minimum of 1-1/2” deep and constructed of 14-gauge steel.

F. Inlet air openings shall include fixed louvers sized to allow proper airflow and cooling without water infiltration.

G. Exhaust silencer shall be mounted inside the enclosure.

H. Maximum noise levels allowed for the generator set shall be 68 dB at 23 feet.

203-5.10 Accessories:

A. Exhaust Silencer: Critical-type silencer, with muffler companion flanges and flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer’s instructions. The exhaust silencers shall be of chambered construction, provide maximum degree silencing, and be sized to assure proper operation without excessive back pressure when installed in the exhaust system. The exhaust silencer shall be supplied with condensation drains, flexible exhaust tubing, and rain caps, as required or indicated in the Project Plans.

B. Batteries: Heavy-duty, deep cycle gel pack/absorption glass-mat (AGM) type storage batteries, 12 or 24 volts, sized as recommended by the engine-generator manufacturer. Match battery voltage to starting system. Furnish cables and clamps.

C. Battery Tray: Treated for electrolyte resistance; constructed to contain spillage.

D. Battery Charger: Solid state to operate with type of batteries furnished. Current limiting type designed to float at 2.17 volts for each cell and equalize at 2.33 volts for each cell. Furnish overload protection, full wave rectifier, DC voltmeter and ammeter, and fused input. Furnish enclosure to meet NEMA 250, Type 1 requirements, or furnish as an internal component of the ATS.

E. Line Circuit Breaker: NEMA AB 1, molded case circuit breaker on generator output with integral thermal and instantaneous magnetic trip in each pole. Furnish battery voltage operated shunt trip, connected to open circuit breaker on engine failure. Unit mount in enclosure to meet NEMA 250, Type 1 requirements.

F. Dual Fuel Natural Gas / Liquid Propane Gas Changeover System: Fuel system shall comply with NFPA Standard No. 30, 37, 54, and 58. Changeover system shall be supplied by the generator set manufacturer and shall be installed following the prime manual shutoff valves, dry fuel filters, and primary gas service pressure regulators. Changeover system shall consist of fuel change pressure switch, solenoid valves, secondary pressure reducing flow valves, and propane gas flow adjusting valve, and shall operate to control the flow of propane gas upon loss of natural gas supply for continued generator set operation without interruption. Return to natural gas shall be automatic when supply is restored.

203-5.11 Source Quality Control:

A. Provide shop inspection and testing of completed assembly.

B. Make completed engine-generator assembly available for inspection at manufacturer's factory prior to packaging for shipment. Notify Engineer at least seven (7) days before inspection is allowed.

C. Allow witnessing of factory inspections and tests at manufacturer's test facility. Notify Engineer at least seven (7) days before inspections and tests are scheduled.

203-5.12 Installation:

A. Mount generator set in accordance with the manufacturers written instructions and the details indicated on the Project Plans.

B. Install engraved plastic nameplates in accordance with Section 201.

C. Ground and bond generator and other electrical system components in accordance with Section 201.

203-5.13 Field Quality Control:

A. Inspect and test in accordance with NETA ATS, Section 7.22 as follows:
   1. Visual and Mechanical Inspection
      a. Compare equipment nameplate data with drawings and specifications.
      b. Inspect physical and mechanical condition.
      c. Inspect correct anchorage and grounding.
   2. Electrical and Mechanical Tests
      a. Perform an insulation-resistance test on generator winding with respect to ground in accordance with ANSI/IEEE Standard 43.
      b. Calculate polarization index.
      c. Test protective relay devices in accordance with Section 7.9.
      d. Perform phase-rotation test to determine compatibility with load requirements.
      e. Functionally test engine shutdown for low oil pressure, over-temperature, over-speed, and other features as applicable.
      f. Perform vibration baseline test. Plot amplitude versus frequency for each main bearing cap.

g. Conduct performance test in accordance with ANSI/NFPA Standard 110, Section 5-13 (Installation Acceptance).
h. Verify correct functioning of governor and regulator.
i. Inspect and test fuel oil piping according to NFPA 30 “Testing” Paragraph and NFPA 31 “Tests of Piping” Paragraph.
j. Repair leaks and defects with new materials, and retest system until satisfactory results are obtained.
k. Test and adjust controls and safeties

3. Test Values
   a. Polarization index values shall be in accordance with ANSI/IEEE Standard 43.
   b. Vibration levels shall be in accordance with manufacturer’s published data.
   c. Performance tests shall conform to manufacturer’s published data and ANSI/NFPA Standard 110.

203-5.14 Manufacturer’s Field Services:

A. Engage the services of a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to assist in testing. Report results in writing.

B. Testing:
   1. Perform field quality control testing under the supervision of the manufacturer’s factory-authorized service representative.

C. Tests: Include the following:
   1. Tests recommended by manufacturer.
   2. Adjust generator output voltage and engine speed to meet specified ratings.
   3. International Electrical Testing Association Tests: Perform each visual and mechanical inspection, and electrical and mechanical test stated in NETA ATS for engine-generator sets, except omit vibration baseline test. Certify compliance with test parameters for tests performed.
   4. NFPA 110 Acceptance Tests (per NFPA 110, 5-13.2):
      a. Perform on-site installation test per 5-13.2.3
      b. Provide load bank suitable for full load of unit and perform 2-hour full load test per 5-13.2.5.
      c. Perform single-step full-load pickup test per 5-13.2.6.
      d. Perform Cycle Crank test per 5-13.2.8
      e. Provide testing documentation per 5-13.3
   5. Exhaust-System Backpressure Test: Use a manometer with a scale exceeding 40 inches water gauge (120 kPa). Connect to exhaust line close to engine exhaust manifold. Verify that backpressure at full-rated load is within manufacturer’s written allowable limits for the engine.
   6. Exhaust Emissions Test: Comply with applicable government test criteria.

D. Coordinate tests for engine-generator with tests for automatic transfer switch, and run them concurrently. Run complete electrical test, including, but not limited to, automatic transfer switch and generator control panel to ensure proper automatic Start-Stop operation. Coordinate testing with Automatic Transfer Switch field service representative.

E. Retest: Correct deficiencies identified by tests and observations, and retest until specified requirements are met.

F. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach

a label or tag to each tested component indicating satisfactory completion of tests. Provide certified copies of field tests approved and signed by the authorized service representative.

203-5.15 Demonstration and Training:

A. Provide four (4) hours of training and instruction for at least four persons, to be conducted at project site with manufacturer's certified field service representative. Instruction shall include handouts to all trainees, procedures for the proper operation, adjustments and maintenance of the engine-generator system.

B. Simulate operation of the engine-generator in manual mode, test mode and causing a power outage by interrupting normal source, and demonstrate that system operates to provide engine- power.

203-5.16 Maintenance Materials:

A. Provide as-build and supplied Operations and Maintenance Manuals, three (3) sets hardcopy, bound in 3-ring binders, and three (3) sets on CDROM or DVD.

203-5.17 Cleaning:

A. Clean engine and generator surfaces. Replace oil and fuel filters with new filters after unit testing and prior to acceptance of the project.

B. On completion of installation, inspect system components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish. Clean components internally using methods and materials recommended by manufacturer.

203-5.18 Payment: 25 KW Dual Fuel Generator Set 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 for doing all the work involved in furnishing, installing, testing, and starting up a complete and working generator set including, but not limited to, generator equipment pedestal, anchorage, fuel connections and appurtenances, generator set and accessories, sound enclosure, transportation, testing, start-up services, training, permits 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.

SECTION 204
PROPANE TANK AND GAS PIPING

204-1 General

204-1.01 Summary: Included in the work are furnishing and installing natural gas and propane piping, fittings, propane tank, and all materials necessary for the generator systems to be complete and operating for the lift station.

Incidental parts which are not shown on the plans or specified herein and which are necessary to complete the work shall be furnished and installed as though such parts were shown on the plans or specified herein.

204-1.02 Rules and Regulations: All mechanical equipment shall conform to the standards of the Underwriters Laboratories, Inc. All material and work shall conform, where applicable, to the requirements of the National Fire Protection Association; the California Administrative Code, Title 24, Part 5, California Plumbing Code; and the International Building Code.

204-1.03 Submittals: Submit shop drawings and product data for all pipe and equipment including manufacturers catalog literature, model numbers, identification symbols, abbreviations lists, valve and pipe tags, color coding for pipe identification, and valve charts and schedules.

204-1.04 Field Quality Control: Test, inspect, and purge gas according to NFPA 54, NFPA 58, authorities having jurisdiction. Gas piping will be considered defective if it does not pass tests and inspections. Prepare test and inspection reports.

204-2 Materials

204-2.01 Gas Piping Tubing, and Fittings: Steel gas pipe shall be used for above grade applications only and shall be Schedule 80, Type E or S, Grade B black steel seamless or electric-resistance welded pipe conforming to ASTM A53 / A53M with NTP threaded ends conforming to ANSI B1.20.1. Fittings used on steel gas piping shall be Class 150 malleable iron threaded fittings conforming to ASME 816.3. Unions for use on steel gas pipe shall be ASME 816.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

Polyethylene (PE) gas pipe shall be copper tubing size (CTS) PE2708 Yellow Medium Density Polyethylene (MDPE) gas pipe meeting ASTM D3350 materials grades and manufactured in accordance with ASTM D2513. Fittings shall be socket fusion type fittings meeting the requirements of ASTM D2683 or butt-fusion type meeting the requirements of ASTM D3261.

PE to Steel Transition Fittings shall be factory-fabricated fittings with PE pipe complying with ASTM D2513, SDR 11; and steel pipe complying with ASTM A53 / A53M, black steel, Schedule 80, Type E or S, Grade B.

Service-Line Risers shall be non-corrodible anodeless with a PE underground portion and PE transition fitting inside a steel pipe casing with tracer wire clips, corrosion-protective end-to-end coating, primary and secondary gas seals, moisture seals, and ultraviolet shield. Risers shall be factory fabricated and leak tested.

204-2.02 Gas Piping Valves and Specialties: Flexible Connectors shall be corrugated stainless-steel tubing with a polymer coating suitable for outdoor conditions and shall be designed and manufactured in accordance with ANSI Z21.24 and ANSI Z21.75. End fittings shall be zinc-coated

steel with threaded connections complying with ASME B1.20.1. The maximum length of natural gas flexible connectors shall be 48-inches. The maximum length of liquid propane gas flexible connectors shall be 36-inches.

Y-Pattern Strainers shall have a cast iron body complying with ASTM A126, Class B, bolted cover, bottom drain connection, 40 mesh startup strainer, and perforated stainless-steel basket with 50 percent free area. End connections shall be threaded.

Joint Compound and Tape shall be suitable for both natural gas and liquid propane gas.

Metallic Manual Gas Shutoff Valves shall be two-piece, full-port, bronze ball valves with bronze trim complying with ASME B16.33 and UL 842 for use in gas piping systems and shall meet the following requirements:

1. Rating: 250 psig
2. Body: Bronze, complying with ASTM B584
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body design with adjustable-stem packing.
7. Ends: Threaded complying with ASME B1.20.1
8. Tamperproof locking feature as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
9. Valves 1” and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction. Valves shall be suitable for natural-gas service with "WOG indicated on valve body.

PE Ball Valves shall comply with ASME B16.40 and shall only be used where specifically indicated on the Project Plans and following approval by the Engineer.

Line and Service Pressure Regulators shall comply with ANSI Z21.80 and shall be single stage suitable for natural gas or liquid propane gas with a steel jacket and corrosion-resistant components meeting the following requirements:

1. Body and Diaphragm Case: Cast Iron or die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
5. Orifice: Aluminum; interchangeable.
6. Ends: Threaded complying with ASME B1.20.1
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet. Pilot pressure sensing regulators with piping external to the regulator will not be allowed.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.

Equipment Pressure Regulators shall be single stage, comply with ANSI Z21.18 and shall be suitable for natural gas or liquid propane meeting the following requirements:

1. Body and Diaphragm Case: Die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.

5. Orifice: Aluminum; interchangeable.
6. Ends: Threaded complying with ASME B1.20.1
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet. Pilot pressure sensing regulators with piping external to the regulator will not be allowed.
9. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
10. Maximum Inlet Pressure: 0.5 psig.

Hydrostatic Relief Valve shall comply with NFPA 58 and have an operating pressure of 250 psig. Pressure relief valve shall have a brass body, stainless steel spring, nitrile disc and seat, and protective cap. Relief valve shall be factory set and tested. Valve shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction. Valves shall re-seat after relieving pressure.

204-2.04 Identification for Gas Piping: Identification for gas piping shall include the following:

1. Plastic Tags: Laminated three-layer plastic with engraved black letters on light background color, minimum 1-112 inches diameter.
2. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener. Color and Lettering: Conform to ASME A13.1.
3. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Color and Lettering: Conform to ASME A13.1.
4. Plastic Underground Pipe Markers: Bright colored continuously printed plastic acid and alkali resistant ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service. Tape shall be detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

204-2.05 Liquid Propane Storage Tank: Storage Tank shall be an above-ground storage tank rated for storage of 499 gallons of liquid propane gas (LPG). LPG storage tank shall be closed, welded steel, tested and stamped in accordance with ASME Section Vlll Division I for unfired pressure vessels and NFPA 58/Title 8 for 250 psi rating and bear the "U" stamp, national board number and serial number; minimum 250 psig (1700 kPa) rating.

Tank shall be supplied with a rust inhibitive primer and be finished with two coats of factory applied high gloss baked enamel. Rattle-can touch-ups will not be allowed. If needed, coating touch-up procedure and materials shall be approved by the tank manufacturer and comply with NFPA 58.

Furnish tank with steel support saddles, pressure gage, valves, standard accessories, tapping for installation of piping and all necessary accessories.

Provide a copy of the ASME data sheet U1A, signed by an ASME authorized inspector.

204-3 Construction

204-3.01 General: Outdoor Piping Installation shall comply with NFPA 58 and NFPA 54 for installation and purging of natural-gas and liquid propane piping. Install underground gas piping at least 36 inches below finished grade. If natural-gas piping is installed less than 36 inches below finished grade, it shall be installed in a containment conduit. Install underground PE natural-gas piping according to ASTM D 2774. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

204-3.01 Valves: Install manual gas shutoff valves for each piece of gas equipment ahead of pressure regulators and corrugated stainless-steel tubing. Install regulators and overpressure

protection devices with maintenance access space adequate for servicing and testing. Install anode for metallic valves in underground PE piping.

204-3.03 Pipe Joining: Ream ends of pipes and tubing and remove burrs. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

Cut threads on threaded pipe joints full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified. Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

PE pipe sections and fittings shall be jointed together using the butt-fusion method conforming to ASTM D2657. Each pipe, fitting, or component being joined shall be of the same type, grade and class of polyethylene compound. Clean and dry joining surfaces by wiping with clean cloth. Thermal butt-fusion joining shall provide joint weld strength equal to or greater than the tensile strength of the pipe. All welding shall be performed by a certified welder with at least three years of experience in thermal butt fusion welding of gas piping.

204-3.04 Connections: Connection to PG&E gas main shall be performed by PG&E personnel or under inspection of PG&E and according to PG&E's procedures and requirements.

Connect to propane tank according to procedures and requirements of NFPA 58.

Install gas piping electrically continuous and bonded to gas equipment's grounding conductor according to NFPA 70.

Connect piping to equipment using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired equipment. Install dielectric unions between valves and the equipment as necessary.

204-4.01 Payment: Gas Piping shall be paid for at the contract price per **linear foot**, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing, testing, and starting up the natural gas and propane gas piping systems complete in place and operating as shown on the plans, and as specified in these Special Provisions, and as directed by the Engineer, including, but not limited to trenching, saw cutting, excavation, bedding, backfill, disposal of excavated material, temporary asphaltic concrete trench patching, gas pipe, gas connections, valves, regulators, testing, and all miscellaneous work, including permits, coordination, and all other related items, complete and in place, and no additional allowance will be made therefor.

Furnish and Install 499 Gallon Liquid Propane Fuel Tank 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 for doing all the work involved in furnishing, installing, testing, and starting up of the propane gas tank system complete in place and operating as shown on the plans, and as specified in these Special Provisions, and as directed by the Engineer, including, but not limited to placement of the tank on the new concrete slab, anchoring, permits, and all other related items, complete and in place, and no additional allowance will be made therefor.

Natural Gas Service shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, fees, and coordination for installation and testing of the new natural gas service complete in place and operating as shown on the plans, and as specified in these Special Provisions, and as directed by the Engineer, including, but not limited to all miscellaneous work, permits, coordination, and all other related items, complete and in place, and no additional allowance will be made therefor.

SECTION A
FEES AND PERMITS

The City has obtained a permit from the City of Santa Rosa Environmental Compliance Section for a one time discharge of groundwater to the sanitary sewer system. The Contractor shall be responsible for meeting all conditions of the permit. The City will be responsible for collecting and analyzing samples of the groundwater and payment of the permit fees.

The Contractor shall obtain a permit from the State of California Division of Industrial Safety.

In the event hazardous material is encountered, the Contractor shall obtain a hazardous material excavation permit from the Santa Rosa Fire Department prior to removal and disposal contaminated soils.

The Contractor shall obtain all necessary and required permits for the project.

The City has applied for Building permits and has paid all associated fees.

Building Permit Number as follows:

Spring Lake Lift Station B16-3788

The Contractor shall pick up the building permit during normal counter hours at the City of Santa Rosa Department of Community Development, 100 Santa Rosa Avenue, Room 3.

All other required permits shall be obtained at the Contractor's expense.

The City is in the process of obtaining and easement from the Sonoma County Water Agency (SCWA) and is expected to receive it prior to construction. However, in the event that the easement has not been finalized, the contractor shall obtain a revocable license from SCWA.

The Contractor shall obtain a permit from the Bay Area Air Quality Management District (BAAQMD). The Contractor shall pay permit fees and obtain “Permit to Construct” (in the City’s name) from BAAQMD. Attention is directed to Section 203 of these Special Provisions.

The Contractor shall obtain a permit for the Above Ground Fuel Storage Tank (AST) from the Santa Rosa Fire Department. Contact the Fire Prevention Bureau located at 2373 Circadian Way, Santa Rosa, CA 95407, or phone (707) 543-3500. The Contractor shall comply with all requirements indicated in the “Santa Rosa Fire Department Fire Prevention Bureau Plan Review Checklist - Aboveground Storage Tank Installation.”

Pre-construction nesting bird surveys are required for projects that could affect nesting birds (e.g. tree removal, grading, etc.,) that occur within the nesting season of February 1 thru August 31. These surveys must be performed within 1 week prior to beginning work during the nesting season. If work starts after two weeks from the last nesting bird survey you must schedule a new survey. If an active nest is found during work activities the Contractor must cease work in the area of the nest and contact an Environmental Specialist to implement the appropriate measures to protect the nesting birds.

The City of Santa Rosa will conduct nesting bird surveys prior to construction activities. If nesting birds are found, the contractor must cease work in the nesting area (50-150 feet around nest); until further evaluation by the City Environmental Specialist and given approval to resume work in the area.

All electrical service charges or fees that may be required by Pacific Gas and Electric Company shall be paid for by the City.

Full compensation for securing and complying with 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: 4/14/09]

FIRE DEPARTMENT FIRE PREVENTION BUREAU PLAN REVIEW CHECKLIST – ABOVE GROUND STORAGE TANK INSTALLATION

CITY OF SANTA ROSA FIRE DEPARTMENT SOIL DISPOSAL LETTER

SECTION B
SHOP DRAWINGS

The Contractor shall submit shop drawings and/or manufacturer's specifications for all mechanical and electrical equipment.

The Contractor shall prepare or secure and submit five copies of each submittal for review by the Engineer. All submittals shall be approved by the Engineer prior to manufacture, fabrication, or shipment.

After approval of the drawings by the Engineer, the Contractor shall submit copies of purchase orders for items of equipment and material to the Engineer as proof of placing the order. Each copy of a purchase order shall be submitted immediately after the order has been placed and will clearly indicate the date the order was placed. Copies of purchase orders shall be submitted on the following items:

A. Generator Set and Accessories (See Section 203)

B. Fencing

C. All Electrical, Control and Telemetry Equipment (See Section 201)

D. Liquid Propane Fuel Tank

E. Pumper Connection Vault and Cover

Full compensation for preparing, submitting and obtaining approval for shop drawings and other submittals shall be considered as included in the contract prices paid for the various items of work and no additional allowance will be made therefor.

SECTION C
DESCRIPTION OF WORK

The work to be done consists, in general, of geotechnical remediation and improvements to the site layout, lift station suction piping, propane tank, generator, site access, surface drainage, fencing, site lighting, electrical, controls, and miscellaneous improvements as shown on the plans and indicated herein.

The work to be done consists of supplying all labor, methods, processes, implements, tools, machinery, equipment, and materials to construct the improvements shown on the plans and indicated herein, including all incidentals and other work not mentioned herein which, required by the Special Provisions or special instructions, are to be furnished and installed, all as specified herein or as directed by the Engineer to supply complete and working systems to the satisfaction of the City.

[Version: 4/14/09]

SECTION D
TESTS AND INSPECTIONS

All materials, equipment, installation, and workmanship included in this contract, if so required by the Engineer, shall be tested and inspected to prove compliance with the contract requirements.

All mechanical and electrical equipment shall be tested by the Contractor to the satisfaction of the Engineer before any facility is put into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, adjusted, and connected. Any changes, adjustments, or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work.

A summary of the warranties required for the project are as follows:

1. Paint and Coating Warranty
2. General Electrical Equipment 1 Year Warranty
3. Generator Set 5 Year Comprehensive Warranty

At least 60 days before the time allowed in his construction schedule for commencing testing and start-up procedures, the Contractor shall submit to the Engineer, in duplicate, details of the procedures he proposes to adopt for testing and start-up of all mechanical and electrical equipment to be operated singly and together, excepting when such procedures have been covered in the specifications.

During the testing of mechanical, instrumentation, and electrical equipment, the Contractor shall make available experienced factory trained representatives of the manufacturers of all the various pieces of equipment, or other qualified persons, who shall instruct the City's personnel in the operation and care thereof. Instruction shall include step-by-step troubleshooting procedures with all necessary test equipment.

If, under test, any portion of the work shall fail to fulfill the contract requirements and is altered, renewed, or replaced, tests on that portion when so altered, removed, or replaced, together with all other portions of the work as are affected thereby, shall, if so required by the Engineer, be repeated within reasonable time and in accordance with the specified conditions, and the Contractor shall pay to the City all reasonable expenses incurred by the City as a result of the carrying out of such tests.

Where, in the case of an otherwise satisfactorily installed test, any doubt, dispute, or difference should arise between the Engineer and the Contractor regarding the test results or the methods or equipment used in the carrying out of the test by the Contractor, then the Engineer may order the test to be repeated. If the repeat test, using such modified methods or equipment as the Engineer may require, substantially confirms the previous test, then all costs in connection with the repeat test will be paid by the City; otherwise the costs shall be borne by the Contractor. Where the results of any installed test fail to comply with the contract requirements for such test, then such repeat tests as may be necessary to achieve the contract requirements shall be made by the Contractor at his own expense.

As soon as possible after each Contractor's submittal for equipment defined herein has been approved by the Engineer, and no later than the time of delivery of that equipment to the job site, a single copy of operating and maintenance instructions and procedures shall be presented to the Engineer for review and acceptance. Since such instructions are considered to be an integral

part of the equipment provided, ten percent of the materials and labor costs for each such item of equipment will be withheld from payment to the Contractor until the instructions have been accepted by the Engineer.

Items or assemblies requiring operating and maintenance instructions shall include all mechanical equipment, electrical, and instrumentation equipment, and, in addition, any other items specifically noted in the specifications.

The operating and maintenance instructions shall include, as a minimum, the following data for each item of equipment.

A. An itemized list of all data provided.

B. Name and location of the manufacturer, the manufacturer's local representative, the nearest supplier, and spare parts warehouse.

C. Approved submittal information applicable to operation and maintenance.

D. Recommended installation, adjustment, start-up, calibration, and troubleshooting procedures.

E. Recommended lubrication and an estimate of yearly quantity needed.

F. Recommended step-by-step procedures for all modes of operation.

G. Complete internal and connection wiring diagrams.

H. Recommended preventive maintenance procedures and schedule.

I. Complete parts lists, by generic title and identification number, with exploded views of each assembly.

J. Recommended spare parts.

K. Disassembly, overhaul, and reassembly instructions.

Following completion of installation of an item of equipment, operating and maintenance instructions and procedures shall be modified by the Contractor to reflect field changes and corrections made by the Engineer. After corrections have been made, four complete copies shall be submitted.

[Version: 4/14/09]

Full compensation for securing and complying with 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: 4/14/09]

City of Santa Rosa
WATER

NON-RESIDENTIAL
ONE TIME DISCHARGE PERMIT SR-1X08835

Mail To:

Andy Wilt
City of Santa Rosa Public Works Department
69 Stony Circle
Santa Rosa, CA 95401

Located At:

5391 Montgomery Drive
Santa Rosa, CA

Permit #: **SR-1X08835**
Account #: **70667**

Effective Date: **09/15/2016**
Expiration Date: **12/31/2017**

The contractor to be awarded the City of Santa Rosa Spring Lake Lift Station Improvements is authorized to discharge any generated non-contaminated groundwater and/or trench water to the City of Santa Rosa's sewer collection system. This discharge will be in accordance with the City of Santa Rosa's Most Current Sewer Code and/or Ordinance, any applicable provisions of federal or state law or regulation, and in accordance with discharge point(s), effluent limitations, monitoring requirements, and other conditions set forth herein.

PART I — SPECIAL CONDITIONS

1. The discharge rate to the sanitary sewer shall be at a discharge rate that will not result in any spillage or surcharging of the sewer system.
2. Sediment must be removed prior to any discharge to the sanitary sewer, and the discharge shall not exceed 25,000 gallons per day.
3. The permittee shall be responsible for all liability imposed by law for personal injury or property damage caused by work done by permittee under this permit, including work beyond the scope of this permit. If any claim of such liability is made against the City, its officers or employees, permittee shall defend, indemnify and hold them, and each of them, harmless from such claim and liability insofar as permitted by law.
4. It is required that this office be notified 48 hours in advance of the commencement of the discharge so that an Environmental Compliance Inspector may be on site at the beginning of the operations to verify the discharge point to the sanitary sewer.
5. A permit fee of $222.00 will be assessed plus an additional $128.00 per hour will be charged for any permit related services that exceed initial (3) hour base period.

Deputy Director of Environmental Services: _____ Date: 9.16.16

SUBREGIONAL WATER RECLAMATION SYSTEM
Environmental Compliance Section • 4300 Llano Road, Santa Rosa, CA 95407
Phone: 707 543 3369 • Fax: 707 543 3399 • Email: envcompliance@srcity.org

C01570

July 1, 2010	**SANTA ROSA FIRE DEPARTMENT** FIRE PREVENTION BUREAU INSPECTION CHECKLIST
City of Santa Rosa	**ABOVEGROUND STORAGE TANK INSPECTIONS**

Address:		**Permit #:**
Inspector:	**Date:**	**Status:**
Inspector:	**Date:**	**Status:**
		A-Approved; R–Re-inspection Required

This Checklist outlines general requirements. Information contained herein applies to typical instances and may not address all circumstances.

FILE REVIEW

	Y	N	
1.	☐	☐	Approved Hazardous Materials Permit
2.	☐	☐	Annual Permit Fees current
3.	☐	☐	Approved Unidocs.org account
4.	☐	☐	Site is currently in compliance

FILE REVIEW

5.	☐	☐	Annual Permit Fees current
6.	☐	☐	Approved CERS account
7.	☐	☐	Site is currently in compliance

INSPECTION OBSERVATIONS

8.	☐	☐	Property use identified (Gas, bulk storage, government, utility, residential, school, emergency generator)
9.	☐	☐	Tank Contents are identified. (Gas diesel, kerosene waste, fuel oil, aviation, other)

	Y	N	
10.	☐	☐	Tanks are labeled with capacity, tank number if applicable, contents, no smoking and NFPA diamond.
11.	☐	☐	Exterior tank is protected from corrosion
12.	☐	☐	Tank is protected from impact. How: _____
13.	☐	☐	Tank is free of cracks
14.	☐	☐	Audible alarms in place
15.	☐	☐	Tank spacing is appropriate
16.	☐	☐	Monitoring is in place. Monitoring method: _____
17.	☐	☐	Seismic considerations are in place
18.	☐	☐	Crash protection is in place
19.	☐	☐	Secondary containment is in place
20.	☐	☐	Emergency shutoff is in place and operational. Location: _____
21.	☐	☐	Spill containment is provided
22.	☐	☐	Overfill prevention is in place. Type: _____
23.	☐	☐	Fill ports and piping are labeled
24.	☐	☐	Piping support is provided as necessary
25.	☐	☐	Anti siphon devices are in place
26.	☐	☐	Fire protection is in place (extinguishers, chemical system)
27.	☐	☐	Leak detection is in place. Type: _____
28.	☐	☐	SPCC plan is available on site
29.	☐	☐	Hazardous Materials Business Plan is approved and in CERS
30.	☐	☐	Employee training is current
31.	☐	☐	Exterior of tank is painted and/or protected from corrosion

C01570

	Y	N	
32.	☐	☐	Tank is free of cracks, corrosion or areas of wear
33.	☐	☐	Daily visual inspections are performed on tank
34.	☐	☐	Five-year detailed inspection is completed
35.	☐	☐	Deficient equipment has been repaired or tank taken out of service
36.	☐	☐	Protection against scouring exists (wear plates)
37.	☐	☐	Tank level gauges in place and operational
38.	☐	☐	High-level alarm/overfill protection in place
39.	☐	☐	Check valves for pump-filled tanks in place
40.	☐	☐	Valves are properly labeled for closed/open positions
41.	☐	☐	110% secondary containment exists
42.	☐	☐	Spill catchment basin/ spill bucket in place & clean
43.	☐	☐	Secondary containment area is coated with compatible material
44.	☐	☐	Secondary containment is free of cracks, erosion or evidence of releases
45.	☐	☐	Transfer area has spill containment
46.	☐	☐	Transfer valves and piping are located within transfer area
47.	☐	☐	Transfer area is equipped with sump & manually-controlled drainage
48.	☐	☐	Transfer area drainage system is locked closed
49.	☐	☐	Transfer area is properly coated with compatible material
50.	☐	☐	Cathodic protection for steel tank bottoms
51.	☐	☐	Cathodic protection is checked annually by a qualified technician
52.	☐	☐	Tank base drains & removes liquid so a leak may be detected
53.	☐	☐	Tank base is free of cracks, excessive settlement or evidence of releases
54.	☐	☐	Tank protected from explosion, vacuum and/or over pressurization

C01570

	Y	N	
55.	☐	☐	Tanks subject to melting are protected against fire
56.	☐	☐	Tanks over 5,000 gallons have a manway
57.	☐	☐	Piping is labeled and shows no signs of leaking
58.	☐	☐	Piping in contact with soil is non-corrodible or cathodically protected
59.	☐	☐	Rainwater drainage procedure is in place
60.	☐	☐	Piping is protected from atmospheric corrosion (painted)
61.	☐	☐	Pumps and valves are protected from leaks
62.	☐	☐	Procedures are in place to prevent deliveries to wrong tank
63.	☐	☐	Facility is fenced and gates locked when not attended
64.	☐	☐	Facility has adequate lighting
65.	☐	☐	Tank area is free of spills and/or signs of leakage
66.	☐	☐	A working telephone is accessible
67.	☐	☐	Personal protective equipment is available
68.	☐	☐	A fire extinguisher is accessible
69.	☐	☐	Unused absorbent material is available
70.	☐	☐	Hose length is acceptable. Hose length: _____
71.	☐	☐	Where required breakaway hose and dispensing devices are in place
72.	☐	☐	Electrical wiring is in good repair
73.	☐	☐	Tank records are available

C01570

2373 Circadian Way
Santa Rosa, CA 95407
Phone: (707) 543-3500
Fax: (707) 543-3520
www.SantaRosaFD.com

HAZARDOUS MATERIALS PLAN REVIEW
A CERTIFIED UNIFIED PROGRAM AGENCY
C.U.P.A.

Project: Spring Lake Lift Station
Address: Montgomery Drive @ Spring Lake
Type of Review: Pond #2 Soil Disposal Approval
Tracking Number: F16-0244
Review Number: 1
Contact: Paul Lowenthal (707) 543-3542 plowenthal@srcity.org
Date: May 15, 2016

TO: Andy Wilt
City of Santa Rosa
Capital Improvement Project

THIS REQUEST HAS BEEN REVIEWED AND DETERMINED TO BE:

(X) **APPROVED**
( ) **APPROVED WITH CONDITIONS**
( ) **NOT APPROVED** (A complete plan check could not be completed. Please revise per attached comments)

NOTE: Please review the comments and make corrections, changes and/or additions as required. Approval of this plan does not approve any omission or deviation from the applicable regulations.

Item #	Code Section	Comments	Correction
1		The findings presented in the Spring Lake Lift Station project are acceptable.	
2		The trench spoils as specifically identified from this project may be deposited in Pond #2.	
3		Any materials not approved for Pond #2 fill, such as asphalt and other foreign materials listed in the Pond 2 Soil Management Plan, shall be segregated out of the approved spoils.	

Reviewer (*signature*)

5/15/16
Date

SECTION B
SHOP DRAWINGS

The Contractor shall submit shop drawings and/or manufacturer's specifications for all mechanical and electrical equipment.

The Contractor shall prepare or secure and submit five copies of each submittal for review by the Engineer. All submittals shall be approved by the Engineer prior to manufacture, fabrication, or shipment.

After approval of the drawings by the Engineer, the Contractor shall submit copies of purchase orders for items of equipment and material to the Engineer as proof of placing the order. Each copy of a purchase order shall be submitted immediately after the order has been placed and will clearly indicate the date the order was placed. Copies of purchase orders shall be submitted on the following items:

A. Generator Set and Accessories (See Section 203)

B. Fencing

C. All Electrical, Control and Telemetry Equipment (See Section 201)

D. Liquid Propane Fuel Tank

E. Pumper Connection Vault and Cover

Full compensation for preparing, submitting and obtaining approval for shop drawings and other submittals shall be considered as included in the contract prices paid for the various items of work and no additional allowance will be made therefor.

SECTION C
DESCRIPTION OF WORK

The work to be done consists, in general, of geotechnical remediation and improvements to the site layout, lift station suction piping, propane tank, generator, site access, surface drainage, fencing, site lighting, electrical, controls, and miscellaneous improvements as shown on the plans and indicated herein.

The work to be done consists of supplying all labor, methods, processes, implements, tools, machinery, equipment, and materials to construct the improvements shown on the plans and indicated herein, including all incidentals and other work not mentioned herein which, required by the Special Provisions or special instructions, are to be furnished and installed, all as specified herein or as directed by the Engineer to supply complete and working systems to the satisfaction of the City.

[Version: 4/14/09]

SECTION D
TESTS AND INSPECTIONS

All materials, equipment, installation, and workmanship included in this contract, if so required by the Engineer, shall be tested and inspected to prove compliance with the contract requirements.

All mechanical and electrical equipment shall be tested by the Contractor to the satisfaction of the Engineer before any facility is put into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, adjusted, and connected. Any changes, adjustments, or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work.

A summary of the warranties required for the project are as follows:

1. Paint and Coating Warranty
2. General Electrical Equipment 1 Year Warranty
3. Generator Set 5 Year Comprehensive Warranty

At least 60 days before the time allowed in his construction schedule for commencing testing and start-up procedures, the Contractor shall submit to the Engineer, in duplicate, details of the procedures he proposes to adopt for testing and start-up of all mechanical and electrical equipment to be operated singly and together, excepting when such procedures have been covered in the specifications.

During the testing of mechanical, instrumentation, and electrical equipment, the Contractor shall make available experienced factory trained representatives of the manufacturers of all the various pieces of equipment, or other qualified persons, who shall instruct the City's personnel in the operation and care thereof. Instruction shall include step-by-step troubleshooting procedures with all necessary test equipment.

If, under test, any portion of the work shall fail to fulfill the contract requirements and is altered, renewed, or replaced, tests on that portion when so altered, removed, or replaced, together with all other portions of the work as are affected thereby, shall, if so required by the Engineer, be repeated within reasonable time and in accordance with the specified conditions, and the Contractor shall pay to the City all reasonable expenses incurred by the City as a result of the carrying out of such tests.

Where, in the case of an otherwise satisfactorily installed test, any doubt, dispute, or difference should arise between the Engineer and the Contractor regarding the test results or the methods or equipment used in the carrying out of the test by the Contractor, then the Engineer may order the test to be repeated. If the repeat test, using such modified methods or equipment as the Engineer may require, substantially confirms the previous test, then all costs in connection with the repeat test will be paid by the City; otherwise the costs shall be borne by the Contractor. Where the results of any installed test fail to comply with the contract requirements for such test, then such repeat tests as may be necessary to achieve the contract requirements shall be made by the Contractor at his own expense.

As soon as possible after each Contractor's submittal for equipment defined herein has been approved by the Engineer, and no later than the time of delivery of that equipment to the job site, a single copy of operating and maintenance instructions and procedures shall be presented to the Engineer for review and acceptance. Since such instructions are considered to be an integral

part of the equipment provided, ten percent of the materials and labor costs for each such item of equipment will be withheld from payment to the Contractor until the instructions have been accepted by the Engineer.

Items or assemblies requiring operating and maintenance instructions shall include all mechanical equipment, electrical, and instrumentation equipment, and, in addition, any other items specifically noted in the specifications.

The operating and maintenance instructions shall include, as a minimum, the following data for each item of equipment.

A. An itemized list of all data provided.

B. Name and location of the manufacturer, the manufacturer's local representative, the nearest supplier, and spare parts warehouse.

C. Approved submittal information applicable to operation and maintenance.

D. Recommended installation, adjustment, start-up, calibration, and troubleshooting procedures.

E. Recommended lubrication and an estimate of yearly quantity needed.

F. Recommended step-by-step procedures for all modes of operation.

G. Complete internal and connection wiring diagrams.

H. Recommended preventive maintenance procedures and schedule.

I. Complete parts lists, by generic title and identification number, with exploded views of each assembly.

J. Recommended spare parts.

K. Disassembly, overhaul, and reassembly instructions.

Following completion of installation of an item of equipment, operating and maintenance instructions and procedures shall be modified by the Contractor to reflect field changes and corrections made by the Engineer. After corrections have been made, four complete copies shall be submitted.

[Version: 4/14/09]

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*., 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.

CITY OF SANTA ROSA

STATE OF CALIFORNIA

SPRING LAKE LIFT STATION IMPROVEMENTS

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:

CITY OF SANTA ROSA UNIT PRICE SCHEDULE
SPRING LAKE LIFT STATION IMPROVEMENTS

Item No.	Description	Quantity	Units	Unit Price	Total Price
1	TRAFFIC CONTROL	1	LS	$_____	$_____
2	WATER POLLUTION CONTROL	1	LS	$_____	$_____
3	GROUNDWATER MANAGEMENT	1	FA	$_____	$_____
4	SELECTIVE SITE DEMOLITION	1	LS	$_____	$_____
5	EXCAVATION (F)	232	CY	$_____	$_____
6	OVER EXCAVATION	40	CY	$_____	$_____
7	STRUCTURAL FILL (F)	200	CY	$_____	$_____
8	ROCK LINED SWALE	25	LF	$_____	$_____
9	EROSION CONTROL	1	LS	$_____	$_____
10	ASPHALT CONCRETE SURFACE	70	TON	$_____	$_____
11	REINFORCED CONCRETE SLAB	598	SF	$_____	$_____
12	CONCRETE VALLEY GUTTER	225	SF	$_____	$_____
13	CONCRETE MOW CURB	38	LF	$_____	$_____
14	PRECAST PUMPER CONNECTION UTILITY VAULT	1	LS	$_____	$_____
15	WET WELL SUCTION CONNECTION	1	LS	$_____	$_____
16	DRY WELL ENTRY HOIST	1	LS	$_____	$_____
17	DRIVEWAY AND SIDEWALK	265	SF	$_____	$_____
18	6' HIGH SECURITY FENCE	20	LF	$_____	$_____
19	8' HIGH SECURITY FENCE	82	LF	$_____	$_____
20	WOOD FENCE	62	LF	$_____	$_____

CITY OF SANTA ROSA UNIT PRICE SCHEDULE
SPRING LAKE LIFT STATION IMPROVEMENTS

Item No.	Description	Quantity	Units	Unit Price	Total Price
21	6' HIGH ROLLING GATE	1	EA	$_____	$_____
22	8' HIGH ROLLING GATE	2	EA	$_____	$_____
23	6' HIGH WALK GATE	1	EA	$_____	$_____
24	STABILIZATION FABRIC	500	SY	$_____	$_____
25	GEOGRID	100	SY	$_____	$_____
26	1" WATER SERVICE AND HOSE BIB	1	LS	$_____	$_____
27	TREE PROTECTION AND REMOVAL	1	LS	$_____	$_____
28	GENERAL ELECTRICAL WORK AND LIGHTING	1	LS	$_____	$_____
29	ELECTRICAL AND CONTROLS PEDESTAL	1	LS	$_____	$_____
30	METER PEDESTAL	1	LS	$_____	$_____
31	25KW DUAL FUEL GENERATOR SET	1	LS	$_____	$_____
32	GAS PIPING	150	LF	$_____	$_____
33	FURNISH AND INSTALL 499 GALLON LIQUID PROPANE FUEL TANK	1	LS	$_____	$_____
34	NATURAL GAS SERVICE	1	LS	$_____	$_____

GRAND TOTAL BID **$**_____

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 8-1.04.

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: _____

CONTRACT

CITY OF SANTA ROSA

CALIFORNIA

CONTRACT NO. C01570
SPRING LAKE LIFT STATION IMPROVEMENTS

This Contract is made and entered into as of date to be added upon award at Santa Rosa, California, between the City of Santa Rosa (“City") and _____ of _____ ("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 the Standard Specifications of the State of California Department of Transportation, dated 2010, insofar as the same may apply (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, dated 2010 (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.

The work to be performed is further shown upon a plan consisting of 24 sheets entitled, Spring Lake Lift Station Improvements, File Number 2016-0004, approved by the Deputy Director of Transportation and Public Works, hereinafter referred to as the Project Plan(s).

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, 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 8-1.04C 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:	**Contractor:**
City of Santa Rosa, a Municipal corporation	Name of Contractor, Type of entity
By: _____	By: _____
Title: _____	Name: _____
ATTEST: By: _____	Title: _____
Title: _____	By: _____
Approved as to form:	Name: _____
By: _____ Office of City Attorney	Title: _____