INVITATION FOR BIDS

City of Santa Rosa

FOR CONSTRUCTING

SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 – R3, R6, R7 & R12B AND VARIOUS OTHER SITE IMPROVEMENTS S1, S2, R6 & R12A

CONTRACT NUMBER

C00568

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

CONTAINING:

NOTICE TO BIDDERS

SPECIAL PROVISIONS

BID FORMS

CONTRACT

FOR

SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 R3, R6, R7 & R12B AND VARIOUS OTHER SITE IMPROVEMENTS – S1, S2, R6 & R12A

Contract No. C00568

SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 R3, R6, R7 & R12B AND VARIOUS OTHER SITE IMPROVEMENTS – S1, S2, R6 & R12A

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CITY OF SANTA ROSA
STATE OF CALIFORNIA

NOTICE TO BIDDERS

➢	For technical questions regarding this project, contact Tracy Duenas at (707) 543-3952.
➢	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 17, 2017, for Seismic Upgrades and Improvements Phase 4 - R3, R6, R7 & R12B And Various Other Site Improvements - S1, S2, R6 & R12A, Contract No. C00568. (Engineer's Estimate: $3,044,204.00)

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 1:59 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., May 9, 2017, in the Transportation and Public Works Department located at 69 Stony Circle, 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
SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 - R3, R6, R7, & R12B AND VARIOUS OTHER SITE IMPROVEMENTS - S1, S2, R6 & R12A

Item No.	Description	Quantity	Units
1	MOBILIZATION	1	LS
2	TRAFFIC CONTROL	1	LS
3	S1 SITE IMPROVEMENTS	1	LS
4	S2 SITE IMPROVEMENTS	1	LS
5	CLEARING AND GRUBBING	1	LS
6	SEAL COAT	26,289	SF
7	ASPHALT CONCRETE REPAIR	225	SF
8	ASPHALT CONCRETE AT R7	27	TON
9	ASPHALT CONCRETE PARKING PAD AT R12B	17	TON
10	ASPHALT CONCRETE DIKE	230	LF
11	R3 TANK RING FOUNDATION	1	LS
12	R7 TANK RING FOUNDATION	1	LS
13	R12B TANK RING FOUNDATION	1	LS
14	R3 TANK INTERIOR RECOATING	1	LS
15	R7 TANK INTERIOR RECOATING	1	LS
16	R12B TANK INTERIOR RECOATING	1	LS
17	R3 TANK EXTERIOR RECOATING	1	LS
18	R7 TANK EXTERIOR RECOATING	1	LS
19	R12B TANK EXTERIOR RECOATING	1	LS
20	R6 TANK PARTIAL EXTERIOR RECOATING	1	LS
21	R3 TANK SITE DRAINAGE IMPROVEMENTS	1	LS
22	R7 TANK SITE DRAINAGE IMPROVEMENTS	1	LS
23	R12B TANK SITE DRAINAGE IMPROVEMENTS	1	LS
24	ROCK SLOPE PROTECTION	1	LS
25	CURB AND GUTTER	170	LF
26	VALLEY GUTTER	94	SF
27	STEEL BOLLARD	13	EA
28	R3 TANK UPGRADES	1	LS
29	R7 TANK UPGRADES	1	LS
30	R12B TANK UPGRADES	1	LS
31	CHAIN LINK FENCE	1,568	LF
32	R3 CHAIN LINK FENCE GATE	1	LS
33	R7 CHAIN LINK FENCE GATE	1	LS
34	R12B SINGLE LEAF BAR GATE	1	LS
35	R3 TANK SITE ELECTRICAL IMPROVEMENTS	1	LS
36	R7 TANK SITE ELECTRICAL IMPROVEMENTS	1	LS
37	R12B TANK SITE ELECTRICAL IMPROVEMENTS	1	LS
38	R3 TANK SITE AND WATER SYSTEM IMPROVEMENTS	1	LS
39	R7 TANK SITE AND WATER SYSTEM IMPROVEMENTS	1	LS
40	R12B TANK SITE AND WATER SYSTEM IMPROVEMENTS	1	LS

CITY OF SANTA ROSA
ESTIMATED QUANTITIES
SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 - R3, R6, R7, & R12B AND VARIOUS OTHER SITE IMPROVEMENTS - S1, S2, R6 & R12A

Item No.	Description	Quantity	Units
41	R12A MISCELLANEOUS CONSTRUCTION	1	LS
42	R12A CHAIN LINK FENCE GATE	1	LS
43	R12A ROLLING GATE	1	LS
44	R12A TANK SITE ELECTRICAL IMPROVEMENTS	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 for this project.

Project plans, bid and contract forms for Seismic Upgrade and Improvements Phase 4 - R3, R6, R7 & R12B and Various Other Site 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.

TRACY DUENAS
Supervising Engineer Date

SPECIAL PROVISIONS

General Specifications

CITY OF SANTA ROSA, CALIFORNIA

SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 - R3, R6, R7 & R12B AND VARIOUS OTHER SITE IMPROVEMENTS - S1, S2, R6 & R12A

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 31 sheets entitled Seismic Upgrades and Improvements Phase 4 - R3, R6, R7 & R12B and Various Other Site Improvements - S1, S2, R6 & R12A, 2014-0060
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 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.	Course of construction/ builders' risk	Amount of completed value of project without co-insurance provisions	Required for construction projects over $3 million. The City shall be named as loss payee.

B. Endorsements:

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

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

D. Other Insurance Provisions:

1. No policy required by this Contract shall prohibit Contractor from waiving any right of recovery prior to loss. Contractor hereby waives such right with regard to the indemnitees.
2. All insurance coverage amounts provided by Contractor and available or applicable to this Contract are intended to apply to the full extent of the policies. Nothing contained in this Contract limits the application of such insurance coverage. Coverage for an additional insured shall NOT be limited to the insured's vicarious liability. Defense costs must be paid in addition to coverage amounts.
3. Self-insured retentions above $10,000 must be approved by the City. At the City's option, Contractor may be required to provide financial guarantees.
4. City reserves the right to modify these insurance requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other special circumstances.

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

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

3-1.20 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. 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 31 sheets entitled Seismic Upgrades and Improvements Phase 4 - R3, R6, R7 & R12B and Various Other Site Improvements, 2014-0060
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, submitted at the pre-conference meeting.

The work is to be scheduled, and every effort made during construction so that tanks are able to be put back into service in the following order; R3, R7 then R12B.

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

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

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

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

If a Contractor disputes the City's written response, or if the City fails to respond to a Claim within the time prescribed, the Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the City shall conduct a meet and confer conference within 30 days for settlement of the dispute. Within 10 business days following the conclusion of the meet and confer conference, if the Claim or any portion of the Claim remains in dispute, the City shall provide the Contractor a written statement identifying the portion of the Claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the City issues its written statement. Any disputed portion of the Claim, as identified by Contractor in writing, shall be submitted to nonbinding mediation, with

the City and the Contractor sharing the associated costs equally. The City and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the Claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the Claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator.

6 CONTROL OF MATERIALS

6-2.01 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 review and approval by the City at least (3) three weeks prior to delivery to the job site.

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. Except for the materials and workmanship as specified in Section 6-3.01C "Coating Material Guarantee", the successful bidder shall unconditionally guarantee project materials and workmanship for a period of one year from the recording date of the Notice of Completion. The guarantee shall cover 100% of all costs for repairs within the one year period, including all costs of labor, materials, equipment, and incidentals. The City will notify the Contractor during this one-year period to inform them of any required repairs and to schedule this work. Any needed repairs shall be completed at the City's convenience. 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.

6-3.01C Coating Material Guarantee: The successful bidder shall unconditionally guarantee materials and workmanship as it applies to all exterior and interior coating and coating related items, and all non-coating improvements on the tank interiors for a period of two years from written acceptance by the City for the completed coating work at all sites (one acceptance date will be provided once coating work at all sites is completed and accepted by the City). The guarantee shall cover 100% of all costs for repairs within the two-year period, including all costs of labor, materials, equipment, and incidentals. The City will notify the Contractor to schedule their onsite presence and to coordinate the draining of the tanks for inspection, and any subsequent repair work that may be needed. Although this notification is anticipated to take place approximately 23 months after the recording date of the Notice of Completion, the City reserves right to have individual

repairs completed at any time during the two-year period. Although the City will attempt to schedule inspections for all the tanks at the same time, the Contractor is made aware that City staff schedules and system requirements may require a separate scheduled inspection date, along with any required repairs at each tank at no additional cost to the City. All schedules shall be at the City's convenience. Proper coordination for all coating and non-coating repairs shall be the responsibility of the Contractor, and any work found to be defective shall be repaired in accordance with the manufacturer's recommendations, this specification, and to the satisfaction of the Engineer. The Contractor shall supply all needed items, including air monitors, lighting and scaffolding, for inspection by, and to the satisfaction of the Engineer during the warranty inspection and any needed repairs.

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 located at 35 Stony Point Road (707-543-4280) and rent a hydrant meter(s). Contractor is responsible for the cost of all water and the cost of all deposits, permits and fees.

Contractor is made aware that the time period to set, or relocate a hydrant meter is approximately 3 working days. Contractor may at their discresion rent more than one meter at a time.

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 hydrants, and any other appurtenance if specifically requested, 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:

260 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 8:00 a.m. or later than 6:00 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. Contractor shall also furnish reasonable documentation to the City to support Claims. If additional information is required by the Engineer, Contractor shall provide such information to the Engineer no later than the 15th day after receipt of the written request from the Engineer. If the 15th day falls on a weekend, holiday, or day City offices are closed, then the information shall be provided to the Engineer no later than close of the next business day. Failure to submit the requested information to the Engineer within the time specified will be sufficient cause for denying the Claim.

Contractor shall keep full and complete records of the costs and additional time incurred for any work for which a claim for additional compensation is made. The Engineer or any designated Claim

investigator or auditor shall have access to those records and any other records as may be reasonably required by the Engineer to determine the facts or contentions in each Claim. Failure to grant access to such records shall be sufficient cause for denying the Claims.

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

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

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

Technical Specifications

For

Seismic Upgrades and Improvements Phase 4
R3, R7 & R12B
and
Other Site Improvements – S1, S2, R6

Contract No. C00568

APRIL 2017

Prepared By:

Mark N Obergfell
Mark N. Obergfell, RCE 36977

4-17-17
Date:

COASTLAND
1400 Neotomas Avenue
Santa Rosa, CA 95405
(707) 571-8005

SECTION 10-3
GENERAL CONSTRUCTION

10-3.01 Mobilization: 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 at individual sites.

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

7. Moving onto the individual sites 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** shall be paid for at the contract **lump sum** price, which price shall not exceed 5% of the total bid price for the work, and shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in for conforming to the provisions of Section 10, as specified herein, and no additional allowance will be made therefor.

SECTION 12
TRAFFIC CONTROL

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), the Americans with Disabilities Act (ADA), 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 under the provisions in Section 7-1.03, "Public Convenience", and Section 7-1.04, "Public Safety", shall be considered as included in the contract lump sum price paid for traffic control and no additional allowance will be made therefor.

12-3 Traffic-Handling Equipment and Devices

12-3.01A(3) Submittals: 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 traffic control. If the Contractor proposes to use the current edition of CAMUTCD in specific work operations, they shall submit in writing for consideration which Typical Application Diagram will be used and how they will apply it to each work operation. Traffic Control Plans or proposals shall be submitted for review at least two weeks prior to implementation. Traffic Control Plans shall also show proposed locations for the temporary staging of equipment and materials for each site.

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

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

1. Show location and limits of the work zone.

2. Give dimensions of lanes affected by traffic control that will be open to traffic.

3. Indicate 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 traffic will be handled 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. 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.

12-3.01C Construction: Any proposed lane closures, regardless of duration, shall be detailed in the submitted Traffic Control Plans along with proposed times of operation. The Contractor shall maintain vehicle access to homes, businesses and other properties at all times while work is in progress.

The Contractor is advised that access to tank sites R3 and R7 are on heavily travelled roads with minimal visibility. The Contractor is also advised that access to tank site R12B is shared with residents and may be used by hikers. If the Contractor has to close this access road for more than 15 minutes, the Contractor shall notify and coordinate the closure with affected residents and setup signage for hikers. In general, vehicle access shall be maintained at all times for use by Emergency Vehicles and City forces.

Vehicle and pedestrian access to public and private properties shall not be blocked.

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.

Flaggers along with any necessary traffic devices shall be positioned to allow safe passage whenever moving equipment and/or materials on or off site.

The Contractor will be allowed use of each tank site during construction activities although City forces and other agencies shall be allowed access to their facilities that will remain active during construction at all hours, specifically the pump station at tank site R3. Prior to mobilization to each site, the Contractor shall coordinate with the Engineer to ensure access to these facilities will not be blocked.

All temporary signage shall be constructed with retroreflective material on a backing of metal or fabric. For signs directed to pedestrians only, corrugated printed signs may be used. Signs shall be removed or covered when not required.

12-3.01C(1) Construction Traffic: The Contractor shall submit a trucking route for approval by the Engineer. The route must minimize traffic on residential streets that are not part of the project. Temporary staging of construction materials shall not occur in streets or areas that are not within the limits of the project sites.

The staging of equipment and/or materials shall not take place on Fountain Grove Parkway, Yerba Buena Road or on unpaved surfaces. Proposed locations for staging on Woodley Place must first be approved as part of the traffic control plan as specified in section 12-3.01A(3) of these Special Provisions.

Any damage to public or private property used for staging shall be repaired or replaced at the Contractor's expense and to the satisfaction of the Engineer.

12-4 Maintaining Traffic: Traffic control devices shall be monitored frequently (multiple times a day) by the Contractor to verify their proper use and location.

The Contractor shall conduct their 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.

When construction activities will prevent vehicle access to individual driveways, the Contractor shall notify the affected residents per Sections 12-1.03, "Traffic Control" and 121 "Notification", of these Special Provisions. **Full access shall be provided to all driveways during non-working hours.**

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or parking lanes, including any section closed to the public traffic or marked no parking by the Contractor.

Vehicles shall not be left running unless it is required for the progress of work.

12-7 Temporary Pedestrian Walkways

12-7.01 General: The Contractor is directed to Chapter 6D, Pedestrian and Worker Safety, in the CAMUTCD, the 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) and 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 each work day unless an alternate ADA compliant route has been approved by the Engineer.

12-9 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 vehicle and pedestrian traffic control, including temporary relocation of regulatory signs, installing project signs, flagging, accommodating pedestrian access, pedestrian traffic control, including providing, placing, maintaining and removal of temporary paths and/or ramps, excavation, compaction, furnishing, and placement of asphalt concrete and/or PCC, signs, barricades, toe rails, and foot rails, and complying with CAMUTCD Standards for Pedestrian Safety, as specified herein, and no additional allowance will be made therefor.

SECTION 13
WATER POLLUTION CONTROL

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 provisions of Section 13, and any other section as they apply, shall be considered as included in the prices paid for the **various contract items** of work, and no additional compensation will be allowed therefor.

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.

13-3.01A 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.

13-4.03B: 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(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.

13-4.03E(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(5)**;
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(1)**,

13-4.03G Dewatering: 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 pipe or other structures are installed and until backfilling has progressed to a sufficient height to anchor the

work against possible flotation or leakage. The Contractor shall have a minimum of 2 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 Industrial Waste 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.

13-5.02B Turf Reinforcement Mat: Turf reinforcement mat for the area specified at tank site R3 shall be Landlok 450 or approved equal. The Contractor shall submit product data to the Engineer for review. The mat shall be anchored per manufacturer's recommendations and shall be tan in color. All loose material shall be removed prior to placement and disposed of offsite. No separate measurement or payment will be made for turf reinforcement mat. Full compensation for turf reinforcement mat as specified shall be considered as included in the prices paid for **R3 Tank Site and Water System Improvements** and no additional allowance will be made therefor.

SECTION 14
ENVIRONMENTAL STEWARDSHIP

14-6.03 Bird Control System: The Contractor shall submit on proposed material and installation plan for a bird control system for the access platform on tank R7 as specified. The system shall be a tension wire and post system manufactured for this purpose. All material shall be stainless steel and able to withstand all weather conditions. The stainless steel wire shall have a clear nylon coating. In lieu of manufacturer supplied posts, the Contractor may modify and utilize the access platform posts as shown on the Project Plans, if design for doing so is approved.

The Bird control system shall in no way obstruct the use of hand rails.

14-8.02 Noise Control: The Contractor shall make themselves aware, and comply with all City of Santa Rosa noise control requirements.

14-9.03A General: Sweeping per section 14-9.03C 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.

14-9.03C 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 paved surfaces and pick up all loose debris in the work zone to minimize dust and debris from leaving the worksite.

At the Engineer's discretion, additional watering and/or sweeping, including the use of a commercial grade street sweeping truck equipped with a rear pickup broom may be required at no additional cost to the City.

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.

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.

14-11.01A Summary: The bidder's attention is directed to the fact that there is **no known** subsurface petroleum hydrocarbon contamination at any of the tank sites 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.

14-11.02E(2) Soil: None of the excavated material shall be disposed of on the work site. All material excavated from trenches in the project area shall be the property of the Contractor. 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. Contractor shall comply with all disposal regulations such as City, County, and/or State permits and licenses, as may be required.

Excess trench spoils which are free of; asphalt concrete; sewer, water or storm drain pipe of any kind or type; concrete; metal; rock greater than 6" in size; vegetation; and other deleterious materials, may be deposited at the City's Municipal Service Yard located at 35 Stony Point Road in the designated area known as Pond 2. It shall the Contractor's responsibility to coordinate any disposal to this site with the Engineer, and to make sure spoils are free of debris. All debris found will need to be picked up and disposed of properly.

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. Any excess trench spoils placed in Pond 2 not associated with this project will be cause for terminating Contractor's option to deposit excess trench spoils on City property. 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. The Contractor shall comply with all disposal regulations such as City, County, and/or State permits and licenses, as may be required.

Should the Contractor elect to dispose of material at the City's Municipal Service Yard in Pond 2, a 3 working day advanced notice is required. Soil disposal shall be limited to Monday through Friday between the hours of 7:30 a.m. and 4:30 p.m. Disposal site access is directly affected by weather conditions. The Contractor should anticipate no access during and for some time after rain events, unless wet weather site conditions are met at Contractor's expense. Any such improvements shall become the property of the City of Santa Rosa Utilities Department.

The haul route shall be through the City's 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. The Contractor shall prevent the tracking of material from the disposal location onto any and all paved surfaces. Should tracking become evident sweeping will be required at the Contractors cost no later than the end of day, with no exceptions. Dust control shall be provided at all times on an as needed basis in accordance with Section 10. 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.

14-13 Payment: Full compensation for conforming to the provisions of Section 14, and any other section as they apply, shall be considered as included in the prices paid for the **various contract items** of work, and no additional compensation will be allowed therefor.

SECTION 15
EXISTING FACILITIES

15-1.03A General: Existing facilities at sites S1, S2, R3, R6 R7 and R12B disturbed by construction shall conform to the applicable provisions of Section 5-1.36 of the Standard Specifications. 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 storm drains found to reside in excavated areas shall be supported, removed, or replaced at the Contractor's option and at no additional cost to the City. The Contractor shall be responsible for maintaining the existing line and grade of the storm drains. If the Contractor elects to remove and replace, it shall be done per applicable City Standards and Specifications.

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.

15-2.02C Traffic Stripes and Pavement Markings: All traffic stripes, pavement markings or any other traffic markings shall be removed by the Contractor to the satisfaction of the Engineer and in accordance with Sections 84 of the Standards, and the Plans. Stripes and Markings that get fully or partially coated with asphalt from the Contractor's operations or vehicles shall be replaced.

15-2.02D Pavement Markers: All raised pavement markers shall be removed by the Contractor to the satisfaction of the Engineer and in accordance with Sections 85 of the Standard Specifications, City Standards, and the Plans. Pavement Markers that get fully or partially coated with asphalt from the Contractor's operations or vehicles shall be replaced.

15-2.02E Payment: Full compensation for the replacement of all traffic stripes, pavement markings, any other traffic markings and all raised pavement markers disturbed by construction and not specifically shown to be replaced on the Project Plans shall be considered as included in the prices paid for **various contract items** of work and no additional allowance will be made therefor.

15-2.02N Asbestos Cement Pipe: The Contractor is advised that asbestos cement pipe (ACP) will be encountered on this project. Cutting of ACP shall be done utilizing a Pipe Cutter (snapper), of the proper type and size for the intended use. A ratcheting hand snapper shall only be used on ACP sizes of 6 inch and smaller. The "snapper", and all appurtenances shall have been inspected by the Contractor to ensure that it is in good working order prior to use.

If field conditions require an alternative method of cutting the ACP, the alternative method shall comply with all laws and requirements as specified by OSHA, the Contractor's State Licensing Board, and any other governing body for this type of work.

In all cases, cutting, handling and disposal shall be done per the above stated governing bodies. Cut pipe shall be properly enclosed as soon as possible after removed from the trench.

15-2.02O Payment: Full compensation for the cutting, removal and disposal of asbestos cement pipe shall be considered as included in the prices paid for **various contract items** of work and no additional allowance will be made therefor.

15-3.03 Construction: All removed concrete, asphalt, steel and existing facilities not otherwise noted on the Project Plans shall become the property of the Contractor and shall be immediately off-hauled. None of the removed material shall be dumped or stockpiled on the work site. The Contractor shall dispose of all removed material at a recycler for the specified material. Burying of broken concrete or asphalt within the limits of the project will not be allowed.

All concrete which is to be removed from sidewalk, curb, gutter and driveway areas 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 effect.

It is anticipated that reinforcing steel will be encountered in portions of concrete to be removed and no additional allowance will be made for the removal and disposal of such steel.

Landscaping and other surfaces or structures shall be restored to original condition at no additional cost to the City.

15-3.04 Payment: Payment for compliance of Section 15-3.03 shall be included in the contract prices paid for **various contract items** of work and no additional allowance will be made therefor.

15-4.01 Pump Station Site Improvements: The Contractor shall construct water pumping station site improvements in accordance with these Special Provisions, the Project Plans, all applicable City Standards and Specifications and the Standard Specifications.

Contractor shall provide a minimum 5 working days advance notice prior to mobilization at each site.

15-4.02 Payment: S1 Site Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved for the pumping station site improvements as specified, including but not limited to, notification and coordination, submittals, clearing and grubbing, saw cutting, excavation, removal and disposal of excavated material, including asphalt and concrete, placing and compacting all required fill and backfill, relocation of existing irrigation valve, replacement/installation of new irrigation piping, conduit, chase pipe, wiring and valve box, obtainment and use of construction water, relocation of sign, aggregate base course, asphaltic concrete paving, crack sealing, bituminous seal coating, portland cement concrete apron, curb and gutter, replacement of existing chain link fence gate locking mechanism with new gate lock per detail on plans, and any other work necessary to install the pumping station site improvements to comply with the project plans and these special provisions not specifically enumerated, and no additional allowance will be made therefor.

S2 Site Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved for the pumping station site improvements as specified, including but not limited to, notification and coordination, submittals, clearing and grubbing, saw cutting, excavation, removal and disposal of excavated material, including asphalt and concrete, relocation of boulders, placing and compacting all required fill and backfill, obtainment and use of construction water, aggregate

base course, paving header board and stakes, asphaltic concrete paving, crack sealing, bituminous seal coating, sewer manhole frame and cover replacement, removal and disposal of existing pipe gate, posts, footings and appurtenances, installing two new single leaf bar gates, per the details on the plans, complete with one connecting locking mechanism, hold open posts and chains, replacement of existing chain link fence gate locking mechanism with new gate lock per detail on plans, and any other work necessary to install the pumping station site improvements to comply with the project plans and these special provisions not specifically enumerated, and no additional allowance will be made therefor.

15-7 Utility Clearances: All items noted in this section shall take place prior to any other construction activities at each site.

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

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

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

15-8 Tree Root Pruning: All tree roots two inches and greater which are encountered during excavation must be pruned by hand. The root shall be cut cleanly with a saw to avoid splits. When digging within the drip line of trees, Contractor shall exercise extreme caution to avoid pulling on roots with excavation equipment. Hand dig around all roots greater than one inch in diameter. The Contractor shall notify the Engineer when encountering roots within the drip line of trees which are greater than one inch. If the Engineer elects to get direction from an arborist the Contractor shall redirect crews to other contract work after safeguarding the area.

15-8.01 Payment: Full compensation for removing and pruning tree roots, hand digging to avoid root damaging roots, and excavating cautiously with respect to tree roots is considered as included in the prices paid for **various contract items** of work and no additional allowance will be made therefor.

15-9 Wooden Structure Removal at R3: The Contactor shall demolish the wooden structure as specified on the Project Plans at tank site R3. The structure is mainly constructed from wood materials but the Contractor is made aware that a small amount of other miscellaneous materials will be encountered as well, including but not limited to, metal hardware and roofing materials. All material shall become the property of the Contractor and shall be removed from the site and disposed of in accordance with all laws and regulations.

15-9.01 Payment: Full compensation for wooden structure removal and disposal as specified shall be considered as included in the prices paid for under **R3 Tank Site and Water System Improvements** and no additional allowance will be made therefor.

SECTION 16
CLEARING AND GRUBBING

16-1.01 General: Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications, and any specified modifications. "Clearing and Grubbing" shall take place to the areas as shown on the Project Plans, as well as to where chain link fences are to be installed at Tanks R3 and R7. Attention is directed to Section 80 "Chain Link Fence" and Section 72 "Slope Protection" of these Special Provisions.

The Contractor shall remove the existing vegetation and plant material where specified, specifically, but not limited to, areas shown to receive slope protection and the new pavement section at R12B, and as necessary to provide access along the existing fence to be removed and along the new fence alignment. During clearing and grubbing operations the Contractor shall take all necessary measures to prevent debris and sediment from entering drainage systems. Sections of existing fence that may be removed during construction shall be replaced with temporary fencing until the new fence is installed.

Only the vegetation noted on the Project Plans to be removed or so designated by the Engineer shall be removed. Existing vegetation not required to be removed by the Contractor in order to perform the work shall be protected in a manner approved by the Engineer.

The Contractor is made aware that there may be overhead clearance issues due to trees owned by neighbors at two locations on the access road leading to tank R12B. It shall be the Contractor's responsibility to inspect the site and conclude whether or not their equipment will clear these areas. If trimming is required to access the site without damage to private property, the Contractor shall notify the Engineer prior to mobilizing any equipment that will not clear the obstructions. If trimming is required it shall be done by the Contractor under inspection by the City, and at no additional cost to the City.

Nothing herein shall be construed as relieving the Contractor of their responsibility for final cleanup as specified in Section 4-1.13, "Cleanup" of the Standard Specifications and Section 197 "Clean Up" of these Special Provisions.

16.2 Payment: Clearing and Grubbing shall be paid for at the contract **lump sum** price, which shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in as specified, including removal and proper disposal of all waste materials, and no additional allowance will be made therefor.

SECTION 19
EARTHWORK

19-1.01 General: The Contractor is directed to the Geotechnical Investigation Report Santa Rosa Water Storage Tanks R3, R7 and R12B Seismic Upgrade report (Job No. 131370), dated March 18, 2013, and the addendum dated January 27, 2017, prepared by Kleinfelder. An electronic copy (PDF) of the reports may be obtained via email from the City, by request, and is ***not*** considered part of the contract documents. In addition, reports evaluating the structural elements and tank coatings at tank sites R3, R7 and R12B have been prepared by Harper and Associates, all dated December 1998. An electronic copy (PDF) of the report may be obtained via email from the City by request and is ***not*** considered part of the contract documents.

The information contained in this report was obtained for design purposes only. All statements, findings and interpretations in the report are those of the Geotechnical Engineers' and the City makes neither interpretations nor representations as to their 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 and/or to make additional borings upon which to base his conclusions, all at no cost to the City.

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

19-1.01C Existing Site Conditions: Contractor shall note that material of varied hardness and size may be encountered at the various sites including, but not limited to, fluvial deposits (Tank R7), tuffaceous lahar bedrock (Tank R3) and slightly weathered, moderately strong rhylolite bedrock (Tank R12B) as mentioned in the Geotechnical Report. The Contractor shall use an appropriate method that is approved by the Engineer to remove any material encountered. Blasting of rock shall not be allowed.

19-2 Roadway Excavation

19-2.01A Summary: Roadway excavation shall conform to the applicable provisions of Section 19 of the City of Santa Rosa Construction Specifications with the following modifications:

Roadway excavation shall consist of excavation of the roadway prism within the limits for road reconstruction, as shown on the Plans, and disposal of excess material, as specified herein. **Any additional excavation performed by the Contractor beyond the limits of the road reconstruction shown on the Plans shall be filled with asphalt concrete base in accordance with Section 39 of these Special Provisions at the Contractor's expense.**

Roadway excavation shall be performed by approved methods, including jack-hammering and removal of existing pavement and base materials by hand that will not disturb adjacent roadway structural section or the existing subgrade.

Removal of existing bituminous pavement and base materials will be paid for as roadway excavation and no additional allowance made therefor.

Excess materials from the excavation and grading operations shall become the property of the Contractor and shall be disposed of by them, at their expense. Excavated Soil shall be disposed of in accordance with Section 14-11.01 of these Special Provisions.

The Contractor shall furnish an excavation and resurfacing plan with requested locations for reference point locations per Section 39-1.01 of these Special Provisions. The Engineer will provide reference points and cut sheets for the excavation of the roadway and grading. The Contractor shall furnish a grade setter to insure that the subgrade conforms to the lines and grades established by the Engineer.

Roadway finished subgrade shall be compacted to 95 percent relative compaction at a moisture content at least 2 percent above optimum moisture content prior to placing aggregate base.

19-2.03G Slopes: The elevations of the existing grades at the back of dikes are currently to the top of the dike. Except where rock slope protection is specified, the Contractor shall grade the existing slopes adjacent to the back of existing and/or new dikes and curbs at each site as needed to create a smooth transition from approximately 2 – 3 feet up the slope to the midpoint of the back of dike or curb or as shown on the Project Plans. All excess material shall be removed from the site.

All other areas around tank roadways shall be graded as little as possible to slope away from the roadway leaving the finished grade at top of dike.

19-2.09 Payment: Full compensation for Roadway Excavation shall be considered as included in the contract price paid for **Tank Site and Water System Improvements** at the various sites, which price shall include full compensation for all work as specified herein and no additional allowance will be made therefor.

19-3.03L Tank Ring Foundation Excavation: Tank ring foundation excavation shall consist of excavation, removal of existing concrete foundation, in accordance with the dimensions of the proposed concrete footings on the Plans, and shall include excavation to establish neat and trimmed footings. The concrete ring foundation shall be placed neat against undisturbed soil or rock, if possible. The materials exposed in footing excavations should not be allowed to dry before placing concrete. Any loose or disturbed materials at the base of the ring foundation shall be removed.

It shall be the Contractor's responsibility to coordinate with the Engineer, and provide the needed time, for the special inspection of tank ring foundation; excavations (prior to placement of reinforcing steel and forms); reinforcing steel; and concrete.

The maximum allowable circumferential distance (measured at the outside face of the foundation) that the tank foundation may be exposed at any one time by excavations is:

R3: a total of approximately 1/2 of the circumference in 3 equal segments spaced equally around the circumference (35+/- feet)

The maximum allowable circumferential distance (measured at the tank shell) that the tank may be undermined at any time by excavations is:

R7: 15 feet
R12B: 10 feet

Layout of foundation pours over under tank piping shall be centered over pipes. Where inlet and outlet pipes are too close for this requirement, foundation joint of two adjacent sections shall be centered between pipes.

Foundation anchor bolts are required as specified. The Contractor's attention is directed to Section 51 "Concrete Structures" of these Special Provisions.

19-3.04 Payment: Full compensation for Tank Ring Foundation Excavation shall be considered as included in the price paid for **Tank Ring Foundation** at the various sites, which price shall include full compensation for furnishing all labor, materials, tools, and equipment to complete the work and no additional allowance will be made therefor.

19-8.03A Subgrade Stabilization: Unstable roadway section shall be stabilized per Section 19-1.03B of the Standard Specifications with the following modifications:

The Engineer may request the Contractor, at the Contractor's expense, to dig a test hole to verify that subgrade conditions are sufficiently dry to proceed with subgrade stabilization.

Subgrade stabilization shall conform to these Specifications. Subgrade stabilization shall consist of excavation and removal of unstable areas as shown on the Plans, identified in the field or as determined by the Engineer, and replacement of asphalt. The exact locations for subgrade stabilization shall be marked in the field by the Engineer after roadway excavation of the area is complete. No additional compensation will be made for excavation and stabilization beyond the limits of the areas marked by the Engineer or for excavation and stabilization at locations other than those marked by the Engineer. **Any additional excavation and stabilization done by the Contractor beyond the limits of the areas marked by the Engineer shall be at Contractor's cost.**

Full compensation for Subgrade Stabilization shall be shall be considered as included in the contract price paid for Asphalt Concrete Repair which price shall include full compensation for all work as specified herein and no additional allowance will be made therefor.

No separate measurement or payment shall be made for asphalt used to plug unstable subgrade. The cost for the asphalt shall be included with the contract unit cost for subgrade stabilization.

SECTION 26
AGGREGATE BASE

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

Compaction 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. If the Engineer determines that the aggregate base has dried excessively before compaction can be achieved, the aggregate base shall be removed and replaced, or moisture conditioned prior to resumption of compaction effort at the Engineer's direction and the Contractor's expense.

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

26-1.03D Compacting: Aggregate base compaction shall comply with the Plans and these additional requirements. 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.

26-1.06 Payment: Full compensation for aggregate base shall be considered as included in the prices paid for the **various contract items** of work and shall include all compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in furnishing and placing the base material as specified, including furnishing, hauling, and applying water as specified and directed by the Engineer, and no additional allowance will be made therefor.

SECTION 37
BITUMINOUS SEALS

37-2.01A Summary: The work conducted under this section shall be done in accordance with Sections 37 & 94 of the Standard Specifications, the seal coat manufacturer's specifications, and any modifications herein.

This work involves the furnishing and application of a pavement seal coat to all new and existing asphalt concrete where shown on the Project Plans and as stated herein.

New and existing asphalt concrete dikes shall receive a seal coat on the exposed face and top surfaces.

Seal coat shall be applied as the last order of work at each site, and no earlier than 30 days after all asphalt concrete has been placed to allow for proper cure. Working days will not be counted during the required cure time for asphalt concrete if, in the opinion of the Engineer, no other contract work can be performed at any of the site locations.

37-2.01C (2) Asphaltic Emulsion Seal Coat: The Contractor shall provide a submittal for any product proposed to be used to complete this work. If requested by the Engineer, the Contractor shall also provide a one half gallon sample in an appropriate.

37-2.01D Quality Control and Assurance: Section 37-2.01D(3) will not apply on this project.

37-2.02 Materials: Seal coat shall be Reed & Graham OverKote Asphalt Pavement Coating, or an approved equivalent.

Oilsealant shall be Reed & Graham OverKote Oil-Spot Seal, or an approved equivalent.

Crackfiller shall be Reed & Graham OverKote Crack Filler or an approved equivalent.

All materials used as described in this section shall be compatible.

37-2.03D Surface Preparation: Prior to placement of seal coat, the entire surface of the designated areas shall be free of dirt, water and vegetation. Cleaning may be accomplished by air blowing, vacuum, mechanical sweeper, power washing, or other techniques as approved by the Engineer. Edges of concrete surfaces abutting areas to receive a seal coat application shall be power washed to remove moss or other contaminants. If power washing the existing surface is used, the surface shall not have any standing water prior to application of the seal coat. Where there are deposits of grease or oil, these areas shall be cleaned by scraping, burning and/or the use of an approved detergent such as trisodium phosphate (using a stiff brush to scrub the area clean). Where a detergent is used, the pavement shall be thoroughly rinsed with water. All rinsate from pavement cleaning, if any, shall be collected and disposed of in accordance with all applicable laws and regulations. Rinsate disposal shall be the responsibility of the Contractor. No rinsate, or other products from the work, shall be allowed to flow to the storm drain or off site. After cleaning and removing grease and oil deposits, the cleaned area shall be sealed with an approved oilseal, applied per manufacturer's recommendations.

Cracks in excess of 1/4 inch, but less than 1 inch in width shall be sealed prior to application of the seal coat. Cracks shall be cleaned out with a stiff bristle broom and/or compressed air prior to crack sealing with crackfiller. The crackfiller shall be applied per manufacturer's recommendations and must be dry to the touch prior to application of the seal coat. Cracks that contain weeds and other live vegetable matter must be treated with locally approved non-oil based sterilant prior to application of crackfiller.

Cracks wider than 1 inch shall be filled with hot dense graded asphalt concrete conforming to Section 39 of the California Standard Specifications for 3/8" Maximum Asphalt Concrete and compacted level with adjacent surfaces.

All surfaces and facilities other than those shown to be coated shall be fully covered using a heavy mil plastic or oil resistant construction paper secured by tape in such a manner leaving a neat break between the sealed and unsealed surfaces.

37-2.03F (3) Asphaltic Emulsion for Seal Coat: New asphalt concrete pavement (HMA) shall be allowed to cure at least 30 days before seal coat application.

Two separate applications of seal coat shall be applied using a minimum of 30 gallons of undiluted sealer per 1,000 square feet of area. The second application shall be made after the first application is dry to the touch and won't scuff under normal walking. The total area to be covered is approximately 7800 square feet.

The sealer shall be mixed to uniform free flowing consistency. Water shall be added (not to exceed 15% by volume) to obtain a semi-fluid consistency. In exceptionally hot weather, the surface shall be dampened with water prior to the first application of the sealer. Any excess water shall be removed to leave the surface only slightly damp. The sealer shall be applied to the pavement in continuous parallel lines and spread immediately ahead by use of rubber faced squeegees and/or mechanized spreading equipment.

Surface preparation and sealer application shall not be performed if rain is forecast within 48 hours after application. Surface preparation and sealer application shall not be performed during or just prior to freezing weather conditions. Surface temperature shall be at least 55° F and rising during application.

It shall be the responsibility of the Contractor to protect the seal coat during drying. After application of the sealer is complete, traffic shall be excluded from the area until the sealer is completely dry and won't scuff under tires. This drying time shall be a minimum of 24 hours.

Any surface or facility damaged by over-spray shall be cleaned or replaced to the satisfaction of the Engineer at the Contractor's expense.

37-2.04 Payment: Seal Coat at all sites, including R12A, shall be shall be paid for at the contract price per **square foot** as measured in the field. Price shall include full compensation for all labor, materials, tools, and equipment, and doing all work involved in surface preparation and seal coat application as specified herein, as well as any other incidentals needed to comply with these Special Provisions and the Project Plans, and no additional allowance will be made therefor.

37-5 Crack Treatment: Section 37-2.03D shall be followed in lieu of Section 37-5 for surface preparation. Material used for crackfiller shall receive an application of a compatible detackifier

agent prior to opening up the area to traffic, and shall be cured per manufacturer's recommendations prior to seal coat application.

37-5.04 Payment: Full compensation for crack treatment shall be shall be considered as included in the contract price paid for Seal Coat which price shall include full compensation for all work as specified herein and no additional allowance will be made therefor.

SECTION 39
HOT MIX ASPHALT

39-1.01A Summary: Section 39-1 includes general specifications for producing and placing HMA, at all sites, 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 specified on the Project Plans.

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.

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

The Contractor shall also furnish a grade setter to insure that the asphalt concrete surface paving conforms to the lines and grades established by the Engineer.

A tack coat of SS-1h or SS-1 emulsified asphalt shall be applied to all vertical mating surfaces and conforms to existing pavement, curbs, gutters, 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 surface course shall be allowed to cool to 160° F at mid depth before the pavement is opened to traffic.

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.

39-1.02B Tack Coat: 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: 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: 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 virgin 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 is 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 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: Subsection shall be deleted in its entirety.

39-1.03G Job Mix Formula Acceptance: You may start HMA production if Engineer approves the JMF

39-1.05 Acceptance Criteria: HMA acceptance is specified in Section 39-3 Method Construction Process.

39-1.06 Dispute Resolution: Work with the Engineer to avoid potential conflicts and to resolve disputes regarding test result discrepancies.

39-1.08A General: 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.

39-1.09B Subgrade: The subgrade to receive asphalt concrete 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.

39-1.12A 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.

39-1.14 Miscellaneous Areas and Dikes: The aggregate grading for asphalt concrete placed on miscellaneous areas shall conform to that specified for the asphalt concrete placed on the traveled way, unless otherwise directed by the Engineer.

Dikes shall be shaped and compacted with an extrusion machine or other equipment capable of shaping and compacting the material to the required cross section.

39-1.15 Minor Hot Mix Asphalt: Subsection shall be deleted in its entirety.

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

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: Compaction rollers shall be either 2-axle steel-tired rollers, pneumatic-tired rollers, or approved double-drum vibratory rollers. Steel-tired static compaction rollers shall weigh not less than 12 tons.

Double-drum vibratory rollers 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.

All pneumatic-tired rollers shall be equipped with an approved windskirt unless otherwise permitted by the Engineer. Pneumatic-tired rollers used for compaction of asphalt concrete base shall be so equipped that the air pressure in all tired may be regulated uniformly by the operator while the roller is in motion.

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, sewer and water lines have been tested, and water lines chlorinated. The surface course of asphalt concrete shall not be placed until final utility connections have been made, unless otherwise permitted by the Engineer.

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 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. Material which cannot be placed in compliance with these requirements shall 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 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.

A. Asphalt concrete surface course and leveling courses.

1. Equipment Required
If production in any one hour exceeds the limits set forth below, the Contractor shall cease his paving operation until additional rolling equipment has arrived on the project.

a. 125 tons per hour or more.

The Contractor will be required to furnish a minimum of two approved double-drum vibratory rollers and one minimum 3-ton double-drum vibratory finish roller for each asphalt paver with a separate operator for each roller.

A pneumatic roller may be substituted for one of the vibratory rollers if approved by the Engineer.

b. 50-125 tons per hour.

The required minimum rolling equipment specified above may be reduced to one approved double-drum vibratory roller and one 3-ton double-drum vibratory roller for each asphalt paver with a separate operator for each roller when the compacted thickness is not less than 0.17'.

c. 50 tons per hour or less, at any location.

The required minimum rolling equipment specified above may be reduced to one approved double-drum vibratory roller, weighing not more than 12 tons for each paving machine.

2. Compaction Requirements.

Compaction rolling shall consist of a minimum of four complete vibratory coverages with an approved double-drum vibratory roller.

Finish rolling shall consist of one or more coverages with a minimum 3-ton double-drum vibratory roller immediately following completion of compaction rolling.

39-5 Measurement: Asphalt concrete 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 Repair** will be paid for at the contract **square foot** price, which price shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in asphalt concrete repair as specified herein including all site prep work; excavation; tack coat; furnishing, placing and compacting aggregate base and asphalt concrete, and compaction, and no additional allowance will be made therefor.

The estimated quantity of Asphalt Concrete Repair 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 Asphalt Concrete Repair, 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 9-1.06B and 9-1.06C of the Standard Specifications and no adjustment of the contract price for Asphalt Concrete Repair will be made by reason of such increase or decrease.

Asphalt Concrete at R7 will be paid for at the contract **ton** price, which price shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in placing asphalt concrete at the R7 site including, but not limited to, all site prep work, aggregate base, furnishing and placing material, tack coat and compaction, and no additional allowance will be made therefor.

Asphalt Concrete Parking Pad at R12B will be paid for at the contract **ton** price, which price shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in placing asphalt concrete parking pad, including, but not limited to, all site prep work, aggregate base, furnishing and placing material, tack coat and compaction, and no additional allowance will be made therefor.

Full compensation for furnishing weigh master's certificates shall be considered as included in the contract price paid and no additional allowance will be made therefore.

39-9 Asphalt Concrete Dike

39-9.01 Description Asphalt Concrete Dike shall be placed in conformance with the details and at the locations shown on the Project Plans and in accordance with the provisions of Section 39-1.14, "Miscellaneous Areas and Dikes," of the Standard Specifications.

39-9.02 Asphalts: The amount of asphalt binder used in asphalt concrete placed in asphalt concrete dikes and miscellaneous areas shall be increased one percent by weight of the aggregate over the amount of asphalt binder determined for use in asphalt concrete placed on the traveled way.

39-9.03 Payment: **Asphalt Concrete Dike** at all sites, including R12A, will be paid for at the contract **linear foot** price, which price shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in placing asphalt concrete dike, including saw cutting and removing the existing where required, cleaning the area, conforming to existing and no additional allowance will be made therefor.

SECTION 39A
ASPHALT CONCRETE TRENCH PAVING

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

39A-2.01 Asphalts: Temporary paving is required on all trenches and other excavated areas as determined by the Engineer and shall be ½-inch maximum, medium grade aggregate, hot mix asphalt concrete installed a minimum 2" thick **placed each day** over the work.

Permanent trench paving shall not take place until all underground work is finished and the City has given written notice of acceptance to the Contractor.

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.

Tack coat as specified in Section 39 of the City of Santa Rosa Construction Specifications shall be applied to all mating surfaces along conforms to existing pavement prior to placement of new asphalt concrete.

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-6.01 General Requirements: The Contractor shall provide compaction of backfill and base material as the job progresses, and temporary paving shall be placed over the work each day. Temporary paving shall be removed for final pavement reconstruction and/or trench paving. The Contractor shall only use 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. Prior to placing final paving, the Contractor shall sawcut and remove all AC paving to at least 6" beyond all excavation limits to facilitate pavement repair. Restore paving where removed or damaged with a minimum of 3-inches asphalt concrete on 6-inches aggregate base, unless otherwise shown on the Project Plans. Hot mix asphalt concrete shall be placed and compacted around all edges of steel plates used in the travelled way with a sufficient width and gradual slope in order to provide a smooth transition to existing pavement.

Permanent asphalt trench paving shall be even, smooth riding, and have an appearance that closely matches the surrounding surface, unless prior written approval has been provided by the Engineer.

39A-6.03 Compacting: Compaction shall be according to Section 39-6.03 of the City of Santa Rosa's Construction Specifications for Public Improvements, 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 coverage's required shall be the minimum number required to obtain 97% relative compaction.

39A-8.01 Payment: Full compensation for furnishing and installing temporary and 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.

SECTION 51
CONCRETE STRUCTURES

51-1.01 Description: The work covered by this section includes cast-in-place and precast concrete associated with the construction of tank ring foundations, equipment pads or footings; valve vaults; anchor and thrust blocks, including formwork, bracing and anchorage; reinforcing steel and accessories; curing, and; finishing; complete in accordance with the Plans and as specified herein.

51-1.02B Concrete: Portland cement concrete structures shall be constructed in accordance with Section 51 of the Standard Specifications, the details shown on the Plans, these special provisions, and as directed by the Engineer.

All Concrete, except tank ring foundation and where otherwise specified, shall be "Class A" concrete and shall conform to the provisions of Section 90 of these Special Provisions.

Backfill for foundations shall not be placed until the concrete has cured to 75% of its design strength or no sooner than one week after being placed, whichever comes later. There shall be no suspension of working days for concrete cure times unless, in the opinion of the Engineer, there are no other contract items of work able to be worked on during this time.

51-1.03F(2) Ordinary Surface Finish: Concrete shall be finished in accordance with Section 51-1.03F(2) of the Standard Specifications, and any modifications shown on the Project Plans or specified herein. Exposed portions of the tank ring foundations shall receive a hard trowel finish. Provide a 1 inch chamfer on the exposed edge of ring foundations and 3/4 inch chamfer on equipment pads and other concrete structures or as shown on the Project Plans.

51-1.05 Tank Ring Foundation: Tolerances on concrete ring foundation shall be in accordance with AWWA D100-11, Section 12.6.2. Depth and width of ring foundation shall be as shown on the Plans.

The Contractor shall cut observation holes into the floors of tanks R7 and R12B prior to pouring each foundation section, see Section 19-3.03L of these technical specifications for foundation specifics. R7 shall have a minimum of three holes per section, and R12B shall have a minimum of two holes per section to allow for visual verification of the concrete making contact with the underside of each tank. The observation holes shall be circular and between 6 and 8 inches in diameter and evenly spaced and centered over each section of foundation pour. These observation holes may also be utilized by the Contractor as access ports for concrete vibration during the pour and shall be sealed and welded similar to seal weld detail on the Project Plans and the welds tested per Section 77-7.01 of these Special Provisions.

Tank ring foundations shall be poured neat into competent material as determined by the Geotechnical Engineer. Above grade portions shall be formed. Bottom excavations shall conform to the recommendations of the geotechnical report, and shall be witnessed by the Geotechnical Engineer prior to placement of any concrete. Concrete shall attain the minimum strength noted on the Plans. Backfilling shall not commence until the foundation has achieved a strength of 2,500 psi or 1 week, whichever comes later.

The Contractor shall take all precautions to ensure that no structural or aesthetic damage takes place to tank ring foundations throughout all construction operations. Tank ring foundations shall

be fully protected against all adverse elements, including moisture buildup that may run down exterior shell walls and affect the finish.

51-1.05.01 Depth of Footing: The elevations of the bottoms of footings shown on the Plans shall be considered as approximate only, and the Engineer may order, in writing, such changes in elevations of footings as may be necessary to construct 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 footing elevations.

51-1.06 Reinforcement: Bar reinforcement shall conform to the provisions of Section 52 of the Standard Specifications.

The Contractor shall furnish the Engineer with a certificate of compliance from the supplier of the reinforcing steel stating that the steel delivered complies with the requirements of Section 52-1.02 of the Standard Specifications.

Horizontal circumferential reinforcing steel used in the tank ring foundations shall be connected using an approved mechanical coupler or have laps as shown on the Project Plans.

51-1.07 Excavation, Backfill and Resurfacing: Excavation, backfill and resurfacing shall conform to City Standards, or as modified herein and/or on the Project Plans. Excavations at R3, R7 and R12B shall comply with Section 19-3.03L.

Excavations around vaults and drain inlets, where not backfilled with CDF, shall be a minimum of 24 inches wider than the outside wall. All excavations shall be able to accommodate equipment and personnel required for backfilling and compaction testing. If, in the opinion of the Engineer, typical compaction methods cannot be used, the Engineer may require the use of a pneumatic Pogo Stick/Powder Puff type compactor at no additional cost to the City.

Controlled density fill (CDF) shall be in accordance with City Standard 215 and placed at locations where specified. All trenches with CDF backfill shall be covered until fully cured.

It is the Contactor's responsibility to ensure that all structures are laid and bedded on sound, stable material. All existing material that has been disturbed must be removed from the trench prior to installation of new material. The Contractor shall promptly notify the Engineer of any field conditions that may affect alignment and/or final grades.

51-1.08 Anchor Bolts and Bar Reinforcement: Anchor bolts and bar reinforcement shall be installed as specified. The Contractor shall be responsible for coordinating special inspections.

51-7.03 Valve Vault: Valve vaults shall be cast in place concrete or precast concrete as specified.

51-7.04 Vault Access Door: Valve vault access doors shall consist of double leaf spring assisted doors conforming to the dimensions shown on the Project Plans, and shall be Bilco Type JD-AL H20 or an approved equivalent. All access doors shall be preassembled by the manufacturer and installed in accordance with the manufacturer's recommendations and as specified. The doors shall be hinged on the long side. The exterior surface of all the doors shall have a permanent non-skid finish and concrete collar as shown. Drains shall be installed so that the access door channels drain to the exterior of the vault and into exterior aggregate.

51-7.05 Electrical Equipment Pads: Concrete electrical equipment pads shall be constructed as specified, and placed at the locations shown. The top 6" of subgrade shall be moisture conditioned and compacted to 95% R.C.

51-7.06 6" Concrete Pad at R3: After removal of the wooden structure at tank site R3 as specified elsewhere, the Contractor shall excavate an area of approximately 250 square feet within the boundaries of the existing retaining wall as shown to a depth of between eight and 12 inches below existing grade as needed, and remove four existing 8" x 8" x 2' deep concrete piers. Holes left due to pier removal shall be backfilled with sand and compacted. The entire area within the retaining walls shall receive a minimum 2 inch thick bedding of compacted sand as a base for the 6 inch thick concrete pad. The top 6" of subgrade shall be moisture conditioned and compacted to 95% R.C. prior to laying sand base. One layer of No. 4 bars, 12 inches on center in both directions, shall be laid out at the vertical center of the pad per the detail shown on the Project Plans for the Electrical Equipment Pad. The surface of the pad shall have a broom finish and be sloped at a 2 percent slope toward the roadway. The construction of the pad shall be so the surface matches the top of the existing A.C. dike. Joint expansion material shall be placed between all new and existing surfaces prior to pad installation with two layers being set where pad is adjacent to the retaining wall. After concrete pad has cured, all construction joints shall be trimmed below grade and sealed watertight with a self-leveling sealant manufactured for this type of application.

51-7.10 Payment: R3 Tank Ring Foundation will 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 constructing tank ring foundations including, but not limited to, submittals, concrete removal, excavation, removal and disposal of excavated material, bar reinforcement, placement of anchor bolts, and other embedded items, formwork, creating, pouring, placing, curing and finishing concrete, caulking and/or applying rubberized undercoating between tank and foundation, backfill and compaction of adjacent subgrade, temporary and permanent paving, complete as specified, and any other work necessary to construct tank ring foundation not specifically enumerated, and no additional allowance will be made therefor.

R7 Tank Ring Foundation will 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 constructing tank ring foundations including, but not limited to, submittals, concrete removal, excavation, removal and disposal of excavated material, bar reinforcement, placement of anchor bolts, and other embedded items, formwork, creating, seal welding and testing of observation holes, pouring, placing, curing and finishing concrete, caulking and/or applying rubberized undercoating between tank and foundation, backfill and compaction of adjacent subgrade, temporary and permanent paving, complete as specified, and any other work necessary to construct tank ring foundation not specifically enumerated, and no additional allowance will be made therefor.

R12B Tank Ring Foundation will 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 constructing tank ring foundations including, but not limited to, submittals, concrete removal, excavation, removal and disposal of excavated material, bar reinforcement, placement of anchor bolts, and other embedded items, formwork, creating, seal welding and testing of observation holes, pouring, placing, curing and finishing concrete, caulking and/or applying rubberized undercoating between tank and foundation, backfill and compaction of adjacent subgrade, temporary and permanent paving, complete as specified, and any other work

necessary to construct tank ring foundation not specifically enumerated, and no additional allowance will be made therefor.

Full compensation for **Anchor Bolts** and related items shall be considered as included in the contract price paid for **Tank Ring Foundation** for the various sites, which shall include but is not limited to, furnishing all labor, materials, tools, and equipment, and doing all work involved in installing all anchorage included, but not limited to, submittals, removal and disposal of material as needed, placing anchor bolts as shown on the plans, special inspection notification, coordination and testing, installing cement grout, complete as specified, and any other work necessary to install anchor bolts and related items not specifically enumerated, and no additional allowance will be made therefor.

Full compensation for **Valve Vaults** shall be considered as included in the contract price paid for **Tank Site and Water System Improvements** for the various sites, which shall include but is not limited to, furnishing all labor, materials, tools and equipment, and doing all the work involved to install valve vault as specified, including but not limited to, submittals, saw cutting, excavation, removal and disposal of excavated material, dewatering as needed, placing drain rock and filter fabric, furnishing and installing vault and access doors, providing concrete collar, sump and pipe penetrations, grouting and sealing pipe penetrations and joints, placing and compacting all required backfill, including CDF, temporary and permanent paving, and any other work necessary to install valve vaults and access doors not specifically enumerated, and no additional allowance will be made therefor.

Full compensation for **Electrical Equipment Pads** (including electrical access pad at R7) shall be considered as included in the contract price paid for **Tank Site Electrical Improvements** for the various sites, which shall include but is not limited to, furnishing all labor, materials, tools and equipment, and doing all the work involved, including, but not limited to, removal of existing concrete pads and appurtenances, excavation, removal and disposal of excavated material, bar reinforcement, conduit penetrations, pouring, placing, curing and finishing concrete, backfill and compaction of adjacent subgrade, and any other work necessary to install electrical pads not specifically enumerated, and no additional allowance will be made therefor.

Full compensation for **6" Concrete Pad at R3** shall be considered as included in the contract price paid for **R3 Tank Site and Water System Improvements**, which price shall include but is not limited to, furnishing all labor, materials, tools, and equipment, and doing all work involved in constructing a 6 inch thick "Class A" concrete pad on a compacted sand base at tank site R3 as specified, including but not limited to, submittals, pier removal, excavation and disposal of excavated material, joint expansion material, sealing of joints, and any other work necessary but not specifically enumerated, and no additional allowance s be made therefor.

SECTION 59
PAINTING

59-1.01 General: Steel water storage tanks shall be coated in accordance with AWWA D102-14 and any modifications specified.

The Contractor shall hold a valid State Contractor's C-33 License for performing surface preparation and coating work and the contractor as well as the on-site Supervisor shall have a minimum of five (5) years practical experience and successful history in the application of specified products to surfaces of storage facilities. The Contractor shall substantiate this requirement by furnishing a list of references of his or her specific history for the coating systems to be applied. Prior to commencement of work.

The work covered by this section consists of furnishing all materials, equipment, appliances, and labor and performing all operations in connection with coating, recoating, overcoating and touch-up coating on all tanks, tank accessories, piping, fittings, bracing, carpentry, structural steel, and other items requiring coatings. Related preparation, finish work and cleanup shall be as specified.

The Coating Contractor shall maintain a Supervisor at the work site during cleaning, preparation and coating application operations. The Supervisor shall have the authority and ability to sign change orders, coordinate work, make decisions pertaining to the fulfillment of the Contract and communicate effectively with the Engineer, Inspector and City personnel for all coating related work. The General Contractor shall not utilize this person to oversee non-coating related operations unless they work directly for the General Contractor. No substitution of this Supervisor shall be allowed without prior authorization from the Engineer.

All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with and must be approved by the Engineer.

All cutting and welding operations shall be complete prior to the start of coating operations at each site. Damage to coatings due to welding or cutting operations associated with other items of work under this contract shall be fully repaired from bare metal and in a manner acceptable to the Engineer.

Tanks R3, R7 and R12B, including all appurtenances except those otherwise specified, shall have their entire interior and exterior surfaces recoated from bare metal as specified herein.

Tank R6 shall have the following exterior surfaces recoated from bare metal; a section, weld to weld plus two other small areas, of the top course of the shell (approximately 500 SF), the entire knuckle, roof and all roof appurtenances, including vents, the ladder cage and the platform. Any interior coating that is damaged due to the Contractor’s operations shall also be repaired with acceptable materials to the satisfaction of the Engineer. Total square footage for items to be coated at R6, including shell areas as noted above, is approximately 15,250 SF. Tank R6 shall remain in service during the work, and the Contractor shall provide all means and methods to protect the interior of the tank and the potable water against any contamination, dust, or debris during preparation and coating operations. Only one vent may be fully blocked at any time.

The knuckle (including the welds connecting the knuckle to the shell), roof and all roof appurtenances, including the ladder cages and platforms of tanks R3, R6, R7 and R12B, and the

sections of the shell of R6 as previously noted, shall have a top coat of Tnemec HydroFlon Low VOC Series V701 Semi-Gloss or an approved equivalent.

The telemetry cabinets (supplied by City) to be installed by the Contractor at tank sites R3, R7 and R12B will arrive on site with a powder coat finish, along with separate, uncoated materials for a solar and rain shield to be attached by the Contractor to the roof of the cabinets. The Contractor shall field prep all exterior surfaces, of cabinet and shield, accessible when the cabinet doors are in the open position, protecting all other surfaces and equipment, and apply a primer coat to all uncoated materials, including all surfaces that are inaccessible after attached to the cabinets, and two spray coat applications of the same finish coat applied to the tank shells. The final application shall be fully cured prior to final placement of the telemetry cabinet, and any required touchups after placement shall be done in a neat manner approved by the Engineer. Solar/Rain shield shall be coated prior to, and attached after final placement of cabinet.

The meter pedestals (supplied by Contractor), shall arrive at tank sites R7 and R12B with a factory applied powder coat finish in a color, approved by the Engineer, that matches the tank's finish coat.

Unless otherwise specified herein, all other electrical equipment, including above ground conduits, shall first receive the required surface preparation, then be coated with the same coating system as the tank shells.

The Contractor shall provide and require the use of protective life saving equipment for persons working in or about the project site in accordance with requirements set forth by regulatory agencies applicable to the construction industry and manufacturers printed instructions and appropriate technical bulletins and manuals. The Contractor shall furnish, maintain and remove prior to departing the job site, a compressor and/or compressed air bottles capable of providing NIOSH-approved Class D breathing air for use at the work site.

The Contractor shall provide their own power to operate all equipment used on this project regardless of the type of work.

59-1.02 Materials: This section includes the coating and finishing of all surfaces of work in the Contract as specified.

All coating systems, and any other material, used on the tank interiors shall be fully compliant with ANSI/NSF Standard 61 for potable water. Coating manufacturer and materials submitted for use on tank interiors must be currently listed on the NSF.ORG website under NSF/ANSI 61 - Drinking Water System Components - Health Effects.

Colors used shall be selected by the Engineer from the manufacturer's standard and custom color charts. Final exterior coating color on tanks R3, R7 and R12B, accessories and exterior piping shall be the custom color "Camel Tan". Final exterior coating color on the surfaces specified of tank R6 shall be the custom color "Sea Ranch Green". The Contractor shall provide color samples on drawdown cards to the Engineer for review along with coating material submittals. If requested by the Contractor, the Engineer will provide a color sample for color matching purposes. If so requested and supplied, the sample shall be returned to the Engineer immediately after utilization for color matching.

All coatings, primers, and paint products shall be as manufactured by Tnemec, International, or an 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. No request for substitution will be considered which decreases the film thickness designated and/or the number of coats specified. Requests for substitution shall contain the full name of each product, descriptive literature, including directions for use, its generic type, performance data and its nonvolatile content by volume. Coating systems that meet the performance criteria of the specified products may be acceptable upon review by the Engineer. Only integral systems of the same manufacturer shall be used and no deviations will be permitted. If any of the components of the specified coating systems do not comply with regulations in effect at the time, component substitutions must be made that meet performance specifications listed herein and that are approved by the Engineer. Such substitutions will be provided at no additional cost to the City.

Where thinning is necessary only the products of the manufacturer furnishing the coating, and for the particular purpose, shall be allowed and all such thinning shall be done strictly in accordance with the manufacturer's instructions.

Coating materials specified are those which have been evaluated for the specific service. Specific products have been listed to establish a standard of quality. Equivalent coating systems by other manufacturers will be acceptable upon approval by the Engineer.

All material shall be brought to the job site in the original sealed containers. They shall not be used until the Engineer has inspected their contents and obtained data from information on containers or labels. Materials exceeding storage life recommended by the manufacturer, or one year (whichever is shorter) shall be rejected. Materials shall be mixed as full kits.

All coatings shall be stored in enclosed structures and according to manufacturer’s recommendations to protect them from weather and excessive heat or cold. Flammable coatings shall be stored in conformance with County, State and/or Local Codes for flammable materials. All materials shall have a batch number and date of manufacture on each container. Coatings in excess of one year old will not be allowed.

Safety Data Sheets for all coating materials shall be submitted at least thirty (30) days prior to start of coating operations and the Contractor shall keep a copy for all accepted materials readily available on site during coating operations at all times.

The following items shall not be coated:

1. Stainless Steel
2. Aluminum (except as otherwise noted on the Project Plans)
3. Electrical Control Panels*
4. Buried Pipe (except as otherwise specified)
5. Name Plates & Glass Items
6. Grates and Grate Frames
7. Concrete (including existing tank foundation)

*Except as otherwise specified, electrical and control panels shall be required to have a shop applied epoxy coating suitable for outdoor installation with a color matching the finish coat of the tank.

Before start of work, the Contractor shall submit to the Engineer the name and manufacturer of coating materials including material descriptions and literature giving instructions for application and suitability of coating materials for the intended use.

The Contractor shall apply coatings only when weather conditions are favorable in regards to air temperature and humidity and substrate temperature as per manufacturer's application instructions. At all times coating is in progress, Contractor shall have a psychrometer, satisfactory to the Engineer, available on the job for measuring relative humidity and dew point. Contractor shall also have on site a method to convert temperature readings and variance to dew point such as the US Weather Bureau Psychrometric Tables. A means to measure the temperature of the surface is also necessary.

Coating materials shall be properly stored in accordance with manufacturer's instructions and protected from moisture, direct sunlight and extreme temperature.
Coating material containers shall have labels bearing manufacturer's name, name and type of material, and color name and number. In addition, thinning instructions and application instructions shall be available at the job site.

Coating shall be done at such times that dust-free and neat work can be obtained. All coating shall be done strictly in accordance with the manufacturer's instructions and in a neat workmanlike manner. All surfaces not being coated shall be protected from over-spray, drip and splatter by covering or masking. All drip and spatter marks shall be immediately cleaned from adjacent surfaces to the satisfaction of the Engineer. Contractor shall take care in preventing off-site over-spray as there are numerous private residences adjacent to portions of the work areas. All costs associated with any damage claims by third parties shall be borne by the Contractor.

Except where factory application of finish coatings is permitted elsewhere in these specifications, all items of equipment shall be finish-coated after installation. Shop priming will be permitted in all cases. Materials and applications as specified shall govern regardless of whether coatings are factory-applied or field-applied. After installation, any damaged areas in prime or finish coatings shall be repaired as directed by the Engineer.

Offsite surface preparation, priming and coating operations associated with this project shall be monitored at all times by the Engineer or their designee. If unanticipated trips to the surface preparation, priming and coating facilities are required, in the opinion of the Engineer, due to inadequate or inaccurate notification by the Contractor, expenses incurred by the Engineer to conduct extra trips to offsite production facilities shall be borne by Contractor.

Any off-site work which cannot be confirmed to meet the requirements of the Contract Documents is subject to rejection by the Engineer.

All coating materials shall be stored in a safe, secure, and environmentally responsible manner and shall be kept above manufacturer’s minimum storage temperature or 35 degrees Fahrenheit, whichever is higher, at all times. Coating materials that are found or suspected to have dropped below this temperature shall not be used to fulfill the requirements of this Contract. All empty or discarded coating containers or other surface preparation or coating debris / waste / garbage shall be stored in a covered, watertight dumpster or equivalent container immediately after being

generated and shall be disposed of legally. In general, the jobsite shall be maintained free of coating related refuse at all times.

59-1.02.01 Welded Steel Tank Interior Coating Systems:

59-1.02.01.01 General: Interior coating systems shall be similar to AWWA D102-14 Inside Coating System No. 3 and as further specified.

Except as otherwise specified, all interior tank modifications shall be completed prior to the start of interior coating operations.

To be considered as an equivalent to the coating materials listed hereinafter for interior tank coating use, a material shall be of the generic classification specified, shall be approved by the NSF and listed on their website as an acceptable coating for potable water tanks and shall meet or exceed the following performance criteria:

Zinc-Rich Primer:
Adhesion Method: ASTM D 4541, Type V)
Requirement: No less than 2,083 psi (14.36 MPa) adhesion, average of three tests

Prohesion Method: ASTM G 85
Requirement: No blistering, cracking or delamination of film. No more than 1/64 inch rust creepage at scribe after 15,000 hours exposure

Salt Spray Method: ASTM B 117
Requirement: No blistering, rusting or delamination of film. No more than 1/8 inch creepage at scribe and no more than 1% rusting on plane after 50,000 hours exposure.

Cathodic Disbondment Method: ASTM G8, Method A
Requirement: No blistering, cracking , rusting or delamination and no undercutting at holiday after 30 days exposure.

Recoat Time / Immersion Method: Panels coated with one coat zinc-rich primer were exposed to direct sunlight for one, three, six and twelve months prior to topcoating (without scarification) with a two-component epoxy. The panels were then placed in potable water immersion for 12 months.
Requirement: No rusting, blistering, delamination or any other film defects after 12 months eimmersion. No less than 5B adhesion rating per ASTM D 3359.

Epoxy Intermediate / Finish:
Abrasion Method: ASTM D4060, CS-17 wheel, 1,000 gram load.
Requirement: Not more than 140 mg loss after 1,000 cycles.

Adhesion: ASTM D4541 (Type V) Coating System: Two coats epoxy applied to SSPC-SP10/NACE No.2 Near White Metal Blast Cleaned steel and cured 14 days at 75 degrees Fahrenheit.
Requirements: No less than 1,943 psi (13.40 MPa) pull, average of three tests.

Fresh Water Immersion Method: ASTM D870, Coating System: One coat zinc/two coats epoxy applied to SSPC-SP10/Nace No.2 Near-White Blast Cleaned steel.
Requirements: No blistering, delamination or other loss of film integrity after 24 months.

Salt Spray Method: ASTM B117, Coating System: One coat zinc/two coats epoxy applied to SSPC-SP10/NACE No.2 Near-White Metal Blast Cleaned steel and cured 14 days at 75 degrees Fahrenheit.
Requirements: No blistering, cracking or delamination of film. No more than 1/16-inch rust creepage at scribe and not more than 1 percent rusting at the edges after 10,000 hours of exposure. No more than 1/4 inch rust creepage at scribe and no more than 1% rusting on plane after 20,000 hours exposure.

Coatings matching the approved system shall be applied to all interior appurtenances unless otherwise specified.

59-1.02.01.02 Immersion and Non-Immersion Zones: Coatings for tank interiors shall be equivalent to the following coating system:

Prime Coat:	Zinc Rich Aromatic Urethane, 2.5 to 3.5 mils DFT. Standard of Quality: Tnemec Hydro-Zinc, 91-H20 in accordance with ANSI/NSF Standard 61.
Intermediate Coat:	Polyamidoamine Epoxy, 4.0 to 6.0 mils DFT Standard of Quality: Tnemec Pota-Pox Plus, Series V140F - 1255 Beige
Finish Coat:	Polyamidoamine Epoxy, 4.0 to 6.0 mils DFT Standard of Quality: Tnemec Pota-Pox Plus, Series V140F – 15BL Tank White

Minimum DFT shall be 10.5 mils, maximum DFT shall be 15.5 mils.

59-1.02.02 Welded Steel Tank Exterior Coating System:

59-1.02.02.01 General: Coating systems for the exteriors of welded steel tanks shall be similar to AWWA Outside Coating System No. 6, with the exception of the finish coat, as further specified.

To be considered as an equivalent to the coating materials listed hereinafter for exterior tank coating use, a material shall be of the generic classification specified and shall meet or exceed the following performance criteria:

Zinc-Rich Primer:
Adhesion Method: ASTM D 4541 (Type V)
Requirement: No less thatn 2,083 psi (14.36 MPa) adhesion, average of three tests

Prohesion Method: ASTM G 85
Requirement: No blistering, cracking or delamination of film. No more than 1/64 inch rust creepage at scribe after 15,000 hours exposure

Salt Spray Method: ASTM B 117
Requirement: No blistering, rusting or delamination of film. No more than 1/8 inch creepage at scribe and no more than 1% rusting on plane after 50,000 hours exposure.

Cathodic Disbondment Method: ASTM G8, Method A

Requirement: No blistering, cracking , rusting or delamination and no undercutting at holiday after 30 days exposure.

Epoxy Intermediate:
Adhesion Method: ASTM D 4541 (Type V)
Requirement: No less than 1,909 psi pull (13.16 MPa), average of three tests.

Cyclic Salt Fog/UV Exposure Method: ASTM D 5894
Requirement: No blistering, cracking, rusting or delamination of film after 10,000 hours.

Humidity Method: ASTM D 4485
Requirement: No blistering, cracking, rusting or delamination of film after 10,000 hours exposure.

High Dispersion Pure Acrylic Finish:
Abrasion Method: ASTM D 4060, (CS17 Wheel, 1,000 grams load)
Requirement: No more than 142 mg loss after 1,000 cycles, average of three tests.

Adhesion Method: ASTM D 4541 (Type V)
Requirement: No less than 2,213 psi (16.29 MPa) pull, average of three tests.

Fungal/Mold/Mildew Resistance Method: ASTM D 5590
Requirement: No more than traces of fungal growth (less than 10%) after four weeks continuous exposure.

QUV Exposure Method: ASTM D 4587 (UVA-340 bulbs, 8 hours UV, 4 hours condensation)
Requirement: No blistering, cracking or delamination from film. No less than 100% gloss retention, no more than 0.45 DE00 color change and no units gloss loss after 3,000 hours.

Fluoropolymer Finish:
Abrasion Method: ASTM D 4060 (CS17 Wheel, 1,000 grams load)
Requirement: no more than 134 mg loss after 1,000 cycles, average of three tests.

Exterior Exposure Method: ASTM D 4141, Method C (EMMAQUA)
Requirement: No blistering, cracking or chalking and no less than 80% gloss retention (8.2 units gloss change) and 0.29 DED Hunter Lab Scale color change after 1,260 MJ/m2 EMMAQUA exposure, average of five tests in five colors.

Harddness Method: ASTM D 3363
Requirement: No gouging with an 8H or less pencil.

QUV Exposure Method: ASTM D 4587 (UVA-340 bulbs, Cycle 4: 8 hours UV/4 hours condensation)
Requirement: No blistering, cracking or chalking. No less than 86% gloss retention (7.3 units gloss change) and 0.54 DED FMCII (MacAdam units) color change after 3,000 hours exposure, average of five tests in five colors.

59-1.02.02.02 Coating System: Coating systems shall be equivalent to the following:

Shell:

Prime Coat:	Zinc Rich Aromatic Urethane, 2.5 to 3.5 mils DFT. Standard of Quality: Tnemec Tnemec-Zinc Series 90-97
Intermediate Coat:	Polyamide Epoxy, 4.0 to 6.0 mils DFT. Standard of Quality: Tnemec Hi-Build Epoxoline Series 66HS
Finish Coat:	High Dispersion Pure Acrylic, 2.0 to 3.0 mils DFT Standard of Quality: Tnemec Enduratone Series 1029 "Camel Tan" for Tanks R3, R7 and R12B. Minimum DFT shall be 8.5, maximum DFT shall be 12.5 mils.

Knuckle, Roof and Roof Appurtenances (and area of R6 shell as noted):

Prime Coat:	Zinc Rich Aromatic Urethane, 2.5 to 3.5 mils DFT. Standard of Quality: Tnemec Tnemec-Zinc, 90-97
Intermediate Coat:	Polyamide Epoxy, 4.0 to 6.0 mils DFT. Standard of Quality: Tnemec Hi-Build Epoxoline Series 66HS-33GR Gray
Finish Coat:	High Dispersion Pure Acrylic, 2.0 to 3.0 mils DFT Standard of Quality: Tnemec HydroFlon Low VOC Series V701 Color: J7828 "Sea Ranch Green" for Tank R6 Color: "Camel Tan" for Tanks R3, R7 and R12B Minimum DFT shall be 7.5, maximum DFT shall be 11.5 mils.

There shall be no noticeable color contrast between the final coats applied to tank shells and knuckles/roofs.

59-1.02.03 Coating Colors: The Contractor shall submit color samples for review and approval by the Engineer at least 30 days prior to start of coating operations.

The interior finish color of the tanks shall be uniformly white or off-white. Any bleed through of the subsequent intermediate coats of another color will not be allowed. Repair will be performed at the Contractor's expense.

Exterior finish coat color of each tank and exposed piping shall be as specified, or approved equivalent. The Contractor shall provide to the Engineer color samples on drawdown cards for review and approval.

59-1.03.01 Surface Preparation: Without limiting the general aspects and other requirements of these Specifications, all surface preparation and coating of surfaces shall conform to the applicable requirements of the National Association of Corrosion Engineers (NACE), the Society for Protective Coatings (SSPC), and the Manufacturer's printed instructions. The Engineer's

decision shall be final as to interpretation and/or conflict between any of the reference Specifications and Standards contained herein.

All surfaces to be coated shall be prepared in a workmanlike manner with the objective of obtaining a clean and dry surface. No coating shall be applied before the prepared surfaces are inspected by the Engineer. On the first day of any coating, the Contractor shall establish with the inspector a schedule so that all surface preparation may be inspected and approved prior to application of any coating, for the duration of the project.

Surface preparation of steel items shall conform with specifications set forth in the Society for Protective Coatings "SSPC Painting Manual, Volume 2, 2005 Edition", or as specified by the Engineer.

Surface preparation shall be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Structures" (SSPC-Vis 1), "NACE" Standard TM-01-70, or as described below. Anchor profile for prepared surfaces shall be measured by use of a non-destructive instrument such as a Keane-Tator Surface Profile Comparator, Testex Press-O-Film System or Clemtox Anchor Pattern Comparator.

To facilitate inspection, the Contractor shall on the first day of abrasive blast cleaning operations, blast clean a set of metal panels to the standard specified. These panels shall be equivalent to the plate stock which is to be coated and shall have minimum measurement of 8-1/2 inches by 11 inches (216 mm x 280 mm). After agreeing that a specific panel meets the requirements of the specification, it shall be initialed by the Contractor and Engineer and coated with a clear non-changing finish. Panels shall be utilized for inspection purposes throughout the duration of blast cleaning operation.

All surfaces to be coated shall be prepared in strict conformance with the coating manufacturer's surface preparation requirements. The Contractor shall submit the surface preparation proposed and product data sheets containing the manufacturer's surface preparation requirements.

Steel surfaces in service within an immersion zone or within the interior or exterior of a water storage tank shall be sandblasted to near white blast condition in accordance with SSPC-SP-10/NACE No. 2 Near-White Blast Clean method.

The Contractor is advised that the project sites are within residential neighborhoods and are in close proximity to private residences and highly trafficked streets. **Abrasive blasting and coating operations on water tank exteriors and interiors shall be fully contained to prevent windblown abrasives, overspray, and odors from traveling offsite and onto neighboring properties and streets.** To accomplish this, the Contractor shall provide all the necessary equipment, tools, labor and materials required to construct, maintain, and operate blasting and overspray containment facilities around each water tank. Containment facilities shall include, but not be limited to, structure and materials to **completely wrap each tank in its entirety** during blasting and coating operations in order to contain airborne particulates and odor causing chemicals. The Contractor shall be responsible for furnishing, erecting and removing the sealed structures, respirators, and other such equipment as may be required for the safety of personnel and safe operations during blasting and coating within the containment facility. Forced ventilation and air filtration is anticipated to be required in order to achieve all safety requirements, and is included in the cost of this item. The Contractor may submit alternant containment measures than those already specified “for R6 only”. Any alternant containment shall not allow any debris or other

foreign matter to leave the job site, and all jobsite debris shall be cleaned to the satisfaction of the Engineer.

The Contractor shall keep particulates, overspray, and odors below levels that are detectable to the Engineer or general public at the perimeter of the jobsite. This includes keeping overspray below detectable levels on adjacent houses and cars traveling or parked on adjacent streets. The Contractor shall be solely responsible for any claims arising from lack of sufficient containment.

All ferrous metal to be primed in the shop shall have all rust, dust, and scale, as well as all other foreign substances removed by sandblasting (SSPC-SP10/NACE No. 2 Near White Blast – All interior and exterior tank steel). Cleaned metal shall be primed with specified primer immediately after cleaning to prevent new rusting. All ferrous metals not primed in the shop shall have all sharp edges, burrs, and weld spatter ground smooth and shall be sandblasted or otherwise cleaned in the field (as approved by the Engineer) prior to application of the primer.

All exposed bituminous coated metal shall be solvent cleaned to remove visible contaminants before subjecting all surfaces to abrasive blast cleaning to remove all existing bituminous coating, achieving a minimum anchor pattern of 1.5 mils. Trace amounts of bituminous coating (not a film) may remain in the pores of the metal. The first two (2) new coats shall be roller applied or if spray applied, shall be immediately backrolled. (Bituminous coatings may be encountered on piping.)

All nonferrous metals, whether to be shop or field primed, shall be solvent cleaned prior to the application of the pretreatment and/or primer. In addition, galvanized surfaces intended for immersion duty shall be sandblasted to provide a profile of 1.5 to 2.0 mils. Galvanized surfaces for exterior exposure shall be prepared Per SSPC-SP16 Surface Preparation on Non-Ferrous Metals. Careful attention will be given to prevent blasting through galvanizing. If damaged, galvanized surfaces will have to be repaired in a manner to achieve a smooth transition between the existing substrate to the new galvanized surface.

Epoxy coated steel pipe and fittings shall be brush-off blasted per SSPC-SP7/NACE 4 Brush-Off Blast Clean or scarified to provide tooth for coating adhesion. If the epoxy coating is to be brush off blasted or scarified in the field, the Contractor shall follow the procedures set forth by the coating supplier. The written procedure provided by the coating supplier shall be submitted to the Engineer. In the event that the underlying epoxy coating is thinned to below the minimum allowable thickness specified by the surface preparation procedures, the pipe or fitting shall be fully recoated with epoxy at the Contractor's expense. Field repairs or spot patching shall not be allowed.

All shop blasting, shop priming and shop coating shall be made available to be witnessed and inspected by the Engineer or his Inspector. Contractor shall notify Engineer 10 working days in advance of shop blasting, shop priming and shop coating and make the work available for inspection.

The Contractor's shop blasting, shop priming and shop coating equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from air. The contractor shall insure that the shop blasting, shop priming and shop coating equipment has been purged of water, oils, solvents and undesirable coating materials by discharging pressurized air into a white cloth prior to the addition of coating into the spray coating equipment. The contractor shall notify the Engineer with 24 hours advance notice when a “clean air” test is to be performed.

Surfaces not intended to be coated shall be adequately protected from the effects of cleaning and coating. Any such surfaces which have been damaged by the Contractor shall be repaired or replaced to the condition which existed prior to the damage, all at the Contractor's expense.

In case of questions concerning the quality of the blast cleaning provided, SSPC blasting standards for visual comparison (SSPC-Vis 1) and corresponding definitions shall be consulted. The Engineer shall be sole judge as to whether the quality of blast cleaning conforms to visual comparison standards, and his decision as to any allowable deviation there from shall be final.

Slag, weld accumulations and spatters shall be removed by chipping and grinding. All sharp edges shall be peened, ground smooth, or otherwise blunted. All weld repairs will be made and approved by the Engineer prior to any coating application.

The Contractor shall keep the area of his work in a clean condition and shall not permit blasting materials to accumulate as to institute a nuisance or hazard to the performance of the work or the operation of the existing facilities. Blast materials should be disposed of daily and kept separate from other debris. Abrasive blast waste materials containing hazardous substances shall be kept in sealed containers on site until they can be picked up and removed by a licensed transporter.

No coating shall be applied over damp or moist surfaces. The air and surface temperature shall be no less than 5°F above the dew point during coating application and initial cure. All surfaces with condensation or other moisture shall be blown or wiped dry. If rust is present, all surfaces shall be re-blasted per specification. Climatic conditions and surface conditions shall be measured, recorded and approved by the Engineer prior to the application of any coatings.

All surfaces shall be pressure washed as per SSPC-SP12, and shall be cleaned to an SSPC-SP12/NACE No. 5, WJ-3 Thorough Cleaning condition with no flash rusting apparent at the time of painting. All surfaces must be clean, dry and free of any dirt, dust, rust, grease, oils, salts or other deleterious materials prior to primer or paint application.

The levels of hazardous substances in the existing coatings on some surfaces of the tanks may require classification as hazardous waste during and after removal. The following table lists the tank, surface affected, hazardous material and the level of contamination:

		Concentration (ppm)		
Tank	**Surface**	**Lead**	**Chromium**	**Zinc**
R3	Exterior Roof	6138*	1781	1187
	Exterior Shell	7148*	1708	1093
	Interior Roof	873	ND	291
	Interior Shell	544	ND	272
R7	Exterior Roof	ND	ND	16142*
	Exterior Shell	ND	ND	916
	Interior Roof	ND	ND	916
	Interior Shell	481	ND	529
R12B	Exterior Roof	ND	ND	1482
	Exterior Shell	1643*	240	1122
	Interior Roof	ND	ND	ND
	Interior Shell	422	ND	ND
R6	Exterior Roof	ND	ND	ND

ND	=	Non Detectable
NA	=	Not Available
*	=	Exceeds maximum allowable contaminant level

All personnel working on and around the site must strictly adhere to OSHA and NIOSH regulations for working with lead coatings. Regulations include personnel biological testing and monitoring of worker's air and air in the vicinity of the site. Inclusively, regulations outlined in 29 CFR Part 1926 and Cal-OSHA Title 8 must be strictly adhered to.

Coating removal from tank surfaces with hazardous concentrations of lead, chromium or zinc shall be by conventional methods with total containment of the tank, or by grit blasting with total containment and recovery of abrasive. Containment enclosures must use heat welded seams and be inspected by the Engineer prior to any abrasive blast operations. Adhesives and Adhesive tapes will not be allowed for seams of enclosures.

Alternate methods of complete coating removal, which remove the coating without any abrasive may be submitted by the Contractor for review and potential approval by the Engineer. All hazardous materials restrictions shall apply.

Tank R6 shell (500 SF+/- as specified), knuckle, roof and appurtenances, except as otherwise specified, shall have all surfaces abrasive blasted using methods that will not allow any foreign materials to leave the immediate job site. Methods to accomplish this shall be submitted for review and approval by the Engineer. Containment methods and mechanical removal methods such as wheelabrater machines will be considered. Open air blasting will not be allowed. Abrasive blasting will stop at the knuckle / shell welled. The new coating shall start at this intersection with a sharp masked line. No overspray will be allowed on the shell surfaces, and operations shall be conducted so that no area of the tank will be left without a complete coating system in place.

Alternate methods for coating removal may either leave no surface profile or an irregular surface profile. Abrasive blast cleaning of the surface with a conventional abrasive after completion of the alternative coating removal method shall be required. Abrasive blast cleaning shall comply with SSPC-SP10/NACE No. 2 Near White Blast Clean. Abrasive blasting shall not be performed outside of a 100% containment area.

Upon completion of coating removal from tank surfaces, a representative sample of the spent abrasive containing the removed coating particles shall be collected and sent to an approved testing laboratory for testing under Title 22 and Land Ban requirements.

If tests indicate the spent abrasive with removed coating particles is not hazardous, the wastes can be disposed of in a local Class III or unclassified landfill, regardless of the presence of heavy metal coating particles. The local Regional Water Quality Control Board, which has jurisdiction over the landfill site, may require further testing to ensure the waste does not violate any of their local regulations. This could result in the waste being classified as a Designated Waste, which requires disposal at a Class II landfill site.

If tests indicate levels of lead, chromium or zinc exceeding the maximum allowable contaminant level, spent abrasives must be placed in approved containers, be removed to an approved Class I landfill site via a licensed hazardous waste transporter, and disposed of in strict conformance with Title 22 and Land Ban regulations. Incineration, encapsulation in concrete or other binder-type materials are also acceptable methods of disposal.

Waste sludge from chemical removal methods shall be considered hazardous with no further testing. Waste sludge shall be removed to an approved Class I landfill site via a licensed hazardous waste transporter, and disposed of in strict conformance to Title 22 and Land Ban regulations.

The Contractor shall be additionally responsible for:

1. Obtaining all permits
2. Processing all related project paperwork
3. Blood testing of all involved personnel
4. Sampling and testing of waste as required
5. Bulking, packaging and storing waste at jobsite
6. Using licensed hazardous waste transporters to deliver the hazardous wastes to their ultimate legal disposal site
7. Arranging for and paying for all laboratory testing
8. Preparing a summary report for the City to be reviewed and approved by the Engineer describing the required work, sampling requirements, testing results, permits, landfill requirements, characterization of the waste and ultimate disposition of the waste

Electrical equipment required to be coated shall first receive an SP-2 Hand Tool cleaning on all surfaces to be coated. All residue shall be completely removed and all areas that are not to be coated protected prior to coating.

59-1.03.02 Coating Touch-up Surface Preparation: Coating touch-up shall be required on all coating defects, or when damage to new coatings occurs as a result of the contractor's activities. Failed surfaces, areas of rust or areas damaged shall be spot abrasively blast cleaned to SSPC-SP10/NACE No. 2 Near-White Blast Clean or power tool cleaned per SSPC-SP11 Power Tool Clean to Bare Metal to at least 3-inches in all directions beyond the target repair area. From the bare metal repair area, feather edges and abrade a minimum of 4-inches of the surrounding tightly adhering coating with coarse grit abrasive (maximum 120 grit, minimum 100 grit). Touch-up coating system shall then be applied in conformance with these Special Provisions. Where zinc based materials are used, overcoating will not be allowed. In order to avoid overcoating, the contractor will use spray equipment with spray pattern controls adjusted to avoid overcoating any areas or exceeding maximum DFT. Due care shall be taken to avoid visual accentuation of repaired areas. Brush applied touch ups on the interior of the tank and some tank appurtenances may be an acceptable alternative to spray application with all the aforementioned requirements still in place. All exterior touch ups to the tank shall be by spray application unless otherwise approved by the Engineer.

Repair of damage to coatings resulting from the Contractor's activities shall be the responsibility of the Contractor and no additional allowance shall be made. After surface preparation and coating application have been completed, all surfaces shall be inspected in order to identify areas requiring coating touch-up due to damage caused by the Contractor's work. Contractor shall repair these areas at his sole expense.

59-1.03D Coating Application: All metal surfaces, excluding those materials listed in Section 59-1.02A, shall be coated. In no case shall metal be left uncoated, even though not specifically defined herein. Coating operations on water tank exteriors shall be contained to prevent overspray from traveling offsite and onto neighboring properties or streets.

Except where otherwise specified all surfaces shall be coated by spray application and shall be free from lap marks.

The Contractor shall apply each coat of paint at the rate specified by the manufacturer to achieve the minimum dry mil thickness required. If material has thickened and must be diluted, the coating shall be built up to the same film thickness achieved with undiluted material. In other words, one gallon of coating as originally furnished by the manufacturer must not cover a greater square foot area than when applied un-thinned. Deficiencies in film thickness shall be corrected by the application of one or more additional coats of paint. Total DFT exceeding the approved coating thickness of tank interior applied coatings as stated in these special provisions shall be removed and reapplied at the Contractor's expense. On porous surfaces, it shall be the Contractor's responsibility to achieve a uniform, protective finish free of imperfections either by decreasing the coverage rate or by applying additional coats of paint.

Drying time shall be construed to mean "under normal conditions" or as specified by the manufacturer. Where conditions are other than normal because of cold weather or because coating must be done in confined spaces, longer drying times will be necessary. Additional coats of paint shall not be applied, nor shall units be returned to service until coatings are thoroughly dry. See discussion of dehumidification and environmental monitoring requirements found elsewhere in these special provisions.

Each succeeding coat of paint shall have a slightly different color to readily distinguish between coats.

Coatings shall not be applied in extreme heat or cold; in dusty or smoke laden air; windy, foggy, damp, or humid weather.

Particular care must be taken to obtain a uniform, unbroken coating over all bolts, threads, nuts, welds, edges, and corners. On tank interior surfaces, all of these listed features, or similar unlisted features, shall receive an additional coat of the approved coating system applied between the primer and finish coat applications.

Where coating is applied by spray, the air and/or fluid pressure used shall be within the ranges recommended by the coating and spray equipment manufacturers.

Spray coating shall be conducted under controlled conditions, and the Contractor shall be fully responsible for any damage occurring from spray coating.

On the first day of any coating, the Contractor shall establish, with the Engineer, a schedule so that all surface preparation may be inspected and approved prior to the application of any coatings for the duration of this project.

The Contractor is hereby notified that the Engineer will inspect the project prior to the expiration of the warranty period and all defects and/or degradation in workmanship and materials shall be repaired by the Contractor.

59-1.03D(1) Welded Steel Tanks, General: Coating application shall conform to the requirements of the Society for Protective Coatings Paint Application Specification SSPC-PA1, latest revision, for "Shop, Field and Maintenance Painting" and recommended practices of the National Association of Corrosion Engineers and the Manufacturer of the coating materials. All materials shall be applied as specified.

Coating procedures and recoat/topcoat cycles are critical for interior coating application. Contractor shall submit with shop drawings the coating system manufacturer's latest written instructions and recommendations for material storage, surface preparation, application equipment and procedures, ventilation requirements, curing requirements and repair techniques for review and approval. **No deviations from the manufacturer's instructions and recommendations will be allowed without approval from the Engineer and manufacturer.** If minimum/maximum recoat times are not stated in the coating Manufacturer's standard product literature, the Contractor must supply such information to Engineer prior to starting coating application, or supply a written statement from Coating Manufacturer that limitations for recoat times do not apply to the coating specified.

The Contractor shall utilize quality assurance procedures and practices to monitor all phases of coating application and curing. Contractor shall measure humidity, ambient temperature and surface temperature of the current work area continuously and these values shall be provided to the City. Contractor shall keep records on all product batch numbers, quantities of materials and induction times. All information shall be submitted to the Engineer on a daily basis. Procedures or practices not specifically defined herein may be utilized, provided they meet recognized and acceptable professional standards and are approved by the Engineer.

No coating shall be applied:

1. When the surrounding air temperature as measured in the shade or the temperature of the surface to be coated is below 50 degrees F., or is less than 5 degrees above the dew point, except as recommended by manufacture and approved by Engineer;

2. When the temperature is expected to be less than 5 degrees F. above the dew point within eight (8) hours after application of coating,

3. When the surface temperature exceeds 125 degrees F., dew point shall be measured by use of an instrument such as a Sling Psychrometer and the use of US Weather Bureau Psychrometric Tables.

4. When wind velocities are anticipated to mobilize local debris or dust that may become entrapped in uncured coated surfaces.

Application of the first coat shall follow immediately after surface preparation and cleaning and within an eight (8) hour working day. Any cleaned areas not receiving first coat within an eight (8) hour period shall be recleaned prior to application of first coat.

The Contractor shall provide continuously operated dehumidification, heating, and ventilation equipment for all interior surface preparation, coating application and complete cure cycle, unless otherwise approved by the Engineer and coating system manufacturer. A minimum dew point spread of 17 degrees is required 24 hours per day for the duration of the interior coating portion of the contract. The Contractor shall provide shop drawings and a written plan for the methods to be employed for dehumidification, heating and ventilation for review and approval. The

equipment shall be of a capacity deemed appropriate by the Manufacturer to permit unrestricted production through project duration. Forced ventilation shall be introduced at the bottom of the tank to facilitate removal of solvents as they evaporate during curing. The equipment shall be on the job site location and in operation from the first day of interior production until the interior coating is completely cured. Such equipment costs will be borne entirely by the Contractor.

Dehumidification shall comply with the following minimum performance requirements or the coating system manufacturer's requirements, whichever are more stringent:

1. Continuously deliver air with a maximum relative humidity of 11 percent.
2. Supply sufficient dry air to ensure the air adjacent to the surfaces to be blasted or coated does not exceed 35 percent relative humidity, or lower of determined by the coating manufacturer, at any time during the blasting, coating, or curing. Interior dew point shall be at least 15 degrees above the surface temperature. If the dew point falls below the 15 degree limit for more than 8 hours, all bare blasted areas shall be reblasted prior to prime coat application.
3. Minimum ventilation capacity of 1.2 tank volume air changes per hour to permit unrestricted application through the duration of the coating, but higher if necessary to maintain proper environmental conditions.
4. Dehumidification and temperature equipment shall be capable of depressing the dew point in the tank 10 degrees below ambient air temperature within 20 minutes.
5. Noise shall not exceed 76 decibels at 10 feet from the dehumidification and temperature control equipment.

The Contractor shall provide and maintain a record of dew point, inside air dry bulb temperature, inside air wet bulb temperature, inside air humidity, surface temperature, outside dry bulb temperature, outside air wet bulb temperature, outside air humidity, and equipment run times at 1 hour intervals throughout the required dehumidification, temperature control, and entire curing period. The chart recorders or data loggers shall be placed to monitor temperature on the tank's interior and exterior. Daily recorded temperature and humidity conditions will be delivered to the ENGINEER every morning for the previous 24 hours. Daily records shall be mandatory while the dehumidification and temperature control equipment is operating.

No weather days will be granted during interior surface preparation, interior coating or interior touch-up.

Commercial lighting shall be used during blasting and coating operations, and provided for inspections. Flashlights will not be allowed.

Thinning of coating materials shall be permitted only as recommended by the manufacturer and approved by the Engineer. Any thinning and use of solvents shall not cause the resulting coating/thinner mixture to be in violation of prevailing VOC regulations.

Where thinning is necessary, only the products of the manufacturer furnishing the coating shall be used. Thinning shall only be performed according to the manufacturer's recommendations. The Contractor shall be responsible for providing and utilizing a calibrated measuring device for obtaining proper thinning ratios. Visual or estimated addition of thinners will not be allowed. If

materials are found by the Engineer to be over-thinned, all thinned material shall be legally disposed of at the Contractor's expense.

Each application of coating shall be applied evenly, free of brush marks, sags, and runs, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on hardware. Coatings shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.

Drop cloths shall be used to protect floors, fixtures and equipment. Care shall be exercised to prevent coatings from being spattered on to surfaces, which are not to be coated. Surfaces from which material cannot be removed shall be treated as required to produce a finish satisfactory to the Engineer.

Under all circumstances, contrasting colors are required between all successive coats of multiple coat systems in order for the Contractor and Engineer to visually review continuity of coverage during and after application.

Where a number of coats of paint or coating are specified, they shall be considered the minimum required. Where dry film thickness is specified, "total dry film thickness" (DFT) is considered to be a minimum. Individual coats may vary as to dry film thickness within parameters specified by the Manufacturer and approved by the Engineer. Special care shall be taken to assure the maximum DFT is not exceeded as per NSF certification for the particular material being applied. Any areas exceeding the maximum DFT shall be removed and reapplied at the Contractor’s expense.

All welds, inside corners, nuts, bolts, flanges, edges, angles, and irregular surfaces shall receive one brushed on “stripe coat” of the approved primer prior to spray application of first complete coat. Spraying shall be used to apply each successive coat(s) of primer and finish, unless otherwise directed by the Engineer. Surfaces receiving a stripe coat shall not exceed dry film thickness requirements.

The painter shall apply each coating application at a rate and in a manner specified by the manufacturer. If material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material.

If the Contractor applies any coatings for which he has not submitted Manufacturer's volatile organic compound levels, or if he applies coatings that have been modified or thinned to such a degree as to cause them to exceed established VOC levels, Contractor shall be responsible for any fines, costs, remedies, including disinfection to meet Engineer’s requirements for allowable VOC’s, or legal action that may result.

The Contractor's coating equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from air. The contractor shall insure that the coating equipment has been purged of water, oils, solvents and undesirable coating and by discharging pressurized air into a white cloth prior to the addition of coating into the spray coating equipment. The contractor shall notify the Engineer with 24 hours advance notice when a “clean air” test is to be performed.

59-1.03D(2) Welded Steel Tank Interior Coating System Application: All inaccessible surfaces of the tank and new equipment/accessories shall be field or shop blasted and coated with specified coating system prior to installation.

The Contractor shall use wooden wedges to create enough space between interior roof plates and rafters that will allow the surfaces between the two to receive an abrasive blast and one application of the specified prime coat. The coating shall be allowed to fully cure prior to removing the wedges. Wedges shall then be relocated as needed to fully coat these surfaces. All wedges shall be removed at the completion of this operation.

Where different coatings are specified to be applied to immersion and non-immersion zones, these zones are defined as follows:

Immersion zone is comprised of all interior surfaces below the elevation of the overflow weir crest. Non-immersion zone is comprised of all interior surfaces above the elevation of the overflow weir crest.

See Section 59-1.03.01 for surface preparation requirements.

Total dry film thickness shall be as specified at all measured locations on the tank. Any deficiency in dry film thickness (DFT) shall be corrected by applying additional finish coats, at no additional cost to the City. Maximum DFT shall not exceed manufacturer's recommendation.

The interior ladder and all stainless steel components and fasteners shall not be installed during blasting and coating operations. Installing and wrapping of ladder and other stainless steel components will not be allowed.

59-1.03D(3) Welded Steel Tank Exterior Coating System Application: All inaccessible surfaces of new equipment/accessories shall be field blasted and coated as specified prior to installation.

See Section 59-1.03.01 for surface preparation requirements.

Total dry film thickness shall be as specified at all measured locations on the tank. Any deficiency in total dry film thickness shall be corrected with additional coats at no additional cost to the City. Curing shall be in accordance with all manufacturers' recommendations.

All metal surfaces not accessible in the field shall be shop sand blasted and shall have shop applied primer, intermediate and final coat of paint applied prior to transport to the site.

The safety climb bar and all stainless steel components being attached with bolted connections shall be installed and fitted for proper placement, and then removed prior to coating and blasting operations and shall be reinstalled after coating is complete and fully cured. Installing and wrapping of ladder and other stainless steel components will not be allowed.

59-1.03E Quality Assurance: Quality assurance procedures and practices shall be utilized to monitor all phases of surface preparation, application and inspection. Procedures or practices not specifically defined herein may be utilized, provided they meet recognized and acceptable professional standards and are approved by the Engineer.

The Contractor shall provide all rigging, lighting, scaffolding, labor, etc., as deemed necessary by the Engineer to facilitate all work and inspection, including the end of warranty inspection.

The Engineer shall be given a minimum of seven working days advance notice prior to start of any field surface preparation and/or coating application work. All work shall be performed only in

the presence of the Engineer, unless Engineer has granted prior approval to perform such work in his/her absence.

The Contractor shall provide a coating supervisor at the prejob conference and at the work site during the cleaning and application operations. Any replacement request for the coating supervisor is subject to a jobsite conference and approval by the Engineer.

All materials furnished and all work performed under the contract shall be subject to inspection by the Engineer. Work done in the absence of prescribed inspection may be required to be removed and replaced under proper inspection. The Contractor shall be responsible for the entire cost of removal and replacement of materials.

Personnel shall conduct all operations in a sanitary manner. The Contractor shall be responsible for maintaining the tanks in a highly clean and sanitary condition and any exception will result in the Engineer's refusal to accept the tank.

59-1.03F Inspection Testing: All coated surfaces will be inspected for the following defects:

Pinholes	Orange-peel	Holidays, missed areas
Blisters	Mud cracking	Over spray
Bubbling	Sanding Scratches	Contaminants, including spent abrasives
Fish eyes	Runs,sags, curtains	Mechanical damage – chipping, chips, scratches
Unmatched colors	Sand lines	Excessive or insufficient gloss

Contractor shall manage spent abrasives sufficiently to avoid damaging recently applied coatings or from contaminating previously cleaned areas. Defects in any coat of multiple coat applications must be repaired prior to application of subsequent coats. Coating defects may only be rectified after the coating in which the defect occurred has dried/cured sufficiently, unless approved otherwise by the Engineer. **Usage of rollers to mask or obliterate defects in sprayed coatings will result in rejection of the work.** In case of numerous or significant defects, the Engineer may require complete removal and replacement of all coatings applied by the Contractor. All defects shall be corrected by the Contractor at the Contractor's expense.

Thickness of coatings on metal surfaces shall be checked with a properly calibrated, non-destructive type thickness gauge. Each coat shall be checked for correct thickness. No measurements shall be taken within 8 hours after coating application.

The finish coating on all interior surfaces shall be completed without defects permitting moisture penetration when tested according to the low voltage, wet sponge method. Deficiencies in the continuity of the coating shall be corrected by applying additional finish coats, at the expense of the Contractor. The Contractor shall furnish a low voltage, wet sponge type holiday detector for use in inspecting the finished coating job. All pinholes shall be marked, repaired in accordance with the manufacturer's recommendations and retested. No pinholes or other irregularities will be permitted in the final coating. Dry film thickness gauges and holiday detectors shall be made available to the Engineer for use at all times until final acceptance of the project. The inspection devices shall be in good working condition. The Contractor shall also furnish U.S. Department of Commerce, National Bureau of Standards, certified thickness calibration plates to test accuracy of dry film thickness gauge and certified instrumentation to test accuracy of holiday detectors. Holiday detectors shall not exceed the voltage recommended by the manufacturer of the coating system.

Whenever required by the Engineer, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the Engineer. Temporary ladders and scaffolding shall conform to applicable safety requirements and shall be erected when requested by the Engineer to facilitate inspection and be removed by the Contractor to locations requested by the Engineer.

Dry-film thickness gages and holiday detectors shall be made available for the Engineer's use at all times until final acceptance of application. Holiday detection devices shall be operated only in the presence of/or by the Engineer.

Acceptable devices for ferrous metal surfaces include, but are not limited to, Tinker-Rasor Model M-1 holiday detector for coatings up to 20 mils. dry film thickness and DeFelsko PosiTest or PosiTector 2000 units for dry-film thickness gauging. Non-ferrous metal surfaces shall be checked with an instrument such as an Elcometer "Eddy Current" Tester or DeFelsko PosiTector 3000.

59-1.03G Disinfection And Volatile Organic Testing: Upon completion of all modifications, (including installation and approval by the Engineer of vents, hatches, interior ladder and Saf-T-Climb apparatus) and complete curing and drying of the interior tank coating system and touch-up coatings, all interior surfaces shall be cleaned, to the satisfaction of the Engineer, prior to starting disinfection procedure. Water used for cleaning shall be from a City approved source and must be supplied with enough force and volume to fully remove all dirt, blast sand and foreign material from roof plates and rafters as well as all other interior surfaces without damaging the coating. Under tank piping shall also be cleaned and free of all foreign matter prior to tank filling. All water, dirt and foreign material accumulated prior to or during the cleaning operation shall be removed from the tank and piping and disposed of in an appropriate manner.

Due to the preparatory work and staff time required by the City's Water Distribution staff disinfection and filling shall begin on a separate Monday for each tank. The Contractor shall submit a separate written request, at least 5 working days in advance of proposed date(s), to the Engineer to schedule disinfection and filling at each tank site. The City's Water Distribution staff will attempt to facilitate requested dates, however, extenuating circumstances may result in adjustments to requested dates, and under such conditions, no claims related to delays shall be considered.

Just prior to disinfection of the tank the Contractor shall remove any debris and "wall residue" that may have accumulated in the under tank portion of the outlet piping. Once this is complete the Contractor shall notify the City's Inspector and allow for their visual verification and approval that the pipe is ready for disinfection operations. Any liquid in the pipe due to this cleaning shall be flushed, trapped and removed at the downstream drain inlet.

Disinfection shall be accomplished similar to AWWA C652-11, Section 4.3, Chlorination Method 2, using a liquid solution only. A solution of 200 mg/L available chlorine shall be applied to all interior surfaces of the tank starting with the interior of the outlet pipe, and shall include those surfaces that will be above the water level when tank is full. The chlorine solution shall remain in contact with all interior surfaces for a minimum of 30 minutes, after which the tank shall be filled with potable water from the City's water distribution system and the drain line flushed with all chlorinated water trapped and properly disposed of. The residual chlorine level when the tank is full shall be between 0.8ppm and 1.2ppm. All applications of disinfectant must be witnessed by the Engineer or their designee.

At no time shall water trucks or any other unapproved vessel be used in the application of cleaning or filling of tanks or pipes unless first approved of by the Engineer in writing. Equipment and methods for cleaning and filling must be submitted for review and approval.

See Section 99-1.19 for disposal of chlorinated water.

NOTE: The Contractor shall exercise special precautions to insure the safety of his/her employees during disinfection.

The reservoir interior coating work shall be deemed accepted when the coatings have substantially cured and the reservoir has been disinfected, filled for water sampling by the City and has passed all testing. Failure of the interior coating system to pass the California Department of Health Services Sanitation and Radiation Laboratory guidelines for potable water storage facilities will extend the date of acceptance.

After each tank is filled, samples for each shall be collected by the City in the presence of the Contractor for bacteriological, volatile organic compounds (VOC) and odor testing. Bacteriological samples shall be collected on days 2, 4 and 7, and an odor sample collected on day 7 after tank filling at each site. Testing for VOCs shall be according to the State Resources Control Board Sanitation and Radiation Laboratory guidelines set forth in "Collection, Pretreatment, Storage and Transportation of Water and Wastewater Samples", most current edition. The VOC sample shall be collected after the tank has been full for at least 7 days. Filling of the tank(s) and the first set of all samples specified shall be conducted by City personnel and at the City's expense. If the test results are satisfactory, the tank may be placed into service without replacing the water. If the bacteriological test results are unsatisfactory, additional disinfection procedures approved by the Engineer shall take place until satisfactory results are obtained. If the volatile organic test results are unsatisfactory, additional curing or other corrective action will be required. Should any of the test results prove unsatisfactory, the costs of subsequent testing and corrective actions will be borne by the Contractor, including proper disposal of all water not meeting testing requirements and refilling of the tank. For scheduling purposes the Contractor shall note that samples will not be taken on Weekends or City Holidays unless first approved by the Engineer.

The Contractor's attention is directed to AWWA Standards C652-11 Appendix C, and C655-09, or any updated revisions, for the disposal of chlorinated water. No water containing chlorine shall be discharged to the waters of the State.

Disposal of all liquids drained from the tank shall be the responsibility of the Contractor and shall be performed in accordance with a plan that has been prepared and submitted by the Contractor to the North Coast Regional Water Quality Control Board for approval. No water may be discharged to the storm drain system without an approved plan. At a minimum the plan shall address the separation of solids from the water and the neutralization of chemicals to acceptable concentrations.

59-1.03H Acceptance: Acceptance by the City of the completed coating work, and all interior tank work, as specified is subject to a guarantee by the Contractor to complete any needed repairs due to leaks or damage caused by defective workmanship or materials furnished by Contractor for a period of two years after Notice of Acceptance has been issued.

59-1.03I Warranty Inspection: The City will conduct a warranty inspection as outlined in AWWA D102-14, Section 5, within 24 months following completion and written acceptance of coating work at all sites. Along with tank coatings and related items, this inspection shall also cover all

interior tank improvements. The City shall notify the Contractor and schedule a separate date for the inspection of each tank and notify the Contractor for scheduling of the work. Any work found to be defective shall be repaired at this time and in accordance with the manufacturer's recommendations, this specification, and to the satisfaction of the Engineer. Repairs shall be completed at the City's convenience and shall be performed within the time periods designated by the City. Repairs, if any, shall be performed in accordance with these specifications. The Contractor shall supply lighting and scaffolding, acceptable to the Engineer, for inspection by the City and the Engineer during the warranty inspection.

59-1.04 Payment: **R3 Tank Interior Recoating** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved, including but not limited to, submittals, notification, coordination, compliance with applicable laws and regulations, obtaining all permits, containment structure, removal and disposal of existing coating and spent abrasives, power for equipment, heating and cooling, dehumidification and ventilation equipment, surface preparation, coating, testing, repairs, touchups, cleanup, disinfection, disposal of wash down and chlorinated water, and any other work necessary for tank interior recoating not specifically enumerated in the Plans or Specifications, and no additional allowance will be made therefor.

R7 Tank Interior Recoating shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved, including but not limited to, submittals, notification, coordination, compliance with applicable laws and regulations, obtaining all permits, containment structure, removal and disposal of existing coating and spent abrasives, power for equipment, heating and cooling, dehumidification and ventilation equipment, surface preparation, coating, testing, repairs, touchups, cleanup, disinfection, disposal of wash down and chlorinated water, and any other work necessary for tank interior recoating not specifically enumerated in the Plans or Specifications, and no additional allowance will be made therefor.

R12B Tank Interior Recoating shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved, including but not limited to, submittals, notification, coordination, compliance with applicable laws and regulations, obtaining all permits, containment structure, removal and disposal of existing coating and spent abrasives, power for equipment, heating and cooling, dehumidification and ventilation equipment, surface preparation, coating, testing, repairs, touchups, cleanup, disinfection, disposal of wash down and chlorinated water, and any other work necessary for tank interior recoating not specifically enumerated in the Plans or Specifications, and no additional allowance will be made therefor.

R3 Tank Exterior Recoating shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved, including but not limited to, submittals, notification, coordination, compliance with applicable laws and regulations, obtaining all permits, containment structure, removal and disposal of existing coating and spent abrasives, power for equipment, heating and cooling, dehumidification and ventilation equipment, surface preparation, coating, testing, repairs, touchups, cleanup, disposal of wash down water, surface prep and coating of other site equipment and facilities as specified, and any other work necessary for tank exterior recoating not specifically enumerated in the Plans or Specifications, and no additional allowance will be made therefor.

R7 Tank Exterior Recoating shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved, including but not limited to, submittals, notification, coordination, compliance with applicable laws and regulations, obtaining all permits, containment structure, removal and disposal of existing coating and spent abrasives, power for equipment, heating and cooling, dehumidification and ventilation equipment, surface preparation, coating, testing, repairs, touchups, cleanup, disposal of wash down water, surface prep and coating of other site equipment and facilities as specified, and any other work necessary for tank exterior recoating not specifically enumerated in the Plans or Specifications, and no additional allowance will be made therefor.

R12B Tank Exterior Recoating shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved, including but not limited to, submittals, notification, coordination, compliance with applicable laws and regulations, obtaining all permits, containment structure, removal and disposal of existing coating and spent abrasives, power for equipment, heating and cooling, dehumidification and ventilation equipment, surface preparation, coating, testing, repairs, touchups, cleanup, disposal of wash down water, surface prep and coating of other site equipment and facilities as specified, and any other work necessary for tank exterior recoating not specifically enumerated in the Plans or Specifications, and no additional allowance will be made therefor.

R6 Tank Partial Exterior Recoating for tank site R6 shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved to remove the existing exterior coating and recoat tank shell areas as noted, knuckle, roof and all items attached, including but not limited to, submittals, notification, coordination, compliance with applicable laws and regulations, obtaining all permits, site containment as required, protection of the interior of the tank against dust and debris, removal and disposal of existing coating and spent abrasives, power for equipment, surface preparation, coating, testing, repairs, touchups, cleanup, disposal of wash down water, and any other work necessary for knuckle, roof and roof appurtenances recoating not specifically enumerated in the Plans or Specifications, and no additional allowance will be made therefor.

Full compensation for submittals, color matching, surface preparation and coating of electrical equipment and all other items as specified 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 64
PLASTIC PIPE

64-1.01A Description: All storm drains and related appurtenances shall be constructed in accordance with these Special Provisions, Project Plans, City Standards and Specifications, Standard Plans and Specifications, and as directed by the Engineer.

64-1.02 Materials: Except as otherwise specified, plastic storm drain pipe shall be type S, smooth interior wall and corrugated exterior wall high density polyethylene pipe (HDPE) as specified in AASHTO designation M294. HDPE pipe shall be ADS N-12 or approved equal.

Pipe and fittings shall be joined with a bell-and-spigot joint meeting AASHTO M252, AASHTO M294 or MP7. The joint shall be silt tight with o-ring gaskets made of polyisoprene meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on gasket and bell during assembly. The spigot shall be pushed into the bell to the “home line” on the pipe.

12” drain pipe installed from overflow drain inlet to existing drain inlet at R7 shall be “green” C900 PVC pipe.

Three inch drain pipe and fittings shall be Acrylonitrile-Butadiene-Styrene (ABS) and shall be manufactured from ABS compound with a cell class of 42222 for pipe and 32222 for fittings as per ASTM D 3965 and shall conform with National Sanitation Foundation (NSF) Standard 14. Pipe shall be iron pipe size (IPS) conforming to ASTM F 628. Fittings shall conform to ASTM D 2661.

Three inch drain pipe cleanouts shall be ABS two way cleanouts installed similar to City Standard 513A. Cleanout box shall be Geneco CC4 or an approved equivalent, with lid marked “C.O.”, “Cleanout” or “Storm”. Markings shall be either cast into, or neatly and legibly welded onto lids.

Solvent cement shall conform to ASTM D 2235.

All pipe shall be from a single manufacturer and all fittings shall be from a single manufacturer and both installed in accordance with manufacturer’s recommendations and local code requirements.

Drainage Inlets shall be manufactured by US Concrete (Precast Group), Hansen Concrete Products, or an approved equivalent,

64-1.02B Trench Excavation, Backfill and Resurfacing: Excavation, backfill and resurfacing shall conform to City Standards, or as modified herein and/or on the Project Plans.

If during excavation for any pipe or structure, material is encountered which is unsuitable as a foundation for the pipe, such unsuitable material shall be removed to a depth as required by the Engineer and the resulting space shall be refilled with approved material.

Excavations around drain inlets, where not backfilled with CDF, shall be a minimum of 24 inches wider than the outside wall. All excavations shall be able to accommodate equipment and personnel required for backfilling and compaction testing. If, in the opinion of the Engineer, typical

compaction methods cannot be used, the Engineer may require the use of a pneumatic Pogo Stick/Powder Puff type compactor at no additional cost to the City.

Controlled density fill (CDF) shall be in accordance with City Standard 215 and placed at locations where specified. All trenches with CDF backfill shall be covered until fully cured.

It is the Contactor's responsibility to ensure that storm drain components are laid and bedded on sound, stable material. All existing material that has been disturbed must be removed from the trench prior to installation of new bedding material. The Contractor shall promptly notify the Engineer of any field conditions that may affect alignment and/or grade.

Trenches shall not be open longer than the time required to place the pipe and backfill to the adjoining grade. Unless permission is otherwise granted by the Engineer, all trenches shall be backfilled the same day within the allowable working hours. If permission is granted to leave a trench open the Contractor shall cover the opening with 3/4" plywood in non-traveled areas and steel plates elsewhere to allow safe access to City crews during nonworking hours.

Contractor shall exercise caution when working in close proximity to existing trenches.

The Contractor will not be compensated for any additional efforts resulting from encountering CDF, slurry and/or concrete during trenching operations.

Blasting will not be permitted.

All excavated material shall be removed from the job site by the end of each day unless otherwise specified.

64-1.02F Trench Bracing and Shoring – Storm Drain: 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 7-1.02K(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, adjacent areas and structures from the hazards of the trenching or excavation operations.

64-1.03C Laying Pipe: Plastic storm drain pipe shall be installed in accordance with the Standard Specifications, generally accepted practice and on the alignment and grade as shown on the Project Plans.

It is the Contactor's responsibility to ensure that storm drain pipe is laid and bedded on sound materials, existing and new. Any field conditions that may affect alignment and/or grade shall be brought to the attention of the Engineer prior to installation. All existing material that has been disturbed must be removed from the trench prior to the installation of new bedding material.

When connecting a new pipe to an existing drainage inlet, if the inlet has an existing penetration from an old pipe, the Contractor shall modify the opening, as needed, by chipping the existing concrete away just enough to allow for a proper connection with the new pipe. For a new penetration, the wall of the inlet shall be breached by core drilling, sawing, or other approved method that does not disturb the structural integrity of the manhole. After the new pipe is inserted, the Contractor shall backfill the exterior of the drainage inlet around the pipe penetration with concrete to stabilize the connection, and grout the interior of the inlet penetration with a rapid set,

high strength, non-shrink cementitious mortar to a smooth, acceptable finish. All exposed joints, cracks and chips on the interior of new and existing drain inlets shall be patched with an acceptable material.
Concrete collars shall be installed when connecting new pipes to existing pipes per Section 64 of the Standard Specifications and any modifications herein or on the Project Plans.

Where ground water or surface drainage occurs, pumping shall continue until backfilling has progressed to a sufficient height to prevent flotation of the pipe.

All existing storm drain pipe that will no longer be active shall be fully removed by the Contractor and their excavations backfilled per these Special Provisions.

Unless otherwise specifically permitted by the Engineer, all pipes shall be laid upgrade.

64-1.03D Structures: Drainage inlets shall conform to the provisions in Section 51, “Concrete Structures” and Section 70, "Miscellaneous Facilities," of the Standard Specifications as amended by the City of Santa Rosa Construction Standards and these Special Provisions.

Drainage Inlets shall be equipped with locking traffic rated frames and grates. New drainage inlets for tank overflow systems shall be installed at least 6 inches away from new tank ring foundations. Backfill between tank foundations and drop inlets shall be CDF material to within 3 inches of finish grade when drop inlets are installed within 1 foot of foundations. Remaining 3 inches to grade shall be asphalt concrete.

Traffic rated inlet frame and grates shall conform to the provisions in Section 75, "Miscellaneous Metal" of the Standard Specifications. No separate measurement will be made for miscellaneous metal.

Prior to ordering or constructing drainage inlets, the Contractor shall verify sizes, locations and elevations as needed.

64-1.10 Payment: **R3 Tank Site Drainage Improvements** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all work involved to comply with this section, including but not limited to, removal and disposal of existing pipe and appurtenances, furnishing and installing new drain pipe, drainage inlets, cleanouts, and appurtenances, including inlet, frames, grates and locking devices, saw cutting, excavation, removal and disposal of excavated material, trench bracing and shoring, supporting existing utilities as needed, dewatering trenches, connections to new and existing pipe or inlet, setting structures to grade, furnishing, placing and compacting all drain rock, bedding and backfill, including CDF as required, trench plates, temporary and permanent trench paving, and any other work required to comply with Section 64 not specifically enumerated herein or on the Project Plans, and no additional allowance will be made therefor.

R7 Tank Site Drainage Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all work involved to comply with this section, including but not limited to, removal and disposal of existing pipe and appurtenances, furnishing and installing new drain pipe, drainage inlets, cleanouts, and appurtenances, including inlet, frames, grates and locking devices, saw cutting, excavation, removal and disposal of excavated material, trench bracing and shoring, supporting existing utilities as needed, dewatering trenches, connections to new and existing pipe or inlet, setting structures to grade, furnishing, placing and compacting all drain rock, bedding and

backfill, including CDF as required, trench plates, temporary and permanent trench paving, and any other work required to comply with Section 64 not specifically enumerated herein or on the Project Plans, and no additional allowance will be made therefor.

R12B Tank Site Drainage Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all work involved to comply with this section, including but not limited to, removal and disposal of existing pipe and appurtenances, furnishing and installing new drain pipe, drainage inlets, cleanouts, and appurtenances, including inlet, frames, grates and locking devices, saw cutting, excavation, removal and disposal of excavated material, trench bracing and shoring, supporting existing utilities as needed, dewatering trenches, connections to new and existing pipe or inlet, setting structures to grade, furnishing, placing and compacting all drain rock, bedding and backfill, including CDF as required, trench plates, temporary and permanent trench paving, and any other work required to comply with Section 64 not specifically enumerated herein or on the Project Plans, and no additional allowance will be made therefor.

SECTION 72
SLOPE PROTECTION

72-2.01 Description: Rock slope protection (RSP) at tank site R12B shall consist of all preparatory work not already specified in this or other sections, furnishing and placement of geotextile fabric and loose rock riprap. The slope protection shall be placed at the location shown on the Project Plans, per these Special Provisions, and in conformance with the Standard Specifications.

72-2.02 Materials: Loose Rock Riprap - Rocks shall be angular and well graded from an average diameter of four inches to an average diameter of 15 inches with approximately 50 percent by weight smaller than nine inches in average diameter. Not more than ten percent of the rock riprap by weight shall be less than 4-inches average diameter. An occasional rock having an average diameter of not more than 20 inches may be included provided that no more than five percent of the rock riprap area shall have these larger rocks projecting above the neatlines, but in any event the total rock mass shall be dense and well integrated.

72-2.03C Placement Method A: Backfill any voids from clearing and grubbing with clean soil compacted to 90% relative density. Placement of loose rock riprap shall be per Placement Method A of the Standard Specifications and as directed by the Engineer in the field. Placement shall progress in such a manner that does damage existing features and facilities. The Contractor shall take all necessary precautions to ensure no damage to the tank during their operations.

72-2.04 Payment: **Rock Slope Protection** shall be will be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved in rock slope protection, and no additional allowance will be made therefor.

SECTION 73
CONCRETE CURB AND GUTTER

73-1.01A Summary: This work shall consist of curb and gutter and valley gutter construction and shall be constructed in accordance with these Special Provisions, the Project Plans, all applicable City Standards and Specifications and the 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 "Pewter #860", applied in a dosage of 1 pound per 94 pound sack of cement (approximately 6 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 equivalent.

73-1.02 Material: Concrete for curb & gutter and valley gutter shall be "Class A" concrete as specified in Section 90 of these Special Provisions.

73-2.03 Construction: Curb and gutter construction shall be in accordance with Section 73-1.05 of the City Standards and any modification herein and on the Project Plans.

Valley gutter construction shall be in accordance with Section 73-1.07 of the City Standards and any modification herein and on the Project Plans.

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

All concrete shall be cured in accordance with the requirements of Section 90-1.03B of the Standard Specifications and Section 90 of these Special Provisions. Pigmented curing compound or any other material that will leave a noticeable residue will not be allowed.

All oil, paint, tire marks, and other discoloring shall be removed from the curb and gutter, and any other concrete facilities, by power washing or other approved method prior to acceptance by the Engineer. Cement mortar installed to cover defects will not be allowed. Vandalism to uncured concrete surfaces shall be removed in a manner acceptable to the Engineer. If it cannot be removed from the surface, then the vandalized concrete shall be removed and replaced to the nearest score mark or as directed by the Engineer.

73-2.04 Payment: Curb and Gutter 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 doing all the work involved in constructing curb and gutter complete and in place including but not limited to, saw cutting, excavation and disposal of excavated material, constructing forms, furnishing, placing and finishing concrete, removing discoloring, furnishing material for and placing expansion joints, constructing weakened plane joints, backfilling and compaction, temporary and permanent paving adjacent to new concrete curb and gutter, and any other work necessary for concrete curb and gutter installation not specifically enumerated herein or on the Project Plans, and no additional allowance will be made therefor.

Valley Gutter shall be paid for at the contract price per **square foot**, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved in constructing valley gutter complete and in place including but not limited to,

saw cutting, excavation and disposal of excavated material, constructing forms, furnishing, placing and finishing concrete, removing discoloring, furnishing material for and placing expansion joints, constructing weakened plane joints, backfilling and compaction, temporary and permanent paving adjacent to new valley gutter, and any other work necessary for valley gutter installation not specifically enumerated herein or on the Project Plans, and no additional allowance will be made therefor.

SECTION 75
MISCELLANEOUS METAL

75-1.01 General: The work covered by this section consists of furnishing all labor, equipment, appliances and materials, and in performing all operations in connection with the installation of miscellaneous metal work, complete and in accordance with these Special Provisions, the Plans, any approved Shop Drawings, the Standard Specifications, and the City Standards.

Metals shall be free from defects impairing strength, durability and appearance and be of the best commercial quality for the purpose specified.

All exposed fasteners shall be made of the same material, color and finish as the metal to which applied unless otherwise shown or required.

75-1.02 Miscellaneous Shapes, Plates and Bars: The Contractor shall provide and install all miscellaneous shapes, plates, and bars including connections complete as specified.

The Contractor shall fabricate, provide holes for proper installation, and set accurately in place all miscellaneous metal work, complete as specified.

The Contractor shall furnish and install additional miscellaneous braces, clips, connections etc., as may be required to provide a stable, rigid installation.

75-1.02.01 Steel Bollard: Steel bollards, stationary and removable, shall be placed at the locations shown and in conformance with these Special Provisions and the details shown on the Project Plans.

75-1.02.02 Bolts, Nuts and Anchors:

75-1.02.02A General: All bolts, nuts and anchors shall be of adequate size and length for their intended use.

All bolts shall be standard Hex head with cold pressed nuts and locking washers or cut washers, unless otherwise indicated on the drawings.

The length of all bolts and anchors shall be such that after joints are made up, the bolt protrudes through the nut one-eight (1/8) to one half (1/2) inch. Bolts protruding through the nut more than one-half (1/2) inch shall be cut back (no torches) and ground smooth.

Anchor bolts, excluding tank hold down anchors, shall be imbedded to the depth shown on the Project Plans, or a minimum of 6-inches if not specifically shown.

75-1.02.02B Materials: Carbon steel bolts shall be ASTM A307 Grade B unless otherwise specified. Nuts shall be ASTM A563 Grade A Hex style, unless otherwise indicated on the plans.

Non-headed anchor bolts, either bent or straight to be used for structural anchorage purposes, unless otherwise indicated on the plans, shall conform to the requirements of ASTM Specification A36. Nuts shall be ASTM A563 Grade A.

All carbon steel fasteners shall be zinc coated by the hot dip process in accordance with the requirements of ASTM Specification A153 Class C.

All stainless steel bolts shall be ASTM A320 Grade B8M (AISI Type 316). Nuts shall be austenitic alloy nuts conforming to ASTM A194 Grade 8M. For securing equipment to exterior pads, stainless steel concrete anchors shall be Hilti drop in anchors or approved equivalent. All bolts, nuts and anchors located in the interior of the tanks shall be Type 316 stainless steel.

75-1.02.02C Fabrication: Insofar as possible, the work shall be fitted and shop assembled, ready for erection. Work shall be executed in strict accordance with the plans, details and approved shop drawings.

Shop and field connections shall be bolted or welded, as required. No welding of stainless steel to carbon steel shall be allowed.

Jointing and intersection of metals shall be accurately made, tightly fitted and made in true planes, with adequate fastenings.

Holes and connections shall be made for work of other trades and connection shall be made thereto, unless otherwise indicated or directed by the Engineer.

Welding and welding equipment shall conform to the requirements of the American Welding Society's Code of Welding in Building Construction.

Fabricators and welders shall be licensed operators. Welding certifications shall be provided to the Engineer for each welder prior to working on this project. Welding shall conform to the best modern practice. All welds shall be of adequate strength and durability, with jointing made tight, flush, in true planes with base metals and shall be clean and ground smooth.

All field welding of steel shall be done by an unvarying arc welding process which excludes the atmosphere during the process of deposition and while the metal is in a molten state. The type and size of electrode used, and the current and voltage required shall in all cases be of common acceptable practice. Previously used or otherwise damaged electrodes shall not be used and violation of this provision shall be sufficient cause for rejection of the work. All welds shall be of uniform composition, neat, smooth, full strength, and ductile; shall be free from undercut, porosity and clinker; and shall be made with a technique which will insure uniform distribution of load throughout the welded section with a minimum tendency to produce eccentric stress or distortion of the weld or in the metal adjacent thereto. Welding shall be continuous along the entire line of contact.

Any exposed stainless steel shall be fully protected while grinding and/or welding carbon steel. Material used to grind or cut carbon steel shall not be used on stainless steel.

75-1.02.02D Shop Drawings: Shop Drawings of all fabrications shall be submitted by the Contractor for review and approval by the City at least three (3) weeks prior to delivery to the job site.

Shop Drawings shall be labeled to clearly show location(s) of intended use, the operating characteristics, dimensions, etc., for the equipment and/or materials being proposed. Shop Drawings that are not so marked or are unclear will be returned to the contractor for resubmittal.

The Engineer's review of product submittals shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or compliance with Contract Documents.

The Contractor shall submit a minimum of five (5) copies of all shop drawings. One copy will be returned to the Contractor upon review by the City.

75-1.05 Galvanizing: All exposed ferrous metal except stainless steel, including supports, clips, braces, hangers, bolts, washers and nuts shall be fabricated as shown on the approved shop drawings and hot dip galvanized after fabrication in accordance with ASTM A 123 "Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, Forged Steel Shapes, Plates, Bars, and Strips" and ASTM A 153 "Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware."

75-1.06 Payment: Full compensation for conforming to all provisions of this section, except as otherwise specified, shall be considered as included in the prices paid for the **various contract items** of work involved and no additional compensation will be made therefor.

Steel Bollard, stationary and removable, shall be paid for at the contract price **each**, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all work involved, including but not limited to, saw cutting, excavation, removal and disposal of excavated material, placing bollard and concrete footing, filling stationary bollard with concrete and creating a rounded and smooth concrete cap, providing handles and at-grade locking mechanism for removable bollards, paving, and any other work necessary to construct steel bollard, stationary and removable, not specifically enumerated herein or on the Project Plans, and no additional allowance will be made therefor.

SECTION 77
WELDED STEEL TANK UPGRADES

77-1.01 Description: The work covered by this section of the Special Provisions consists of furnishing all labor, equipment, appliances, materials and incidentals and performing all operations in connection with adding, removing or modifying piping or other appurtenances on welded steel tanks for potable water use. Specifically, this section shall apply to constructing the modifications to the existing R3, R7 and R12B tanks and shall consist of, among other items specified, the following:

- shell manhole addition,
- modifications to existing shell manhole,
- modifications to existing roof vent(s),
- installing new roof vents,
- internal ladder and safety climb bar replacement,
- exterior ladder and platform modification,
- safety cage addition,
- overflow modification,
- outlet piping floor penetration,
- inlet mixing system addition,
- seal welding,
- reinforce interior columns,
- anchor bolt hold downs,
- removal of cathodic protection system, including hanging anodes and their appurtenances.

The Contractor shall provide their own power to operate all equipment used on this project regardless of the type of work.

77-1.02 Related Work Elsewhere: Site preparation and earthwork shall comply with the requirements of Sections 16 and 19 of these Special Provisions.

Tank concrete ring foundation replacement, including anchor bolts and related items, shall comply with the requirements of Section 51 of these Special Provisions.

Piping and pipe appurtenances shall comply with the requirements of Section 99 of these Special Provisions.

Coatings shall comply with the requirements of Section 59 of these Special Provisions.

77-1.03 Tank Bottom Pad: Unless otherwise specified, wherever disturbance to the existing bottom pads occurs due to the various operations of work under this contract, the bottom pad shall be restored per the requirements specified.

77-1.03.01 Tank Bottom Anti-Corrosion Coating: Two coats of protective coating material shall be applied to all exposed areas of the tank bottom. The coating shall consist of a Heavy Duty Rubberized Undercoating as manufactured by Permatex, or an approved equivalent. Prior to the application of this material, all scale, cane fiber padding, and other dirt and debris shall be

thoroughly cleaned from the underside of the tank floor where the plates will be in contact with the concrete foundation. The contractor shall submit the proposed undercoating for approval.

77-1.04 Trench Bedding and Backfill Under Tank: The Contractor shall use two sack controlled density fill (CDF) as bedding and backfill around under tank piping. The CDF shall be poured neat against the undisturbed trench wall under the tank with forms on all other sides. Limits of the CDF shall not obstruct tank foundation. Mix shall be submitted to the Engineer for acceptance and the City may request minor modifications and no additional cost.

77-1.05 Tank Upgrades: The design and construction of the tank upgrades shall conform to American Water Works Association Specifications D100-11, American Welding Society Specification D5.2, the Uniform Building Code latest revisions, and as specified in these contract documents.

All tank shell fabrication/modification shall be by welding. The underside (tank interior) of all existing roof plates shall be seal welded to reduce corrosion potential between plates. Roof plates shall not be welded to any structural steel. Areas where roof plate lap seams sit on rafters and are inaccessible for welding shall be separated from the rafter by the use of wooden wedges, where possible, to allow for seal welding.

Each tank shall be modified to include the equipment and appurtenances specified. **The Contractor shall cut out a coupon from the side of each tank, for access to the interior just large enough for the largest piece of equipment to pass through.** The coupon shall be re-welded in place when interior work, except for coating, is complete and tested per Section 77-7.01 of these Special Provisions. During construction the coupon shall be temporarily hinged to the tank, with means of securely locking it closed during nonworking hours.

77-2 Inlet Mixing System:

77-2.01 General: The inlet mixing system shall be defined as all pipe, valves and appurtenances within the tank downstream of the inlet pipe penetration through the bottom of the tank, and the piping under the tank from the tank bottom penetration to the first fitting outside the perimeter of the tank foundation. Appurtenances include pipe fittings, pipe supports, elastomeric duckbill check valves and all other materials and equipment necessary for a complete installation as specified.

Piping for the inlet mixing system shall be schedule 20 fusion bonded epoxy lined and coated welded steel meeting the requirements of Section 99 of these Special Provisions.

All mixing system flange faces and bolt holes for pipe and fittings shall be fusion bonded epoxy coated. Flange faces shall have a finished surface that will not hinder a watertight connection.

77-2.02 Inlet Connection: The inlet mixing system manifold piping shall be connected to the welded steel inlet piping in the vertical pipe section above the tank floor by means of a standard flanged connection with elongated slots in lieu of bolt holes. The connecting flange shall also have elongated slots. Flange drilling shall conform to ANSI 16.1/16.5. The inlet mixing system manifold must be capable of rotating horizontally (10 degrees minimum) in order to avoid tank columns or other obstructions while maintaining a rigid and restrained connection.

77-2.03 Fittings: Mixing system fittings may be carbon steel (except fittings described in 77-2.07).

Carbon steel fittings shall be fabricated of ASTM A53 or API 5L, standard weight, seamless or ERW carbon steel pipe and standard weight welding fittings conforming to ASTM A234 and ANSI B16.9. Flanges shall be forged steel conforming to ASTM A105 and ANSI B16.5. Flanges shall be class 150, slip on or weld neck. Fitting dimensions shall conform to AWWA C208-12.

All mixing system fittings shall be fusion bonded epoxy coated inside and outside. Fusion bonded epoxy coating shall be Skotchkote 203 Fusion Bonded Epoxy Coating as manufactured by the Electro Products Division of the 3M Company or approved equivalent. The coating shall be applied in accordance with the manufacturer's recommendations to a minimum dry film thickness of ten (10) mils. The coating shall be inspected and tested for thickness and pin holes. Any coating imperfections shall be repaired at the Contractor's expense using a field applicable Epoxy Coating compatible with the shop applied epoxy coating.

Field applied epoxy coatings shall be compatible with shop applied coatings, and shall be submitted for review and approved by the Engineer prior to their use.

77-2.04 Flange Gaskets: Flange gaskets shall be full-faced and shall be in accordance with ASTM D1330. Gasket drilling pattern shall be mating flanges. Gasket material shall be EPDM.

77-2.05 Fasteners: Hex head bolts and nuts shall be 316 stainless steel conforming to ANSI/ASME B18.2.1 and ANSI/ASME B18.2.2. The use of dielectric isolators is required when fastening to, or permanent contact will be made between dissimilar metals. A food grade never seize shall be neatly applied to all threads prior to final placement.

77-2.06 Horizontal Pipe Supports: All pipe support components shall be carbon steel except for the "over strap/C-clamp", or approved equivalent, and fasteners, which shall be dielectrically isolated, 316 stainless steel. The pipe support assembly shall provide adequate vertical adjustment to allow for proper alignment of the horizontal pipe section. If stainless steel C-clamps are use they shall be appropriately sized for the installation, not leaving any gaps between the pipe and the clamp. The pipe support reinforcing plates shall be welded to the tank floor and allowed to cool prior to the installation of any other pipe support components. The base of the pipe supports shall be seal welded to the reinforcing plate as shown, and all adjustable sections welded in place after final adjustments are made to ensure the mixing system pipe is level. Stainless steel "over strap/C-clamp" and fasteners shall be installed after final coating has cured.

The pipe support assembly shall consist of three weldments:

1. A reinforcing plate weldment as shown.

2. A base plate weldment that consists of a base plate with a center-located tubular guide.

3. A top-works weldment that consists of a support plate formed to provide 120 degrees of contact area with the pipe and a center-located pipe stub welded to the bottom of the support plate. Stainless steel over-straps or C-clamps and fasteners shall be provided with the top-works.

The pipe stub shall be inserted into the tubular guide of the base plate weldment during installation of the support assemblies.

A 1/8" thick EPDM strip matching the length and width of the support at contact to pipe/fitting shall be placed between the pipe and the pipe supports.

The base plate weldment and top-works weldment shall be joined by field welding following cooling of the reinforcing plates and proper vertical adjustment of the assembly.

77-2.07 Elastomeric Duckbill Check Valve: The Contractor shall install duckbill check valve assemblies where specified so that the opening is in a vertical position.

Check Valves are to be all rubber of the flow operated check type with a flanged end connection of the sizes indicated on the Project Plans. The port area shall contour down to a duckbill, which shall allow passage of flow in one direction while preventing reverse flow. The flange and flexible duckbill sleeve shall be one piece rubber construction with nylon reinforcement. Any valve that arrives on site "fish mouthed" will be rejected.

The flange drilling shall conform to ANSI B16.1 Class 125/ANSI B16.5, Class 150 standards. The valve shall be furnished with 316 stainless steel backing rings for installation.

Manufacturer must have available flow test data from an accredited hydraulics laboratory to confirm pressure drop data. The manufacturer shall have performed hydraulic testing of the valves for flow capacity, head loss and jet velocity and shall furnish data from such testing upon request. Company name, plant location, valve size and serial number shall be bonded to the check valve.

When line pressure inside the valve exceeds the backpressure outside the valve by a certain amount, the line pressure forces the bills of the valve open, allowing flow to pass. When backpressure exceeds the line pressure by at the same amount, the bills of the valve are forced closed.

Duckbill check valves shall be installed so the "mouth" is in a vertical (up and down) orientation after final coating of mixing system components, and in accordance with manufacturer's written installation instructions and approved submittals.

Duckbill check valves shall be Tideflex Series 35, NSF 61 certified inlet nozzle as manufactured by Red Valve Co. or approved equivalent.

77-2.08 Coatings: All carbon steel components of the system shall be coated according to the interior tank coating specification. Surface preparation and coating procedures shall be in strict accordance with Section 59 of these Special Provisions. Areas that will not be accessible after installation shall receive all coats prior to installation.

77-2.09 Submittals: Submittals for the inlet/outlet mixing system shall include the following:

1. Drawings for all fabricated pipe joints, fittings and pipe supports.
2. Performance graph of flow vs. head for all duckbill check valves. Graph for inlet valves shall cover a minimum flow range of 0 to 1400 gpm.
3. Duckbill check valve NSF 61 certification listing.
4. Test report from an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine per ASTM D471-98.
5. Dielectric isolation system and fasteners.
6. EPDM strip

7. Food grade never seize
8. Documentation that shop coating material, prep and application was adhered to.

77-2.10 Installation Guidelines: Following installation of the complete mixing system, the Contractor shall visually inspect the entire system under actual flow conditions to ensure that flow is being discharge through all inlet valves and that no leakage is occurring.

77-3 Outlet Pipe and Vortex Breaker: Outlet piping shall be schedule 20 fusion bonded epoxy lined and coated welded steel meeting the requirements of Section 99 of these Special Provisions.

Vortex breaker and sediment trap shall be constructed as shown on the Plans and arrive on site with a fusion bonded epoxy coating.

Fusion bonded epoxy coating shall be Scotchkote 203 Fusion Bonded Epoxy Coating as manufactured by the Electro Products Division of the 3M Company or approved equivalent. The coating shall be applied in accordance with the manufacturer's recommendations to a minimum dry film thickness of ten (10) mils. The coating shall be inspected and tested for thickness and pin holes. Any coating imperfection shall be repaired at Contractor's expense using a field applicable Epoxy Coating compatible with the shop applied epoxy coating. Field applied epoxy coating touch up materials shall be submitted for review and approved by the Engineer prior to their use.

77-3.01 Coatings: All accessible components of the outlet piping system, including the vortex breaker and sediment trap, shall be field coated according to the interior tank coating specification. Surface preparation and coating procedures shall be in strict accordance with Section 59 of these Special Provisions.

77-4 Overflow Pipe: Piping for the overflow shall be schedule 20 fusion bonded, epoxy lined welded steel meeting the requirements of Section 99 of these Special Provisions.

Overflow pipe flange face and bolt holes shall be fusion bonded epoxy coated. Flange face shall have a finished surface that will not hinder a watertight connection.

The existing 6 inch overflow pipe and all appurtenances, including overflow weir, shall be removed and replaced with a new 12 inch overflow pipe and weir box. The Contractor shall install a doubler plate at the tank penetration for support. The new weir box shall be constructed as specified. The Contactor shall measure the elevation of the existing weir overflow in the field and construct the new weir box at the same overflow elevation.

The pipe segments to create the "dogleg", as shown, shall have the shop applied coating held back approximately three inches, and shall be welded in the field with each joint receiving a surface prep and field applied epoxy coating as work progresses. Flanged connections will not be allowed except where connecting to duckbill check valve.

Fusion bonded epoxy coating shall be Scotchkote 203 Fusion Bonded Epoxy Coating as manufactured by the Electro Products Division of the 3M Company or approved equivalent. The coating shall be applied in accordance with the manufacturer's recommendations to a minimum dry film thickness of ten (10) mils. The coating shall be inspected and tested for thickness and pin holes. Any coating imperfection shall be repaired at Contractor's expense using a field applicable

Epoxy Coating compatible with the shop applied epoxy coating. Field applied epoxy coatings shall be submitted for review and approved by the Engineer prior to their use.

77-4.01 Flange Gaskets: Flange gaskets shall be full-faced and shall be in accordance with ASTM D1330. Gasket drilling pattern shall be mating flanges. Gasket material shall be EPDM.

77-4.02 Fasteners: Hex head bolts and nuts shall be 316 stainless steel conforming to ANSI/ASME B18.2.1 and ANSI/ASME B18.2.2. The use of dielectric isolators is required.

77-4.03 Elastomeric Duckbill Check Valve: The Contractor shall install duckbill check valves as shown on the plans, as directed by the Engineer and in accordance with these special provisions.

Check Valves are to be all rubber of the flow operated check type with a flanged end connection of the size indicated on the plans. The port area shall contour down to a duckbill, which shall allow passage of flow in one direction while preventing reverse flow. The flange and flexible duckbill sleeve shall be one piece rubber construction with nylon reinforcement. Any valve that arrives on site “fish mouthed” will be rejected.

The flange drilling shall conform to ANSI B16.1 Class 125/ANSI B16.5, Class 150 standards. The valve shall be furnished with 316 stainless steel backing rings for installation.

Manufacturer must have available flow test data from an accredited hydraulics laboratory to confirm pressure drop data. The manufacturer shall have performed hydraulic testing of the valves for flow capacity, headloss and jet velocity and shall furnish data from such testing upon request. Company name, plant location, valve size and serial number shall be bonded to the check valve.

Valve shall be installed, after final coating, in accordance with manufacturer’s written installation instructions and approved submittals.

Duckbill check valves shall be Tideflex Series 35, NSF 61 certified inlet nozzles as manufactured by Red Valve Co. or approved equivalent.

77-4.04 Coatings: All carbon steel components of the overflow system shall be coated according to the exterior tank coating specification. Surface preparation and coating procedures shall be in strict accordance with Section 59 of these Special Provisions.

77-4.05 Submittals: Submittals for the overflow system shall include the following:

1. Drawings for all fabricated pipe joints, fittings and support brackets.
2. Performance graph of flow vs. head for all duckbill check valves. Graph for inlet valves shall cover a minimum flow range of 0 to 1400 gpm.
3. Duckbill check valve NSF 61 certification listing.
4. Test Report from an accredited independent laboratory that confirmed there is no degradation in the valve elastomer when exposed to chlorine and chloramine per the ASTM D471-98.
5. Dielectric isolation system and fasteners.
6. Documentation that shop coating material, prep and application was adhered to.

77-6 Safety and Health:

77-6.01 General: The Contractor shall provide and require use of personal protective life saving equipment for persons working in or about the project site in accordance with requirements set forth in the latest revisions of OSHA Regulations for Construction, American Water Works Association (AWWA), Manual M3 , and all other regulatory agencies applicable to the construction industry. The Manufacturer's printed instructions, appropriate technical bulletins and manuals, including all applicable SSPC Standards and Guides shall apply.

77-6.02 Head and Face Protection and Respiratory Devices: For coating removal or application in confined areas, all persons exposed to toxic vapors or atomized coatings shall wear air-supplied masks. Equipment shall also include protective helmets, which shall be worn by all persons while in the vicinity of the work area. In addition, workers engaged in or near work during abrasive blasting, shall wear eye and face protection devices and air purifying respirators with appropriate filters. Barrier creams shall be used on any exposed skin.

The Contractor shall at all times conduct his work so as to assure the least possible inconvenience to the general public and adequate protections of persons and property in the work vicinity. If abrasive blasting or coating operations occur outside of a contained area, attention shall be paid to prevailing winds to reduce drifting of abrasive blast residue, dust, and coating overspray. At no time should drifting materials exceed any governmental agency's laws, codes, or guidelines. Abrasive blast removal of coatings containing lead, zinc or chromium VI concentrations of more than the federally allowed limit shall be not be allowed without proper containment.

77-6.03 Ventilation: All solvent vapors shall be completely removed by suction type, explosion-proof exhaust fans and blowers, as described in AWWA Manual M3, Air shall not be forced from the outside into the enclosure. Care should be taken to remove toxic vapors and atomized particles with special attention given to the lowest and coolest areas. The exhaust from blasting shall be filtered to remove particulate matter. Ventilation system shall be approved by the Engineer prior to the start of work.

Ventilation systems shall remain in service during coating application and for a minimum of seven (7) days after completion of final coating application or coating repair, or until coating has fully cured. Fuel or electricity costs shall be borne by the contractor unless specified otherwise.

The minimum blower size used for ventilation shall be 20,000 CFM unless otherwise approved by the Engineer.

77-6.04 Sound Level: Whenever occupational noise exposure exceeds maximum allowable sound levels, Contractor shall provide and require the use of approved ear protection devices. Equipment shall be placed in locations or muffled in order to reduce exterior noise with respect to nearby residents. All equipment which creates noise in excess of 50 decibels at property lines shall be sound attenuated. All other work which creates noise in excess of 50 db at property lines shall be limited to between 8:00 a.m. and 5:00 p.m. - Monday through Friday.

77-6.05 Illumination: Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Engineer, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. Flashlights for illumination will not be considered adequate for work or inspection.

77-6.06 Temporary Ladders and Scaffolding: Prior to their use, the Contractor shall provide onsite ladder and scaffold training to their workers and up to four City employees. The training shall cover erection and use of the types of this equipment that will be utilized for this project. Training shall be conducted by an instructor that is qualified to train personnel on this equipment.

All temporary ladders and scaffolding shall be erected by experienced and qualified personnel and must conform to all applicable safety standards. They shall be erected as needed to facilitate the work, and where requested by the Engineer to facilitate inspection and be moved by the Contractor to locations requested by the Engineer. Any system required by the Engineer for inspection shall be constructed is such a manner that will not damage new or existing facilities or coatings. Scaffolding shall be inspected by qualified personnel prior to first use and at the beginning of each work day with the inspection logged on an inspection tag fastened to the scaffold.

77-6.07 Grounding: Abrasive blasting and coating hoses shall be grounded to prevent accumulation of a charge of static electricity.

77-6.08 Fire Hazard: Flammable, volatile solvents in coatings constitute a major hazard with regard to fire and explosions wherever flame or spark exposure is possible. All flames, smoking, and welding, etc., are strictly prohibited. Fire abatement devices shall be readily available and in operating condition. All coatings shall be stored in conformance with applicable State, County and/or Local Fire Codes pertaining to flammable materials.

The Contractor shall take necessary precautions to keep fire hazard to a minimum; removing from the area daily all oily rags, waste, and other combustibles not in covered containers.

77-6.09 Fines: The cost of any penalties or fines levied due to the Contractor's actions which violate any regulatory codes or requirements shall be borne by the Contractor.

77-7.01 Leakage and Weld Testing: Prior to any coating, each tank shall be tested for leakage. A vacuum apparatus satisfactory to the Engineer shall be used to test the floor in locations where welds were made. All vacuum testing shall be conducted in the presence of the Engineer.

All welds on the tank shall be tested by the radiographic method in conformance with AWWA D100-11, Section 11, by a special inspector (testing laboratory) hired by the City. The weld test results will be documented and submitted to the Engineer by means of a report conforming to AWWA D100-11. Approval of the testing laboratory shall be done by the City Building Division in conjunction with the Engineer. Welds that fail the special inspection shall be repaired and retested at the Contractor's expense prior to the start of tank coating operations.

The Contractor shall notify the Engineer a minimum of 2 working days in advance of any testing procedure.

The Contractor is directed to Section 59-1.03G of these Special Provisions for disinfection and testing requirements.

77-12 Security: The areas where the tank upgrade work will be performed are located within locked and fenced areas. The sites are accessible from public or private roads. The Contractor will be allowed to store items within the fenced and/or locked areas, but the City will NOT assume liability for theft, damage or injury, which is the sole responsibility of the Contractor.

77-13 Payment: **R3 Tank Upgrades** shall be paid for at the contract **lump sum** price for the various tanks, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved to comply with the contract documents, including but not limited to, removal of existing material and equipment as required, inlet mixing system, outlet pipe, weir box replacement, vortex breaker and drain channel in tank bottom, overflow pipe modifications, shell access manhole additions and modifications, roof hatch additions and modifications, new interior ladder and appurtenances, new exterior access ladder and platform modifications, antenna relocation, sample and level tap installation and all appurtenances, including supports, stainless steel ball valves and dielectric fittings, remove cathodic protection system, roof vent modifications, safety lanyards, seal welding of all interior roof plates and weld plate covers on wall and roof penetrations, remove and replace safety cables, anchor bolt hold down chairs, submittals, supporting, removal and disposal of existing utilities and their appurtenances, removing sections of steel tank, tank penetrations, piping/tubing and accessories as required, excavation and disposal of excavated materials, installation of FBE steel pipe, polyethylene wrap, welding flange, installation of fittings, elastomeric duckbill check valves, pipe supports and brackets, placing and compacting all required bedding and backfill, including controlled density fill, application of tank bottom anti-corrosion coating, tank welding, cleaning, disinfection and testing, providing saf-t-climb harnesses and sliders, and any other work necessary for tank upgrades not specifically enumerated, and no additional allowance will be made therefor.

R7 Tank Upgrades shall be paid for at the contract **lump sum** price for the various tanks, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved to comply with the contract documents, including but not limited to, removal of existing material and equipment as required, inlet mixing system, outlet pipe, vortex breaker and drain channel in tank bottom, overflow pipe modifications, shell access manhole additions and modifications, roof hatch additions and modifications, new interior ladder and appurtenances, new exterior access ladder and platform modifications, antenna relocation, sample and level tap installation and all appurtenances, including supports, stainless steel ball valves and dielectric fittings, remove cathodic protection system, roof vent modifications, safety lanyards, seal welding of all interior roof plates and weld plate covers on wall and roof penetrations, remove and replace safety cables, anchor bolt hold down chairs, submittals, supporting, removal and disposal of existing utilities and their appurtenances, removing sections of steel tank, tank penetrations, piping/tubing and accessories as required, excavation and disposal of excavated materials, installation of FBE steel pipe, polyethylene wrap, welding flange, installation of fittings, elastomeric duckbill check valves, pipe supports and brackets, placing and compacting all required bedding and backfill, including controlled density fill, application of tank bottom anti-corrosion coating, tank welding, cleaning, disinfection and testing, bird control system, providing saf-t-climb harnesses and sliders, and any other work necessary for tank upgrades not specifically enumerated, and no additional allowance will be made therefor.

R12B Tank Upgrades shall be paid for at the contract **lump sum** price for the various tanks, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved to comply with the contract documents, including but not limited to, removal of existing material and equipment as required, inlet mixing system, outlet pipe, vortex breaker and drain channel in tank bottom, overflow pipe modifications, shell access manhole additions and modifications, roof hatch additions and modifications, new interior ladder and appurtenances, new exterior access ladder and platform modifications, antenna relocation, sample and level tap installation and all appurtenances, including supports, stainless steel ball valves and dielectric fittings, remove cathodic protection system, roof vent modifications, safety lanyards, seal welding of all interior roof plates and weld plate covers on wall and roof

penetrations, remove and replace safety cables, anchor bolt hold down chairs, submittals, supporting, removal and disposal of existing utilities and their appurtenances, removing sections of steel tank, tank penetrations, piping/tubing and accessories as required, excavation and disposal of excavated materials, installation of FBE steel pipe, polyethylene wrap, welding flange, installation of fittings, elastomeric duckbill check valves, pipe supports and brackets, placing and compacting all required bedding and backfill, including controlled density fill, application of tank bottom anti-corrosion coating, tank welding, cleaning, disinfection and testing, providing saf-t-climb harnesses and sliders, and any other work necessary for tank upgrades not specifically enumerated, and no additional allowance will be made therefor.

SECTION 80
CHAIN LINK FENCE

80-1.01 General: Chain link fence, gates, and appurtenances to be erected under this contract shall be constructed in accordance with these Special Provisions, the details shown on the Project Plans, Section 80 of the Standard Specifications and as directed by the Engineer.

Fence and gates shall be 8 feet high. Fences shall not be topped with barbed wire.

80-1.02 Clearing: Site preparation for new fence shall be done per Section 16 of these Special Provisions, as shown on the Project Plans, and any additions herein. The Contractor may, at their discretion, either remove the existing fence entirely prior to construction of the new fence, or as needed during erection of the new fence.

Existing post footings shall be completely removed to a minimum 12 inches below grade, and the voids filled and compacted to 85% RC with native or other approved material.

All removed and unused fencing material shall become the property of the Contractor and shall be disposed of away from the construction site in compliance with all laws and regulations.

80-1.07 Temporary Fences: For site security purposes, there shall be a complete perimeter fence in place at all times consisting of existing, new and/or approved temporary fencing. No existing or temporary fencing material shall be reused on the new fence. Any additional temporary fencing required to maintain site security will be provided, maintained, and removed by the Contractor at no additional charge to the City.

Temporary perimeter fence shall be a minimum of 6 feet with galvanized chain link fabric and either wood or steel posts.

The Contractor is made aware that the neighbor that shares the fencing on the eastside of tank R3 has dogs. For the safety of workers as well as the dogs, the Contractor shall notify and coordinate with the property owner and Engineer prior to, and during demolition and construction of the perimeter fence.

80-3.02 Materials: Visual inspection of all material shall be made prior to installation. Any material showing signs of damage shall not be used.

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. The color of the vinyl coatings shall be black.

80-3.02B Post and Braces: All posts, gate frames, and rails shall be steel pipe galvanized and vinyl clad according to the specifications of AASHTO Designation M-111 and as specified on the Plans.

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 Fabric: Chain link fence 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.

80-3.03 Construction: The fence shall be installed by skilled and experienced fence erectors on lines and grades furnished by the Engineer or shown on the plans. Line and corner posts for perimeter fence shall be set in concrete foundations a minimum of 36" inches deep and gate posts a minimum of 48" deep. Concrete foundations shall be no less than three times the diameter of the posts. Line post spacing shall not exceed ten foot centers.

The existing fencing, gates and appurtenances shall become the property of the Contractor and shall be disposed of away from the construction site to the satisfaction of the Engineer.

80-1.06 Payment: Chain Link Fence at tank sites; R3, R7 and R12A, will 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 work involved in constructing chain link fence in place complete as specified, including but not limited to; submittals, furnishing and installing fence, gate and appurtenances, additional site preparation as needed other then as specified in Section 16, removal of existing, gate and concrete footings, excavation or drilling, placement of new concrete post footings, attaching fabric to posts, drop bar, locking device, coating as required, and any other work necessary to construct chain link fence and gate not specifically enumerated herein, on the Project Plans or in the Standard Specifications, and no additional allowance will be made therefor.

Full compensation to relocate chain link fence at R12B, as shown on the Project Plans, shall be considered as included in the prices paid for **R12B Tank Site and Water System Improvements,** which includes but is not limited to, furnishing all labor, materials, tools, equipment and incidentals, and doing all work involved in relocation of approximately 30 LF of existing 10 foot high galvanized chain link fence complete and in place as specified, including but not limited to; submittals, furnishing and installing new posts, replacing the gate locking mechanism, adding to existing chain link as needed and appurtenances, additional site preparation as needed other then as specified in Section 16, removal of existing, concrete footings, filling and compacting holes, excavation or drilling, placement of new concrete post footings, attaching fabric to posts, removal and proper disposal of materials, and any other work necessary to relocate existing fence not specifically enumerated herein, on the Project Plans or in the Standard Specifications, and no additional allowance will be made therefor.

Quantities of chain link fence to be paid for will be determined from actual measurements in the field, such measurement is to be made parallel to the ground slope along the line of the completed fence.

80-10.03 Gates: Two 12-foot wide drive gates providing a 24-foot wide clear opening shall be provided at the driveway at tank site R7 and two 9-foot wide drive gates providing a 18-foot clear opening shall be provided at the driveway at tank site R3, installed where shown on the Project Plans and as directed by the Engineer. Gates shall be provided with catch and locking attachment of an approved design which will not rotate around the latch post. Stops to hold gates open and a center rest with catch shall be provided. Gate hinges and stops shall provide a 90 degree (minimum) opening. All appurtenances, including the locking system as shown on the Project Plans shall be powder coated with a black finish, unless otherwise approved by the Engineer.

A new single leaf bar gate shall be installed at the beginning of the access road to R12B as shown on the Project Plans. After the new gate is installed and operational, the Contractor shall remove the existing gate which consists of two steel posts, their foundations and a cable. All material shall become the property of the Contractor and is to be removed from the site. Holes left behind after post removal shall be filled and compacted with approved material.

See Section 15-4.01 for gate requirements at site Pump Station site S2.

80-10.04 Payment: R3 Chain Link Fence Gate shall be will be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved in double panel chain link fence gate installation, and no additional allowance will be made therefor.

R7 Chain Link Fence Gate shall be will be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved in double panel chain link fence gate installation, and no additional allowance will be made therefor.

R12B Single Leaf Bar Gate shall be will be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all work involved in single leaf bar gate installation, and no additional allowance will be made therefor.

SECTION 86
ELECTRICAL SYSTEMS

86-1.01 Summary: Tank site electrical improvements covered by this section of the Special Provisions consists of furnishing all necessary labor, materials, equipment and incidental materials necessary to construct in a good, workmanlike and prompt manner, complete and operational electrical, instrumentation and control systems in strict accordance with applicable law, the Standard Specifications, the City Specifications, the City Standards, the City Standard Plans, the Plans and these Special Provisions.

Coordinated mobilization shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for the establishment of all offices and other facilities necessary for work on the project; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various contract items on the project site.

Electrical work shall include, but not be limited to, the following items of work:

1. Demolition, removal and disposal of existing electrical, control and instrumentation apparatus, including foundations, cabinets, brackets and posts, cathodic equipment, per these Special Provisions and as shown on the Plans, including the safe de-energizing of those electrified systems in the project area. Existing equipment removed shall be stored in a safe and dry location for selective salvage by the Engineer, after which, the remainder of the electrical equipment shall be removed and properly disposed of by the Contractor.
2. Replacement or relocation of any electrical systems, which may be interrupted due to the new work, but that is not deemed a part of this work. Rerouting electrical systems shall be limited to the project area.
3. Providing temporary power and supply of all necessary apparatus for temporary lights and power outlets for the tools used in construction. Outlets utilized during construction shall have approved ground fault circuit protection.
4. Placement and installation of new electrical and telemetry panels to be supplied by the City at each site, connecting to the existing power and telephone systems, and connecting the sample and gauging water lines as required to complete and make functional each panel.
5. Installation of new electrical distribution panels, extensions of existing power and telephone conduits and circuits, new light fixtures, including trenching and backfilling, underground conduit, wire, pull boxes and the like, as referenced on the Plans.
6. New electrical equipment housekeeping pad(s), support anchors, sleeves, and seismic restraints, as required.
7. Complete grounding system including all ground rods in ground well box, bonds, connectors and testing.

The following items are not included in the electrical work:

1. Telephone network cable, final connection to telephone equipment.
2. Protective structures, fences, retaining walls, and architectural barricades around electrical equipment.

The Contractor shall provide their own power to operate all equipment used on this project regardless of the type of work.

86-1.02 Regulations and Code: The components of the assemblies shall be designed, manufactured, tested in accordance with the latest applicable standards of the IEEE, ANSI, NEMA, PG&E, EUSER and latest requirements of the National Electrical Code. Applicable sections and components shall bear the UL seal and/or label.

The motor control center and major components shall be suitable for and certified to meet all applicable seismic requirements of the California Building Code (CBC) through zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the equipment manufacturer and be based upon testing of representative equipment. The motor control center shall be manufactured by an ISO 9001 certified facility.

The Contractor shall obtain electrical permits and pay all fees required by the local inspecting authority. Contractor shall determine which local, state or federal regulatory guidelines apply and meet the requirements of those provisions. Conform to applications for which work permits have been issued and to any approved amendments thereafter. Amendments in work covered by approved permits shall not be made without the prior written approval. Upon completion of the project, furnish to the Engineer all final certificates of Inspection.

86-1.02.01 Technical Sections: References in this specification are those published sections that describe products, installation procedures, and equipment operations. The publications listed below shall form a part of this section to the extent referenced.

1. National Electrical Code (NFPA Volume 7).
2. National Fire Protection Association (NFPA).
3. Underwriters Laboratories (UL).
4. American National Standards Institute (ANSI).
5. Institute of Electrical and Electronic Engineers (IEEE).
6. Insulated Power Cable Engineers Association (IPCEA).
7. National Electrical Manufacturer's Association (NEMA).

86-1.02.02 Safety: It is the responsibility of the Contractor to minimize fire and fall hazards. When contracted work has been completed or at the end of the work day/shift the area around the construction site will be cleared of all debris by parties performing work in the area. Employees shall immediately notify their supervisor of any perceived fire or fall hazards. Clear access shall always be maintained around emergency vehicle lanes, building exits, breaker panels, trash receptacles, extinguishers, showers and fire hydrants. Contractor shall be responsible for implementing safety practices found in the following:

- Occupational Safety and Health Act of 1970 – OSHA 29CFR 1910.269
- National Fire Protection Association – NFPA 70E
- Applicable state and local safety operating procedures.

86-1.04 Equipment List and Drawings: Within 15 days after receiving "written notice to proceed", the Contractor shall deliver a submittal schedule for approval. Submittal schedule shall include a title of each submittal package, who is to prepare the submittal package, and the delivery date of each. Submittals packages shall conform to the following requirements. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, and project specification paragraph referencing the submitted item.

Submit the manufacturer's catalog data for the following miscellaneous items:

1. Conduit
2. Wire and Cable
3. Underground Pull boxes
4. Light Poles and Fixtures
5. Meter Pedestals (exterior shall be fabricated from 304 stainless steel)

The final (record plan) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

Closeout Submittals shall be the operation and maintenance manuals. Before completion of project, three (3) bound identified copies of operation maintenance instructions and parts lists for equipment furnished shall be delivered to the Engineer at the jobsite. Manuals that are inadequate or incomplete will be returned and the Contractor shall resubmit adequate and complete manuals.

Original drawings are prepared with the intent to show with sufficient clarity and detailed dimension the nature and character of the work to be performed. Electrical drawings are generally diagrammatic in nature. The Contractor shall make inspections prior to construction to determine which measurements and conditions will differ from those shown on the plans and make the necessary adjustments to conform to the requirements. The Engineer reserves the right to require minor changes in location of new equipment, prior to roughing in, without incurring any additional costs.

Alteration or deviation from the contracted documents, involving extra costs of material or labor will be performed only upon a written change order. Change orders shall show in detail the nature of the requested change and will include adjustment in the scheduled completion date, if any. In the event of deviations, change, or alteration in the plans and/or specifications the original signed drawings will becomes nullified, until verified by an authorized amendment.

As Built drawing shall be keep separate of electrical drawings at job site and accurately record all changes, revisions and additions in red. At completion of job, submit this set to Engineer.

86-1.07 Scheduling of Work and Inspections: The Contractor shall be responsible for notification and coordination with the City, PG&E or any other agency as needed before beginning any work that will require the agency's services or approval. The Contractor shall also coordinate with manufacturer or vendor of equipment as needed. The Engineer shall be included on all notification and coordination to all agencies by the Contractor.

The Contractor is made aware that once PG&E has conducted the final inspection of their electrical facilities at each site it may take up to four weeks for each individual meter installation providing power to the sites. 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 site power for completion.

The Contractor shall cooperate with the Engineer and shall provide assistance at all times for the inspection of the electrical work performed under this contract. Assist with removing covers, operate machinery, or perform any reasonable work, which in the opinion of the Engineer, will be necessary to determine the quality and adequacy of the work. Allow sufficient time for inspections to be made without delaying progress of work.

A qualified inspection team will witness the formal tests after receipt of written request with the attachments indicating that preliminary tests have been completed and that the system is ready for final inspection. Systems provided by the manufacturer/vendor of the motor control center shall have a manufacturer's technical representative present for the final inspection and test of their equipment. Preliminary tests shall be repeated, and functional and operational tests conducted, as requested by the Engineer. When defects cause failure of a test, and if the cause is not remedied in a timely fashion, perform additional tests to isolate the defective item from the demonstration, to show that the system will conform to contract specifications after correction of defective item.

Upon completion of all work, an Engineer will make a final inspection of the project. At this time, the Contractor shall operate all devices, equipment and systems to demonstrate proper function of complete electrical installation.

86-1.07.01 Quality Assurance: All equipment and material of a given type shall be of a single manufacture throughout the work and shall be of industrial rating and quality. All electrical materials and equipment shall bear a label of the Underwriters' Laboratories, and approved by them for the purpose for which they are used, unless the materials and equipment are of a type which Underwriters Laboratories do not list nor provide label service.

Substitutions of materials and equipment that are identified by manufacturer's name, trade name, model or catalog number by the Contractor is permitted only for specified items. Permission to substitute equal or superior items of material and equipment may be requested by written request to the Engineer as a submittal. The completion date will not be extended because of any time lost due to consideration or installation of substitutions.

Defective materials that are defective or damaged during installation shall be replaced or repaired in such a manner meeting approval of an Engineer at no additional cost to the City.

86-2 Materials and Installation:

86-2.01 Excavation and Backfill: Contractor shall prospect or deduce the cover for all existing substructures that are marked or anticipated that may interfere with installation. The bottom of trenches and excavations shall be kept clear of rocks or other hard objects and shall be drained of water to the extent necessary so as not to interfere with the progress of the job. Clearances of 12" minimum shall be maintained between sumps, piping or trench and any other foreign underground system encountered during this work.

Backfill shall be placed in 18" layers with each layer compacted to a minimum 90% of maximum density. The final 12" shall be compacted to a minimum of 95% of maximum density, ASTM D-1557, in place density as determined by ASTM D-1556.

All underground boxes and subsurface raceways shall be inspected and accepted by the Engineer prior to commencement of backfilling operations. All OSHA safety regulations must be complied with and special attention given to Title 8, Article 6 Paragraph 15.40, 15.41A and 15.41B which cover shoring requirements for trenches and excavations.

Warning tape shall mark all buried conduits, buried 12 to 18 inches below grade. The tape shall be 6 inches wide, non-fading red in color with yellow lettering. Tape shall be made of high quality polyethylene base material. The warning tape shall have the wording, "CAUTION - BURIED

ELECTRICAL LINE" or 'CAUTION - BURIED SIGNAL LINE" continuously along the tape. Markings per OSHA 1910.144.

Comply with PG&E trenching requirements at the end of this Section, Appendix "A"

86-2.03 Foundations: Concrete for area and flood light base foundations shall be "Class A" concrete per Section 90 of these Special Provisions.

86-2.04D Site Lighting: Area, flood and combination lights shall be as specified. All material removed for the installation of new or the replacement of existing lights shall become the property of the Contractor and must be immediately removed from the site.

86-2.05 Conduit

86-2.05A Material: Conduit shall be rigid nonmetallic conduit, rigid metal conduit, electrical metallic tubing (EMT), and liquid tight flexible conduit, conforming to the following:

Rigid Metal Conduit (RGC) shall be hot dipped galvanized exterior, zinc or enamel interior. Fittings for RGC shall be shall be cadmium, or zinc-coated threaded type, UL514B.

Electrical Metallic Tubing (EMT) shall be zinc coated, galvanized or sherardized. Fittings for EMT shall be compression type requiring of nut on gland ring or approved setscrew.

Liquid-Tight Flexible Metal Conduit with plastic jacket, galvanized spirally wound interlocking steel. Fittings for flexible metal conduit shall be cadmium, or zinc-coated threaded type. Bushings for flexible metal conduit shall have brass-grounding ferrule, UL514B.

Rigid Non-Metallic Conduit (PVC) shall be rigid polyvinyl chloride schedule per UL651, NEMA TC2, ASTM-D-1784-69. Adapter transition from PVC conduit to RGC shall be of PVC material complete with O-ring and locking bushings for watertight joint.

86-2.05C Installation: Above ground conduit shall be galvanized rigid steel of the sizes shown on the plans suitably terminated at approved metal boxes or cabinets or subsurface pullbox.

Underground conduit shall be Schedule 40 PVC with transition to rigid galvanized steel conduit when stubbing above ground or when penetrating subsurface boxes. Concrete encase underground 11.25deg, 22.5deg, 45deg, and 90deg bends, and at stub-ups and pole locations with 3" of concrete. Allow 3" separation between conduit for concrete encasement. Use 3-sack cement per cubic yard of 1/4" to 3/8" aggregate.

Conduits shall be separated from substructures, pipes, etc. by a minimum of 12 inches on the horizontal when paralleling and a minimum of 6 inches on the vertical when crossing.

Conduit stub-ups shall be galvanized rigid steel were conduits stubbed up through concrete slab or rough grade to a point where run becomes horizontal. Extend stub-ups to equipment in rigid galvanized steel conduit, except that flexible metal conduit may be used up to 6" above floor. Where no equipment connections are made, install screwdriver-operated threaded flush plugs or threaded cap as shown in conduit end.

Flexible connections for equipment subject to vibration, noise transmission, or movement; and for motors and shall be no longer than 48-inches, allowing for slack. Provide liquid-tight flexible conduit in wet locations. Provide ground conductor when using flexible conduit.

Support above ground conduit as shown on the Plans.

Directional changes in conduit runs shall be made with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

Restrictions applicable to Aluminum Conduit: Do not install.

Restrictions applicable to Nonmetallic Sheathed Cable (Romex): Do Not Install.

Restrictions applicable to Armored Cable (AC): Do not install.

Restrictions applicable to EMT:

1. Do not install underground.
2. Do not encase in concrete.
3. Do not use in areas subject to severe physical damage.
4. Do not use outdoors.

Terminate underground conduit in subsurface pull boxes with bell ends. Provide spare underground conduit stub-ups with recessed galvanized steel threaded plugs.

Terminate conduit in exterior enclosures with weather-proof lock nuts on both sides of enclosures and a grounding bushing with an insulated plastic throat (Myers hub), on the inside of the enclosure. The grounding bushings shall be connected to each other, the enclosure they terminate in, and to the grounding electrode system.

Terminate conduit to sheet metal boxes and cabinets with two locknuts, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Locknuts shall have sharp edges to dig into wall of metal enclosures. Install insulating type bushings on ends of conduits.

Where several feeders pass through a common pull box, provide conduit tags to clearly indicate electrical characteristics, conduit number, and panel designation.

The Contractor shall arrange for sleeves, chases and openings through floors, walls, ceilings and structural members in a manner approved by a structural engineer. Obtain permission from a structural engineer for any cutting, drilling or welding of structural members.

Conduits for the telephone service conductors shall be installed as shown on the plans. A pull wire shall be installed in the telephone conduit, and shall be doubled back into the conduit at both ends.

The telephone company shall furnish and install the telephone jacks, apparatus box and telephone service conductors in accordance with the telephone company rules.

86-2.06 Pull Boxes: Pull boxes shall be flush with surrounding grade or top of curb if installed behind curb. Pull boxes shown adjacent to lighting standards shall be placed aside of foundation. The interior of boxes shall receive a one inch thick high-strength, non-shrink grout bottom with all sides sloped to a one inch diameter drain hole at the center. Mortar all joints and openings.

If field conditions require side entry into underground pull boxes, the conduit should be cut flush with the inside of the structure and mortared. Conduit should never enter hand hole at the center of the wall nor through the bottom.

Provide boxes in wiring or raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. When surface mounted to open structural members boxes shall be minimum 4 inches square, except that 4 by 2 inch boxes may be used where only one raceway enters outlet.

Pull box lids shall be marked “Electric” or “Telemetry” depending on installation use. It shall be the Contractor’s responsibility to verify with the Engineer prior to ordering. Markings shall be either cast into, or neatly welded onto lids.

86-2.06.01 Pull Ropes: Install pull ropes in empty conduits in which wire is to be installed by others. Pull ropes shall be 3/8” orange dielectric polypropylene rope having minimum 350 pound tensile strength. Secure minimum 12 inches of slack at each end. Where conduit is capped coil 12 inches of slack into end of conduit. All conduit placements must be cleaned, proven or mandrelled before conductor or pull rope installation. Use approved plastic plugs on ends of plastic conduit, (DO NOT USE TAPE OR RAGS).

86-2.07 Equipment Manufacturer: When manufacturer's equipment requirements are specific or requires devices of only one kind, provide components of equipment as required by manufacture. Provide work required to satisfy manufacturer's requirement. Materials, equipment, and devices shall meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70.

86-2.08 Conductors: Conductors shall meet all applicable requirements of NFPA 70 and UL for type insulation, jacket, and conductor specified. Wires and cables manufactured more than 12 months prior to date of delivery to site shall not be used.

Conductors in cables shall be annealed copper. Aluminum conductors are not permitted. Design is based on copper conductors. Color coding shall be provided for service, feeder, branch, control, and signaling circuit conductors. Color shall be green for grounding conductors and white for neutrals. Color of conductors in different voltage systems shall be as follows:

Voltage,	Phase A	Phase B,	Phase C,	Neutral,	Ground
120/240	Black	Red		White	Green
277/480	Brown	Orange	Yellow	Gray	Green

Conductor Types:

Bonding Wire	Solid bare copper wire #8 and smaller, ASTM B1.
	Stranded bare copper wire #6 and larger, ASTM B8.
Power Wires	600-volt, type RHW-2
Fixture Wire	600-volt, type RHW-2 or XHHW, 90C, UL44.

Switchboard Control	600-volt, type SIS or MTW, 90C, UL1015,
Signal	300-volt, type Class 2 or Class 3, CL3/PLTC, Shld, UL13.
Telephone cables	ICEA S. 80 576, UL 444.
Cord Sets and Power	Supply Cords UL 817

86-2.09 Wiring: Provide insulated conductors installed in conduit, except where specifically specified otherwise or required by NFPA 70 to be installed otherwise.

Wiring external to panels shall be installed in metallic raceways. Wiring shall be installed without splices. Cables and conductors shall be tagged at both ends, Wires in control panels shall be neatly laced up and harnessed in bundles with wire ties and shall be secured to panel and contained in covered metal or plastic wiring ducts or raceways . Wiring bundles shall prevent sagging or breakage from weight or vibration. Conductors shall not be strained at terminals. Wiring shall not be spliced and shall be free of abrasions and tool marks.

Separate AC and DC circuitry by installing in dedicated wire ways, providing fixed barriers or air gaps of at least 2". Barriers will be provided to isolate major components as provided by UL508A, ANSI C37.20.1.

Cable ties shall secure wires into bundles into harnesses. Each tie shall hold without slipping.

86-2.09.01 Splices: Branch circuitry splices for #10AWG wires shall be twist-on threaded spring lock, wing lock or wire lock insulated splice connectors, UL 486A, UL 486C. Splices for #8AWG and larger wires shall be solderless compression connector made with crimping die, with insulation equivalent to conductor insulation IEEE 323, IEEE 383.

Power distribution blocks, ring tongue type terminals #22AWG thru #8 AWG 75C, cu/al, 600V, solderless box lug type #10AWG and up cu/al, 600V, with labels, IEC 947-7-1.

Power feed thru distribution block, mechanical locking screw pressure-type or compression type, #8 and larger, one or two line side in and from one to twelve load side out wiring terminals per pole, 75°C, al/cu, 600V, UL 94V-0.

Pull-apart terminal blocks, NEMA ITS-4.

Tape for use on for electrical connections shall be as follows:

- Rubber-insulated type tape, UL44.
- Thermoplastic-insulated type tape, UL83.
- Varnished-cloth insulated type tape, UL 133.

86-2.09.02 Wire Ties:

- Rubber / acrylic based foam tape adhesives mounts for smooth surface applications.
- Epoxy type adhesives, used especially on clean masonry surfaces with some abrasion, UL44.

Barriers will be provided to isolate major components as provided by ANSI C37.20.1. All connections shall be terminated in accessible areas.

86-2.09.03 Cable Ties: Cable ties shall be self-locking one-piece loop-thru latching type of the length and width and loop tensile strength necessary. Polypropylene ties in oily chemical environments, nylon standard grade black ties in enclosures.

86-2.09.04 Lubricant: Pulling lubricant shall not deteriorate insulation, Aqua-Gel II or equal, 28°F to 180°F, ASTM D-1693, UL 124.

86-2.10 Grounding:

Ground Rods shall be copper-clad steel, iron core, UL467.

Joint Compound, Penetrox "A" anti-oxide inhibitor on all mechanical connections.

Connections below grade shall be fusion welded.

Connections above grade shall be mechanical, UL467.

Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic and nonmetallic raceways, and neutral conductor of wiring systems. Make ground connection at main service equipment, and extend grounding conductor to ground rods and UFER ground and as required by local code authority.

Ground busses will be bonded to the metal panel. Grounding conductors shall be bare or insulated colored green installed in feeder and branch circuits, including lighting circuits. Grounding conductor shall be separate from electrical system neutral conductor.

86-2.10.01 Ground Rods: The resistance to ground shall be measured using the fall-of-potential method described in IEEE Std 81. The maximum resistance of a driven ground shall not exceed 25 ohms under normally dry conditions. If this resistance cannot be obtained with a single rod, the project engineer shall be notified immediately.

86-2.14 Testing: Before testing and energizing the system, all necessary precautions shall be taken to ensure the safety of personnel and all equipment. All electrical equipment and conductors shall be properly set and operative during the tests. The ground connection on each piece of equipment shall be checked for tightness and the entire system shall be checked for proper continuity prior to energizing the system.

Cable assembly testing shall comply with applicable requirements of ICEA publication S-68-516 Ethylene-Propylene-rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

After installing the wiring and before system installation is completed, and at such time as directed, the contractor shall conduct continuity tests and record test data for approval. The wiring shall be demonstrated to operate in accordance with the requirements of this specification. Continuity test shall be conducted on the low voltage signal and telephone wiring system. The Contractor shall furnish all instruments and personnel required for the tests. No part of the system shall be energized prior to the resistance testing of that system and submission of test.

Test the dielectric strength and the insulation resistance of the power wiring system by means of an (megger) instrument capable of generating 500 volts dc and equipped to indicate leakage current in 1000 megohms. For the purpose of this testing, the instrument shall be connected between one conductor and another conductor at same end or between one conductor and ground, with the other extremity open circuited and all series-connected devices in place. The

system shall withstand the tests without breakdown and shall indicate a near infinite resistance, >500,000 ohms, the measurement being taken after an electrification of not more than 1.0 minute with a dc potential of not less than 100 volts nor more than 550 volts.

86-2.16 Painting of Equipment: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test.

86-2.17 Identification: Post DANGER HIGH VOLTAGE signs for all access areas with power circuits. Major items of electrical equipment and major components shall be permanently marked with an identification name to identify the equipment by type or function and specific unit number.

Identify manufactures equipment with nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
Install typewritten directory behind glass or plastic on inside of enclosure door showing circuit number and complete as-built description of all outlets controlled by each circuit breaker.

Identify each conductor within each enclosure where a tap, splice, or termination is made. Color coding shall be by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves. Identify control circuit terminations in accordance with motor control center section.

Identify each terminal block using a manufactured labeling system. Control wires shall be numbered on both ends with wire markers applied next to the terminals with the number visible.

Identification nameplates shall be made of laminated with black outer layers and a white core. Edges shall be chamfered. Plates shall be fastened with black-finished round-head drive screws, or approved metal fasteners. At the option of the Contractor, the equipment manufacturer's standard embossed nameplate material with black paint-filled letters may be furnished in lieu of laminated plastic. The following equipment, as a minimum, shall be provided with identification nameplates:

Minimum 1/2-Inch High Letters	Minimum 1/4-Inch High Letters
Panelboards	Control Power Transformers
Starters	Control Devices
Transformers	
Equipment Enclosures	

86-2.20 Payment: **R3 Tank Site Electrical Improvements** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved with tank site electrical improvements as specified, including but not limited to, submittals, notification and coordination with City and outside agencies, compliance with all applicable laws and regulations, obtaining all permits, furnishing and installing conduits, conductors, pull boxes, connection boxes, meter pedestal, lighting, concrete pads and foundations, grounding, painting, identification, excavation and backfill, removal and disposal of existing and unused material, any needed site preparation, installation of City supplied telemetry cabinet and solar/rain shield, site cleanup, and any other work necessary for tank site electrical improvements not specifically specified, and no additional allowance will be made therefor.

R7 Tank Site Electrical Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved with tank site electrical improvements as specified, including but not limited to, submittals, notification and coordination with City and outside agencies, compliance with all applicable laws and regulations, obtaining all permits, furnishing and installing conduits, conductors, pull boxes, connection boxes, meter pedestal, lighting, concrete pads and foundations, grounding, painting, identification, excavation and backfill, removal and disposal of existing and unused material, any needed site preparation, installation of City supplied telemetry cabinet and solar/rain shield, site cleanup, and any other work necessary for tank site electrical improvements not specifically specified, and no additional allowance will be made therefor.

R12B Tank Site Electrical Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved with tank site electrical improvements as specified, including but not limited to, submittals, notification and coordination with City and outside agencies, compliance with all applicable laws and regulations, obtaining all permits, furnishing and installing conduits, conductors, pull boxes, connection boxes, meter pedestal, lighting, concrete pads and foundations, grounding, painting, identification, excavation and backfill, removal and disposal of existing and unused material, any needed site preparation, installation of City supplied telemetry cabinet and solar/rain shield, site cleanup, and any other work necessary for tank site electrical improvements not specifically specified, and no additional allowance will be made therefor.

TYPICAL DISTRIBUTION TRENCH

Joint Trench - Franchise Area or P.U.E.

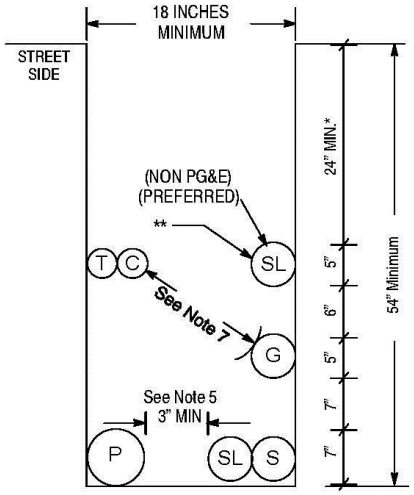


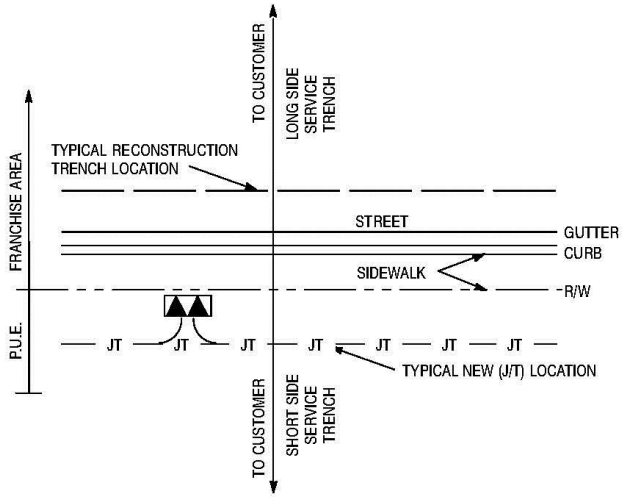
FIG. 1

Placement of the Distribution Trench within a P.U.E. is the preferred method. Trenching in the Franchise Area should only be used when a P.U.E. is unobtainable or otherwise infeasible.

* Increase cover to 30" in the street area (see Note 3).

** Separation must be 12" unless a reduction (6") is mutually agreed upon by affected utilities.

STANDARD TRENCH LOCATIONS



TYPICAL SERVICE TRENCH

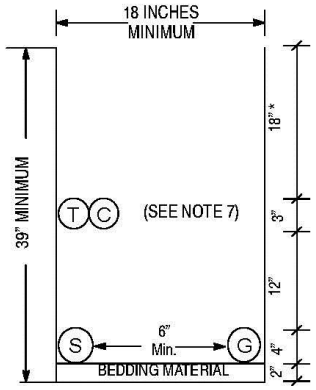


FIG. 2
(View facing Distribution Trench)

MINIMUM SEPARATION AND CLEARANCE REQUIREMENTS

		G	DUCT T	DB T	C	S	P
G	(GAS) SEE NOTES 4, 7 & 13	—	12"	12"	12"	6"	12"
T	(TELEPHONE) DUCT	12"	—	1"	1"	12"	12"
T	(TELEPHONE) DIRECT BURY	12"	1"	—	1"	12"	12"
C	(CATV)	12"	1"	1"	—	12"	12"
S	(ELECTRIC SECONDARY)	6"	12"	12"	12"	—	3"
P	(ELECTRIC PRIMARY)	12"	12"	12"	12"	3"	—
SL	(STREETLIGHT) SEE NOTE 5	6"	12"	12"	12"	1"	3"

SEPARATION AND CLEARANCE DEFINITIONS

Cover:
The term "cover" means the radial distance between the surface of an underground cable, conduit, pipe, or other substructure and the surface elevation (grade).

Backfill:
The term "backfill" refers to the materials used to refill a cut or other excavation, or the act of such refilling after any needed shading is performed.

Shading:
The term "shading" refers to the materials used to provide a measure of separation between facilities installed at different levels within an excavation or cut.

Lift:
The term "lift" is a layer of fill as spread or as compacted or a measurement of material depth that is the rated effective soil depth a compactor can achieve.

Bedding:
The term "bedding" refers to the materials installed beneath facilities at the bottom of a cut or other excavation and intended to provide support and/or protection for those facilities.

JOINT TRENCH CONFIGURATIONS & OCCUPANCY GUIDE

09-27-06

S5453, Exhibit B

PACIFIC GAS AND ELECTRIC COMPANY

Page 1 of 4

OTHER TYPICAL PG&E DISTRIBUTION JOINT TRENCH CONFIGURATIONS

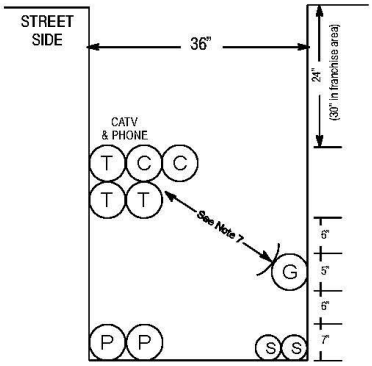


FIG. 3
36" Wide Joint Trench

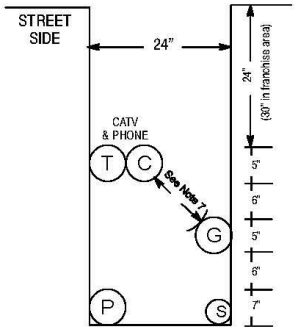


FIG. 4
24" Wide Joint Trench

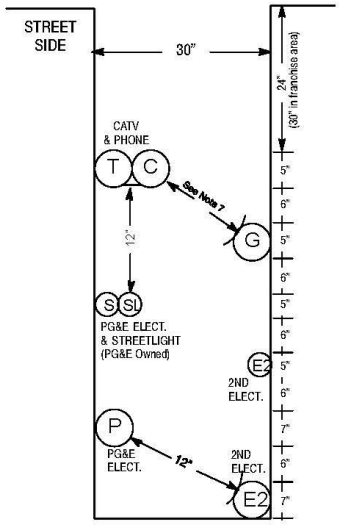


FIG. 5
Joint Trench With Second Electric Utility

Trench Configuration Notes

The trench configurations shown in this guide are to be considered "typical" only and that other trench widths, depths, as well as utility configurations (placement) may be used, provided all minimum requirements for separation, clearances, and cover are observed. In no case shall electric primary or secondary (excluding street lighting) be placed at a level higher than that of the gas and communications level. Gas shall be placed at the same level or below communications when gas is placed above the electric facilities.

Special Notes for Joint Trench With Second Electric Utility

A. Refer to Sheet 3 for General Notes.

B. A red 3-inch wide "PG&E Electric Line in Conduit" plastic marking tape, Code 375054, shall be installed, spiral wound in a manner that allows for the tape to be readily visible every 3 feet, with each conduit intended to be used for PG&E electric facilities. An equivalent red tape marked to identify the owner shall be installed with the conduit intended to be used for the second electric facility.

C. Each utility shall ensure adequate grounding between electric facilities is provided (See UO Standard S5453, "Joint Trench").

D. Provide a minimum of 2 inches of compacted PG&E approved bedding material as a trench leveling concourse, where required. See General Notes Items 11 and 12 (on Page 3), in order to obtain proper compaction.

General Notes

1. The preferred trench location is in a Public Utility easement (P.U.E.).
2. All depths and resulting cover requirements are measured from final grade.
3. Cover, clearances, and separation shall be as great as practicable under the circumstances, but under no circumstances shall be less than the minimum cover, clearance, and separation requirements set forth in General Order 128 and 49CFR 192.321, 49CFR 192.325, and 49CFR 192.327. All facilities shall be anchored in place prior to compaction, or other means shall be taken to ensure no motion of the facilities. Dimensional requirements for shading, leveling, and backfilling shall be determined subsequent to compaction.
4. Trench dimensions shown are typical. Trench sizes and configurations may vary depending upon occupancy and/or field conditions. Trench size and configuration must at all times be constructed in a manner that ensures proper clearances and cover requirements are met. Any "change" to the trench width and configurations as shown in this exhibit must be designed to ensure this requirement.
5. It is preferred to have non-PG&E owned streetlights at a level other than the gas or electric level. Non-PG&E owned streetlights may be at the electric level of the trench as long as minimum clearances are provided and comply with all special notes for a joint trench with a second electric utility.
6. Non-Utility facilities are not allowed in any Joint Utility trench, e.g., irrigation control lines, building fire alarm systems, private telephone systems, outdoor electrical cable, etc.
7. When communication ducts are installed, a minimum of 12" radial separation shall be maintained from gas facilities. Exception: With mutual agreement, when 4-inch diameter or smaller gas pipe is installed, the separation may be reduced to not less than 6 inches.
8. Provide separation from trench wall and other facilities sufficient to ensure proper compaction.
9. Maintain proper separation between PG&E facilities and "wet" utility lines as described in UO Standard S5453. The minimum allowable horizontal separation between Company facilities and "wet" facilities is 3' with a minimum 1' of undisturbed earth or the installation of a suitable barrier between the facilities.

   If a 3' horizontal separation cannot be attained between "wet" utilities and Company dry facilities, a variance may be approved by the local Inspection Supervisor and submitted to the Service Planning Support Program Manager for approval. Separations of 1' or less are not permissible and will not be allowed. The Company may agree to waive the minimum 3' separation requirement at the request of an applicant if warranted and the need is justified. The request for a waiver must:

   - Be made in writing and submitted to the Company ADE during the planning and design phase of the project,
   - Clearly describe the conditions necessitating the waiver,
   - Include a proposed design,
   - And, include a design for a barrier between the "wet" utilities and Company dry facilities in the event 1' of undisturbed earth cannot be maintained.

   Note: Drain lines connected to downspouts on buildings are considered a "wet" utility for the purposes of this standard.
10. Separations shall be maintained at aboveground termination points.
11. Procedures for approving native backfill for shading of PG&E gas facilities:

    - Random soil samples shall be taken from a minimum of 3 locations per 1,000' of trench. 100% of the sample must pass through a 1/2" sieve and 75% must pass through a #4 screen. Additional samples must be taken if existing soil conditions change and are to be taken at the discretion of the PG&E representative on site.
    - The soils must not contain any rocks that have sharp edges or that may otherwise be abrasive.
    - The soils must not contain clods larger than 1/2" if to be used as shading, bedding, or leveling materials.
    - Compaction requirements must meet any applicable PG&E, Federal, State, County, or local requirements.
    - At no time shall the over saturation of native soils be used to achieve these requirements.

    The sieves and screens shall be:

    - 1/2" Sieve: 8" diameter by 2" deep, stainless steel mesh screen.
    - #4 Screen: 8" diameter by 2" deep, stainless steel mesh screen.

Notes continued on the next page

General Notes, continued

12. Procedures for approving native backfill for shading at PG&E electric facilities:
    - Random soil samples shall be taken from a minimum of 3 locations per 1,000' of trench. Additional samples must be taken if existing soil conditions change and are to be taken at the discretion of the PG&E representative on site.
    - Shading material containing large rock, paving material, cinders, sharply angular substances, or corrosive material shall not be placed in the trench where such material may damage the conduits and/or prevent proper compaction over or around the conduits.
    - Native soils containing clods not to exceed 6" in diameter may be included in the shading material provided the clods are readily breakable by hand.

      Note: Soils consisting primarily of adobe, hard compact (dense) clay, and bay muds shall not be used as shading material.
    - At no time shall the over saturation of native soils be used to achieve these requirements.
    - Refer to Engineering Document 062288, Item 13 on Page 2.
13. Competent native soils are preferred to be used for shading, bedding, and backfilling throughout the trench.
    - Where native soils exceed 1/2" minus and/or where gas is to be placed at the bottom of a trench in areas that exceed 1/2" minus soil conditions, or where the bottom of a trench is considered to consist of hard pan, PG&E approved 1/2" minus import material shall be used for shading and/or bedding of gas facilities.
    - PG&E approved import material is per CGT Engineering Guideline 4123.
    - If a leveling course is required for gas facilities, the use of native soils is preferred, but if 1/2" minus conditions are not attainable with the native soils, then the use of PG&E approved import materials is required. Bedding under gas facilities will be a minimum of 2" of compacted 1/2" minus native soils or PG&E approved import material.
    - For electric facilities, refer to Note 12. This applies to leveling courses as well as shading.
    - The minimum PG&E approved bedding material may be increased at the discretion of PG&E when warranted by existing field conditions (e.g., rocky soils, hard pan, etc.).
    - The use of any imported material for backfilling purposes shall be limited to those situations when native soils do not allow for required compaction.
14. The applicant is responsible for the removal of excess spoil and associated costs.
15. Separation between gas facilities and electric facilities may be reduced to 6" when crossing.
16. Service saddles are the preferred service fittings for use throughout the joint trench project. All projects will be designed and estimated using service saddles. However, service tees may be used if all clearances, separation, and coverage requirements are maintained.

Revision Notes

1. Revised Note 9 to clarify the minimum allowable horizontal separations requirements.
2. This document was revised on 09-27-2006.

SECTION 90
CONCRETE

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

90-1.01B Definitions: The following concrete mix shall be considered "Class A Concrete".

Except where otherwise specified herein or on the Project Plans, all concrete used on this project shall be truck-mixed, ready-mixed concrete consisting of a mixture of Type II Portland Cement and Supplementary Cementitious Materials (SCM), sand, fine aggregate, coarse aggregate and water. 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.

90-1.01C(6) Mix Design: 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: Class A 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 Class A Concrete shall be 4000 pounds per square inch (psi) or greater.

90-1.01D(6) Curing Compound: The following shall apply in lieu of Section 90-1.01D(6): The Contractor shall submit on any proposed material and method used to cure concrete. Unless otherwise specified elsewhere, all 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.

90-1.01E(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 CONSTRUCTION

99-1 General: All new water system components and their installation shall conform to Section 99 of the City Standards, and any modifications and additional requirements in these Special Provisions:

Within 7 working days of the final tie in at each site the Contractor shall provide record as-built information on a full size set of plans showing, at a minimum, depths and locations of all tees and bends, horizontal distances, as needed for future location of separate components, and the location of any installed Foster Adapters. It shall be the Contractor's responsibility to provide all necessary power to operate all tools and equipment used on this project regardless of the type of work.

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

All materials used that have the potential to come in contact with the City's potable water system shall be NSF-61 approved, submittals will be required.

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 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 types of items supplied for this project (at all sites) unless otherwise approved by the Engineer:

- Steel Pipe
- Ductile Pipe
- Fittings
- Valves

For the material specified above, the Contractor shall only submit on material that is purposed to be used on the project, submittals showing alternant material along with the primary material proposed will be rejected.

The Contactor shall submit the installation location for any proposed use of flange fittings not already specified.

99-1.02 Pipe: Any pipe that is delivered to the job site that, in the opinion of the Engineer, shows signs of contamination, damage and/or defect, will be rejected, along with any pipe that was delivered to the supplier on the same shipment. One of the types of contamination that will be inspected for is transport vehicle exhaust residue on pipe or fitting interiors.

All ductile iron pipe buried underground shall be encased with 8 mil (minimum) polyethylene film in tube form. Polyethylene material and installation procedure for the encasement shall conform to AWWA C105/A21.5-10 or most recent issue. Polyethylene tubes shall not be cut and wrapped around pipe.

All ductile iron pipe installed above ground shall be properly prepped and coated as specified elsewhere.

All steel pipe buried underground shall be encased with two layers of 8 mil (minimum) polyethylene film in tube form. Polyethylene material and installation procedure for the encasement shall conform to AWWA C105/A21.5-10 or most recent issue. Polyethylene tubes shall not be cut and wrapped around pipe.

Tracer wire shall be installed on all water pipe and HDPE tubing, per City Standards and any modifications herein. 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. Where splicing is required only watertight connectors shall be used, and shall be either Copperhead Snakebite, 3M DBR, or an approved equivalent.

All below ground water piping shall be Ductile Iron Pipe with restrained joints except where otherwise specified.

Stainless Steel (Type 316) Pipe shall be installed where specified. Stainless steel pipe shall be minimum schedule 5. Connections to non-stainless steel pipe shall be by dielectric nylon threaded bushings. Welding of stainless steel pipe may be performed in the shop or in the field by a welder certified in stainless steel welding techniques, and with at least five (5) years of stainless welding experience.

Steel pipe shall be fusion bonded, epoxy lined and coated carbon steel pipe. Steel pipe shall be electrically butt-welded straight seam, spiral-seam or seamless pipe for use in water system facilities conforming to AWWA C200-12. Fusion bonded epoxy coating shall conform to the requirements of AWWA C213-15. Coating shall extend to the end of all pipe sections. Special pipe connections and appurtenances shall also be coated except for threaded fasteners. The Supplier shall furnish to the Engineer an affidavit that all materials and work furnished comply with the applicable requirements of the Project Plans and 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 where shown for overflow piping and at welding flanges attached to the pipe specifically for connections to the tank structure. The Contractor shall have a field touchup epoxy coating kit compatible with the shop applied epoxy coating on site prior to assembling or welding any steel pipe or appurtenances. Steel pipe shall be schedule 20 for diameters 8-inches and larger and schedule 40 for diameters less than 8-inches. The film shall be thoroughly taped closed around the pipe near tank or vault penetrations. Welded steel pipe shall be used for all under tank piping, overflow modifications, and wherever else specified.

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

99-1.04 Fittings: All Fittings for pipe 4 inch and larger shall be ductile iron mechanical joint type unless otherwise specified.

Flanged fittings shall only be used where shown on the Project Plans.

Fittings for HDPE tubing shall be CTS brass as specified per applicable City Standards or per approved submittal.

For “tight” installations where a ductile iron “pup” between two connecting mechanical joint ends is impractical, for installation and future repair, a Foster Adapter manufactured by Infact Corporation, or an approved equivalent, shall be used.

All non-stainless steel nuts and exposed threads shall be first dried and then coated with Permatex spray-on heavy duty rubberized under-coating or approved equivalent.

99-1.04A Restrained Joint Fittings: All bell to spigot connections shall be equipped with an approved restraining gasket compatible with the pipe and approved for use by the pipe manufacturer. All other joint connections, except where otherwise specified, shall be mechanical joint type with an approved restraining (locking) gland.

99-1.04B Cut-in Tees: Cut-in tees shall be installed at the locations shown on the Project Plans per the City Standards and any modifications specified.

99-1.05 Gate Valves: Gate Valves shall be ductile iron valves conforming to City Standards and the latest revisions of AWWA C509 or C515. All gate valves shall have mechanical joint type connecting ends unless otherwise specified herein or on the Project Plans. All external bolts and nuts of the valve shall be type 304 stainless steel.

When any part of the new water system is pressurized, all affected gate valves must be accessible to City personnel at all times.

Gate valves installed above ground or in vaults shall be provided with attached hand wheels.

99-1.05A Check Valve Assembly: The Contractor shall install a swing-type check valve assembly in the sizes and at the locations shown on the Project Plans.

Check valve bodies and covers shall be fusion bonded epoxy lined and coated ductile iron. Discs shall be steel and nylon reinforced, and covered with Buna-N rubber conforming to ASTM D2000-BG. Disc shall be accessible without removing the valve from the water line.

Check valve discs shall be capable of swinging entirely out of the flow path for 100% unrestricted flow. The discs shall be the only moving part. Disc design shall allow for positive seating at low pressures.

Check valves shall be Swing-Flex, as manufactured by Val-Matic Corporation, or an approved equivalent.

Adjustable pipe supports shall be installed as shown on the plans. Pipe supports shall be B-Line B-3093 with B-3088T pipe stand, or an approved equivalent. The Contractor shall note that the support saddle shall have a flat top as noted on the Project Plans. The pipe support and stand shall have an electro-plated finish.

99-1.07 Valve Boxes: Valve box riser pipe shall be installed centered over and plumb with the valve nut prior to final paving. If riser pipe needs to be lowered for paving it shall be cut perpendicular to the axis of the riser and free of jagged edges. If sections need to be added after paving they shall be installed per City Standard 877. The riser pipe shall extend into the bottom of the valve box a minimum of 2 inches. Sections of riser pipe shall not be shorter than 12” in length.

99-1.08 Locating and Adjusting Water Valve Boxes: After each site has been paved, the Contractor shall mark the location of all water valve boxes in white paint before the close of that work day. All water valve boxes shall be adjusted to grade by the end of the following day, and final paving around valve boxes shall be completed within 24 hours after they are raised to grade.

If the Contractor's operations require the removal of an existing water valve box not already shown to be replaced, the Contractor shall request a replacement box from the Engineer at least two working days prior to the needed date for installation. The Contractor shall install the new valve box per City Standard 877 at no additional cost to the City.

99-1.09 Fire Hydrant and Lateral Assembly:
The new fire hydrant location at site R7, as shown on the Project Plans, is approximate, it shall be the Contractor's responsibility to coordinate exact placement in the field with the Engineer.

All fire hydrants, including the existing fire hydrant at tank site R12B after it is reinstalled, shall be properly prepped and coated with two applications of paint per City Standard 857. First application shall be fully cured prior to the second being applied.

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

Unless permission is otherwise granted by the Engineer, all trenches shall be backfilled the same day as the facility is installed. If permission is granted to leave a trench open, the Contractor shall cover the opening with 3/4" minimum plywood in non-traveled areas and nonskid steel plates elsewhere to allow safe access by City crews during nonworking hours.

Excavations for vaults shall be a minimum of 24 inches wider than the outside wall. Areas where this requirement cannot be met, and in the opinion of the Engineer compaction efforts may be compromised, shall be backfilled with controlled density fill (CDF) unless otherwise directed by the Engineer. All excavations shall be able to accommodate any typical compaction and testing equipment and personnel used to backfill and test the trench. If, in the opinion of the Engineer, typical methods cannot be used, the Engineer may require the use of a pneumatic Pogo Stick/Powder Puff type compactor at no additional cost to the City.

It is the Contractor's responsibility to ensure that water system components are laid and bedded on sound, stable material. All existing material that has been disturbed must be removed from the trench prior to the installation of new material. The Contractor shall promptly notify the Engineer of any field conditions that may affect alignment and/or grade.

The top 30 inches of backfill outside of pavements shall be the same native material removed or an approved topsoil.

Bedding and backfilling of under tank pipe trenches shall be done per these Technical Specifications, and as shown on the Project Plans. The Contractor shall ensure that onsite City Inspection is taking place during this operation.

Blasting will not be permitted.

The Contractor shall exercise caution when working in close proximity to existing facility trenches.

The Contractor will not be compensated for any additional efforts resulting from encountering CDF, slurry and/or concrete during trenching operations.

Controlled density fill (CDF) shall be placed in the locations shown on the Project Plans and where cover is less than 3 feet, or as directed by the Engineer. CDF shall typically conform to City Standard 215, mix design must be reviewed and approved by the City of Santa Rosa Materials Lab. There shall be no additional compensation for any minor adjustments requested by the Materials Lab.

99-1.11A Trench Bracing and Shoring – Water: All bracing and shoring shall conform to Section 7-1.02K(6)(b),"Excavation Safety" of the Standard Specifications and the Division of Industrial Safety Construction Safety Orders, which are currently in use.

Trench sheeting or boxes shall be withdrawn in such a manner as to prevent caving at the walls of excavations or damage to piping or other structures. Except as may be hereinafter modified, no sheeting shall be left in the trench and no backfill shall be made against the sheeting before it is removed. Any sheeting extending below the invert of the pipe shall be left in place by cutting off in a manner satisfactory to the Engineer. Trenching operations shall be conducted in such a manner not to disturb the existing curb and gutter and the existing utilities.

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.

99-1.12 Laying and Handling Pipe Materials: All pipe stockpiled on the job shall be stored with the ends covered to prevent the entrance of foreign matter, any pipe not stored as specified may be rejected for use by the Engineer. At times when pipe laying is not in progress, the open ends of installed pipe shall be closed watertight by mechanical plug, cap or other means approved by the Engineer.

Where, in the opinion of the Engineer, a new main cannot start on the same line and grade as the existing main, restrained fittings shall be used to make grade and/or alignment transitions for tie-ins to existing mains. This does not eliminate the requirement for thrust blocking unless specifically stated herein or on the on the Project Plans.

The alignment and placing of new water system components, as shown on the Project Plans, may require minor field adjustments during construction. If field adjustments are required and approved by the Engineer they shall be made at no additional cost to the City.

99-1.15B HDPE Water Service: The Contractor shall install a 2-inch HDPE water service similar to City Standard 865A to feed the pump house at tank site R7 as shown on the Project Plans and any modifications herein. The Contractor shall coordinate with the Engineer for the exact alignment in the field.

Prior to connecting the new service to the existing line, the new 2-inch service and appurtenances shall be capped for disinfection and testing per City Standards and as specified herein.

The Contractor shall pothole to determine the exact location and size of the existing suction and discharge pump lines where the connections to the new piping will be made approximately 6 inches outside the pump house walls.

The existing suction and discharge lines to be connected to may be metal or plastic and may not be the same size as those shown on the Project Plans. The Contractor shall provide couplings, connectors and fittings as necessary to complete the connection to the new water service suction and discharge lines at no additional cost to the City.

The Contractor shall purge all air and debris from the water service line prior to connecting to the existing line.

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

The Contractor shall notify the Engineer a minimum of 2 working days prior to the requested date for connecting to the existing pump house line for coordination with the City's Distribution staff.

The service line installation and tie-in shall be witnessed by the field Inspector, and it is the Contractor's responsibility to coordinate these inspections.

99-1.16 Thrust Blocking: Unless otherwise specified, and regardless of restrained joint installation, concrete trust restraint shall be installed, per applicable City Standard behind all tees or when making an offset alignment connection to any existing line, and anywhere else where restrained joints cannot be used or alone are deemed insufficient by the Engineer.

Where temporary restraints are not feasible, and where specified on the Project Plans, permanent thrust blocks and/or harness restraints that are required for the immediate activation of a service line or main shall be installed at a minimum of 24 hours prior to starting the item of work which requires the restraint when completed. There shall be no additional cost to the City for this requirement.

99-1.17 Abandon or Removal of Existing Water System Components: Unless otherwise directed by the Engineer the Contractor shall completely remove all existing water system components and appurtenances, above ground and below, that will no longer be active after activation of the new water system.

All removed components shall become the property of the Contractor and shall be immediately removed from the site for proper disposal unless otherwise specified.

Barrels of existing fire hydrants to be removed and not shown to be reused shall be carefully separated from risers and buries by the Contractor, and the hydrant only shall be delivered to the City Municipal Services Center, located at 35 Stony Point Road, unless the Contractor has obtained specific written approval by the Engineer to otherwise dispose of the materials.

Any abandonment that requires a system shutdown, in the opinion of the Engineer, shall be done under inspection by authorized City personnel.

99-1.18 Hydrostatic Test: Hydrostatic testing of all new pipes, including the mixing system, and appurtenances shall be performed in accordance with Section 99-1.18 of the City Standards and any modifications herein.

Hydrostatic testing shall not take place until all new pipes, including the mixing system and appurtenances have been installed and thoroughly flushed clean, except where otherwise specified, but prior to disinfection procedures and interior tank coating.

For testing and flushing purposes blind flanges and gaskets shall be temporarily installed in place of the duckbills on the mixing system. In place of one blind flange at the downstream end of the mixing system the Contractor shall install a 6 inch x 2-inch threaded companion flange with a 2-inch brass water tight plug to accommodate testing and the additional fittings required for bacteria sampling.

99-1.18A Temporary Blow-Offs: Temporary blow-offs as shown on the Project Plans shall be installed similar to City Standard 859. Thrust blocking and harnesses will not be required when all joints being tested are mechanically restrained. If concrete thrust blocks and tie-back rods are installed for temporary blow offs they shall be fully removed after they are no longer needed.

99-1.19 Cleaning, Flushing and Chlorination of new Water Pipes and Appurtenances: Attention is directed to Section 99-1.22 "Construction Water" of these Special Provisions and the City Standards.

Each section of pipe and all appurtenances shall be visually inspected by the Contractor, just prior to installation, and any residue, debris and/or foreign matter that is visible shall be completely removed. At the Engineer's discretion individual components may be required to have their interiors thoroughly wiped down with a one to three percent chlorine solution at no additional cost to the City.

All new system components shall be completely flushed prior to hydrostatic testing. To insure that all debris is fully removed, the Contractor shall not install the 12 inch blind flange on the end of the mixing system until all flushing is complete, and the under-tank outlet piping shall be protected to not allow entry of any foreign matter. If additional flushing is required at a later date, the Contractor may be required to remove and reinstall this blind flange at no additional cost to the City.

Water used for flushing shall be considered contaminated after exiting the new system and shall not be allowed to reenter the new system. The flushed water shall be collected by the Contractor on site and may be discharged into the City's sanitary sewer system upon approval by the Engineer. The Contractor shall maintain an **"air gap"** from the discharge conduit to the receiving sewer facility with a minimum vertical distance of twice the diameter of the discharge conduit.

The Contractor is made aware that City sewer customers are connected to the sanitary sewer systems located around the tank sites. It is the Contractor's responsibility to ensure that discharges shall be done so that there will not be any damage to City or private property, and care shall be taken so that flows shall not overcome available capacity. Discharges to the sanitary sewer system shall be monitored by authorized City personnel.

After all lines have been cleaned and flushed, and the hydrostatic testing is accepted by the Engineer, the Contractor shall disinfect all new pipes, including the mixing system, and appurtenances per Section 99-1.19 of the City Standards and any modifications herein.

All material, equipment and methods used for hydrostatic testing and chlorination must first be approved by the Engineer. It shall be the Contractor's responsibility to notify and coordinate this information with the Engineer prior to the start of these operations.

Sodium hypochlorite (liquid chlorine) of 10%, 12.5% or 15% shall be used for piping disinfection and shall be applied as stated herein and per City Standards. The Contractor shall notify the Engineer of the chlorine percentage at least 2 working days prior to disinfection of the first tank site. The same disinfectant shall be used at all tanks.

The point of application of the disinfectant shall be through a temporary blow off, or through a new fire hydrant installed as part of the new system. Adequate venting must be allowed, and both filling and venting port elevations shall be a minimum of 6 inches higher than all components, including the top of the fire hydrant, to be disinfected.

Water from the City's existing distribution system shall be used to fill the new mains at a slow controlled rate of flow during the application of chlorine, this rate of flow shall not exceed the limits of any openings used to expel water and/or air. Precautions shall be taken to prevent back pressure causing a reversal of flow into the City's water system. In the process of disinfecting, all valves and other appurtenances on the new pipe shall be operated in such a way to allow the chlorine mixture to be fully distributed to all parts of the new water system.

The rate of chlorine feed shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall be at least 100 ppm and not greater than 200 ppm. The chlorine solution shall be retained in the pipe for a minimum period of 24 hours but no longer than 72 hours. After 24 hours, chlorine levels shall not be less than 50% of the initial dosage, as recorded by the Inspector. If the chlorine level is less than 50% of the initial dosage, the system shall be flushed and the above chlorine procedures shall be repeated until obtaining acceptable results. Chlorinated water shall be discharged as stated herein under "Discharge of Chlorinated Water" and all new mains and appurtenances shall be given a final flush and then filled with water from the City's distribution system.

While the final flush of the new system is taking place the Engineer, or their representative, will take a chlorine residual reading from the City's distribution system and note it. If the reading is higher than 0.5 ppm, the new system shall be flushed until residual readings taken at all locations, as determined by the Engineer, are between the residual noted from the City's distribution system and 1 ppm, but no higher. If the residual taken from the City's distribution system is less than 0.05 ppm, the new water system shall be flushed until all locations are between 0.5 ppm and 1 ppm, but no higher.

After the disinfectant is flushed from the new water system and all residual readings are as specified, an initial set, consisting of two bacteria test samples per location, shall be taken where specified by the Engineer per one of the following methods;

Method A:

Take a first set of sample tests just after flushing is complete, and the second after a minimum of 16 hours, but not more than 72 hours after flushing.

Method B:

After flushing is complete let the system sit a minimum of 16 hours without any use, then collect both sets of sample tests from the same locations 15 minutes apart while allowing the sampl e port to maintain a slight flow in between samples.

The method used shall be determined by the Engineer at the time of disinfection.

All residual readings and bacteria test samples specified herein shall be taken by the Engineer, or their designee, and witnessed by the Contractor.

The Engineer must receive written test results showing that all samples from both sets taken are negative for contamination prior to scheduling connection(s) to the City's water distribution system.

If bacteria test results indicate contamination the new water system shall be flushed and sampling shall take place again as specified above. If any results from the additional sampling still show indication of contamination the new system shall be disinfected and flushed again prior to any additional bacteria test sampling taking place.

Unless otherwise approved by The City of Santa Rosa Water Quality Supervisor, the initial two sets of bacteria tests will be considered valid for up to 14 calendar days after the second set has been taken. All other sets taken will be valid for up to 10 calendar days. If more time passes than those specified before connecting to the City's distribution system, additional passing bacteria test samples will be required before connections are approved.

Costs for the collection and analysis of the initial sets of bacteria test samples will be paid for by the City of Santa Rosa. Samples are anticipated to be taken, at a minimum, from the following locations at each site;

R3: one from each of the three hose connections, one from the mixing system pipe and one from the telemetry cabinet

R7: one from the hose connection, one from the mixing system pipe, one from the new 2-inch service and one from the telemetry cabinet

R12B: one from the hose connection, one from the mixing system pipe, one from the fire hydrant and one from the telemetry cabinet

The exact location and quantity of the samples will be determined in the field by the Engineer, and may vary from those specified.

The City shall pay labor and analytical fees for collecting and analyzing up to two additional individual bacteria samples at each sampling location. If additional testing is required, the total costs of sampling and analysis will be deducted from the following progress payment. The Engineer, at their discretion, may require a complete Title 22 potable water test at the Contractor's expense.

DISCHARGE OF CHLORINATED WATER

Chlorinated water used to disinfect newly constructed water systems is the property of the Contractor and its disposal is the responsibility of the Contractor. Chlorinated water used to disinfect the new mains shall be disposed of in accordance with AWWA C655, all laws and regulations, and any modifications herein or specified on other contract documents.

Discharge to the storm drain system or a waterway will not be permitted without the Contractor first obtaining a permit from the North Coast Regional Water Quality Control Board and providing a copy of said permit to the Engineer prior to any discharge.

Discharges of chlorinated water may be allowed to be disposed of into the sanitary sewer system, but must first meet the following requirements:

A. The City of Santa Rosa Subregional Reclamation Facility shall be notified by the Engineer in coordination with the Contractor, prior to the discharge being disposed of in the sanitary sewer system. The payment of any fees required will be the responsibility of the Contractor.

B. The pH of the water must be between 6.0 and 9.5.

C. The Contractor shall maintain an" air **gap"** from the discharge conduit to the receiving sewer facility with a minimum vertical distance of twice the diameter of the discharge conduit.

If the Contractor elects to discharge either flushing water, tank wash down water or chlorinated water to the sanitary sewer system, the discharges shall take place at an offsite location that is approved of by the Engineer and shall be monitored by authorized City personnel and shall be done in such a manner as to not cause damage to any City or private property.

The Contractor shall be advised that City sewer customers are connected to the sanitary sewer systems located around the tank sites. Discharge flows shall be such as to not overcome available capacity.

99-1.20 Water Main Connection Work: Upon completion of construction and testing of new water system components at each site, final connection will be made by the Contractor under inspection by authorized City personnel.

The Contractor shall schedule all work that requires a system shutdown with the Engineer. Tie-ins to the existing system will not be scheduled until the Engineer has received documentation of all required passing bacteria tests. The Contractor shall submit a separate written request to the Engineer to schedule each individual shutdown required to facilitate a tie-in or any other work where a shutdown may be necessary. The Contractor shall submit written shut down requests at least two working days in advance for requested shutdown times. The City will attempt to facilitate shutdowns within these timeframes; however extenuating circumstances may result in response times in excess of those mentioned above. Under such conditions, no claims related to tie-in delays will be considered. Tie-in scheduling shall also be subject to the limitations of Section 6-4.01B, "Water Utility Notification", of these Special Provisions. All shutdowns and valve turning operations shall be performed by authorized City personnel only. Authorized City personnel must be present during any operation requiring a shutdown unless approved by the Engineer in writing. Tie-ins shall not be performed without prior authorization by the Engineer.

Excavations for individual tie-ins, or any other work that will require inspection by authorized City personnel, shall be completed, as much as possible without causing damage to new and/or existing facilities, and plated and all parts on site one working day prior to the scheduled work. If this requirement is not met, the scheduled work will be cancelled and the Contractor will be required to reschedule.
Contractors who fail to keep field appointments shall be billed for City equipment and personnel's time used, and the Contractor shall bear the costs incurred by the City for re-notification of its customers for the subsequent appointment.

City crews work a 9/80 schedule; this schedule may prohibit certain items of work, such as shutdowns on alternating Fridays.

When a connection is required to an existing water pipe, the Contractor shall provide all excavation, shoring, backfill and trench resurfacing in accordance with all applicable City Standards, and as specified elsewhere.

Where a “cut-in” tee is shown on the Project Plans, the Contractor shall provide and install the entire assembly (including valves), and any other hardware necessary under inspection by authorized City personnel, and shall provide all other work and materials necessary to complete the installation to City Standards, and as specified elsewhere. Any visible or disturbed joint within four feet on either side of a proposed cut-in shall be removed and additional piping installed.

Cut-ins shall not be allowed within 4’ of a joint on asbestos cement mains, or 2’ on any other main materials unless first receiving written approval from the Engineer.

Any existing joint that is not specified to be replace and is disturbed by the Contractor’s operations may be require by the Engineer to be removed and replaced with approved pipe and couplings under City inspection, and at no additional cost.

During the work, the Contractor shall exercise all necessary precautions to prevent the entrance of trench water or any other foreign material into the water system, and shall conduct all operations in accordance with the most stringent sanitation practices. The interior of all appurtenances being installed, as well as the outside of pipe that will come in contact with distribution water when the system is active, shall be thoroughly wiped down with a 1 to 3 percent liquid chlorine solution prior to installation.

Connections to cast iron, PVC, or ductile iron pipes shall be made with mechanical joint solid sleeves. When connecting to asbestos cement and/or “over-sized” cast iron pipe, “wide range” style couplings from Ford, Smith-Blair, Romac or an approved equivalent shall be used. Submittals are required for all couplings regardless of type or manufacturer.

When connecting to an existing water main the Contractor shall install permanent thrust restraint per the applicable City Standards, and any modifications specified.

Pier blocks shall be installed under all tees and buried valves, and on the lower fitting required to make a vertical grade adjustment when connecting to an existing pipe. If field conditions require, in the opinion of the Engineer, blocking may also be required under the existing pipe for support, at no additional cost to the City.

99-1.22 Construction Water: The Contractor shall obtain water according to Section 99-1.22 of the City Standards, and Section 6-4.01A, "Construction Water", of and these Special Provisions.

Installation and/or relocation of construction meters may take up to 3 working days after the request is made.
At no time shall water trucks or any other unapproved vessel be used in the application of flushing or loading the new water system unless first approved of by the Engineer.

The Contractor is made aware that water pressures at site hydrants may be too low at times to provide adequate flow through construction meters for some construction operations. Any booster

pump hookups must first be approved by the Engineer. Removal of construction hydrants will not be allowed.

99-3.01 Payment: R3 Tank Site and Water System Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved for tank site water improvements as specified, including but not limited to, notification and coordination, submittals, saw cutting, excavation, removal and disposal of excavated material, including asphalt and concrete, turf reinforcement mat, trench bracing and shoring, supporting, removal and disposal of existing utilities and their appurtenances, removal and disposal of existing wooden structure, dewatering as needed, furnishing and installing pipe, tubing, valves, fire hydrant, fittings, vaults and boxes, cut-in tees, pumper connections, and all other appurtenances as needed, pipe supports, joint restraints, thrust blocking and harnesses as required, temporary blow-offs, placing and compacting all required bedding and backfill, including drain rock and CDF, obtainment and use of construction water, flushing, testing and disinfection of the new system, disposal of water used for flushing and disinfection, trench plates and plywood, connections to existing water pipes and new under tank piping, temporary and permanent trench paving and concrete resurfacing, 6" concrete pad, crack sealing, bituminous seal coating, and any other work necessary to install for tank site water improvements to comply with the project plans and these special provisions not specifically enumerated, and no additional allowance will be made therefor.

R7 Tank Site and Water System Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved for tank site water improvements as specified, including but not limited to, notification and coordination, submittals, saw cutting, excavation, removal and disposal of excavated material, including asphalt and concrete, trench bracing and shoring, supporting, removal and disposal of existing utilities and their appurtenances, removal and disposal of existing wooden structure *if required*, dewatering as needed, furnishing and installing pipe, tubing, valves, fire hydrant, fittings, vaults and boxes, cut-in tees, pumper connections, and all other appurtenances as needed, pipe supports, joint restraints, thrust blocking and harnesses as required, temporary blow-offs, placing and compacting all required bedding and backfill, including drain rock and CDF, obtainment and use of construction water, flushing, testing and disinfection of the new system, disposal of water used for flushing and disinfection, trench plates and plywood, connections to existing water pipes and new under tank piping, temporary and permanent trench paving and concrete resurfacing, crack sealing, bituminous seal coating, and any other work necessary to install for tank site water improvements to comply with the project plans and these special provisions not specifically enumerated, and no additional allowance will be made therefor.

R12B Tank Site and Water System Improvements shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved for tank site water improvements as specified, including but not limited to, notification and coordination, submittals, saw cutting, excavation, removal and disposal of excavated material, including asphalt and concrete, trench bracing and shoring, supporting, removal and disposal of existing utilities and their appurtenances, removal and disposal of existing wooden structure *if required*, dewatering as needed, furnishing and installing pipe, tubing, valves, fire hydrant, fittings, vaults and boxes, cut-in tees, pumper connections, and all other appurtenances as needed, pipe supports, joint restraints, thrust blocking and harnesses as required, temporary blow-offs, placing and compacting all required bedding and backfill, including drain rock and CDF, obtainment and use of construction water, flushing, testing and disinfection of the new system, disposal of water used for flushing and

disinfection, trench plates and plywood, connections to existing water pipes and new under tank piping, temporary and permanent trench paving and concrete resurfacing, crack sealing, bituminous seal coating, relocate chain link fence, and any other work necessary to install for tank site water improvements to comply with the project plans and these special provisions not specifically enumerated, and no additional allowance will be made therefor.

SECTION 121
NOTIFICATION

121-1.01 Description: 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.

The Contractor shall provide a written notice of pending construction to, and attempt to make personal contact with all residents and businesses in the vicinity of each site 10 working days prior to the start of work. The notice shall inform the resident or business of the type of work, the scheduled date(s) and time of the work and the potential impacts to their property.

If loading or unloading of equipment and/or materials has the possibility to impact access to a work site or private property, the Contractor shall notify the Engineer and affected residents 1 working day prior to the operation.

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

Prior to mobilization to each individual tank site, the Contractor shall notify the City in writing a minimum of 10 working days in advance to provide the City's Water Distribution Crew time to make water system adjustments.

Although the Contractor will be allowed to work on all three tanks concurrently their attention is directed to Section 5-1.05 "Order of Work" for specifics on how the work is to be scheduled, and to Section 59-1.03G for scheduling of tank disinfection and filling.

It is not anticipated that there shall be any contract work on private property, but if unanticipated work does require the Contractor to access private property the Contractor shall notify and coordinate this access through the Engineer.

121-1.02 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 made therefor.

SECTION 197
CLEANUP

197-1.01 General: The Contractor shall continually maintain a clean, neat-appearing and safe work site during construction and provide final cleanup that will leave the premises clean and ready for operation as specified, and as directed by the Engineer.

The Contractor shall keep a covered container at each site for the daily disposal of rubbish, waste materials and packing materials. The container(s) shall be an appropriate size to accommodate a full week's waste. All waste materials shall be disposed of offsite at the end of each work week.

The entire site shall be kept free of all garbage, waste materials, unused pipe, excessive dirt and dust. Cleanup shall closely follow pipe laying and backfilling. Fences shall be protected during construction and repaired to the City's satisfaction. Final cleanup shall include the removal and disposal of all foreign material, paper, rubbish, rocks of any size, clods, excess pipe, asphalt, wood, metal, and all other excess miscellaneous construction material.

It is anticipated that, at a minimum, the bottom seven feet of each tank will need to be hand wiped clean of construction dust as part of final cleanup. This work shall be accomplished in a manner that does not damage the new coating in any way. If additional tank cleaning is required by the Engineer, it shall be done at no additional cost to the City.

All surfaces surrounding the water system facilities disturbed during construction shall be restored to pre-construction conditions or better.

All structures shall be completely cleaned prior to final acceptance. All floors shall be thoroughly swept and cleaned. All fixtures shall be cleaned and polished. All coated surfaces, including all piping and equipment shall be cleaned of all dirt, oil, smudges, etc.

All cut and fill slopes, trenches, stockpiles and area where the natural ground has been disturbed shall be left with a smooth, clean appearance. All excess rocks, clods, wood, rubbish, etc. shall be removed by the Contractor from the project area whether or not generated by the Contractor, City or utility companies.

Drainage ditches shall be kept open during times rain is expected. Sediment and debris shall be prevented from entering the storm drain system.

Disposal of excavated materials not suitable for backfilling shall be the responsibility of the Contractor. No material shall be disposed of on site or on private property adjacent to the work area without the written consent of the property owner and the Engineer.

Materials classified as hazardous shall be removed and disposed of at a CLASS 1 LANDFILL, or in a manner consistent with standards and guidelines set forth by the above-named agencies, or as directed by the Engineer and in accordance with all applicable laws.

All empty or discarded coating containers or other surface preparation, coating debris / waste / garbage and/or hazardous material shall be removed from the jobsite upon being generated or stored in a covered, watertight dumpster or equivalent container immediately after being generated and shall be disposed of legally. In general, the jobsite shall be maintained free of coating related refuse at all times.

All silt and debris shall be completely removed from drainage ditches, inlets, vaults and utility boxes.

Upon completion of the work, the Contractor shall remove all staging, scaffolding, abrasives, containers, etc., from the work site in a manner approved by the Engineer. Disposal of abrasive blast residue shall be in a manner consistent with guidelines set forth by the U.S. Environmental Protection Agency (USEPA) or California Department of Public Health (CDPH).

Coating, paint spots and/or oil stains on adjacent surfaces shall be removed and the job site cleaned. All damage to surfaces and/or landscaping resulting from work in this section shall be cleaned, repaired, replanted or refinished to the satisfaction of the Engineer, at no cost to the City.

197-1.02 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 made therefor.

SECTION A
FEES AND PERMITS

Fees and Permits: The Contractor shall obtain all necessary and required permits for completion of this project.

The Contractor shall obtain the following permits:

1. A permit for excavating and shoring trenches in excess of five feet or more in depth will be required from the State of California Division of Industrial Safety.

2. A building permit for each tank site is required. The City has arranged for payment of the permit fees and a permit for each site is available for pick up by the Contractor at City Hall, Department of Community Development, 100 Santa Rosa Avenue, Room 3 after award of the contract by the City of Santa Rosa. The Contractor may be required to obtain additional permits for other on-site work. The Contractor will be responsible for complying with all building permit requirements, scheduling all inspections and obtaining final permit sign-off at the completion of the project. Project retention will not be released to the Contractor until after the final sign-off of the permit by the City.

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

4. Confined Space Entry Permits.

The City has obtained a permit from the City of Santa Rosa Public Works Department for a one-time groundwater discharge permit into the City sewer system. Payment of the permit fee and any other fees for discharge into the sewer system shall be paid for by the City. A copy of the Authorization to Discharge is included herein. Any required water sampling will be the responsibility of the City. The phone number for the City's Environmental Compliance Section is 707-543-3369.

The City has applied for and obtained approval for PG&E electrical service relocations for the R7, R12A and R12B sites. The Contractor shall be responsible for complying with all contract and PG&E requirements, providing construction as needed, and coordinating all electrical work with PG&E, including notifications and scheduling all inspections. It shall also be the responsibility of the Contractor to keep the Engineer informed of all work involving PG&E. A copy of the approved agreements can be provided upon request.

It shall be the Contractor's responsibility to determine which local, state or federal regulatory guidelines apply and meet the requirements of those provisions. The Contractor shall also conform to applications for which work permits have been issued and to any approved amendments thereafter. Amendments in work covered by approved permits shall not be made without prior written approval.

Full compensation for securing, complying and the cost of all permits shall be considered as included in the prices paid for the **various contract items** of work and no additional allowance will be made therefor.

City of Santa Rosa

TECHNICAL SPECIFICATIONS

FOR

RESERVOIR 12A SITE SECURITY IMPROVEMENTS

CONTRACT NO. C00568

APRIL 2017

Brelje & Race CONSULTING ENGINEERS

SECTION 10
GENERAL CONSTRUCTION – R12A

10-3 Mobilization: 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** shall be included in the prices paid for various contract items of work and no additional allowance will be made therefor.

10-4 Miscellaneous Construction

10-4.02 Payment: **R12A Miscellaneous Construction** 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 miscellaneous construction work at the R12A site as indicated in these special provisions and on the project plans and not specifically included the prices paid for other contract items of work including but not limited to, tree trimming and removal, miscellaneous concrete, bollards, conform paving, delineators, coordination efforts, and any other items necessary for completion of the project as indicated on the project plans, and no additional allowance will be made therefor.

SECTION 15
EXISTING FACILITIES – R12A

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 at tank site R12A is considered as included in the contract prices paid for **various contract items** of work and no additional allowance will be made therefor.

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.

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 concrete at tank site R12A shall be included in the contract prices paid for **various contract items** of work and no additional allowance will be made therefor.

SECTION 26
AGGREGATE BASE – R12A

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.

Rolling 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: Class 2 Aggregate Base for work at tank site R12A shall be shall be considered as included in the prices paid for **various contract items** of work and no additional allowance will be made therefor.

[Version: 05/03/14]

SECTION 37
BITUMINOUS SEALS – R12A

37-2.01A Summary: The work conducted under this section shall be done in accordance with Sections 37 & 94 of the Standard Specifications, the seal coat manufacturer's specifications, and any modifications herein.

This work involves the furnishing and application of a pavement seal coat to all new and existing asphalt concrete where shown on the Project Plans and as stated herein.

New and existing asphalt concrete dikes shall receive a seal coat on the exposed face and top surfaces.

Seal coat shall be applied as the last order of work at each site, and no earlier than 30 days after all asphalt concrete has been placed to allow for proper cure. Working days will not be counted during the required cure time for asphalt concrete if, in the opinion of the Engineer, no other contract work can be performed at any of the site locations.

37-2.01C (2) Asphaltic Emulsion Seal Coat: The Contractor shall provide a submittal for any product proposed to be used to complete this work. If requested by the Engineer, the Contractor shall also provide a one half gallon sample in an appropriate.

37-2.01D Quality Control and Assurance: Section 37-2.01D(3) will not apply on this project.

37-2.02 Materials: Seal coat shall be Reed & Graham OverKote Asphalt Pavement Coating, or an approved equivalent.

Oilsealant shall be Reed & Graham OverKote Oil-Spot Seal, or an approved equivalent.

Crackfiller shall be Reed & Graham OverKote Crack Filler or an approved equivalent.

All materials used as described in this section shall be compatible.

37-2.03D Surface Preparation: Prior to placement of seal coat, the entire surface of the designated areas shall be free of dirt, water and vegetation. Cleaning may be accomplished by air blowing, vacuum, mechanical sweeper, power washing, or other techniques as approved by the Engineer. Edges of concrete surfaces abutting areas to receive a seal coat application shall be power washed to remove moss or other contaminants. If power washing the existing surface is used, the surface shall not have any standing water prior to application of the seal coat. Where there are deposits of grease or oil, these areas shall be cleaned by scraping, burning and/or the use of an approved detergent such as trisodium phosphate (using a stiff brush to scrub the area clean). Where a detergent is used, the pavement shall be thoroughly rinsed with water. All rinsate from pavement cleaning, if any, shall be collected and disposed of in accordance with all applicable laws and regulations. Rinsate disposal shall be the responsibility of the Contractor. No rinsate, or other products from the work, shall be allowed to flow to the storm drain or off site. After cleaning and removing grease and oil deposits, the cleaned area shall be sealed with an approved oilseal, applied per manufacturer's recommendations.

Cracks in excess of 1/4 inch, but less than 1 inch in width shall be sealed prior to application of the seal coat. Cracks shall be cleaned out with a stiff bristle broom and/or compressed air prior to crack sealing with crackfiller. The crackfiller shall be applied per manufacturer's recommendations and must be dry to the touch prior to application of the seal coat. Cracks that contain weeds and other live vegetable matter must be treated with locally approved non-oil based sterilant prior to application of crackfiller.

Cracks wider than 1 inch shall be filled with hot dense graded asphalt concrete conforming to Section 39 of the California Standard Specifications for 3/8" Maximum Asphalt Concrete and compacted level with adjacent surfaces.

All surfaces and facilities other than those shown to be coated shall be fully covered using a heavy mil plastic or oil resistant construction paper secured by tape in such a manner leaving a neat break between the sealed and unsealed surfaces.

37-2.03F (3) Asphaltic Emulsion for Seal Coat: New asphalt concrete pavement (HMA) shall be allowed to cure at least 30 days before seal coat application.

Two separate applications of seal coat shall be applied using a minimum of 30 gallons of undiluted sealer per 1,000 square feet of area. The second application shall be made after the first application is dry to the touch and won't scuff under normal walking. The total area to be covered is approximately 7800 square feet.

The sealer shall be mixed to uniform free flowing consistency. Water shall be added (not to exceed 15% by volume) to obtain a semi-fluid consistency. In exceptionally hot weather, the surface shall be dampened with water prior to the first application of the sealer. Any excess water shall be removed to leave the surface only slightly damp. The sealer shall be applied to the pavement in continuous parallel lines and spread immediately ahead by use of rubber faced squeegees and/or mechanized spreading equipment.

Surface preparation and sealer application shall not be performed if rain is forecast within 48 hours after application. Surface preparation and sealer application shall not be performed during or just prior to freezing weather conditions. Surface temperature shall be at least 55° F and rising during application.

It shall be the responsibility of the Contractor to protect the seal coat during drying. After application of the sealer is complete, traffic shall be excluded from the area until the sealer is completely dry and won't scuff under tires. This drying time shall be a minimum of 24 hours.

Any surface or facility damaged by over-spray shall be cleaned or replaced to the satisfaction of the Engineer at the Contractor's expense.

37-2.04 Payment: Full compensation for Seal coat work at R12A shall be considered as included in the contract price for **Seal Coat**, which shall include full compensation for all labor, materials, tools, and equipment, and doing all work involved in surface preparation and seal coat application as specified herein, as well as any other incidentals needed to comply with these Special Provisions and the Project Plans, and no additional allowance will be made therefor.

37-5 Crack Treatment: Section 37-2.03D shall be followed in lieu of Section 37-5 for surface preparation. Material used for crackfiller shall receive an application of a compatible detackifier

agent prior to opening up the area to traffic, and shall be cured per manufacturer's recommendations prior to seal coat application.

37-5.04 Payment: Full compensation for crack treatment at tank site R12A shall be shall be considered as included in the contract price paid for Seal Coat which price shall include full compensation for all work as specified herein and no additional allowance will be made therefor.

SECTION 39A
ASPHALT CONCRETE TRENCH PAVING – R12A

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-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-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 feet.

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 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 7-1.13 “Disposal of Materials Outside the Highway Right-of-Way”.

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 furnishing and installing temporary and final trench paving at tank site R12A shall be considered as included in the prices paid for the **various contract items** of work and no additional allowance will be made therefor.

[Revised: 8/28/13]

SECTION 80
FENCES – R12A

80-1 General

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

Chain Link security fencing and gates shall consist of steel mesh fabric and steel posts, both vinyl clad. Fence 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. The security fence shall be constructed per details on the project plans. Security fence shall not be topped with barbed wire.

80-3 Chain Link Fences

80-3.02 Materials

80-3.02A Materials: 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.
Line Posts	2-3/8"	3.65
Terminal and Corner Posts	2-7/8"	5.79
Swinging Gate Posts	5-9/16"	14.63
Rolling Gate End Posts	3-1/2”	7.58
Rolling Gate Track Support Posts	3-1/2”	7.58
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.

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. The color of the vinyl coatings shall be black.

80-3.03 Construction

80-1.04 Erection: Security Fence and Gate construction shall be constructed 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 on lines and grades furnished by the Engineer. Line and corner posts for the security fence shall be set in concrete foundations a minimum of 36" inches deep and gate posts a minimum of 48" deep. Concrete foundations shall be no less than three times the diameter of the posts.

80-3.04 Payment: Chain link fence installation at R12A shall be paid for at the contract price per **lineal foot** under pay item **Chain Link Fence**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in constructing the chain link security 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 a location determined in the field by the Engineer and in accordance with these Special Provisions.

Swinging double panel chain link fence gate shall be provided with catch and locking attachment of an approved design that will not rotate around the latch post. Stops to hold gate open and a center rest with catch shall be provided. Double panel swing gate hinges shall provide a 90 degree (minimum) opening for each side. All fittings shall be hot dip galvanized with vinyl coating as specified herein.

Rolling gate 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.

80-10.04 Payment: R12A Chain Link Fence Gate 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 constructing two single swinging panel gates in place complete as shown on the plans and as specified herein.

R12A Rolling Gate 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 constructing the gate in place complete as shown on the plans and as specified herein.

[Version: 4/14/09]

SECTION 109
ASPHALT CONCRETE DIKE – R12A

109-1.01 General: Asphalt concrete dike shall be 0.5 foot dike-Type A conforming to State Plan A73 9 and shall be constructed in conformance to the details and at the locations shown on the plans and in accordance with the applicable provisions of Section 39 of the Standard Specifications and these Special Provisions.

109-2.01 Measurement: Lengths of asphalt concrete dike to be paid for will be measured in place along the face of the berm.

109-3.01 Payment: Asphalt concrete dike work at R12A shall be paid for at the contract price per **lineal foot** under pay item **Asphalt Concrete Dike**, which shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all the work involved in constructing asphalt concrete dike complete in place as specified.

[Version: 4/14/09]

SECTION 121
NOTIFICATION – R12A

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 Utilities Distribution 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 Distribution Crew time to make water system and/or crew scheduling adjustments.

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 which he proposes to furnish and install, this list shall include supplier and mix design for pavement, CDF and concrete. In addition it shall include all mechanical materials and piping components. The list shall be complete as to name of manufacturer, size and catalog number (if applicable) 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) 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.

121-1.03: Progress Schedules: Contractor shall submit a detailed progress schedule that includes all work associated with the project from the initial Notice to Proceed to the Final Completion. This includes all phases of the work.

Schedule shall show the duration and sequencing of activities required for complete performance of the Work. The schedule must be approved by the Engineer and updates to the schedule will be required throughout the project to reflect actual progress and occurrences to date.

Detailed sub-schedules shall be available upon request of the Engineer to further define critical portions of the Work such as facility shutdowns.

The schedule shall be presented in digital Bar Chart format from Microsoft Project or an approved equal program and submitted in 11 x 17 sheet size paper format and electronically. Schedule shall include a title block showing the name of the project and date submitted.

Contractor shall provide 3-week look ahead schedule that is updated weekly at the request of the Engineer.

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

[Version: 10/13/14-CDA]

SECTION 124
MATERIAL RECYCLING – R12A

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 at tank site R12A 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 – R12A

201-1 General

201-1.01 Scope Of Work:

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

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

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

D. It is recommended that a pre-bid site visit is requested to accomplish the following:

   1. Thoroughly examine existing conditions before submitting his bid proposal to perform any work. He shall compare site conditions with data given on the plans or in these Specifications. No allowance shall be made for any additional costs incurred by the Contractor due to his failure to have examined the site or to have failed to report any discrepancies to the Engineer prior to bid.

   2. It is the Contractor's responsibility to be fully familiar with the existing utility locations, conditions and local requirements and regulations.

   3. Verify all measurements and conditions and shall be responsible for the correctness of same. No extra compensation will be allowed because of differences between Work shown on the Drawings and measurements at the site.

E. Deviations in location and conduit routing, as shown on the Project Plans, must first be approved by the Engineer..

   1. Such 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 Contract drawings, which includes both the furnishing and installation are:

   1. Modifications to existing Reservoir Telemetry Cabinet and associated hardware.

   2. Reservoir Pedestal and associated hardware.

   3. Site Lighting and associated hardware.

4. Relocating existing wire, conduits and pullboxes.
5. Conduits and the field interconnection wiring between the Control Panels, instrumentation, etc. and equipment provided under all other Divisions.
6. Provide all necessary conduits, junction boxes, grounding system, field interconnection wiring, hardware, fittings, and devices to connect the designated equipment and wiring.
7. All necessary miscellaneous shut off, sample, and calibration valves to sensors.
8. Provide trenching, backfilling, and compaction for all underground conduit routes, concrete pads, and pull boxes.
9. Concrete pads and supports for electrical and instrumentation equipment.
10. 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. The following specifications incorporate specific equipment and devices that are preferred by the City because of their serviceability, to match existing equipment, because of the local availability of labor, parts and materials, or because of the ability of the City to umbrella the equipment under existing maintenance contracts.

J. All electrical work shall conform with the National Electric Code (NEC) 2011 issue. Nothing on the Drawings or in the Specifications shall be construed to permit work or materials not conforming to these codes and standards.

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, 2011 Edition.
10. NEMA - National Electrical Manufacturers Association.
11. NETA - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, International Electrical Testing Association.

12. NESC - National Electrical Safety Code.

13. NFPA - National Fire Protection Agency & NFPA820

14. OSHA - Occupational Safety and Health Act Standards.

15. UL - Underwriter's Laboratories, Inc.

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

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

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

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

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

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

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

201-1.03 Related Work in Other Sections:

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

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/or 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.

201-1.05 System Supplier Qualifications:

A. General:

1. It is the intent of this Division that complete responsibility in the supplying other equipment required for this project be supplied by one System Supplier. This responsibility includes, but not limited to, all work necessary to select, furnish, program, supervise installation, calibrate, and place into operation all transmitters, instruments, controllers, alarm equipment, monitoring equipment, and accessories as specified herein.
2. The system supplier shall have an on staff project engineer with prior experience on similar sized projects. This project engineer shall coordinate the technical aspects of this project and prepare the submittals and drawings. The system supplier project engineer shall attend all coordination meetings and be on-site when requested by the City's Engineer.
3. System Supplier shall be Tesco (phone 916 395-8800) to match City Standard at other City reservoirs.

201-1.06 Contract Documents:

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

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

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

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

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

1. It is the Contractor’s responsibility to modify the conduit schedule based upon 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 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 Contract Drawings are approximate. The Contractor is responsible for determining actual lengths for bidding and installation purposes. Contractor is to be made aware that equipment may be installed in the lower levels of the building.

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

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

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

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

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

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

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

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

O. It is the System Supplier's responsibility for obtaining and 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.

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

1. These documents are to be used specifically for recording the as built locations and layout of all electrical and instrumentation equipment, routing of raceways, junction and pull boxes, and other diagram or document changes.
2. These Record documents shall be kept up-to-date during the progress of the job, with all "change orders", submittal modifications, and construction changes shown and stamped with “As-Built” at end of job.
3. These Record documents shall not be used for daily construction use and shall not contain any mark-ups that are unrelated to as-built corrections.
4. The following lists the record documents shall be as-built by Electrical Contractor:
    a. E-Series Drawings.
    b. Panelboard schedules.
    c. Conduit and Wire Routing Schedule.
        1) A copy of the Conduit and Wire Routing Schedule and Electrical plans showing conduit routing shall be updated weekly by the Contractor. Progress payments will be withheld if during monthly checks it is found that the Contractor fails to maintain the Conduit Schedule updates.
    d. Lighting Schedule.
    e. Duct banks and their routing with offset measurement and indicate changes in depth.
5. 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.
6. 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
7. Show the following on the Electrical (E-Series) Record Contract Drawings by dimension from readily obtained base lines:
    a. Exact location, type and function of electrical and instrumentation equipment and devices.
    b. Precise routing and locations of underground conduits, pullboxes, junction boxes, and appurtenances that make-up the raceway system.
    c. Show the dimensions, location and routing of electrical work, which will become permanently concealed.
    d. Show complete routing and sizing of any significant revisions to the systems shown.
8. Prior to acceptance of the work, the Contractor shall deliver to the Engineer one set of record full size drawings neatly marked accurately showing the information required above.

201-1.07 Coordination:

A. The Contractor shall coordinate the electrical work with the other trades, code authorities, utilities, and the Engineer; with due regard to their work, and towards promotion of a rapid

completion of the project. If any cooperative work must be altered due to lack of proper supervision of such, or failure to make proper provisions, then the Contractor shall bear expense of such changes as necessary to be made in work of others.

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

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

D. The electrical and instrumentation modifications and additions are to be made at the operational reservoir. The Contractor shall schedule all the required work with the City, including any electrical shutdown periods that will be required. Carry out scheduled shut downs only after the time, date, and sequence of work proposed to be accomplished during shutdown has been favorably reviewed by the Engineer.

E. 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 electrical facilities at each site, it may take up to four weeks for each individual meter installation providing power to the sites. 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 site power for completion.

F. 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 City it is necessary to do so.

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

201-1.08 Supervision:

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

B. The General Contractor shall supervise all work in this Division, including the electrical system general construction work, from the beginning to completion and final acceptance.

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

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

201-1.09 Inspections:

A. All work or materials covered by the Contract documents shall be subject to inspection at any and all times by the City. If any material does not conform to the Contract documents, or does not have a favorably reviewed submittal status; then the Contractor shall, within three days after being notified by the City, 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 City Construction Manager. 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 City 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 Division.

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

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

201-1.10 Job Conditions:

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

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

C. The normal outdoor, not in direct sunlight, ambient temperature range of the job site will vary between 0 to 110 degrees Fahrenheit. All equipment shall be rated to operate in these temperature ranges or provisions for adequate heating and cooling shall be installed, at no additional cost to the 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 for favorable 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 Division Specification Sections, with addendum updates included and with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.

1. Check marks (√) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated and, therefore, requested by the Contractor, each deviation shall be underlined and denoted by a unique number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the Specifications.
2. The submittal shall be accompanied by a detailed, written justification for each numbered item explaining variance or non-compliance with specifications.
3. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no review.

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

1. Product (item) name used herein and on the Contract Drawings.
2. The manufacturer's model or other designation.
3. Tag name/number per the drawings or schedules.
4. Index Binder Tab Dividers.
5. Detailed electrical one line, elementary control diagrams 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. A complete Bill of Materials list shall be provided at the inside of the front cover.
    a. The Contractor shall provide Bill of Material formatted as shown in Appendix "A." A separate set of Material Listing forms shall be provided for each MCC bucket, control panel and another listing all field equipment.
    b. Generic names or part numbers used by a distributor or Systems House are not acceptable; originating manufacturer's name and part number shall be listed.
19. Submit DVD disk copies of all submitted drawing in AutoCAD format.
20. 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 Contract "electrical" series drawings. Diagrams shall carry a uniform and coordinated set of wire colors, wire numbers, and terminal block numbers. The shop drawings shall include:

1. Electrical one-line diagrams detailing all devices associated with the power distribution system. The following applicable information or data shall be shown on the one-line diagram: location, size and amperage rating of bus; size and amperage rating of wire or cable; breaker ratings, number of poles, and frame sizes; standby generator; automatic transfer switch, utility metering, voltage, amperage, number of wires and phases; fault interrupt ratings; ground size and connections; neutral size and connections; power fail and other protective devices; fuse size and type; distribution transformer; panelboard; starters; contactor size and overload range; motor full load amperage of submitted motor and horsepower; rating for miscellaneous loads; etc. Submit a list for each piece of equipment containing the motor voltage, phase and full load amps with one-lines for verification of accuracy of submitted one line drawings.
2. 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.
3. 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. Catalog cuts and drawings shall be submitted for all devices and components in the electrical system.

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

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

F. Exceptions to the Contract specifications or drawings shall be clearly defined by the equipment supplier.

1. Data shall contain sufficient details so a proper evaluation may be made by the Engineer. Contractor shall provide separate letter (located in the front of the submittal) detailing specific exceptions to the Contract Specifications or Drawings.

2. Exceptions that are noted in the marked-up Drawings or Specifications, but not listed on the Exceptions/Clarifications letter, will be considered as non-responsive and not accepted as changes to the Contract Documents.

G. 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.

H. 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.

I. 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.”

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

K. 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.

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

M. Request for information (RFIs) shall not be included in submittals. RFI’s shall be submitted separately in its individual submittal number.

N. 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.

201-2 Products

201-2.01 Quality:

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

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

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

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

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

time to permit the making of proper tests, analyses, examinations, rejections, and resubmissions before incorporated into the work.

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

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

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

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

201-2.02 Nameplates And Tags:

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

1. For each major piece of electrical equipment provide a manufacturer's nameplate showing the Contract specified name and number designation, the manufacturer's name, model designation, part number, serial number, and pertinent ratings such as voltage, amperage, # of phases, range, calibration, etc.

2. For each device with a specific identity (pushbutton, indicator, instrument, etc.) mounted on the exterior or deadfront of a piece of equipment provide a nameplate with the inscription as shown in the Contract documents. Where no inscription is indicated in the Contract documents, furnish nameplates with an appropriate inscription providing the name and number of device.

3. For all receptacles and switches, provide a faceplate engraved or stamped with the panelboard and circuit number it is fed from. Also, include on faceplate or on a separate nameplate for each light switch identification use such as "OUTSIDE BUILDING LIGHTS," "PERIMETER LIGHTS," "MCC ROOM," etc.

4. All field instruments and devices shall be labeled with designation shown on P&ID diagrams.

5. All transformers and panelboards shall have nameplates with ½" high letters and be engraved with designations as shown on one-line Drawings.

6. All safety and disconnect switches shall have nameplates with ½" high letters and be engraved with designations as shown on one-line drawings.

7. Underground Pull Box and Vault Cover Identification: Engrave or bead weld pull box covers with minimum 1/4"thickness and 1/2" letters and Covers shall be engraved with designations as shown on Contract drawings or as directed by the City.

8. Aboveground Pull Box Cover Identification: 316 stainless steel screws attached stamped 316 stainless steel plate nameplates with 1/2” letters and be engraved with designations as shown on Contract drawings or as directed by the City.

B. Equipment Interior Nameplates - Nameplate material shall be clear plastic with black machine printed lettering as produced by a KROY or similar machine; except caution, warning, and danger nameplates shall have red lettering.

1. The size of the nameplate tape shall be no smaller than 2" in height with 3/8" lettering unless otherwise approved by the Engineer. Securely fasten nameplates in place on a clean surface using the adhesion of the tape. Add additional clear glue to hold the nameplate securely in place when necessary.

2. For each device with a specific identity (relay, module, power supply, fuse, terminal block, etc.) mounted in the interior of a piece of equipment provide a nameplate with the inscription as shown in the Contract documents. Where no inscription is indicated in the Contract documents, furnish nameplates with an appropriate inscription providing the name and number of device used on the submittal drawings.

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 #16 conductors with drain wire. Single twisted shielded pair (T.S.PR.) cables shall be Belden, or approved equal.

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

WIRES COLOR CODE TABLE

DESCRIPTION	PHASE/CODE LETTER	FIELD WIRE WIRE OR TAPE COLOR	NON-FIELD WIRE COLOR
480 V, 3 PHASE	A	BROWN	BROWN
	B	ORANGE	ORANGE
	C	YELLOW	YELLOW
240 V or 208 V, 3P	A	BLACK	-
	B	RED (ORANGE if high leg)	-
	C	BLUE	-
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 Contract example drawings.
2. Wire Labels: The labels shall be machine printed with indelible ink, heat shrink type capable of accepting a minimum of 23 machine printed characters per sleeve label by Brady “Bradysleeve” or equal. Labeling shall be neatly installed for visibility and shall be clearly legible. Each wire and conductor shall be labeled with wire label as shown on approved loop, 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.

201-2.04 Conduit, Raceways, And Wireways:

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

1. All wiring shall be installed in conduits, raceways, or wireways when interconnecting equipment and devices.

2. The Contractor shall use special conduit, raceways, wireways, construction methods, and materials as shown on the Contract drawings; which shall take precedence over any general methods and materials specified in this Section.
3. The minimum size conduit shall be ¾-inch unless indicated otherwise on the Drawings or for special connections to equipment. Buried, encased, or conduits located in walls shall be 1-inch minimum.
4. Conduit stubs for future use shall be capped with coupling, nipple, plug and cap and each end identified with conduit labels.
5. Conduits to be abandoned that protrude above graded shall be cut flush and filled with grout
6. Conduits shall not be filled to more than 50% of their total cross – sectional area.
7. CONDUIT MARKING
    a. All conduits and raceways listed in Conduit & Wire Routing Schedule shall have conduit tags at both ends of each conduit segment. This includes all conduits in pullboxes and vaults.
    b. Tag material shall be aluminum with machine stamped lettering. The size of the tag shall be 1/2” high. No letters are allowed smaller than 1/4". 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 Contract "E"-series Drawings. Labeling shall be neatly installed for visibility and shall be clearly legible.
    c. Prior to encasement, concealment, backfilling of conduits, temporary conduit labels shall be provided at each end of conduit. Temporary conduit labels shall have ½-inch (minimum) lettering at all transition points. After encasement and concealment temporary conduit labels shall be placed at each exposed end.

B. 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.

C. PVC CONDUIT, (PVC-40)

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.
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.

D. 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. RELAYS AND TIMERS

1. General: Relays and timers shall be provided with N.O. or N.C. contacts as shown on the Contract drawings. All spare contacts shown shall be provided. Contacts shall be rated 10

amps minimum at 120 VAC, 60 Hz unless otherwise stated. Supply power or coil voltage shall be 120 VAC unless shown otherwise on the Contract drawings. Relays and timers shall be designed for continuous duty. All relays shall be U.L. listed. The following is a summary of abbreviations associated with relays and timers:

CR - Control Relay

TR - Timing Relay

PFR - Power Fail Relay

TDOE - Time Delay On Energization

TDOD - Time Delay On De-Energization

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

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

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

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

C. CIRCUIT BREAKERS

1. Circuit breakers shall be of the indicating type, providing ON, OFF and TRIPPED positions of the operating handle. Circuit breakers shall be quick-make, quick-break, with a thermal-magnetic (TM) action or Motor Circuit Protectors (MCP) as shown on One-Line Diagrams. Circuit breakers shall be the bolted on type. The use of tandem or dual circuit breakers in a normal single-pole space to provide the number of poles or spaces specified are not acceptable. All multiple-pole circuit breakers shall be designed so that an overload on one pole automatically causes all poles to open. Circuit breakers and motor circuit protectors shall be manufactured by Eaton, G.E., ITE, or approved equal.

2. Each 480 volt or 240V circuit breaker shall have a minimum interrupting capacity of 35,000 amperes. Each 120 volt breaker shall be rated for a minimum 10,000 amperes interrupting capacity. Breakers shall be sized as shown on Drawings and as necessary for the supplied equipment.

3. Fused disconnects shall not be used in place of breakers.

4. All breakers shall be supplied with the correct sized copper only lugs for wire sizes as listed in “Conduit & Wire Routing Schedule”. Provide larger frame breaker or lug adapters as necessary when connecting to the listed oversized wire.

D. TERMINAL BLOCKS

1. CONTROL PANEL TERMINAL BLOCKS

   a. Terminal blocks to be clamp type, 6mm spacing, and 600 volt, minimum rating of 30 amps, and mounted on DIN rail, Entrelec M4/6 colored, Weidemuller or approved equal. DIN rail shall be same type as used for the relays. Install an extra DIN rail on each type of terminal strip with 4 terminals for future additions.

   b. Provide terminal blocks with "follower" plates which compress the wires and have wire guide tangs for ease of maintenance. Terminal blocks which compress the wires with direct screw compression are unacceptable. All power, control and instrument wires entering and leaving a compartment shall terminate on terminal blocks with wire numbers on terminals and on both ends of the wires.

   c. Terminal Tags and Markers: Each terminal strip shall have a unique identifying alphanumeric code at one end (i.e.: TB1, TB2, etc.) and plastic marking strip running the entire length with a unique number for each terminal. On each terminal strip, terminal numbers shall be assigned starting with #1 at one end, incrementing in alphanumerical order (i.e.: 1,2,3,4...). Numbers shall be assigned to all blocks except grounding blocks. Fuse blocks shall be assigned unique tag numbers such as FU1, FU2. No two fuses shall be assigned the same tag number.

   d. Plastic marking tabs shall be provided to label each terminal block. These marking tabs shall have a unique number/letter for each terminal which is identical to the "elementary" and "loop" diagram wire designation. Numbers on these marking strips shall be machine printed and 1/8 inch high minimum.

   e. Terminal blocks shall be physically separated into groups by the level of signal and voltage served. Power and control wiring above 100 volts shall have a separate group of terminal blocks from terminal blocks for wiring below 100 volts, intermixing of these two types of wiring on the same group of terminal blocks is not allowed.

   f. Provide a ground terminal or connection point for each grounding conductor.

   g. Provide a separate common or neutral terminal for every two (maximum) inputs and/or outputs.

2. Power Termination Blocks shall be rated for 600V main power connection. The power termination blocks shall be rated to accept Copper or Aluminum cable rated as shown on Contract one-line diagrams. The power termination block shall be capable of being mounted anywhere in a termination box. Each termination block shall be provided with lug shield to prevent contact with power connections. The power termination blocks shall be Connectron or approved equal.

E. 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.

F. 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.

G. 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.

H. 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 Pull Boxes:

A. Underground pull boxes, where shown or required by length of conduit runs, shall be prefabricated concrete type with the size shown on the Drawings or larger to allow for adequate pull area. Extension sections shall be provided as necessary to reach the depth of underground conduits. All boxes shall have galvanized steel hold down bolts and hardware. Boxes located in paved areas or other areas which vehicles may travel shall be H/20 loading

rated and have diamond plate steel traffic covers. Steel covers or lids shall be galvanized. Pull box covers shall be labeled with pull box designation. 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.

201-2.07 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 buses shall be provided in all electrical enclosures. Each ground bus shall be sized as shown on the Contract drawings or specified herein. The ground bus shall be adequately sized for the connection of all grounding conductors required per NEC. Screw type lugs shall be provided on all ground busses for connection of grounding conductors.

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

E. 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.

F. 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.

G. 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.

H. 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.

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

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

K. 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.

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

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

N. 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.

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

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. Update existing panel drawings at completion of project.

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 Engineer.

   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 Engineer.
2. For captive screw pressure plate type terminals, the insulation shall be removed from the last 0.25 inches of the conductor. The conductors shall be inserted under the pressure plate to full length of the bare portion of the conductor and the pressure plate tightened without excess force. No more than two conductors shall be installed in a single terminal. All strands of the conductor shall be captured under the pressure plate.
3. For screw terminals, appropriately sized locking forked spade lugs shall be used. Lugs shall be crimp on type that forms gas tight connections. All crimping shall be done using a calibrated crimping tool made specifically for the lug type and size being crimped.
4. On shielded cables, the drain wire shall be covered with insulating tubing along its full bare length between the cable jacket and the terminal lug or terminal pressure plate.
5. For screwless terminals, wire shall be stripped back and inserted per the manufacturer's instructions. When stripping insulation from conductors, do not score or otherwise damage conductor.
6. Heat shrink shall be placed on ends of shielded cable to cover foil.
7. Additional condulets with terminal blocks shall be supplied for wire termination to devices with leads instead of terminals. (i.e. solenoid valves, level probe, etc.)
8. Terminate all status, control, and analog I/O wiring on terminal blocks, including spares. Provide additional relay, DIN rails, terminal blocks and side panels as required.

K. A ground bus shall be provided in each enclosure or cabinet. It shall have provisions for connecting a minimum of ten grounding conductors. Screw type lugs shall be provided for connection of grounding conductors. All grounding conductors shall be sized as shown on plans or in accordance with NEC Table 250.122, whichever is larger.

L. Minimum wire bending space at terminals and minimum width of wiring gutters shall comply with NEC Tables 312.6 (a) & (b).

M. Future device and component mounting space shall be provided on the door, backpan, and subpanel where detailed on the Drawings. Where no detail is shown, provide a minimum of 25 percent usable future space.

N. Doors shall swing freely a minimum of 90 degrees and close with proper alignment.

O. Provide larger motor termination boxes as required to accommodate conduit and wires.

P. All conduits entering outdoor panels and enclosures shall use watertight hubs. These hubs shall be located on sides or bottom only. Top entry of outdoor panels or enclosures is not allowed unless specifically shown on Contract Drawings.

Q. All panels and enclosures be delivered with as-built drawings in clear plastic packets within each panel and enclosure.

201-3.04 Delivery:

A. Contractor shall inspect each electrical and instrumentation item delivered to the jobsite.

B. Contractor shall unpack each item for inspection within two (2) days of arrival.

C. Complete written inventory shall be produced by Contractor and submitted to Engineer within (2) days after arrival on jobsite for record keeping prior to any payment for the item.

201-3.05 Damaged Products:

A. Damage products will not be accepted. All damaged products shall be replaced with new products at no additional cost to the City.

201-3.06 Fasteners & Lugs:

A. Fasteners for securing equipment to walls, floors, and the like shall be 316 stainless steel. The fastener size shall match equipment mounting holes.

B. Stainless steel anchor bolts, ½" minimum size, shall be installed for the Electrical Equipment in the front and back of each section at locations recommended by Electrical Equipment manufacturer.

C. Concrete pad with stainless steel anchor bolts shall be provided for all electrical freestanding equipment.

D. All wall mounted panels or enclosures shall be spaced out from wall by stainless steel unistrut or stainless steel spacers with minimum depth of 1/2".

E. All wire & cable lugs shall be copper; aluminum or aluminum alloy lugs shall not be used. The Electrical Contractor shall supply all lugs to match the quantity & size of wire listed in the conduit & wire routing schedule.

201-3.07 Installation, General:

A. System:

1. Install all products per manufacturer's recommendations and the Drawings.
2. Contract Drawings are intended to show the basic functional requirements of the electrical system and instrumentation system and do not relieve the Contractor from the responsibility to provide a complete and functioning system.

B. Provide all necessary hardware, conduit, wiring, fittings, and devices to connect the electrical equipment provided under other Sections. The following shall be done by the Contractor at no additional cost to the City:

1. Provide additional devices, wiring, conduits, relays, signal converters, isolators, boosters, and other miscellaneous devices as required to complete interfaces of the electrical and instrumentation system.
2. Changing normally open contacts to normally closed contacts or vice versa.
3. Adding additional relays to provide more contacts as necessary.
4. Installing additional terminal blocks to land wires.

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 City or 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. Exposed conduits runs shall not be run directly on the ground or roof. Secure conduits to stainless steel unistrut.
8. Duct-taping conduits together is not acceptable. Conduits, installed into concrete pads, shall be installed with a minimum of 2” distance between conduits to allow installation of bushings.
9. Conduit entrances: Seal each conduit entrance from below grade into the Panels, and other electrical enclosures with plugging compound sealant to prevent the entrance of insects and rodents.
10. Special “Soft–Jaw” type pipe clamps shall be used to prevent damage to PVC-coated conduits while field threading, cutting to length, and coupling sections.
11. Conduits shall be painted to match the color of surface attached to as directed by City.
12. All spares shall be mandrel and have pull ropes installed.
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 City.

G. Conduit and Wire Routing Schedule:

1. Conduit material, wire size, and quantity listed in Schedule take precedence over Electrical Section Specifications.

2. All of the entries for each line in the conduit schedule apply to each conduit when multiple quantity of conduits (quantity of which are indicated by number entered in conduit no. column in schedule) are listed in the schedule.
3. Wire sizes listed are in AWG or Kcmil and are copper conductors.
4. Extra wire was intentionally placed in the “Conduit & Wire Routing Schedule,” which shall be labeled on both ends with a unique wire label. “Spare” to be on separate tag or included in wire label.
5. Contractor to supply and install all conduits and wiring as shown on Utility Engineered Design drawings. Utility primary and secondary conduit and wiring shown in “Conduit and Wire Routing Schedule” is for bid purposes only.
6. All control and signal wiring terminations shall have the correct wire label applied prior to making connection.
7. Conduit entries listed as “GRS-PVC” in the Conduit & Wire Routing Schedule are to be “Galvanized Rigid Conduits with PVC coating” the entire length.
8. Vertical offsets and sloping of conduits are not detailed on plans; the Electrical Contractor shall include in his bid the price for the complete conduit run utilizing the civil & mechanical plans to measure vertical & slope distances.
9. Exposed conduits runs shall not be run directly on the ground. Secure conduits to stainless steel unistrut.

H. Excavation and Back Filling:

1. The Electrical Contractor shall provide the excavation for equipment foundations and trenches for conduits or buried cables.
2. Trenches for all underground utility lines shall be excavated to the required depths.
3. Repave any area that was paved prior to excavation. Backfill and surface all areas as shown on the Drawings or where not shown to the original condition that was present prior to the excavation.
4. Underground conduits outside of structures shall have a minimum cover of 24 inches except for utility conduits depth shall be as required by the governing utility requirements. Back filling shall be done only after conduits have been inspected.
5. Contractor shall uncover any uninspected covered conduit trenches, at no additional cost to City, to verify proper installation.
6. Excavation and back fill conduit trenches shall conform to the requirements of the Earthwork Section of these Specifications, unless modified on plans, and to other entities as required. Backfill shall consist of 3/4 inch class 2 aggregate base material, unless otherwise noted.
7. At all times during the installation of the electrical distribution system, the Contractor shall provide barricades, fences, guard rails, etc., to safeguard all personnel, including small children, from excavated trenches.

I. Wiring, Grounding, and Shielding - It is important to observe good grounding and shielding practices in the generally noisy environment in this application. The shield of shielded cables shall be terminated to ground at one end only (source end), the shield at the other end (receive end) shall be encased in an insulated material to isolate it from ground.

J. 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.

K. Cleaning and Touch up:

1. Prior to startup and at completion of the work prior to final acceptance, all parts of the installation, including all equipment, exposed conduit, devices, and fittings shall be cleaned and given touch up by Contractor, as follows:
   a. Remove all grease and metal cuttings.
   b. Any discoloration or other damage to parts of the building, the finish, or the furnishings, shall be repaired.
   c. Thoroughly clean any of his exposed work requiring same.
   d. Vacuum and clean the inside of all MCC and electrical and instrumentation enclosures prior to applying power and a second time immediately prior to the final acceptance inspection.
   e. Clean all above and below ground pull boxes, junction boxes, and vaults from all foreign debris prior to final acceptance.
   f. Paint all scratched or blemished surfaces with the necessary coats of quick drying paint to match adjacent color, texture, and thickness. This shall include all prime painted electrical equipment, including enclosures, panels, poles, boxes, devices, etc.
   g. Remove all decals and lettering from both sides of support plates.
   h. Repair damage to factory finishes with repair products recommended by Manufacturer.
   i. Repair damage to PVC or paint finishes with matching touchup coating recommended by Manufacturer.

201-3.08 Electrical Testing:

A. GENERAL REQUIREMENTS

1. It is the intent of these tests to assure that all equipment is operational within industry and manufacturer's tolerances and is installed in accordance with design plans and specifications.
2. All equipment setup and assembled by the Contractor shall be in accordance with the design plans and Drawings and the manufacturer's recommendations and instructions and shall operate to the Engineer's satisfaction.

a. Follow all manufacturer's instructions for handling, receiving, installation, and pre-check requirements prior to energization.
b. After energization, follow manufacturer's instructions for programming, set-up and calibration of equipment.
c. The Contractor shall be responsible for, and shall correct by repair or replacement, at his own expense, equipment which, in the opinion of the Engineer, has been caused by faulty mechanical or electrical assembly by the Contractor.
d. Necessary tests to demonstrate that the electrical and mechanical operation of the equipment is satisfactory and meets the requirements of these Specifications shall be made by the Contractor at no additional cost to the City.

3. The testing shall not be started until the manufacturer has completed fabrication, wiring, and setup; performed satisfactory checks and adjustments; and can demonstrate the system is complete and operational.
4. 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.
5. 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.
6. The Contractor shall notify the City and the Engineer of the Supplier's readiness to begin all field tests in writing (a minimum of ten working days prior to start), and shall schedule system checkout on dates agreed to by the City and the Engineer in order that the testing be scheduled and witnessed.
7. The Contractor shall fill in & submit for approval the "Scheduled Test Request Form" located in Appendix "B" for each requested inspection, and field test.
8. The supplier shall submit for approval, the proposed 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.

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 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 "B" 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 fill in, for each piece of equipment, Test Form TF4 located in Appendix "B."
    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 ocated in Appendix “B.”

d. GROUNDING SYSTEM TESTS

1) Visual and Mechanical Inspection:

a) Verify ground system is in compliance with Drawings and Specifications.

2) Electrical Tests:

a) Before backfilling trenches, and placement of sidewalks, landscape and paving, measure the resistance of each electrode to ground using a ground resistance tester. Perform the test not less than two days after the most recent rainfall and in the afternoon after any ground condensation (dew) has evaporated.

b) After all individual ground electrode readings have been made, interconnect as required and measure the system's ground resistance.

c) The grounding test shall be in conformance with IEEE Standard 81.

d) Measurements shall be made at 10 feet intervals beginning 25 feet from the test electrode and ending 75 feet from it in a direct line between the system being tested and the test electrode.

e) Point-to-Point: Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points.

3) Test Values:

a) The resistance between the main grounding electrode and equipment ground shall be no greater than five ohms per IEEE Standard 142.

b) Investigate point-to-point resistance values that exceed 0.5 ohms.

c) Plots of ground resistance shall be made and submitted to the Engineer for approval.

4) The Contractor shall fill in Grounding System Test Form TF3 located in Section 16010 Appendix “B.”

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 “B.”

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 Breaker Test Form TF9 located in Appendix “B.”

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. 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 "B."

7. TRIAL OPERATIONS:

   a. The entire electrical installation shall be either tested or trial operated to verify Contract compliance. That is, controls, heaters, fans, light switches, convenience receptacles, lights, etc. shall be trial operated. Contractor shall conduct trial operations in the presence of the Engineer and Operations and Maintenance personnel.

E. 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 City and/or Engineer. Tests shall be repeated by the Contractor at no additional cost to the City and at the discretion of the City and/or 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 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. Warranty certificate with start dates, duration and contact information.
17. Troubleshooting instructions.
18. 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 four (4) each USB drives with lanyards and two sets of DVDs containing all documents in both PDF format and unlocked AutoCAD - DWG format, version 2010 or later:

1. As-built Contract electrical and instrumentation drawings prepared for this project.
2. As-built set of all required Drawings for the project.
3. As-built sets of other computer generated documents prepared for this project, including PLC ladder logic files, and Bill of Materials prepared for this project.
4. Electronic PDF version of O&M manual. Version format shall follow the hard copy submittal of the O&M, including index, equipment record sheet, warranty information, theory of operation, maintenance instruction, etc. PDF shall “bookmarked” to at each index and subtab listed in O&M.
5. 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 designated City maintenance supervisor 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 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.

201-3.11 Final Acceptance:

A. Final acceptance will be given by the City 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:

1. 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.
2. Verify that as-installed drawings have been placed in all new or modified panels.

201-4 Payment:

A. **R12A Tank Site Electrical Improvements** shall be paid for at the contract **lump sum** price, which shall include full compensation for furnishing 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, underground conduits and conductors, ground rods and underground grounding connections, power feeders, control wire, wiring connections, lighting, lighting foundations, concrete work, 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.

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: _____

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: _____

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 : _____
MFGR TRIP TIME @300% MAX: _____
BREAKER RATING / RANGE: _____
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: _____

SECTION 201

ELECTRICAL SYSTEM ANALYSIS – R12A

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 Contract Documents 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 Drawings and specifications shall be documented with justifications. When noting the exception, list which Drawings or which Specification Subsection number the exception is taken.
4. Clarification requests shall list which Drawing or Specification Subsection number the clarification is required for.

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 the City 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 the 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 at tank site R12A shall be considered as included in the prices paid for the **various contract items** of work and no additional compensation will be allowed.

SECTION A
DESCRIPTION OF WORK – R12A

The work to be done consists, in general, of installing site security fencing and lighting, and other miscellaneous upgrades at tank site R12A as shown on the plans and indicated herein.

The work to be done consists of supplying all labor, methods or processes, implements, tools, machinery, equipment, and materials to construct the upgrades 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]

CITY OF SANTA ROSA

STATE OF CALIFORNIA

SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 - R3, R6, R7 & R12B AND VARIOUS OTHER SITE IMPROVEMENTS - S1, S2, R6 & R12A

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:

CITY OF SANTA
UNIT PRICE SCHEDULE

SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 - R3, R6, R7, & R12B AND VARIOUS OTHER SITE IMPROVEMENTS - S1, S2, R6 & R12A

Item No.	Description	Quantity	Units	Unit Price	Total Price
1	MOBILIZATION	1	LS	$_____	$_____
2	TRAFFIC CONTROL	1	LS	$_____	$_____
3	S1 SITE IMPROVEMENTS	1	LS	$_____	$_____
4	S2 SITE IMPROVEMENTS	1	LS	$_____	$_____
5	CLEARING AND GRUBBING	1	LS	$_____	$_____
6	SEAL COAT	26,289	SF	$_____	$_____
7	ASPHALT CONCRETE REPAIR	225	SF	$_____	$_____
8	ASPHALT CONCRETE AT R7	27	TON	$_____	$_____
9	ASPHALT CONCRETE PARKING PAD AT R12B	17	TON	$_____	$_____
10	ASPHALT CONCRETE DIKE	230	LF	$_____	$_____
11	R3 TANK RING FOUNDATION	1	LS	$_____	$_____
12	R7 TANK RING FOUNDATION	1	LS	$_____	$_____
13	R12B TANK RING FOUNDATION	1	LS	$_____	$_____
14	R3 TANK INTERIOR RECOATING	1	LS	$_____	$_____
15	R7 TANK INTERIOR RECOATING	1	LS	$_____	$_____
16	R12B TANK INTERIOR RECOATING	1	LS	$_____	$_____
17	R3 TANK EXTERIOR RECOATING	1	LS	$_____	$_____
18	R7 TANK EXTERIOR RECOATING	1	LS	$_____	$_____

CITY OF SANTA
UNIT PRICE SCHEDULE

SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 - R3, R6, R7, & R12B AND VARIOUS OTHER SITE IMPROVEMENTS - S1, S2, R6 & R12A

Item No.	Description	Quantity	Units	Unit Price	Total Price
19	R12B TANK EXTERIOR RECOATING	1	LS	$_____	$_____
20	R6 TANK PARTIAL EXTERIOR RECOATING	1	LS	$_____	$_____
21	R3 TANK SITE DRAINAGE IMPROVEMENTS	1	LS	$_____	$_____
22	R7 TANK SITE DRAINAGE IMPROVEMENTS	1	LS	$_____	$_____
23	R12B TANK SITE DRAINAGE IMPROVEMENTS	1	LS	$_____	$_____
24	ROCK SLOPE PROTECTION	1	LS	$_____	$_____
25	CURB AND GUTTER	170	LF	$_____	$_____
26	VALLEY GUTTER	94	SF	$_____	$_____
27	STEEL BOLLARD	13	EA	$_____	$_____
28	R3 TANK UPGRADES	1	LS	$_____	$_____
29	R7 TANK UPGRADES	1	LS	$_____	$_____
30	R12B TANK UPGRADES	1	LS	$_____	$_____
31	CHAIN LINK FENCE	1,568.00	LF	$_____	$_____
32	R3 CHAIN LINK FENCE GATE	1	LS	$_____	$_____
33	R7 CHAIN LINK FENCE GATE	1	LS	$_____	$_____
34	R12B SINGLE LEAF BAR GATE	1	LS	$_____	$_____
35	R3 TANK SITE ELECTRICAL IMPROVEMENTS	1	LS	$_____	$_____

CITY OF SANTA
UNIT PRICE SCHEDULE

SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 - R3, R6, R7, & R12B AND VARIOUS OTHER SITE IMPROVEMENTS - S1, S2, R6 & R12A

Item No.	Description	Quantity	Units	Unit Price	Total Price
36	R7 TANK SITE ELECTRICAL IMPROVEMENTS	1	LS	$_____	$_____
37	R12B TANK SITE ELECTRICAL IMPROVEMENTS	1	LS	$_____	$_____
38	R3 TANK SITE AND WATER SYSTEM IMPROVEMENTS	1	LS	$_____	$_____
39	R7 TANK SITE AND WATER SYSTEM IMPROVEMENTS	1	LS	$_____	$_____
40	R12B TANK SITE AND WATER SYSTEM IMPROVEMENTS	1	LS	$_____	$_____
41	R12A MISCELLANEOUS CONSTRUCTION	1	LS	$_____	$_____
42	R12A CHAIN LINK FENCE GATE	1	LS	$_____	$_____
43	R12A ROLLING GATE	1	LS	$_____	$_____
44	R12A TANK SITE ELECTRICAL IMPROVEMENTS	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. C00568
SEISMIC UPGRADES AND IMPROVEMENTS PHASE 4 - R3, R6, R7 & R12B AND VARIOUS OTHER SITE IMPROVEMENTS -S1, S2, R6 & R12A

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 31 sheets entitled, Seismic Upgrades and Improvements Phase 4 - R3, R6, R7 & R12B and Various Other Site Improvements - S1, S2, R6 & R12A, File Number 2014-0060, 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: _____