

INVITATION FOR BIDS



FOR CONSTRUCTION OF

Country Manor Sewer Lift Station 10  
Replacement and Spring Lake Sewer Lift Station  
16 Generator Improvements

**CITY CONTRACT NUMBER**

**C02387**

ISSUED BY

**CAPITAL PROJECTS ENGINEERING DIVISION**

**CITY OF SANTA ROSA, CALIFORNIA**

2025

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## Notice Inviting Bids

1. **Bid Submission.** City of Santa Rosa (“City”) will accept sealed bids for its Country Manor Sewer Lift Station 10 Replacement and Spring Lake Sewer Lift Station 16 Generator Improvements Project, City Contract No. C02387 (“Project”), before **September 4, 2025, at 2:00 p.m.**, at its Transportation and Public Works office, located at 69 Stony Circle, Santa Rosa, California, at which time the bids will be publicly opened and read aloud.
2. **Project Information.**
  - 2.1 **Location and Description.** The Project is located at 1426 Country Manor Drive, at the northeast corner of the Country Manor Drive and Guerneville Road intersection, and at 5391 Montgomery Drive. The work consists of replacing the Country Manor Sewer Lift Station (SLS-10) to accommodate anticipated future flows. Work will include installation of an upsized wet well, installation of new submersible pumps and appurtenances, replacement of the force main piping, valves, meter, and appurtenances, upgrade of the electrical service to 3-phase power, replacement of electrical and controls systems, and installation of a new backup generator. The work also includes replacing the existing backup generator at the Spring Lake Sewer Lift Station (SLS-16) site with the existing backup generator from the Country Manor site.
  - 2.2 **Time for Final Completion.** The Project must be fully completed within 250 Working Days from the start date set forth in the Notice to Proceed. City anticipates that the Work will begin on or about November 2025, but the anticipated start date is provided solely for convenience and is neither certain nor binding.
  - 2.3 **Estimated Cost.** The estimated construction cost is **\$1,720,000**.
3. **License and Registration Requirements.**
  - 3.1 **License.** This Project requires a valid California contractor’s license for the following classification(s): **A**.
  - 3.2 **DIR Registration.** City may not accept a Bid Proposal from, or enter into the Contract with, a bidder without proof that the bidder is registered with the California Department of Industrial Relations (“DIR”) to perform public work pursuant to Labor Code § 1725.5, subject to limited legal exceptions.
4. **Contract Documents.** The plans, specifications, bid forms and contract documents for the Project, and any addenda thereto (“Contract Documents”) may be downloaded from the City’s PlanetBids portal, which may be accessed by selecting the “Bid/Proposal Opportunities” link on the City’s website at <https://www.srcity.org/165/Bids-Proposals>. A printed copy of the Contract Documents is not available.
5. **Bid Security.** The Bid Proposal must be accompanied by bid security of ten percent of the maximum bid amount, in the form of a cashier’s or certified check made payable to City, or a bid bond executed by a surety licensed to do business in the State of California on the Bid Bond form included with the Contract Documents. The bid security must guarantee that within ten days after City issues the Notice of Award, the successful bidder will execute the Contract and submit the payment and performance bonds, insurance certificates and endorsements, valid Certificates of Reported Compliance as required under the California Air Resources Board’s In-Use Off-Road Diesel-Fueled Fleets Regulation (13 CCR § 2449 et seq.) (“Off-Road Regulation”), if applicable, and any other submittals required by the Contract Documents and as specified in the Notice of Award.

**6. Prevailing Wage Requirements.**

**6.1 General.** Pursuant to California Labor Code § 1720 et seq., this Project is subject to the prevailing wage requirements applicable to the locality in which the Work is to be performed for each craft, classification or type of worker needed to perform the Work, including employer payments for health and welfare, pension, vacation, apprenticeship and similar purposes.

**6.2 Rates.** The prevailing rates are on file with the City and are available online at <http://www.dir.ca.gov/DLSR>. Each Contractor and Subcontractor must pay no less than the specified rates to all workers employed to work on the Project. The schedule of per diem wages is based upon a working day of eight hours. The rate for holiday and overtime work must be at least time and one-half.

**6.3 Compliance.** The Contract will be subject to compliance monitoring and enforcement by the DIR, under Labor Code § 1771.4.

**7. Performance and Payment Bonds.** The successful bidder will be required to provide performance and payment bonds, each for 100% of the Contract Price, as further specified in the Contract Documents.

**8. Substitution of Securities.** Substitution of appropriate securities in lieu of retention amounts from progress payments is permitted under Public Contract Code § 22300.

**9. Subcontractor List.** Each Subcontractor must be registered with the DIR to perform work on public projects. Each bidder must submit a completed Subcontractor List form with its Bid Proposal, including the name, location of the place of business, California contractor license number, DIR registration number, and percentage of the Work to be performed (based on the base bid price) for each Subcontractor that will perform Work or service, or fabricate and install Work, for the prime contractor in excess of one-half of 1% of the bid price, using the Subcontractor List form included with the Contract Documents.

**10. Bidders' Conference.** A bidders' conference will be held on **August 20, 2025, at 10:00 a.m.**, at the following location: 1426 Country Manor Drive, Santa Rosa, to acquaint all prospective bidders with the Contract Documents and the Project site. The bidders' conference is not mandatory. A bidder who fails to attend a mandatory bidders' conference may be disqualified from bidding.

**11. Instructions to Bidders.** All bidders should carefully review the Instructions to Bidders for more detailed information before submitting a Bid Proposal. The definitions provided in Article 1 of the General Conditions apply to all of the Contract Documents, as defined therein, including this Notice Inviting Bids.

**12. Specific Brands.** Pursuant to referenced provision(s) of Public Contract Code § 3400(c), City has found that the following specific brands are required for the following particular material(s), product(s), thing(s), or service(s), and no substitutions will be considered or accepted:

<b>Item:</b>	<b>Required Brand:</b>	<b>Reference:</b>
Submersible Pumps	ITT Flygt	Technical Specification Section 129
PLC & PLC Programming	TESCO Controls	Technical Specification Section 201
Motor Starters	Allen-Bradley	Technical Specification Section 201
Chart Recorder	Yokogawa	Technical Specification Section 201
Autodialer	Barnett	Technical Specification Section 201
RFI Filter	Eaton Aegis	Technical Specification Section 201
DC Power Supply	Power One	Technical Specification Section 201
Batteries	Power-Sonic	Technical Specification Section 201
DC-DC Converter	Rhino PSP	Technical Specification Section 201
Bubbler Air Flowmeter	King Instruments	Technical Specification Section 201
Flowmeter	Rosemount	Technical Specification Section 201
Radio	Trio	Technical Specification Section 201
Antenna	Kathrein	Technical Specification Section 201
Automatic Transfer Switch	ASCO	Technical Specification Section 201
Power Monitor	Electro Industries	Technical Specification Section 201
Generator Receptacle	Crouse-Hinds	Technical Specification Section 201
Generator Connectors	Crouse-Hinds	Technical Specification Section 201
Diesel Generator	Caterpillar	Technical Specification Section 202
Diesel Level Transmitter	ToughSonic	Technical Specification Section 202

By: \_\_\_\_\_  
Sara Mathews, P.E. Supervising Engineer

Date: \_\_\_\_\_

Publication Date: August 11, 2025

END OF NOTICE INVITING BIDS

## Instructions to Bidders

Each Bid Proposal submitted to the City of Santa Rosa ("City") for its Country Manor Sewer Lift Station 10 Replacement and Spring Lake Sewer Lift Station 16 Generator Improvements Project, City Contract No. C02387 ("Project") must be submitted in accordance with the following instructions and requirements:

### 1. Bid Submission.

- 1.1 General.** Each Bid Proposal must be completed, using the form provided in the Contract Documents, signed, and submitted to City in a sealed envelope, with all required forms and attachments, before the deadline set forth in Section 1 of the Notice Inviting Bids, or as amended by subsequent addendum. Faxed or emailed Bid Proposals will not be accepted, unless otherwise specified. Late submissions (i.e., submissions at or after the exact hour of bid opening) will be returned unopened. City reserves the right to postpone the date or time for receiving or opening bids. Each bidder is solely responsible for all of its costs to prepare and submit its bid and by submitting a bid waives any right to recover those costs from City. The bid price(s) must include all costs to perform the Work as specified, including all labor, material, supplies, and equipment and all other direct or indirect costs such as applicable taxes, insurance and overhead.
- 1.2 Vendor Registration.** To participate in the bidding process, each bidder must register as a vendor on PlanetBids, download the Contract Documents, and add itself to the "Prospective Bidders" list for the Project. If City issues an addendum, each bidder must log in to PlanetBids and acknowledge the addendum prior to the bid deadline. (See Section 8, below.)
- 1.3 Bid Envelope.** The sealed envelope containing the Bid Proposal and all required forms and attachments must be clearly labeled and addressed as follows:

**BID PROPOSAL:**

Country Manor Sewer Lift Station 10 Replacement and Spring Lake Sewer Lift  
Station 16 Generator Improvements Project  
Contract No. C02387

Transportation and Public Works Department  
69 Stony Circle  
Santa Rosa, California 95401  
Attn: Joyce Brandvold

The envelope must also be clearly labeled, as follows, with the bidder's name, address, and its registration number with the California Department of Industrial Relations ("DIR") for bidding on public works contracts (Labor Code §§ 1725.5 and 1771.1):

*[Contractor company name]*  
*[street address]*  
*[city, state, zip code]*  
DIR Registration No: \_\_\_\_\_

- 1.4 DIR Registration.** Subject to limited legal exceptions for joint venture bids and federally-funded projects, City may not accept a Bid Proposal from a bidder without proof that the bidder is registered with the DIR to perform public work under Labor Code § 1725.5. If City is unable to confirm that the bidder is currently registered with the DIR, City may disqualify the bidder and return its bid unopened. (Labor Code §§ 1725.5 and 1771.1(a).)
- 1.5 Bid Tabulation.** To access the bid tabulation when available, visit [www.srcity.org/bids](http://www.srcity.org/bids). Click the link to "Capital Projects Bid Results" under the Capital Projects heading.

2. **Bid Proposal Form and Enclosures.** Each Bid Proposal must be completed legibly using the Bid Proposal form included with the Contract Documents. The Bid Proposal form must be fully completed without interlineations, alterations, or erasures. Any necessary corrections must be clear and legible and must be initialed by the bidder's authorized representative. A Bid Proposal submitted with exceptions or terms such as "negotiable," "will negotiate," or similar, will be considered nonresponsive. Each Bid Proposal must be accompanied by bid security, as set forth in Section 4 below, and by a completed Bid Schedule, Subcontractor List, and Non-Collusion Declaration using the forms included with the Contract Documents, and any additional forms required by the Notice Inviting Bids or Instructions to Bidders.
3. **Authorization and Execution.** Each Bid Proposal must be signed by the bidder's authorized representative. A Bid Proposal submitted by a partnership must be signed in the partnership name by a general partner with authority to bind the partnership. A Bid Proposal submitted by a corporation must be signed with the legal name of the corporation, followed by the signature and title of two officers of the corporation with full authority to bind the corporation to the terms of the Bid Proposal under California Corporations Code § 313 or as otherwise authorized by law.
4. **Bid Security.** Each Bid Proposal must be accompanied by bid security of ten percent of the maximum bid amount, in the form of a cashier's check or certified check, made payable to the City, or bid bond using the form included in the Contract Documents and executed by a surety licensed to do business in the State of California. The bid security must guarantee that, within ten days after issuance of the Notice of Award, the bidder will: execute and submit the enclosed Contract for the bid price; submit payment and performance bonds for 100% of the maximum Contract Price; submit the insurance certificates and endorsements; and submit valid Certificates of Reported Compliance as required by the Off-Road Regulation, if applicable, and any other submittals, if any, required by the Contract Documents or the Notice of Award.
5. **Requests for Information.** Questions or requests for clarifications regarding the Project, the bid procedures, or any of the Contract Documents must be submitted in writing to City via the PlanetBids portal. Oral responses are not authorized and are not binding on the City. Bidders should submit any such written inquiries at least five Working Days before the scheduled bid opening. Questions received any later might not be addressed before the bid deadline. An interpretation or clarification by City in response to a written inquiry will be issued in an addendum.
6. **Pre-Bid Investigation.**
  - 6.1 **General.** Each bidder is solely responsible at its sole expense for diligent and thorough review of the Contract Documents, examination of the Project site, and reasonable and prudent inquiry concerning known and potential site and area conditions prior to submitting a Bid Proposal. Each bidder is responsible for knowledge of conditions and requirements which reasonable review and investigation would have disclosed. However, except for any areas that are open to the public at large, bidders may not enter property owned or leased by the City or the Project site without prior written authorization from City.
  - 6.2 **Document Review.** Each bidder is responsible for review of the Contract Documents and any informational documents provided "For Reference Only," e.g., as-builts, technical reports, test data, and the like. A bidder is responsible for notifying City of any errors, omissions, inconsistencies, or conflicts it discovers in the Contract Documents, acting solely in its capacity as a contractor and subject to the limitations of Public Contract Code § 1104. Notification of any such errors, omissions, inconsistencies, or conflicts must be submitted in writing to the City no later than five Working Days before the scheduled bid opening. (See Section 5, above.) City expressly disclaims responsibility for assumptions a bidder might draw from the presence or absence of information provided by City.
  - 6.3 **Project Site.** Questions regarding the availability of soil test data, water table elevations, and the like should be submitted to the City in writing, as specified in Section 5, above. Any subsurface exploration at the Project site must be done at the bidder's expense, but only with prior written authorization from City. All soil data and analyses available for inspection

or provided in the Contract Documents apply only to the test hole locations. Any water table elevation indicated by a soil test report existed on the date the test hole was drilled. The bidder is responsible for determining and allowing for any differing soil or water table conditions during construction. Because groundwater levels may fluctuate, difference(s) in elevation between ground water shown in soil boring logs and ground water actually encountered during construction will not be considered changed Project site conditions. Actual locations and depths must be determined by bidder's field investigation. The bidder may request access to underlying or background information on the Project site in City's possession that is necessary for the bidder to form its own conclusions, including, if available, record drawings or other documents indicating the location of subsurface lines, utilities, or other structures.

- 6.4 Utility Company Standards.** The Project must be completed in a manner that satisfies the standards and requirements of any affected utility companies or agencies (collectively, "utility owners"). The successful bidder may be required by the third-party utility owners to provide detailed plans prepared by a California registered civil engineer showing the necessary temporary support of the utilities during coordinated construction work. Bidders are directed to contact the affected third-party utility owners about their requirements before submitting a Bid Proposal.
- 7. Bidders Interested in More Than One Bid.** No person, firm, or corporation may submit or be a party to more than one Bid Proposal unless alternate bids are specifically called for. However, a person, firm, or corporation that has submitted a subcontract proposal or quote to a bidder may submit subcontract proposals or quotes to other bidders.
- 8. Addenda.** Subject to the limitations of Public Contract Code § 4104.5, City reserves the right to issue addenda prior to bid time. Any addenda issued prior to the bid opening are part of the Contract Documents. Bidders should check City's PlanetBids portal periodically for any addenda or updates on the Project, which may be accessed via City's website at: <https://www.srcity.org/165/Bids-Proposals>. Each bidder is solely responsible for ensuring it has received and reviewed all addenda prior to submitting its bid and must acknowledge each addendum in the PlanetBids portal.
- 9. Brand Designations and "Or Equal" Substitutions.** Any specification designating a material, product, thing, or service by specific brand or trade name, followed by the words "or equal," is intended only to indicate quality and type of item desired, and bidders may request use of any equal material, product, thing, or service. All data substantiating the proposed substitute as an equal item must be submitted with the written request for substitution. A request for substitution must be submitted within 35 days after Notice of Award unless otherwise provided in the Contract Documents. This provision does not apply to materials, products, things, or services that may lawfully be designated by a specific brand or trade name under Public Contract Code § 3400(c).
- 10. Bid Protest.** Any bid protest against another bidder must be submitted in writing and received by City at the Transportation and Public Works Department, 69 Stony Circle, Santa Rosa, CA 95401 or sent via email at [lbishop@srcity.org](mailto:lbishop@srcity.org) before 5:00 p.m. no later than two Working Days following bid opening ("Bid Protest Deadline") and must comply with the following requirements:
- 10.1 General.** Only a bidder who has actually submitted a Bid Proposal is eligible to submit a bid protest against another bidder. Subcontractors are not eligible to submit bid protests. A bidder may not rely on the bid protest submitted by another bidder but must timely pursue its own protest. For purposes of this Section 10, a "Working Day" means a day that City is open for normal business, and excludes weekends and holidays observed by City. Pursuant to Public Contract Code § 4104, inadvertent omission of a Subcontractor's DIR registration number on the Subcontractor List form is not grounds for a bid protest, provided it is corrected within 24 hours of the bid opening or as otherwise provided under Labor Code § 1771.1(b).

- 10.2 Protest Contents.** The bid protest must contain a complete statement of the basis for the protest and must include all supporting documentation. Material submitted after the Bid Protest Deadline will not be considered. The protest must refer to the *specific* portion or portions of the Contract Documents upon which the protest is based. The protest must include the name, address, email address, and telephone number of the protesting bidder and any person submitting the protest on behalf of or as an authorized representative of the protesting bidder.
- 10.3 Copy to Protested Bidder.** Upon submission of its bid protest to City, the protesting bidder must also concurrently transmit the protest and all supporting documents to the protested bidder, and to any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest, by email or hand delivery to ensure delivery before the Bid Protest Deadline.
- 10.4 Response to Protest.** The protested bidder may submit a written response to the protest, provided the response is received by City before 5:00 p.m., within two Working Days after the Bid Protest Deadline or after actual receipt of the bid protest, whichever is sooner (the "Response Deadline"). The response must attach all supporting documentation. Material submitted after the Response Deadline will not be considered. The response must include the name, address, email address, and telephone number of the person responding on behalf of or representing the protested bidder if different from the protested bidder.
- 10.5 Copy to Protesting Bidder.** Upon submission of its response to the bid protest to the City, the protested bidder must also concurrently transmit by email or hand delivery, by or before the Response Deadline, a copy of its response and all supporting documents to the protesting bidder and to any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest.
- 10.6 Exclusive Remedy.** The procedure and time limits set forth in this Section are mandatory and are the bidder's sole and exclusive remedy in the event of a bid protest. A bidder's failure to comply with these procedures will constitute a waiver of any right to further pursue a bid protest, including filing a Government Code Claim or initiation of legal proceedings.
- 10.7 Right to Award.** City reserves the right, acting in its sole discretion, to reject any bid protest that it determines lacks merit, to award the Contract to the bidder it has determined to be the responsible bidder submitting the lowest responsive bid, and to issue a Notice to Proceed with the Work notwithstanding any pending or continuing challenge to its determination.
- 11. Reservation of Rights.** Subject to the provisions of its charter and the Santa Rosa City Code ("City Code"), City reserves the unfettered right, acting in its sole discretion, to waive or to decline to waive any immaterial bid irregularities; to accept or reject any or all bids; to cancel or reschedule the bid; to postpone or abandon the Project entirely; or to perform all or part of the Work with its own forces. The Contract will be awarded, if at all, within 90 days after opening of bids or as otherwise specified in the Special Conditions, to the responsible bidder that submitted the lowest responsive bid. Any planned start date for the Project represents the City's expectations at the time the Notice Inviting Bids was first issued. City is not bound to issue a Notice to Proceed by or before such planned start date, and it reserves the right to issue the Notice to Proceed when the City determines, in its sole discretion, the appropriate time for commencing the Work. The City expressly disclaims responsibility for any assumptions a bidder might draw from the presence or absence of information provided by the City in any form. Each bidder is solely responsible for its costs to prepare and submit a bid, including site investigation costs.
- 12. Bonds.** Within ten calendar days following issuance of the Notice of Award, the successful bidder must submit payment and performance bonds to City as specified in the Contract Documents using the bond forms included in the Contract Documents. All required bonds must be calculated on the maximum total Contract Price as awarded, including additive alternates, if applicable.

13. **License(s) and Certificate(s).** The successful bidder and its Subcontractor(s) must possess the California contractor's license(s) in the classification(s) required by law to perform the Work. The successful bidder must also obtain a City business tax certificate, issued pursuant to Chapter 6.04 of the City Code before performing any Work on the Project. Subcontractors must also obtain a City business tax certificate before performing any Work.
14. **Ineligible Subcontractor.** Any Subcontractor who is ineligible to perform work on a public works project under Labor Code §§ 1777.1 or 1777.7 is prohibited from performing work on the Project.
15. **Safety Orders.** If the Project includes construction of a pipeline, sewer, sewage disposal system, boring and jacking pits, or similar trenches or open excavations, which are five feet or deeper, each bid must include a bid item for adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life or limb, which comply with safety orders as required by Labor Code § 6707.
16. **In-Use Off-Road Diesel-Fueled Fleets.** If the Project involves the use of vehicles subject to the California Air Resources Board's In-Use Off-Road Diesel-Fueled Fleets Regulation (13 CCR § 2449 et seq.) ("Off-Road Regulation"), then within ten calendar days following City's issuance of the Notice of Award, the successful bidder must submit to City valid Certificates of Reported Compliance for its fleet and its listed Subcontractors, if applicable, in accordance with the Off-Road Regulation, unless exempt under the Off-Road Regulation.
17. **Community Workforce Agreement.** If checked below, the Project is subject to the City's Community Workforce Agreement ("CWA") and the successful bidder must comply with the requirements therein.

Select One:

- This Project is subject to the City's CWA, which is available on the City's website at <https://www.srcity.org/165/Bids-Proposals> and incorporated herein by reference. Within three Working Days following a request from City, the apparent low bidder must submit to City an executed Appendix A, Contractor Agreement to be Bound, using the form provided with the Contract Documents. Each bidder must provide a copy of the CWA to its Subcontractors, and the successful bidder and its Subcontractors must comply with the CWA. Entering into the CWA is a condition of award of the Contract for the Project.
- This Project is not subject to the City's CWA.

18. **Bid Schedule.** Each bidder must complete the Bid Schedule form with unit prices as indicated, and submit the completed Bid Schedule with its Bid Proposal.
  - 18.1 **Incorrect Totals.** In the event a computational error for any bid item (base bid or alternate) results in an incorrect extended total for that item, the submitted base bid or bid alternate total will be adjusted to reflect the corrected amount as the product of the estimated quantity and the unit cost. In the event of a discrepancy between the actual total of the itemized or unit prices shown on the Bid Schedule for the base bid, and the amount entered as the base bid on the Bid Proposal form, the actual total of the itemized or unit prices shown on the Bid Schedule for the base bid will be deemed the base bid price. Likewise, in the event of a discrepancy between the actual total of the itemized or unit prices shown on the Bid Schedule for any bid alternate, and the amount entered for the alternate on the Bid Proposal form, the actual total of the itemized prices shown on the Bid Schedule for that alternate will be deemed the alternate price. Nothing in this provision is intended to prevent a bidder from requesting to withdraw its bid for material error under Public Contract Code § 5100 et seq.
  - 18.2 **Estimated Quantities.** Unless identified as a "Final Pay Quantity," the quantities shown on the Bid Schedule are estimated and the actual quantities required to perform the Work may

be greater or less than the estimated amount. The Contract Price will be adjusted to reflect the actual quantities required for the Work based on the itemized or unit prices provided in the Bid Schedule, with no allowance for anticipated profit for quantities that are deleted or decreased, and no increase in the unit price, and without regard to the percentage increase or decrease of the estimated quantity and the actual quantity.

- 18.3 Bid Item Description.** The descriptions of bid items in the Specifications are not intended as exclusive descriptions of the Work. Each bidder must determine, and include in its unit pricing, all things necessary and incidental for the timely performance and completion of the Work as specified in the Contract Documents, including, but not limited to, all necessary labor, materials, supplies, tools, equipment, transportation, facilities, and utilities, unless otherwise specified.
- 19. Withdrawal.** A Bid Proposal may not be withdrawn for a period of 90 days after the bid opening without forfeiture of the bid security, except as authorized for material error under Public Contract Code § 5100 et seq. In the event that a bid includes a material error, the bidder may request to withdraw its bid in accordance with Public Contract Code § 5100 et seq. The written request must establish the elements set forth in Public Contract Code § 5103.
- 20. For Reference Only.** The following documents are provided “For Reference Only,” as defined in Section 3.4 of the General Conditions:
- Phase I Environmental Site Assessment dated January 8, 2024
- 21. Subcontractor Work Limits.** The prime contractor must perform at least 30% of the Work on the Project, calculated as a percentage of the base bid price, with its own forces, except for any Work identified as “Specialty Work” in the Contract Documents. The total bid amount for any such Specialty Work, as shown on the Bid Schedule, may be deducted from the base bid price before computing the 30% self-performance requirement. The remaining Work may be performed by qualified Subcontractor(s).

END OF INSTRUCTIONS TO BIDDERS

## Bid Proposal

Country Manor Sewer Lift Station 10 Replacement and Spring Lake Sewer Lift Station 16  
Generator Improvements Project, City Contract No. C02387 ("Project")

\_\_\_\_\_ ("Bidder") hereby submits this Bid Proposal to the City of Santa Rosa ("City") for the above-referenced project ("Project") in response to the Notice Inviting Bids and in accordance with the Contract Documents referenced in the Notice.

1. **Base Bid.** Bidder proposes to perform and fully complete the Work for the Project as specified in the Contract Documents, within the time required for full completion of the Work, including all labor, materials, supplies, and equipment and all other direct or indirect costs including, but not limited to, taxes, insurance and all overhead, for the following price ("Base Bid"):  
\$ \_\_\_\_\_.
2. **Addenda.** Bidder agrees that it has confirmed receipt of or access to, and reviewed, all addenda issued for this bid, as evidenced by its acknowledgement of each addendum on the City's PlanetBids portal. Bidder waives any claims it might have against the City based on its failure to receive, access, or review any addenda for any reason.
3. **Bidder's Certifications and Warranties.** By signing and submitting this Bid Proposal, Bidder certifies and warrants the following:
  - 3.1 **Examination of Contract Documents.** Bidder has thoroughly examined the Contract Documents and represents that, to the best of Bidder's knowledge, there are no errors, omissions, or discrepancies in the Contract Documents, subject to the limitations of Public Contract Code § 1104.
  - 3.2 **Examination of Worksite.** Bidder has had the opportunity to examine the Worksite and local conditions at the Project location.
  - 3.3 **Bidder Responsibility.** Bidder is a responsible bidder, with the necessary ability, capacity, experience, skill, qualifications, workforce, equipment, and resources to perform or cause the Work to be performed in accordance with the Contract Documents and within the Contract Time.
  - 3.4 **Responsibility for Bid.** Bidder has carefully reviewed this Bid Proposal and is solely responsible for any errors or omissions contained in its completed bid. All statements and information provided in this Bid Proposal and enclosures are true and correct to the best of Bidder's knowledge.
  - 3.5 **Nondiscrimination.** In preparing this bid, the Bidder has not engaged in discrimination against any prospective or present employee or Subcontractor on grounds of race, color, ancestry, national origin, ethnicity, religion, sex, sexual orientation, age, disability, or marital status.
  - 3.6 **Iran Contracting Act.** If the Contract Price exceeds \$1,000,000, Bidder is not identified on a list created under the Iran Contracting Act, Public Contract Code § 2200 et seq. (the "Act"), as a person engaging in investment activities in Iran, as defined in the Act, or is otherwise expressly exempt under the Act.
  - 3.7 **Agreement to be Bound by CWA.** If the Project is subject to the City's CWA, Bidder will submit an executed Appendix A, Contractor Agreement to be Bound, using the form provided with the Contract Documents, within three Working Days following a request from City. (See Section 17 of the Instructions to Bidders.)

4. **Award of Contract.** By signing and submitting this Bid Proposal, Bidder agrees that, if City issues the Notice of Award to Bidder, then within ten days following issuance of the Notice of Award, Bidder will do all of the following:
- 4.1 **Execute Contract.** Enter into the Contract with City in accordance with the terms of this Bid Proposal, by signing and submitting to City the Contract prepared by City using the form included with the Contract Documents;
  - 4.2 **Submit Required Bonds.** Submit to City a payment bond and a performance bond, each for 100% of the Contract Price, using the bond forms provided and in accordance with the requirements of the Contract Documents;
  - 4.3 **Insurance Requirements.** Submit to City the insurance certificate(s) and endorsement(s) as required by the Contract Documents; and
  - 4.4 **Certificates of Reported Compliance.** Submit to City valid Certificates of Reported Compliance for its fleet and its listed Subcontractors, if applicable, if the Project involves the use of vehicles subject to the Off-Road Regulation.
5. **Bid Security.** As a guarantee that, if awarded the Contract, Bidder will perform its obligations under Section 4 above, Bidder is enclosing bid security in the amount of ten percent of its maximum bid amount in one of the following forms (check one):

\_\_\_\_\_ A cashier's check or certified check payable to City and issued by \_\_\_\_\_ [Bank name] in the amount of \$ \_\_\_\_\_.

\_\_\_\_\_ A bid bond, using the Bid Bond form included with the Contract Documents, payable to City and executed by a surety licensed to do business in the State of California.

This Bid Proposal is hereby submitted on \_\_\_\_\_, 20\_\_.

s/ \_\_\_\_\_

\_\_\_\_\_  
Name and Title

s/ \_\_\_\_\_  
[See Section 3 of Instructions to Bidders]

\_\_\_\_\_  
Name and Title

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
License #, Expiration Date, and Classification

\_\_\_\_\_  
Address

\_\_\_\_\_  
DIR Registration #

\_\_\_\_\_  
City, State, Zip

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Contact Name

\_\_\_\_\_  
Contact Email

END OF BID PROPOSAL

**Bid Schedule**

BIDDER NAME: \_\_\_\_\_

This Bid Schedule must be completed legibly and included with the sealed Bid Proposal. Pricing must be provided for each Bid Item as indicated. If this Bid Schedule requests pricing for Alternates, pricing must be provided for each Alternate Item as indicated. Items marked "(SW)" are Specialty Work that must be performed by a qualified Subcontractor. The lump sum or unit cost for each item must be inclusive of all costs, whether direct or indirect, including profit and overhead.

AL = Allowance      CF = Cubic Feet      CY = Cubic Yard      EA = Each      LB = Pounds  
 LF = Linear Foot      LS = Lump Sum      SF = Square Feet      TON = Ton (2000 lbs)

**BASE BID**

BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
1	MOBILIZATION & DEMOBILIZATION	1	LS	\$	\$
2	TRAFFIC CONTROL	1	LS	\$	\$
3	WATER POLLUTION CONTROL	1	LS	\$	\$
4	GROUNDWATER MANAGEMENT	1	AL	\$ 20,000.00	\$ 20,000.00
5	SLS-10 SELECTIVE SITE DEMOLITION	1	LS	\$	\$
6	SLS-16 SELECTIVE SITE DEMOLITION	1	LS	\$	\$
7	RELOCATE EXISTING DIESEL GENERATOR	1	LS	\$	\$
8	ADJUST EXISTING VALVE BOX TO GRADE	1	EA	\$	\$
9	ADJUST EXISTING MANHOLE TO GRADE	1	EA	\$	\$
10	UTILITY CLEARANCES	1	LS	\$	\$
11	SUBGRADE STABILIZATION/DIGOUTS	25	SY	\$	\$
12	ROADWAY EXCAVATION (F)	120	CY	\$	\$
13	SOIL STABILIZATION FABRIC	190	SY	\$	\$
14	ASPHALT CONCRETE SURFACE	70	TON	\$	\$
15	ASPHALT CONCRETE BASE	95	TON	\$	\$
16	PERMANENT TRENCH PAVING	60	TON	\$	\$
17	VALVE VAULT AND HATCH	1	LS	\$	\$

BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
18	METER MANHOLE	1	LS	\$	\$
19	REMOVE AND REPLACE ROADSIDE SIGN	2	EA	\$	\$
20	CURB & GUTTER	140	LF	\$	\$
21	CURB RAMP	151	SF	\$	\$
22	SIDEWALK	764	SF	\$	\$
23	4" SIDEWALK DRAIN	1	LS	\$	\$
24	DRIVEWAY	131	SF	\$	\$
25	VALLEY GUTTER	38	SF	\$	\$
26	CITY MONUMENT	1	EA	\$	\$
27	PRECAST CONCRETE FENCE	74	LF	\$	\$
28	CHAIN LINK ROLLING GATE AND FENCE	1	LS	\$	\$
29	STRIPES AND PAVEMENT MARKINGS	1	LS	\$	\$
30	TRENCH BRACING AND SHORING	1	LS	\$	\$
31	SUBMERSIBLE PUMPS	1	LS	\$	\$
32	8" SEWER MAIN	46	LF	\$	\$
33	4" HDPE SEWER FORCE MAIN	181	LF	\$	\$
34	LIFT STATION PIPE AND APPURTENANCES	1	LS	\$	\$
35	48" POLYMER CONCRETE SEWER MANHOLE	2	EA	\$	\$
36	60" POLYMER CONCRETE SEWER MANHOLE	1	EA	\$	\$
37	120" POLYMER CONCRETE WET WELL	1	LS	\$	\$
38	SEWER BYPASS PUMPING	1	LS	\$	\$
39	1" WATER SERVICE & BACKFLOW PREVENTION DEVICE	1	EA	\$	\$
40	GENERAL ELECTRICAL WORK AND LIGHTING	1	LS	\$	\$
41	ELECTRICAL AND CONTROLS PEDESTAL	1	LS	\$	\$

BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
42	METER PEDESTAL AND ELECTRICAL SERVICE	1	LS	\$	\$
43	DIESEL GENERATOR SET	1	LS	\$	\$

(F) Final Pay Quantity

TOTAL BASE BID: Items 1 through 43 inclusive: \$\_\_\_\_\_

*Note: The amount entered as the "Total Base Bid" should be identical to the Base Bid amount entered in Section 1 of the Bid Proposal form.*

END OF BID SCHEDULE



**Noncollusion Declaration**

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

The undersigned declares:

I am the \_\_\_\_\_ [title] of \_\_\_\_\_  
[business name], 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.

This declaration is intended to comply with California Public Contract Code § 7106 and Title 23 U.S.C § 112.

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].

s/ \_\_\_\_\_

\_\_\_\_\_  
Name [print]

END OF NONCOLLUSION DECLARATION

**Bid Bond**

\_\_\_\_\_ (“Bidder”) has submitted a bid, dated \_\_\_\_\_, 20\_\_\_\_ (“Bid”), to the City of Santa Rosa (“City”) for work on the Country Manor Sewer Lift Station 10 Replacement and Spring Lake Sewer Lift Station 16 Generator Improvements Project, City Contract No. C02387 (“Project”). Under this duly executed bid bond (“Bid Bond”), Bidder as Principal and \_\_\_\_\_, its surety (“Surety”), are bound to City as obligee in the penal sum of ten percent of the maximum amount of the Bid (the “Bond Sum”). Bidder and Surety bind themselves and their respective heirs, executors, administrators, successors and assigns, jointly and severally, as follows:

- 1. **General.** If Bidder is awarded the Contract for the Project, Bidder will enter into the Contract with City in accordance with the terms of the Bid.
- 2. **Submittals.** Within ten days following issuance of the Notice of Award to Bidder, Bidder must submit to City the following:
  - 2.1 **Contract.** The executed Contract, using the form provided by City in the Project contract documents (“Contract Documents”);
  - 2.2 **Payment Bond.** A payment bond for 100% of the maximum Contract Price, executed by a surety licensed to do business in the State of California using the Payment Bond form included with the Contract Documents;
  - 2.3 **Performance Bond.** A performance bond for 100% of the maximum Contract Price, executed by a surety licensed to do business in the State of California using the Performance Bond form included with the Contract Documents;
  - 2.4 **Insurance.** The insurance certificate(s) and endorsement(s) required by the Contract Documents;
  - 2.5 **Certificates of Reported Compliance.** Valid Certificates of Reported Compliance for its fleet and its listed Subcontractors, if applicable, in accordance with the In-Use Off-Road Diesel-Fueled Fleets Regulation (13 CCR § 2449 et seq.) (“Off-Road Regulation”), if the Project involves the use of vehicles subject to the Off-Road Regulation; and
  - 2.6 **Other Submittals.** Any other documents required by the Instructions to Bidders or Notice of Award.
- 3. **Enforcement.** If Bidder fails to execute the Contract or to submit the bonds, insurance certificates, and valid Certificates of Reported Compliance as required by the Contract Documents, Surety guarantees that Bidder forfeits the Bond Sum to City. Any notice to Surety may be given in the manner specified in the Contract and delivered or transmitted to Surety as follows:

Attn: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Fax: \_\_\_\_\_  
 Email: \_\_\_\_\_

- 4. **Duration and Waiver.** If Bidder fulfills its obligations under Section 2, above, then this obligation will be null and void; otherwise, it will remain in full force and effect for 90 days

following the bid opening or until this Bid Bond is returned to Bidder, whichever occurs first.  
Surety waives the provisions of Civil Code §§ 2819 and 2845.

This Bid Bond is entered into and effective on \_\_\_\_\_, 20\_\_\_\_\_.

**SURETY:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

(Attach Acknowledgment with Notary Seal and Power of Attorney)

**BIDDER:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

END OF BID BOND

**Appendix A**

**City of Santa Rosa Community Workforce Agreement  
Contractor Agreement To Be Bound**

The undersigned, as a Contractor or Subcontractor ("Contractor") for the \_\_\_\_\_ Project, (hereinafter the "Covered Project"), for and in consideration of the award to it of a contract to perform work on said Covered Project, and in further consideration of the mutual promises made in the "City of Santa Rosa Community Workforce Agreement" (hereinafter "Agreement"), a copy of which was received and is acknowledged, hereby:

- (1) Accepts and agrees to be bound by the terms and conditions of the Agreement, together with any and all amendments and supplements now existing or which are later made thereto.
- (2) Agrees to be bound by the legally established local trust agreements as set forth in Article 17 of this Agreement.
- (3) Authorizes the parties to such local trust agreements to appoint trustees and successor trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor;
- (4) Certifies that it has no commitments or agreements which would preclude its full and complete compliance with the terms and conditions of the Agreement.
- (5) Agrees to secure from any Contractor(s) (as defined in said Agreement) which is or becomes a subcontractor (of any tier) to it, a duly executed Agreement to be Bound in form identical to this document.

The obligation to be a party to and bound by the Agreement shall extend to all work for the Covered Project undertaken by the Contractor.

This letter shall constitute a subscription agreement, to the extent of the terms of the letter.

CONTRACTOR/SUBCONTRACTOR: \_\_\_\_\_

California Contractor State License No. or Motor Carrier (CA) Permit No.: \_\_\_\_\_

Name of Authorized Person (print): \_\_\_\_\_

Signature of Authorized Person: \_\_\_\_\_

Title of Authorized Person: \_\_\_\_\_

Telephone Number of Authorized Person: \_\_\_\_\_

Address of Authorized Person: \_\_\_\_\_

State Public Works Registration Number: \_\_\_\_\_

## Contract

This public works contract ("Contract") is entered into by and between the City of Santa Rosa ("City") and \_\_\_\_\_ ("Contractor"), for work on the Country Manor Sewer Lift Station 10 Replacement and Spring Lake Sewer Lift Station 16 Generator Improvements Project, City Contract No. C02387 ("Project").

The parties agree as follows:

1. **Award of Contract.** In response to the Notice Inviting Bids, Contractor has submitted a Bid Proposal to perform the Work to construct the Project. On \_\_\_\_\_, 2025, City authorized award of this Contract to Contractor for the amount set forth in Section 4, below. City has elected to include the following Project alternate(s) in the Contract: No alternates.
2. **Contract Documents.** The Contract Documents incorporated into this Contract include and are comprised of all of the documents listed below. The definitions provided in Article 1 of the General Conditions apply to all of the Contract Documents, including this Contract.
  - 2.1 Notice Inviting Bids;
  - 2.2 Instructions to Bidders;
  - 2.3 Addenda, if any;
  - 2.4 Bid Proposal and attachments thereto;
  - 2.5 Contract;
  - 2.6 Payment and Performance Bonds;
  - 2.7 General Conditions;
  - 2.8 Special Conditions;
  - 2.9 Project Plans and Specifications;
  - 2.10 Change Orders, if any;
  - 2.11 Notice of Award;
  - 2.12 Notice to Proceed;
  - 2.13 City Standards and City Specifications, as applicable;
  - 2.14 City's CWA, if applicable;
  - 2.15 Caltrans Standard Specifications (excluding Division I) and Caltrans Standard Plans, as applicable; and
  - 2.16 The following:
    - City of Santa Rosa One-Time Discharge Permit (SR-1X09934) dated March 18, 2025, included in Section A of the Technical Specifications
    - PG&E Construction Drawing dated April 3, 2025, included in Section A of the Technical Specifications.
3. **Contractor's Obligations.** Contractor will perform all of the Work required for the Project, as specified in the Contract Documents. Contractor must provide, furnish, and supply all things necessary and incidental for the timely performance and completion of the Work, including all necessary labor, materials, supplies, tools, equipment, transportation, onsite facilities, and utilities, unless otherwise specified in the Contract Documents. Contractor must use its best efforts to diligently prosecute and complete the Work in a professional and expeditious manner and to meet or exceed the performance standards required by the Contract Documents.
4. **Payment.** As full and complete compensation for Contractor's timely performance and completion of the Work in strict accordance with the terms and conditions of the Contract Documents, City will pay Contractor \$\_\_\_\_\_ ("Contract Price") for all of Contractor's direct and indirect costs to perform the Work, including all labor, materials, supplies, equipment, taxes, insurance, bonds and all overhead costs, in accordance with the payment provisions in the General Conditions.

5. **Time for Completion.** Contractor will fully complete the Work for the Project, meeting all requirements for Final Completion, within 250 Working Days from the start date set forth in the Notice to Proceed (“Contract Time”). By signing below, Contractor expressly waives any claim for delayed early completion.
6. **Liquidated Damages.** As further specified in Section 5.4 of the General Conditions, if Contractor fails to complete the Work within the Contract Time, City will assess liquidated damages in the amount of \$4,200.00 per day for each day of unexcused delay in achieving Final Completion, and such liquidated damages may be deducted from City’s payments due or to become due to Contractor under this Contract.
7. **Labor Code Compliance.**
  - 7.1 **General.** This Contract is subject to all applicable requirements of Chapter 1 of Part 7 of Division 2 of the Labor Code, including requirements pertaining to wages, working hours and workers’ compensation insurance, as further specified in Article 9 of the General Conditions.
  - 7.2 **Prevailing Wages.** This Project is subject to the prevailing wage requirements applicable to the locality in which the Work is to be performed for each craft, classification or type of worker needed to perform the Work, including employer payments for health and welfare, pension, vacation, apprenticeship and similar purposes. Copies of these prevailing rates are available online at <http://www.dir.ca.gov/DLSR>.
  - 7.3 **DIR Registration.** City may not enter into the Contract with a bidder without proof that the bidder and its Subcontractors are registered with the California Department of Industrial Relations to perform public work pursuant to Labor Code § 1725.5, subject to limited legal exceptions.
8. **Workers’ Compensation Certification.** Pursuant to Labor Code § 1861, by signing this Contract, Contractor certifies as follows: “I am aware of the provisions of Labor Code § 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 I will comply with such provisions before commencing the performance of the Work on this Contract.”
9. **Conflicts of Interest.** Contractor, its employees, Subcontractors, and agents may not have, maintain, or acquire a conflict of interest in relation to this Contract in violation of any City ordinance or requirement, or in violation of any California law, including Government Code § 1090 et seq., or the Political Reform Act, as set forth in Government Code § 81000 et seq. and its accompanying regulations. Any violation of this Section constitutes a material breach of the Contract.
10. **Independent Contractor.** Contractor is an independent contractor under this Contract and will have control of the Work and the means and methods by which it is performed. Contractor and its Subcontractors are not employees of City and are not entitled to participate in any health, retirement, or any other employee benefits from City.
11. **Notice.** Any notice, billing, or payment required by or pursuant to the Contract Documents must be made in writing, signed, dated, and sent to the other party by personal delivery, U.S. Mail, a reliable overnight delivery service, or by email as a PDF file. Notice is deemed effective upon delivery, except that service by U.S. Mail is deemed effective on the second working day after deposit for delivery. Notice for each party must be given as follows:

**City:**

Transportation and Public Works Department  
69 Stony Circle  
Santa Rosa, CA 95401

Attn: Lucas Bishop  
lbishop@srcity.org  
Copy to: Joyce Brandvold  
jbrandvold@srcity.org

**Contractor:**

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Attn: \_\_\_\_\_  
Email: \_\_\_\_\_  
Copy to: \_\_\_\_\_

**12. General Provisions.**

- 12.1 Assignment and Successors.** Contractor may not assign its rights or obligations under this Contract, in part or in whole, without City’s written consent. This Contract is binding on Contractor’s and City’s lawful heirs, successors and permitted assigns.
- 12.2 Third Party Beneficiaries.** There are no intended third-party beneficiaries to this Contract.
- 12.3 Governing Law and Venue.** This Contract will be governed by California law and venue will be in the Sonoma County Superior Court, and no other place. Contractor waives any right it may have pursuant to Code of Civil Procedure § 394, to file a motion to transfer any action arising from or relating to this Contract to a venue outside of Sonoma County, California.
- 12.4 Amendment.** No amendment or modification of this Contract will be binding unless it is in a writing duly authorized and signed by the parties to this Contract.
- 12.5 Integration.** This Contract and the Contract Documents incorporated herein, including authorized amendments or Change Orders thereto, constitute the final, complete, and exclusive terms of the agreement between City and Contractor.
- 12.6 Severability.** If any provision of the Contract Documents is determined to be illegal, invalid, or unenforceable, in whole or in part, the remaining provisions of the Contract Documents will remain in full force and effect.
- 12.7 Iran Contracting Act.** If the Contract Price exceeds \$1,000,000, Contractor certifies, by signing below, that it is not identified on a list created under the Iran Contracting Act, Public Contract Code § 2200 et seq. (the “Act”), as a person engaging in investment activities in Iran, as defined in the Act, or is otherwise expressly exempt under the Act.

- 12.8 Authorization.** Each individual signing below warrants that he or she is authorized to do so by the party that he or she represents, and that this Contract is legally binding on that party. If Contractor is a corporation, signatures from two officers of the corporation are required pursuant to California Corporations Code § 313 or as otherwise authorized by law.
- 12.9 Electronic Signatures.** In accordance with Government Code § 16.5 and Civil Code § 1633.1 et seq., the parties agree that this Contract may be transmitted and executed electronically and that electronic signatures will have the same force and effect as the use of manual signatures.

*[Signatures are on the following page.]*

The parties agree to this Contract as witnessed by the signatures below:

**CITY:**

Approved as to form:

s/ \_\_\_\_\_

s/ \_\_\_\_\_

\_\_\_\_\_  
Name, Title

\_\_\_\_\_  
Name, Title

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Attest:

s/ \_\_\_\_\_

\_\_\_\_\_  
Name, Title

Date: \_\_\_\_\_

**CONTRACTOR:**

\_\_\_\_\_ Business Name

s/ \_\_\_\_\_

Seal:

\_\_\_\_\_  
Name, Title

Date: \_\_\_\_\_

Second Signature (See Section 12.8):

s/ \_\_\_\_\_

\_\_\_\_\_  
Name, Title

Date: \_\_\_\_\_

\_\_\_\_\_  
Contractor's California License Number(s) and Expiration Date(s)

END OF CONTRACT

## Payment Bond

The City of Santa Rosa ("City") and \_\_\_\_\_ ("Contractor") have entered into a contract for work on the Country Manor Sewer Lift Station 10 Replacement and Spring Lake Sewer Lift Station 16 Generator Improvements Project, City Contract No. C02387 ("Project" or "Contract"). The Contract is incorporated by reference into this Payment Bond ("Bond").

- 1. General.** Under this Bond, Contractor as principal and \_\_\_\_\_, its surety ("Surety"), are bound to City as obligee in an amount not less than \$\_\_\_\_\_, under California Civil Code § 9550 et seq., to ensure payment to authorized claimants. This Bond is binding on the respective successors, assigns, owners, heirs, or executors of Surety and Contractor.
- 2. Surety's Obligation.** If Contractor or any of its Subcontractors fails to pay a person authorized in California Civil Code § 9100 to assert a claim against a payment bond, any amounts due under the Unemployment Insurance Code with respect to work or labor performed under the Contract, or any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of Contractor and its Subcontractors under California Unemployment Insurance Code § 13020 with respect to the work and labor, then Surety will pay the obligation.
- 3. Beneficiaries.** This Bond inures to the benefit of any of the persons named in California Civil Code § 9100, so as to give a right of action to those persons or their assigns in any suit brought upon this Bond. Contractor must promptly provide a copy of this Bond upon request by any person with legal rights under this Bond.
- 4. Duration.** If Contractor promptly makes payment of all sums for all labor, materials, and equipment furnished for use in the performance of the Work required by the Contract, in conformance with the time requirements set forth in the Contract and as required by California law, Surety's obligations under this Bond will be null and void. Otherwise, Surety's obligations will remain in full force and effect.
- 5. Waivers.** Surety waives any requirement to be notified of alterations to the Contract or extensions of time for performance of the Work under the Contract. Surety waives the provisions of Civil Code §§ 2819 and 2845. City waives the requirement of a new bond for any supplemental contract under Civil Code § 9550. Any notice to Surety may be given in the manner specified in the Contract and sent to Surety as follows:  
  
Attn: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Email: \_\_\_\_\_
- 6. Law and Venue.** This Bond will be governed by California law, and venue for any dispute pursuant to this Bond will be in the Sonoma County Superior Court, and no other place. Surety will be responsible for City's attorneys' fees and costs in any action to enforce the provisions of this Bond.

*[Signatures are on the following page.]*

7. **Effective Date; Execution.** This Bond is entered into and is effective on \_\_\_\_\_,  
20\_\_.

**SURETY:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

(Attach Acknowledgment with Notary Seal and Power of Attorney)

**CONTRACTOR:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

**APPROVED BY CITY:**

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

END OF PAYMENT BOND

## Performance Bond

The City of Santa Rosa ("City") and \_\_\_\_\_ ("Contractor") have entered into a contract for work on the Country Manor Sewer Lift Station 10 Replacement and Spring Lake Sewer Lift Station 16 Generator Improvements Project, City Contract No. C02387 ("Project" or "Contract"). The Contract is incorporated by reference into this Performance Bond ("Bond").

1. **General.** Under this Bond, Contractor as principal and \_\_\_\_\_, its surety ("Surety"), are bound to City as obligee for an amount not less than \$\_\_\_\_\_ to ensure Contractor's faithful performance of its obligations under the Contract. This Bond is binding on the respective successors, assigns, owners, heirs, or executors of Surety and Contractor.
2. **Surety's Obligations.** Surety's obligations are co-extensive with Contractor's obligations under the Contract. If Contractor fully performs its obligations under the Contract, including its warranty obligations under the Contract, Surety's obligations under this Bond will become null and void. Otherwise, Surety's obligations will remain in full force and effect.
3. **Waiver.** Surety waives any requirement to be notified of and further consents to any alterations to the Contract made under the applicable provisions of the Contract Documents, including changes to the scope of Work or extensions of time for performance of Work under the Contract. Surety waives the provisions of Civil Code §§ 2819 and 2845.
4. **Application of Contract Balance.** Upon making a demand on this Bond for completion of the Work prior to acceptance of the Project, City will make the Contract Balance available to Surety for completion of the Work under the Contract. For purposes of this provision, the Contract Balance is defined as the total amount payable by City to Contractor as the Contract Price minus amounts already paid to Contractor, and minus any liquidated damages, credits, or backcharges to which City is entitled under the terms of the Contract.
5. **Contractor Default.** Upon written notification from City of Contractor's termination for default under Article 13 of the Contract General Conditions, time being of the essence, Surety must act within the time specified in Article 13 to remedy the default through one of the following courses of action:
  - 5.1 Arrange for completion of the Work under the Contract by Contractor, with City's consent, but only if Contractor is in default solely due to its financial inability to complete the Work;
  - 5.2 Arrange for completion of the Work under the Contract by a qualified contractor acceptable to City, and secured by performance and payment bonds issued by an admitted surety as required by the Contract Documents, at Surety's expense; or
  - 5.3 Waive its right to complete the Work under the Contract and reimburse City the amount of City's costs to have the remaining Work completed.
6. **Surety Default.** If Surety defaults on its obligations under the Bond, City will be entitled to recover all costs it incurs due to Surety's default, including legal, design professional, or delay costs.
7. **Notice.** Any notice to Surety may be given in the manner specified in the Contract and sent to Surety as follows:

Attn: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Fax: \_\_\_\_\_  
Email: \_\_\_\_\_

**8. Law and Venue.** This Bond will be governed by California law, and venue for any dispute pursuant to this Bond will be in the Sonoma County Superior Court, and no other place. Surety will be responsible for City's attorneys' fees and costs in any action to enforce the provisions of this Bond.

**9. Effective Date; Execution.** This Bond is entered into and effective on \_\_\_\_\_, 20\_\_\_\_.

**SURETY:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

(Attach Acknowledgment with Notary Seal and Power of Attorney)

**CONTRACTOR:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

**APPROVED BY CITY:**

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

END OF PERFORMANCE BOND

## General Conditions

### Article 1 - Definitions

**Definitions.** The following definitions apply to all of the Contract Documents unless otherwise indicated, e.g., additional definitions that apply solely to the Specifications or other technical documents. Defined terms and titles of documents are capitalized in the Contract Documents, with the exception of the following (in any tense or form): “day,” “furnish,” “including,” “install,” “work day,” or “working day.”

**Allowance** means a specific amount that must be included in the Bid Proposal for a specified purpose.

**Article**, as used in these General Conditions, means a numbered Article of the General Conditions, unless otherwise indicated by the context.

**Awarding Authority** means the City Council or its authorized delegee(s) unless the Contract is awarded by the Water Department, in which case it means the Board of Public Utilities.

**Change Order** means a written document duly approved and executed by City, which changes the scope of Work, the Contract Price, or the Contract Time.

**City** means the City of Santa Rosa, acting through its City Council, officers, employees, City Engineer, and any other authorized representatives.

**City Engineer** means the City Engineer for City and his or her authorized delegee(s).

**City Specifications** means the City's Construction Specifications for Public Improvements, which may be accessed on the City's website at <https://www.srcity.org/2321/Design-Construction-Standards>.

**City Standards** means the City's Design and Construction Standards, which may be accessed on the City's website at <https://www.srcity.org/2321/Design-Construction-Standards>.

**Claim** means a separate demand by Contractor for a change in the Contract Time or Contract Price, that has previously been submitted to City in accordance with the requirements of the Contract Documents, and which has been rejected by City, in whole or in part; a written demand by Contractor disputing a unilateral Change Order or a portion thereof; or a written demand by Contractor objecting to the amount of Final Payment.

**Contract** means the signed agreement between City and Contractor for performing the Work required for the Project, and all documents expressly incorporated therein.

**Contract Documents** means, collectively, all of the documents listed as such in Section 2 of the Contract, including the Notice Inviting Bids; the Instructions to Bidders; addenda, if any; the Bid Proposal and attachments thereto; the Contract; the Notice of Award and Notice to Proceed; the payment and performance bonds; the General Conditions; the Special Conditions; the Project Plans and Specifications; any Change Orders; and any other documents which are clearly and unambiguously made part of the Contract Documents. The Contract Documents do not include documents provided “For Reference Only,” or documents that are intended solely to provide information regarding existing conditions.

**Contract Price** means the total compensation to be paid to Contractor for performance of the Work, as set forth in the Contract and as may be amended by Change Order or adjusted for an

Allowance. The Contract Price is not subject to adjustment due to inflation or due to the increased cost of labor, material, supplies, or equipment following submission of the Bid Proposal.

**Contract Time** means the time specified for complete performance of the Work, as set forth in the Contract and as may be amended by Change Order.

**Contractor** (or **You**) means the individual, partnership, corporation, or joint venture that has signed the Contract with City to perform the Work.

**CWA** means the Community Workforce Agreement for the City.

**Day** means a calendar day unless otherwise specified.

**Design Professional** means the licensed individual(s) or firm(s) retained by City to provide architectural, engineering, or other design professional services for the Project. If no Design Professional has been retained for this Project, any reference to Design Professional is deemed to refer to the Engineer.

**DIR** means the California Department of Industrial Relations.

**Drawings** has the same meaning as Plans.

**Engineer** means the City Engineer for the City of Santa Rosa and his or her authorized delegates.

**Excusable Delay** is defined in Section 5.3(B), Excusable Delay.

**Extra Work** means new or unforeseen work added to the Project, as determined by the Engineer in his or her sole discretion, including Work that was not part of or incidental to the scope of the Work when the Contractor's bid was submitted; Work that is substantially different from the Work as described in the Contract Documents at bid time; or Work that results from a substantially differing and unforeseeable condition.

**Final Completion** means Contractor has fully completed all of the Work required by the Contract Documents to the City's satisfaction, including all punch list items and any required commissioning or training, and has provided the City with all required submittals, including the instructions and manuals, product warranties, and as-built drawings.

**Final Payment** means payment to Contractor of the unpaid Contract Price, including release of undisputed retention, less amounts withheld or deducted pursuant to the Contract Documents.

**Furnish** means to purchase and deliver for the Project.

**Government Code Claim** means a claim submitted pursuant to California Government Code § 900 et seq.

**Hazardous Materials** means any substance or material identified now or in the future as hazardous under any Laws, or any other substance or material that may be considered hazardous or otherwise subject to Laws governing handling, disposal, or cleanup.

**Including**, whether or not capitalized, means "including, but not limited to," unless the context clearly requires otherwise.

**Inspector** means the individual(s) or firm(s) retained or employed by City to inspect the workmanship, materials, and manner of construction of the Project and its components to ensure compliance with the Contract Documents and all Laws.

**Install** means to fix in place for materials, and to fix in place and connect for equipment.

**Laws** means all applicable local, state, and federal laws, regulations, rules, codes, ordinances, permits, orders, and the like enacted or imposed by or under the auspices of any governmental entity with jurisdiction over any of the Work or any performance of the Work, including health and safety requirements.

**Materials Lab** means City's Materials Engineering Laboratory, which may perform quality assurance functions for a Project relating to asphalt and concrete, including inspection and/or testing of workmanship, materials, and the manner of construction.

**Non-Excusable Delay** is defined in Section 5.3(D), Non-Excusable Delay.

**Plans** means the City-provided plans, drawings, details, or graphical depictions of the Project requirements, but does not include Shop Drawings.

**Project** means the public works project referenced in the Contract, as modified by any Project alternates elected by City, if any.

**Project Manager** means the individual designated by City to oversee and manage the Project on City's behalf and may include his or her authorized delegee(s) when the Project Manager is unavailable. If no Project Manager has been designated for this Project, any reference to Project Manager is deemed to refer to the Engineer.

**Recoverable Costs** is defined in Section 5.3(F), Recoverable Costs.

**Request for Information** or **RFI** means Contractor's written request for information about the Contract Documents, the Work or the Project, submitted to City in the manner and format specified by City.

**Section**, when capitalized in these General Conditions, means a numbered section or subsection of the General Conditions, unless the context clearly indicates otherwise.

**Shop Drawings** means drawings, plan details or other graphical depictions prepared by or on behalf of Contractor, and subject to City acceptance, which are intended to provide details for fabrication, installation, and the like, of items required by or shown in the Plans or Specifications.

**Specialty Work** means Work that must be performed by a specialized Subcontractor with the specified license or other special certification, and that the Contractor is not qualified to self-perform.

**Specifications** means the technical, text specifications describing the Project requirements, which are prepared for and incorporated into the Contract by or on behalf of City, and does not include the Contract, General Conditions or Special Conditions.

**Subcontractor** means an individual, partnership, corporation, or joint venture retained by Contractor directly or indirectly through a subcontract to perform a specific portion of the Work. The term Subcontractor applies to subcontractors of all tiers, unless otherwise indicated by the context. A third party such as a utility performing related work on the Project is not a Subcontractor, even if Contractor must coordinate its Work with the third party.

**Technical Specifications** has the same meaning as Specifications.

**Water Department** means the City of Santa Rosa Water Department.

**Work** means all of the construction and services necessary for or incidental to completing the Project in conformance with the requirements of the Contract Documents.

**Work Day or Working Day**, whether or not capitalized, means a weekday when the City is open for business, and does not include the following holidays observed by the City:

- (A) New Year's Day, January 1;
- (B) Martin Luther King Jr. Birthday, the third Monday in January;
- (C) President's Day, the third Monday in February;
- (D) Cesar Chavez Day, March 31;
- (E) Memorial Day, the last Monday in May;
- (F) Juneteenth, June 19;
- (G) Independence Day, July 4;
- (H) Labor Day, the first Monday in September;
- (I) Veterans Day, November 11;
- (J) Thanksgiving Day, the fourth Thursday in November;
- (K) The day after Thanksgiving Day; and
- (L) Christmas Day, December 25.

**Worksite** means the place or places where the Work is performed, which includes, but may extend beyond the Project site, including separate locations for staging, storage, or fabrication.

## **Article 2 - Roles and Responsibilities**

### **2.1 City.**

- (A) **City Council.** The City Council has final authority in all matters affecting the Project, except to the extent it has delegated authority to the Engineer.
- (B) **Engineer.** The Engineer, acting within the authority conferred by the City Council, is responsible for administration of the Project on behalf of City, including authority to provide directions to the Design Professional and to Contractor to ensure proper and timely completion of the Project. The Engineer's decisions are final and conclusive within the scope of his or her authority, including interpretation of the Contract Documents.
- (C) **Project Manager.** The Project Manager assigned to the Project will be the primary point of contact for the Contractor and will serve as City's representative for daily administration of the Project on behalf of City. Unless otherwise specified, all of Contractor's communications to City (in any form) will go to or through the Project Manager. City reserves the right to reassign the Project Manager role at any time or to delegate duties to additional City representatives, without prior notice to or consent of Contractor.
- (D) **Design Professional.** The Design Professional is responsible for the overall design of the Project and, to the extent authorized by City, may act on City's behalf to ensure performance of the Work in compliance with the Plans and Specifications, including any design changes authorized by Change Order. The Design Professional's duties may include review of Contractor's submittals, visits to any Worksite, inspecting the Work, evaluating test and inspection results, and participation in Project-related meetings, including any pre-construction conference, weekly meetings, and coordination meetings. The Design Professional's interpretation of the Plans or Specifications is final and conclusive.

### **2.2 Contractor.**

- (A) **General.** Contractor must provide all labor, materials, supplies, equipment, services, and incidentals necessary to perform and timely complete the Work in strict

accordance with the Contract Documents, and in an economical and efficient manner in the best interests of City, and with minimal inconvenience to the public.

(B) **Responsibility for the Work and Risk of Loss.** Contractor is responsible for supervising and directing all aspects of the Work to facilitate the efficient and timely completion of the Work. Contractor is solely responsible for and required to exercise full control over the Work, including the construction means, methods, techniques, sequences, procedures, safety precautions and programs, and coordination of all portions of the Work with that of all other contractors and Subcontractors, except to the extent that the Contract Documents provide other specific instructions. Contractor's responsibilities extend to any plan, method or sequence suggested but not required by City or specified in the Contract Documents. From the date of commencement of the Work until either the date on which City formally accepts the Project or the effective date of termination of the Contract, whichever is later, Contractor bears all risks of injury or damage to the Work and the materials and equipment delivered to any Worksite, by any cause including fire, earthquake, wind, weather, vandalism, or theft, subject to the limitations of Laws, including Public Contract Code § 7105.

(C) **Project Administration.** Contractor must provide sufficient and competent administration, staff, and skilled workforce necessary to perform and timely complete the Work in accordance with the Contract Documents. Before starting the Work, Contractor must designate in writing and provide complete contact information, including telephone numbers and email address, for the officer or employee in Contractor's organization who is to serve as Contractor's primary representative for the Project, and who has authority to act on Contractor's behalf. A Subcontractor may not serve as Contractor's primary representative.

(D) **On-Site Superintendent.** Contractor must, at all times during performance of the Work, provide a qualified and competent full-time superintendent acceptable to City, and assistants as necessary, who must be physically present at the Project site while any aspect of the Work is being performed. The superintendent must have full authority to act and communicate on behalf of Contractor, and Contractor will be bound by the superintendent's communications to City. City's approval of the superintendent is required before the Work commences. If City is not satisfied with the superintendent's performance, City may request a qualified replacement of the superintendent. Failure to comply may result in temporary suspension of the Work, at Contractor's sole expense and with no extension of Contract Time, until an approved superintendent is physically present to supervise the Work. Contractor must provide written notice to City, as soon as practicable, before replacing the superintendent.

(E) **Standards.** Contractor must, at all times, ensure that the Work is performed in an efficient, skillful manner following best practices and in full compliance with the Contract Documents, Laws, and applicable manufacturer's recommendations. Contractor has a material and ongoing obligation to provide true and complete information, to the best of its knowledge, with respect to all records, documents, or communications pertaining to the Project, including oral or written reports, statements, certifications, Change Order requests, or Claims.

(F) **Meetings.** Contractor, its project manager, superintendent and any primary Subcontractors requested by City, must attend and participate in a pre-construction conference, weekly Project progress meetings, and coordination meetings, as set forth herein.

(1) **Pre-Construction Conference.** City will designate a date and time for a pre-construction conference with Contractor following Contract execution. Project administration procedures and coordination between City and Contractor will be

discussed. City will provide Contractor with meeting minutes covering the topics discussed after the Pre-Construction Conference. Contractor must present City with the following information or documents at the conference, unless otherwise specified by City, for City's review and acceptance before the Work commences:

- a. Name, 24-hour contact information, and qualifications of the proposed on-site superintendent;
- b. List of all key Project personnel and their complete contact information, including email addresses and telephone numbers during regular hours and after hours;
- c. Staging plans that identify the sequence of the Work, including any phases and alternative sequences or phases, with the goal of minimizing the impacts on residents, businesses and other operations in the Project vicinity;
- d. If required, traffic control plans associated with the staging plans that are signed and stamped by a licensed traffic engineer;
- e. Draft baseline schedule for the Work as required under Section 5.2, to be finalized within ten days after City issues the Notice to Proceed or as otherwise specified by City;
- f. Breakdown of lump sum bid items, to be used for determining the value of Work completed for future progress payments to Contractor;
- g. Schedule with list of Project submittals that require City review, and list of the proposed material suppliers;
- h. Plan for coordination with affected utility owner(s) and compliance with any related permit requirements;
- i. Videotape and photographs recording the conditions throughout the pre-construction Project site, showing the existing improvements and current condition of the curbs, gutters, sidewalks, signs, landscaping, streetlights, structures near the Project such as building faces, canopies, shades and fences, and any other features within the Project area limits;
- j. If requested by City, Contractor's cash flow projections; and
- k. Any other documents specified by City.

(2) *Progress Meetings.* Contractor, its project manager, superintendent and any primary Subcontractors requested by City, must participate in weekly Project progress meetings scheduled with City.

(3) *Coordination Meetings.* If applicable, Contractor may also be required to participate in coordination meetings with other parties relating to other work being performed on or near the Project site or in relation to the Project, including work or activities performed by City, other contractors, or other utility owners.

(G) **Construction Records.** Contractor will maintain up-to-date, thorough, legible, and dated daily job reports, which document all significant activity on the Project for each day that Work is performed on the Project. The daily report for each day must include the

number of workers at the Project site; primary Work activities; major deliveries; problems encountered, including injuries, if any; weather and site conditions; and delays, if any. Contractor will take date and time-stamped photographs to document general progress of the Project, including site conditions prior to construction activities, before and after photographs at offset trench laterals, existing improvements and utilities, damage and restoration. Contractor will maintain copies of all subcontracts, Project-related correspondence with Subcontractors, and records of meetings with Subcontractors. Upon request by the City, Contractor will permit review of and/or provide copies of any of these construction records.

(H) **Responsible Party.** Contractor is solely responsible to City for the acts or omissions of any Subcontractors, or any other party or parties performing portions of the Work or providing equipment, materials or services for or on behalf of Contractor or the Subcontractors. Upon City's written request, Contractor must promptly and permanently remove from the Project, at no cost to City, any employee or Subcontractor or employee of a Subcontractor who the Engineer has determined to be incompetent, intemperate or disorderly, or who has failed or refused to perform the Work as required under the Contract Documents.

(I) **Correction of Defects.** Contractor must promptly correct, at Contractor's sole expense, any Work that is determined by City to be deficient or defective in any way, including workmanship, materials, parts, or equipment. Workmanship, materials, parts, or equipment that do not conform to the requirements under the Contract Documents, as determined by City, will be considered defective and subject to rejection. Contractor must also promptly correct, at Contractor's sole expense, any Work performed beyond the lines and grades shown on the Plans or established by City, and any Extra Work performed without City's prior written approval. If requested by City in City's notice to correct, Contractor must submit a Work plan for correcting defective Work in advance of Contractor taking corrective action. If Contractor fails to correct or to take reasonable steps toward correcting defective Work within five days following notice from City, or within the time specified in City's notice to correct, City may elect to have the defective Work corrected by its own forces or by a third party, in which case the cost of correction will be deducted from the Contract Price. If City elects to correct defective Work due to Contractor's failure or refusal to do so, City or its agents will have the right to take possession of and use any equipment, supplies, or materials available at the Project site or any Worksite on City property, in order to effectuate the correction, at no extra cost to City. Contractor's warranty obligations under Section 11.2, Warranty, will not be waived nor limited by City's actions to correct defective Work under these circumstances. Alternatively, City may elect to retain defective Work, and deduct the difference in value, as determined by the Engineer, from payments otherwise due to Contractor. This paragraph applies to any defective Work performed by Contractor during the one-year warranty period under Section 11.2.

(J) **Contractor's Records.** Contractor must maintain all of its records relating to the Project in any form, including paper documents, photos, videos, electronic records, approved samples, and the construction records required pursuant to paragraph (G), above. Project records subject to this provision include complete Project cost records, copies of the insurance policies and endorsements required by the Contract Documents, and records relating to preparation of Contractor's bid, including estimates, take-offs, and price quotes or bids.

(1) Contractor's cost records must include all supporting documentation, including original receipts, invoices, and payroll records, evidencing its direct costs to perform the Work, including, but not limited to, costs for labor, materials, and equipment. Each cost record should include, at a minimum, a description of the expenditure with references to the applicable requirements of the Contract

Documents, the amount actually paid, the date of payment, and whether the expenditure is part of the original Contract Price, related to an executed Change Order, or otherwise categorized by Contractor as Extra Work. Contractor's failure to comply with this provision as to any claimed cost operates as a waiver of any rights to recover the claimed cost.

(2) Contractor must continue to maintain its Project-related records in an organized manner for a period of five years after City's acceptance of the Project or following Contract termination, whichever occurs first. Subject to prior notice to Contractor, City is entitled to inspect or audit any of Contractor's records relating to the Project during Contractor's normal business hours. Contractor's records may also be subject to examination and audit by the California State Auditor, pursuant to Government Code § 8546.7. The record-keeping requirements set forth in this subsection 2.2(J) will survive expiration or termination of the Contract.

(K) **Copies of Project Documents.** Contractor and its Subcontractors must keep copies, at the Project site, of all Work-related documents, including the Contract, permit(s), Plans, Specifications, addenda, Contract amendments, Change Orders, RFIs and RFI responses, Shop Drawings, as-built drawings, schedules, daily records, testing and inspection reports or results, and any related written interpretations. These documents must be available to City for reference at all times during construction of the Project.

(L) **Quality Control.** Contractor is responsible for developing, implementing, and maintaining a quality control plan that includes sampling, testing, and inspecting the Work to control material quality and to ensure that the Work satisfies the quality characteristics in the Contract Documents. Contractor must submit copies of the quality control plan to City, within two Working Days after the pre-construction conference, and make one copy available at each Worksite.

(1) **Records.** Contractor must prepare and maintain quality control records, including the names and qualifications of samplers, testers, and inspectors; testing laboratories' identification and certifications; testing equipment calibrations and certifications; inspection reports; sampling and testing records organized by date and type of material; test results with comparison of quality characteristic requirements; test results in relation to action and any suspension limits; and records of corrective actions and suspensions. Contractor will submit any quality control test data and test results to the Engineer within two Working Days following test completion. Contractor must immediately notify the Engineer of any noncompliant Work.

(2) **Quality Control Manager.** Unless otherwise specified in the Special Conditions or Specifications, before starting Work, Contractor will designate in writing, and provide complete contact information for, the quality control manager for the Project who will be responsible for receiving, reviewing, and approving all correspondence and submittals prior to submission to the City; signing and implementing Contractor's quality control plan; and maintaining quality control records. The quality control manager must either be an employee of Contractor, or a Subcontractor retained solely to provide quality control services for the Project. The quality control manager must not be employed or compensated by a Subcontractor who will provide other Work for the Project.

(3) **Test Modifications.** The following specific tests are modified as follows: For California Test 216 (Relative Compaction), a mechanical compactor (Ploog Engineering Co. Model M 100 or equal) with a 10-pound hammer and split compaction molds must be used in lieu of the specified manual compaction

equipment. For California Test 231 (Nuclear Gage Determination of In-Place Density), 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.

### 2.3 Subcontractors.

(A) **General.** All Work which is not performed by Contractor with its own forces must be performed by Subcontractors. City reserves the right to approve or reject any and all Subcontractors proposed to perform the Work, for reasons including the Subcontractor's poor reputation, lack of relevant experience, financial instability, and lack of technical ability or adequate trained workforce. Each Subcontractor must obtain a City business tax certificate before performing any Work.

(B) **Contractual Obligations.** Contractor must require each Subcontractor to comply with the provisions of the Contract Documents as they apply to the Subcontractor's portion(s) of the Work, including the generally applicable terms of the Contract Documents, and to likewise bind their subcontractors. Contractor will provide that the rights that each Subcontractor may have against any manufacturer or supplier for breach of warranty or guarantee relating to items provided by the Subcontractor for the Project, will be assigned to City. Nothing in these Contract Documents creates a contractual relationship between a Subcontractor and City, but City is deemed to be a third-party beneficiary of the contract between Contractor and each Subcontractor.

(C) **Termination.** If the Contract is terminated, each Subcontractor's agreement must be assigned by Contractor to City, subject to the prior rights of any surety, but only if and to the extent that City accepts, in writing, the assignment by written notification, and assumes all rights and obligations of Contractor pursuant to each such subcontract agreement.

(D) **Substitution of Subcontractor.** If Contractor requests substitution of a listed Subcontractor under Public Contract Code § 4107, Contractor is solely responsible for all costs City incurs in responding to the request, including legal fees and costs to conduct a hearing, and any increased subcontract cost to perform the Work that was to be performed by the listed Subcontractor. If City determines that a Subcontractor is unacceptable to City based on the Subcontractor's failure to satisfactorily perform its Work, or for any of the grounds for substitution listed in Public Contract Code § 4107(a), City may request removal of the Subcontractor from the Project. Upon receipt of a written request from City to remove a Subcontractor pursuant to this paragraph, Contractor will immediately remove the Subcontractor from the Project and, at no further cost to City, will either (1) self-perform the remaining Work to the extent that Contractor is duly licensed and qualified to do so, or (2) substitute a Subcontractor that is acceptable to City, in compliance with Public Contract Code § 4107, as applicable.

### 2.4 Coordination of Work.

(A) **Concurrent Work.** City reserves the right to perform, have performed, or permit performance of other work on or adjacent to the Project site while the Work is being performed for the Project. Contractor is responsible for coordinating its Work with other work being performed on or adjacent to the Project site, including by any City work forces or utility companies or agencies, and must avoid hindering, delaying, or interfering with the work of other contractors, individuals, or entities, and must ensure safe and reasonable site access and use as required or authorized by City. To the full extent permitted by law, Contractor must hold harmless and indemnify City against any and all claims arising from or related to Contractor's avoidable, negligent, or willful hindrance of,

delay to, or interference with the work of any City work forces, utility company or agency, or another contractor or subcontractor.

(B) **Coordination.** If Contractor's Work will connect or interface with work performed by others, Contractor is responsible for independently measuring and visually inspecting such work to ensure a correct connection and interface. Contractor is responsible for any failure by Contractor or its Subcontractors to confirm measurements before proceeding with connecting Work. Before proceeding with any portion of the Work affected by the construction or operations of others, Contractor must give the Project Manager prompt written notification of any defects Contractor discovers which will prevent the proper execution of the Work. Failure to give notice of any known or reasonably discoverable defects will be deemed acknowledgement by Contractor that the work of others is not defective and will not prevent the proper execution of the Work. Contractor must also promptly notify City if work performed by others, including work or activities performed by City's own forces, is operating to hinder, delay, or interfere with Contractor's timely performance of the Work. City reserves the right to backcharge Contractor for any additional costs incurred due to Contractor's failure to comply with the requirements in this Section 2.4.

**2.5 Submittals.** Unless otherwise specified, Contractor must submit to the Engineer for review and acceptance, all schedules, Shop Drawings, samples, product data, and similar submittals required by the Contract Documents, or upon request by the Engineer. Unless otherwise specified, all submittals, including Requests for Information, are subject to the general provisions of this Section, as well as specific submittal requirements that may be included elsewhere in the Contract Documents, including the Special Conditions or Specifications. The Engineer may require submission of a submittal schedule at or before a pre-construction conference, as may be specified in the Notice to Proceed.

(A) **General.** Contractor is responsible for ensuring that its submittals are accurate and conform to the Contract Documents.

(B) **Time and Manner of Submission.** Contractor must ensure that its submittals are prepared and delivered in a manner consistent with the current City-accepted schedule for the Work and within the applicable time specified in the Contract Documents, or if no time is specified, in such time and sequence so as not to delay the performance of the Work or completion of the Project. Contractor must provide submittals in electronic format, unless otherwise specified by the Engineer.

(C) **Required Contents.** Each submittal must be uniquely numbered and include the Project name and contract number, Contractor's name and address, the name and address of any Subcontractor or supplier involved with the submittal, the date, and references to applicable Specification section(s) and/or drawing and detail number(s). Submittal resubmissions must include a revision designation.

(D) **Required Corrections.** If corrections are required, Contractor must promptly make and submit any required corrections as specified in full conformance with the requirements of this Section, or other requirements that apply to that submittal. Except as required for corrections, Contractor will not make changes to a submittal upon resubmission. City reserves the right to reject a partial resubmission of a submittal.

(E) **Effect of Review and Acceptance.** Review and acceptance of a submittal by City will not relieve Contractor from complying with the requirements of the Contract Documents. Contractor is responsible for any errors in any submittal, and review or acceptance of a submittal by City is not an assumption of risk or liability by City.

(F) **Enforcement.** Any Work performed or any material furnished, installed, fabricated or used without City's prior acceptance of a required submittal is performed or provided at Contractor's risk, and Contractor may be required to bear the costs incident thereto, including the cost of removing and replacing such Work, repairs to other affected portions of the Work or material, and the cost of additional time or services required of City, including costs for the Design Professional, Project Manager, Inspector, and Materials Lab.

(G) **Excessive RFIs.** A RFI will be considered excessive or unnecessary if City determines that the explanation or response to the RFI is clearly and unambiguously discernable from the Contract Documents. City's costs to review and respond to excessive or unnecessary RFIs may be deducted from payments otherwise due to Contractor.

**2.6 Shop Drawings.** When Shop Drawings are required by the Specifications or requested by the Engineer, they must be prepared according to best practices at Contractor's expense. The Shop Drawings must be of a size and scale to clearly show all necessary details. Unless otherwise specified by City, Shop Drawings must be provided to the Engineer for review and acceptance at least 30 days before the Work will be performed. If City requires changes, the corrected Shop Drawings must be resubmitted to the Engineer for review within the time specified by the Engineer. For all Project components requiring Shop Drawings, Contractor will not furnish materials or perform any Work until the Shop Drawings for those components are accepted by City. Contractor is responsible for any errors or omissions in the Shop Drawings, shop fits and field corrections; any deviations from the Contract Documents; and for the results obtained by the use of Shop Drawings. Acceptance of Shop Drawings by City does not relieve Contractor of Contractor's responsibility.

**2.7 Material List.** Unless otherwise specified by City, Contractor must submit to the Engineer, at or before the pre-construction conference, a list of all materials proposed for use in the Work and any supporting documentation and samples required by the Contract Documents and source of supply. For a material listed on the "Engineer's List of Approved Items," located in the Sewer and Water sections of the City Standards, Contractor must provide the name of the manufacturer and model and part number for each material proposed for the Work, unless the item has been replaced for the Project, as specifically set forth in the Contract Documents. For all other materials, Contractor must provide the name of the manufacturer, model and part number, and supporting documentation and samples that will enable the Engineer to evaluate the material.

**2.8 Access to Work.** Contractor must afford prompt and safe access to any Worksite by City and its employees, agents, or consultants authorized by City; and upon request by City, Contractor must promptly arrange for City representatives to visit or inspect manufacturing sites or fabrication facilities for items to be incorporated into the Work.

**2.9 Personnel.** Contractor and its Subcontractors must employ only competent and skillful personnel to perform the Work. Contractor and its Subcontractor's supervisors, security or safety personnel, and employees who have unescorted access to the Project site must possess proficiency in English sufficient to read, understand, receive, and implement oral or written communications or instructions relating to their respective job functions, including safety and security requirements. Upon written notification from the Engineer, Contractor and its Subcontractors must immediately discharge any personnel who are incompetent, disorderly, disruptive, threatening, abusive, or profane, or otherwise refuse or fail to comply with the requirements of the Contract Documents or Laws, including Laws pertaining to health and safety. Any such discharged personnel may not be re-employed or permitted on the Project in any capacity without City's prior written consent.

## Article 3 - Contract Documents

### 3.1 Interpretation of Contract Documents.

(A) **Plans and Specifications.** The Plans and Specifications included in the Contract Documents are complementary. If Work is shown on one but not on the other, Contractor must perform the Work as though fully described on both, consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. The Plans and Specifications are deemed to include and require everything necessary and reasonably incidental to completion of the Work, whether or not particularly mentioned or shown. Contractor must perform all Work and services and supply all things reasonably related to and inferable from the Contract Documents. In the event of a conflict between the Plans and Specifications, the Specifications will control, unless the drawing(s) at issue are dated later than the Specification(s) at issue. Detailed drawings take precedence over general drawings, and large-scale drawings take precedence over smaller scale drawings. Any arrangement or division of the Plans and Specifications into sections is for convenience and is not intended to limit the Work required by separate trades. A conclusion presented in the Plans or Specifications is only a recommendation. Actual locations and depths must be determined by Contractor's field investigation. Contractor may request access to underlying or background information in City's possession that is necessary for Contractor to form its own conclusions.

(B) **Duty to Notify and Seek Direction.** If Contractor becomes aware of a changed condition in the Project, or of any ambiguity, conflict, inconsistency, discrepancy, omission, or error in the Contract Documents, including the Plans or Specifications, Contractor must promptly submit a Request for Information to the Engineer and wait for a response from City before proceeding further with the related Work. The RFI must notify City of the issue and request clarification, interpretation or direction. The Engineer's clarification, interpretation or direction will be final and binding on the Contractor. If Contractor proceeds with the related Work before obtaining the City's response, Contractor will be responsible for any resulting costs, including the cost of correcting any incorrect or defective Work that results. Timely submission of a clear and complete RFI is essential to avoiding delay. Delay resulting from Contractor's failure to submit a timely and complete RFI to the Engineer is Non-Excusable Delay. If Contractor believes that City's response to an RFI justifies a change to the Contract Price or Contract Time, Contractor must perform the Work as directed but may submit a timely Change Order request in accordance with the Contract Documents. (See Articles 5 and 6.)

(C) **Figures and Dimensions.** Figures control over scaled dimensions.

(D) **Technical or Trade Terms.** Any terms that have well-known technical or trade meanings will be interpreted in accordance with those meanings, unless otherwise specifically defined in the Contract Documents.

(E) **Measurements.** Contractor must verify all relevant measurements in the Contract Documents and at the Project site before ordering any material or performing any Work and will be responsible for the correctness of those measurements or for costs that could have been avoided by independently verifying measurements.

(F) **Compliance with Laws.** The Contract Documents are intended to comply with Laws and will be interpreted to comply with Laws.

3.2 **Order of Precedence.** Information included in one Contract Document but not in another will not be considered a conflict or inconsistency. Unless otherwise specified in the Special Conditions, in case of any conflict or inconsistency among the Contract

Documents, the following order of precedence will apply, beginning from highest to lowest, with the most recent version taking precedent over an earlier version:

- (A) Change Orders;
- (B) Addenda;
- (C) Contract;
- (D) Notice to Proceed;
- (E) Attachment B – Federal Contract Requirements (only if used);
- (F) Special Conditions;
- (G) General Conditions;
- (H) Payment and Performance Bonds;
- (I) Specifications;
- (J) Plans;
- (K) Notice of Award;
- (L) Notice Inviting Bids;
- (M) Attachment A – Federal Bidding Requirements (only if used);
- (N) Instructions to Bidders;
- (O) Community Workforce Agreement, if applicable;
- (P) Contractor’s Bid Proposal and attachments;
- (Q) City Standards and City Specifications, as applicable; and
- (R) Any generic documents prepared by and on behalf of a third party, that were not prepared specifically for this Project, such as the Caltrans Standard Specifications, Caltrans Special Provisions, or Caltrans Standard Plans.

**3.3 Caltrans Standard Specifications and Standard Plans.** Any reference to or incorporation of the Standard Specifications of the State of California, Department of Transportation (“Caltrans”), including “Standard Specifications,” “Caltrans Specifications,” “State Specifications,” or “CSS,” means the most current edition of Caltrans’ Standard Specifications, unless otherwise specified (“Caltrans Standard Specifications”), including the most current amendments and revisions as of the date that Contractor’s bid was submitted for this Project. Any reference to or incorporation of Caltrans’ Standard Plans means the most current edition of Caltrans’ Standard Plans, unless otherwise specified (“Caltrans Standard Plans”), including the most current amendments or revisions as of the date that Contractor’s bid was submitted for this Project. The following provisions apply to use of or reference to the Caltrans Standard Specifications, Special Provisions, or Caltrans Standard Plans:

(A) **Limitations.** The “Division I General Provisions” of the Caltrans Standard Specifications, i.e., sections 1 through 9, do not apply to these Contract Documents with the exception of any specific provisions, if any, which are expressly stated to apply to these Contract Documents. Unless otherwise specified in the Specifications, the remaining Divisions of the Caltrans Standard Specifications, i.e., Division II through Division XII, are applicable to the extent relevant to the Work and are subject to any modifications set forth in the Specifications. A specific reference in the Specifications to a section from the Caltrans Standard Specifications will not be construed as excluding other applicable sections from the Caltrans Standard Specifications.

(B) **Conflicts or Inconsistencies.** If there is a conflict or inconsistency between any provision in the Caltrans Standard Specifications or Special Provisions and a provision of these Contract Documents, as determined by City, the provision in the Contract Documents will govern.

(C) **Meanings.** Terms used in the Caltrans Standard Specifications or Special Provisions are to be interpreted as follows:

(1) Any reference to the "Engineer" or "Director" is deemed to mean the City Engineer.

(2) Any reference to the "Special Provisions" is deemed to mean the Special Conditions, unless the Caltrans Special Provisions are expressly included in the Contract Documents listed in Section 2 of the Contract.

(3) Any reference to the "Department" or "State" is deemed to mean City.

(4) Any reference to "Laboratory" is deemed to mean the Materials Lab, or such other laboratory as may be authorized by the City.

- 3.4 For Reference Only.** Contractor is responsible for the careful review of any document, study, or report provided by City or appended to the Contract Documents solely for informational purposes and identified as "For Reference Only." Nothing in any document, study, or report so appended and identified is intended to supplement, alter, or void any provision of the Contract Documents. Contractor is advised that the City or its representatives may be guided by information or recommendations included in such reference documents, particularly when making determinations as to the acceptability of proposed materials, methods, or changes in the Work. Any record drawings or similar final or accepted drawings or maps that are not part of the Contract Documents are deemed to be For Reference Only. The provisions of the Contract Documents are not modified by any perceived or actual conflict with provisions in any document that is provided For Reference Only.
- 3.5 Current Versions.** Unless otherwise specified by the City, any reference to standard specifications, technical specifications, or any City or state codes or regulations means the latest specification, code, or regulation in effect on the date that bids were due.
- 3.6 Conformed Copies.** If City prepares a conformed set of the Contract Documents following award of the Contract, it will provide Contractor with two hard copy (paper) sets and one copy of the electronic file in PDF format. It is Contractor's responsibility to ensure that all Subcontractors, including fabricators, are provided with the conformed set of the Contract Documents at Contractor's sole expense.
- 3.7 Ownership.** No portion of the Contract Documents may be used for any purpose other than construction of the Project, without prior written consent from City. Contractor is deemed to have conveyed the copyright in any designs, drawings, specifications, Shop Drawings, or other documents (in paper or electronic form) developed by Contractor for the Project, and City will retain all rights to such works, including the right to possession.

#### **Article 4 - Bonds, Indemnity, and Insurance**

- 4.1 Payment and Performance Bonds.** Within ten days following issuance of the Notice of Award, Contractor is required to provide a payment bond and a performance bond, each in the penal sum of not less than 100% of the Contract Price, and each executed by Contractor and its surety using the bond forms included with the Contract Documents.
- (A) **Surety.** Each bond must be issued and executed by a surety admitted in California. If an issuing surety cancels the bond or becomes insolvent, within seven days following written notice from City, Contractor must substitute a surety acceptable to City. If Contractor fails to substitute an acceptable surety within the specified time, City may, at its sole discretion, withhold payment from Contractor until the surety is replaced to City's satisfaction, or terminate the Contract for default.

(B) **Supplemental Bonds for Increase in Contract Price.** If the Contract Price increases during construction by five percent or more over the original Contract Price, Contractor must provide supplemental or replacement bonds within ten days of written notice from City pursuant to this Section, covering 100% of the increased Contract Price and using the bond forms included with the Contract Documents.

**4.2 Indemnity.** To the fullest extent permitted by law, Contractor must indemnify, defend, and hold harmless City, its Council, officers, officials, employees, agents, volunteers, and consultants (individually, an "Indemnitee," and collectively the "Indemnitees") from and against any and all liability, loss, damage, claims, causes of action, demands, charges, fines, costs, and expenses (including, without limitation, attorney fees, expert witness fees, paralegal fees, fees and costs of litigation or arbitration, and fees and expenses incurred in enforcing this Section) (collectively, "Liability") of every nature arising out of or in connection with the acts or omissions of Contractor, its employees, Subcontractors, representatives, or agents, in bidding or performing the Work or in failing to comply with any obligation of Contractor under the Contract, except such Liability caused by the active negligence, sole negligence, or willful misconduct of an Indemnitee. This indemnity requirement applies to any Liability arising from alleged defects in the content or manner of submission of Contractor's bid for the Contract. Contractor's failure or refusal to timely accept a tender of defense pursuant to this Contract will be deemed a material breach of the Contract. City will timely notify Contractor upon receipt of any third-party claim relating to the Contract, as required by Public Contract Code § 9201. Contractor waives any right to express or implied indemnity against any Indemnitee. Contractor's indemnity obligations under this Contract will survive the expiration or any early termination of the Contract.

**4.3 Insurance.** No later than ten days following issuance of the Notice of Award, Contractor must procure and provide proof of the insurance coverage required by this Section in the form of certificates and endorsements acceptable to City. The required insurance must cover the activities of Contractor and its Subcontractors relating to or arising from the performance of the Work. The required insurance must remain in full force and effect at all times during the period covered by the Contract through the date of City's acceptance of the Project, except as specified for commercial general liability insurance in subsection (A)(1), below, which requires a longer duration. All required insurance must be issued by a company licensed to do business in the State of California, and each such insurer must have an A.M. Best's financial strength rating of "A-" or better and a financial size rating of "VII" or better. If Contractor fails to provide any of the required coverage in full compliance with the requirements of the Contract Documents, City may, at its sole discretion, purchase such coverage at Contractor's expense and deduct the cost from payments due to Contractor, or terminate the Contract for default. The procurement of the required insurance, or Contractor's failure to procure and maintain the required insurance, will not be construed to limit Contractor's liability under this Contract. The procurement of the required insurance will not be construed to fulfill Contractor's indemnification obligations under this Contract.

(A) **Policies and Limits.** The following insurance policies and limits are required for this Contract, unless otherwise specified in the Special Conditions:

(1) **Commercial General Liability ("CGL") Insurance:** The CGL insurance policy must be issued on an occurrence basis, written on a comprehensive general liability form with coverage at least as broad as ISO CG 00 01, and must include coverage for liability arising from Contractor's or its Subcontractor's acts or omissions in the performance of the Work, including contractor's protective coverage, contractual liability, products liability, completed operations, and broad form property damage, with limits of at least \$5,000,000 per occurrence and at least \$5,000,000 general aggregate. If insurance applies separately to a

project/location, aggregate may be equal to per occurrence amount. The CGL insurance coverage may be arranged under a single policy for the full limits required or by a combination of underlying policies with the balance provided by excess or umbrella policies, provided each such policy complies with the requirements set forth in this Section, including required endorsements. The products liability and completed operations coverage must continue for a period of three years following City's acceptance of the Project.

(2) *Automobile Liability Insurance:* The automobile liability insurance policy must provide coverage of at least \$3,000,000 combined single-limit per accident for bodily injury, death, or property damage, including hired, owned, and non-owned auto liability. Coverage must be at least as broad as ISO Form Number CA 00 01 covering any auto (Code 1).

(3) *Workers' Compensation Insurance and Employer's Liability:* The workers' compensation and employer's liability insurance policy must comply with the requirements of the California Labor Code, providing coverage of at least \$1,000,000 or as otherwise required by statute, per accident for bodily injury or disease. If Contractor is self-insured, Contractor must provide its Certificate of Permission to Self-Insure, duly authorized by the DIR.

(4) *Pollution Liability Insurance:* The pollution liability insurance policy must provide coverage of at least \$1,000,000 per occurrence and \$2,000,000 aggregate for all loss arising out of claims for bodily injury, death, property damage, or environmental damage caused by pollution conditions resulting from the Work. If the Work involves lead-based paint or asbestos identification and/or remediation, the pollution liability insurance policy must not contain lead-based paint or asbestos exclusions. If the Work involves mold identification, the pollution liability policy must not contain a mold exclusion and the definition of "pollution" in the policy must include microbial matter, including mold.

(5) *Builder's Risk Insurance:* The builder's risk insurance policy must be issued on an occurrence basis, for all-risk or "all perils" coverage on a 100% completed value basis on the insurable portion of the Project for the benefit of City, without co-insurance provisions. Contractor must name City as loss payee.

(B) **Notice.** Each certificate of insurance must state that the coverage afforded by the policy or policies will not be reduced, cancelled or allowed to expire without at least 30 days prior written notice to City, unless due to non-payment of premiums, in which case ten days prior written notice must be made to City.

(C) **Waiver of Subrogation.** Each required policy must include an endorsement providing that the carrier will waive any right of subrogation it may have against City.

(D) **Required Endorsements.** The CGL policy, automobile liability policy, pollution liability policy, and builder's risk policy must include the following specific endorsements:

(1) The City of Santa Rosa, including its Council, officials, officers, employees, agents, volunteers and consultants (collectively, "Additional Insured") must be named as an additional insured for all liability arising out of the operations by or on behalf of the named insured, and the policy must protect the Additional Insured against any and all liability for personal injury, death or property damage or destruction arising directly or indirectly in the performance of the Contract. Coverage for an Additional Insured will not be limited to the Additional Insured's vicarious liability. The additional insured endorsement must be provided using ISO forms at least as broad as CG 20 10 04 13 or 20 38 04 13 (ongoing

operations) and CG 20 37 04 13 (completed operations), or equivalent form(s) approved by the City.

(2) The inclusion of more than one insured will not operate to impair the rights of one insured against another, and the coverages afforded will apply as though separate policies have been issued to each insured.

(3) The insurance provided by Contractor is primary and no insurance held or owned by any Additional Insured may be called upon to contribute to a loss. This endorsement must be provided using ISO form CG 20 01 04 13 or an equivalent form approved by the City.

(4) This policy does not exclude explosion, collapse, underground excavation hazard, or removal of lateral support.

(E) **Contractor's Responsibilities.** This Section 4.3 establishes the minimum requirements for Contractor's insurance coverage in relation to this Project but is not intended to limit Contractor's ability to procure additional or greater coverage. Contractor is responsible for its own risk assessment and needs and is encouraged to consult its insurance provider to determine what coverage it may wish to carry beyond the minimum requirements of this Section. Contractor is solely responsible for the cost of its insurance coverage, including premium payments, deductibles, or self-insured retentions, and no Additional Insured will be responsible or liable for any of the cost of Contractor's insurance coverage. Contractor's insurance coverage applies to the full extent of the policies, and nothing contained herein will be construed to limit the application of such coverage.

(F) **Deductibles and Self-Insured Retentions.** Any deductibles or self-insured retentions that apply to the required insurance (collectively, "deductibles") in excess of \$10,000 are subject to approval by the City's Risk Manager, acting in his or her sole discretion, and must be declared by Contractor when it submits its certificates of insurance and endorsements pursuant to this Section 4.3. If the City's Risk Manager determines that the deductibles are unacceptably high, at City's option, Contractor must either reduce or eliminate the deductibles as they apply to City and all required Additional Insured; or must provide a financial guarantee, to City's satisfaction, guaranteeing payment of losses and related investigation, claim administration, and legal expenses.

(G) **Subcontractors.** Contractor must ensure that each Subcontractor is required to maintain the same insurance coverage required under this Section 4.3, with respect to its performance of Work on the Project, including those requirements related to the Additional Insureds and waiver of subrogation, but excluding pollution liability or builder's risk insurance unless otherwise specified in the Special Conditions. A Subcontractor may be eligible for reduced insurance coverage or limits, but only to the extent approved in writing in advance by the City's Risk Manager. Contractor must confirm that each Subcontractor has complied with these insurance requirements before the Subcontractor is permitted to begin Work on the Project. Upon request by the City, Contractor must provide certificates and endorsements submitted by each Subcontractor to prove compliance with this requirement. The insurance requirements for Subcontractors do not replace or limit the Contractor's insurance obligations.

## Article 5 - Contract Time

**5.1 Time is of the Essence.** Time is of the essence in Contractor's performance and completion of the Work, and Contractor must diligently prosecute the Work and complete it within the Contract Time.

(A) **General.** Contractor must commence the Work on the date indicated in the Notice to Proceed and must fully complete the Work in strict compliance with all requirements of the Contract Documents and within the Contract Time. Contractor may not begin performing the Work before the date specified in the Notice to Proceed.

(B) **Authorization.** Contractor is not entitled to compensation or credit for any Work performed before the date specified in the Notice to Proceed, with the exception of any schedules, submittals, or other requirements, if any, that must be provided or performed before issuance of the Notice to Proceed.

(C) **Rate of Progress.** Contractor and its Subcontractors must, at all times, provide workers, materials, and equipment sufficient to maintain the rate of progress necessary to ensure full completion of the Work within the Contract Time. Contractor will diligently prosecute the Work to minimize the public's exposure to construction activities. If City determines that Contractor is failing to prosecute the Work at a sufficient rate of progress, City may, in its sole discretion, direct Contractor to provide additional workers, materials, or equipment, or to work additional hours or days without additional cost to City, in order to achieve a rate of progress satisfactory to City. If Contractor fails to comply with City's directive in this regard, City may, at Contractor's expense, separately contract for additional workers, materials, or equipment or use City's own forces to achieve the necessary rate of progress. Alternatively, City may terminate the Contract based on Contractor's default.

**5.2 Schedule Requirements.** Contractor must prepare all schedules using standard, commercial scheduling software acceptable to the Engineer, and must provide the schedules in electronic and paper form as requested by the Engineer. Contractor must provide the Engineer with a license for use of Contractor's scheduling software, unless otherwise specified by the Engineer. In addition to the general scheduling requirements set forth below, Contractor must also comply with any scheduling requirements included in the Special Conditions or in the Technical Specifications.

(A) **Baseline (As-Planned) Schedule.** Within ten calendar days following City's issuance of the Notice to Proceed (or as otherwise specified in the Notice to Proceed), Contractor must submit to City for review and acceptance a baseline (as-planned) schedule using critical path methodology showing in detail how Contractor plans to perform and fully complete the Work within the Contract Time, including labor, equipment, materials, and fabricated items. The baseline schedule must show the order of the major items of Work and the dates of start and completion of each item, including when the materials and equipment will be procured. The schedule must also include the work of all trades, reflecting anticipated labor or crew hours and equipment loading for the construction activities, and must be sufficiently comprehensive and detailed to enable progress to be monitored on a day-by-day basis. For each activity, the baseline schedule must be dated, provided in the format specified in the Contract Documents or as required by City, and must include, at a minimum, a description of the activity, the start and completion dates of the activity, and the duration of the activity.

(1) **Specialized Materials Ordering.** Within five calendar days following issuance of the Notice to Proceed, Contractor must order any specialized material or equipment for the Work that is not readily available from material suppliers. Contractor must also retain documentation of the purchase order date(s).

(2) *High Dollar or Long Duration Projects.* In addition to the requirements set forth above, if the Contract Price is \$5,000,000 or more or if the Contract Time is 100 Working Days or more, Contractor's baseline (as-planned) schedule must include the following: the start and completion dates for submittal development, submittal review, milestones and constraints, equipment and plant setup, interfaces with outside entities, erection and removal of falsework and shoring, test periods, major traffic stage change, and final cleanup; logical links between time-scaled Work activities; controlling activities; at least 50 but no more than 500 activities, unless otherwise specified or authorized by the Engineer; alphanumeric activity identification and activity description system for labeling Work activities; identification code for each activity for responsibility, stage, Work shifts, location, and bid items; activity durations of at least one Working Day and no more than 20 Working Days for each activity, unless otherwise authorized by the Engineer; and float as the predecessor activity to Final Completion. Each activity description must indicate its associated scope or location of Work.

(B) **City's Review of Schedules.** City will review and may note exceptions to the baseline schedule, and to the progress schedules submitted as required below, to assure completion of the Work within the Contract Time. Contractor is solely responsible for resolving any exceptions noted in a schedule and, within seven days, must correct the schedule to address the exceptions. City's review or acceptance of Contractor's schedules will not operate to waive or limit Contractor's duty to complete the Project within the Contract Time, nor to waive or limit City's right to assess liquidated damages for Contractor's unexcused failure to do so.

(C) **Progress Schedules.** After City accepts the final baseline schedule with no exceptions, Contractor must submit an updated progress schedule and three-week look-ahead schedule, in the format specified by City, for review and acceptance with each application for a progress payment, or when otherwise specified by City, until completion of the Work. The updated progress schedule must: show how the actual progress of the Work as constructed to date compares to the baseline schedule; reflect any proposed changes in the construction schedule or method of operations, including to achieve Project milestones within the Contract Time; and identify any actual or potential impacts to the critical path. Contractor must also submit periodic reports to City of any changes in the projected material or equipment delivery dates for the Project.

(1) *Float.* The progress schedule must show early and late completion dates for each task. The number of days between those dates will be designated as the "float." Any float belongs to the Project and may be allocated by the Engineer to best serve timely completion of the Project.

(2) *Failure to Submit Schedule.* Reliable, up-to-date schedules are essential to efficient and cost-effective administration of the Project and timely completion. If Contractor fails to submit a schedule within the time periods specified in this Section or submits a schedule to which City has noted exceptions that are not corrected, City may withhold up to five percent from payment(s) otherwise due to Contractor until the exceptions are resolved, the schedule is corrected and resubmitted, and City has accepted the schedule. In addition, Contractor's failure to comply with the schedule requirements in this Section 5.2 will be deemed a material default and a waiver of any claims for Excusable Delay or loss of productivity arising during any period when Contractor is out of compliance, subject only to the limits of Public Contract Code § 7102.

(D) **Recovery Schedule.** If City determines that the Work is more than one week behind schedule, within seven days following written notice of such determination, Contractor must submit a recovery schedule, showing how Contractor intends to perform and complete the Work within the Contract Time, based on actual progress to date.

(E) **Effect of Acceptance.** Contractor and its Subcontractors must perform the Work in accordance with the most current City-accepted schedule unless otherwise directed or approved by City. If Contractor wants to perform non-critical Work activities that are out of sequence with the current City-accepted schedule, Contractor must notify and request approval from the Engineer in advance of performance of any such activities. Performance of any such Work must not impact the critical path Work activities. City's acceptance of a schedule does not operate to extend the time for completion of the Work or any component of the Work, and will not affect City's right to assess liquidated damages for Contractor's unexcused delay in completing the Work within the Contract Time.

(F) **Posting.** Contractor must at all times prominently post a copy of the most current City-accepted progress or recovery schedule in its on-site office.

(G) **Reservation of Rights.** City reserves the right to direct the sequence in which the Work must be performed or to make changes in the sequence of the Work in order to facilitate the performance of work by City or others, to facilitate City's use of its property, or to minimize the public's exposure to construction activities. The Contract Time or Contract Price may be adjusted to the extent such changes in sequence actually increase or decrease Contractor's time or cost to perform the Work.

(H) **Authorized Working Days and Times.** Contractor is limited to working Monday through Friday, excluding holidays observed by City, during City's normal business hours, except as provided in the Special Conditions or as authorized in writing by City. City reserves the right to charge Contractor for additional costs incurred by City due to Work performed on days or during hours not expressly authorized in the Contract Documents, including reimbursement of costs incurred for inspection, testing, and construction management services.

### 5.3 Delay and Extensions of Contract Time.

(A) **Notice of Delay.** If Contractor becomes aware of any actual or potential delay affecting the critical path, Contractor must promptly notify the Engineer in writing, regardless of the nature or cause of the delay, so that City has a reasonable opportunity to mitigate or avoid the delay.

(B) **Excusable Delay.** The Contract Time may be extended if Contractor encounters "Excusable Delay," which is an unavoidable delay in completing the Work within the Contract Time due to causes completely beyond Contractor's control, and which Contractor could not have avoided or mitigated through reasonable care, planning, foresight, or diligence, provided that Contractor is otherwise fully performing its obligations under the Contract Documents. Grounds for Excusable Delay may include fire, natural disasters including earthquake or unusually severe weather, acts of terror or vandalism, epidemic, unforeseeable adverse government actions, unforeseeable actions of third parties, encountering unforeseeable hazardous materials, unforeseeable site conditions, or suspension for convenience under Article 13. The Contract Time will not be extended based on circumstances which will not unavoidably delay completing the Work within the Contract Time based on critical path analysis.

(C) **Weather Delays.** A "Weather Delay Day" is a Working Day during which Contractor and its forces, including Subcontractors, are unable to perform more than 40% of the critical path Work scheduled for that day due to adverse weather conditions which impair the ability to safely or effectively perform the scheduled critical path Work that day. Adverse weather conditions may include rain, saturated soil, and Project site clean-up required due to adverse weather. Determination of what constitutes critical path Work scheduled for that day will be based on the most current, City-approved schedule.

Contractor will be entitled to a non-compensable extension of the Contract Time for each Weather Delay Day in excess of the normal Weather Delay Days within a given month as determined by reliable records, including monthly rainfall averages, for the preceding ten years (or as otherwise specified in the Special Conditions or Specifications).

- (1) Contractor must fully comply with the applicable procedures in Articles 5 and 6 of the General Conditions regarding requests to modify the Contract Time.
- (2) Contractor will not be entitled to an extension of time for a Weather Delay Day to the extent Contractor is responsible for concurrent delay on that day.
- (3) Contractor must take reasonable steps to mitigate the consequences of Weather Delay Days, including prudent workforce management and protecting the Work, Project Site, materials, and equipment.

(D) **Non-Excusable Delay.** Delay which Contractor could have avoided or mitigated through reasonable care, planning, foresight, or diligence is "Non-Excusable Delay." Contractor is not entitled to an extension of Contract Time or any compensation for Non-Excusable Delay, or for Excusable Delay that is concurrent with Non-Excusable Delay. Non-Excusable Delay includes delay caused by:

- (1) weather conditions which are normal for the location of the Project, as determined by reliable records, including monthly rainfall averages, for the preceding ten years;
- (2) Contractor's failure to order equipment and materials sufficiently in advance of the time needed for completion of the Work within the Contract Time;
- (3) Contractor's failure to provide adequate notification to utility companies or agencies for connections or services necessary for completion of the Work within the Contract Time;
- (4) foreseeable conditions which Contractor could have ascertained from reasonably diligent inspection of the Project site or review of the Contract Documents or other information provided or available to Contractor;
- (5) Contractor's failure, refusal, or financial inability to perform the Work within the Contract Time, including insufficient funds to pay its Subcontractors or suppliers;
- (6) performance or non-performance by Contractor's Subcontractors or suppliers;
- (7) the time required to respond to excessive RFIs (see Section 2.5(G));
- (8) delayed submission of required submittals, or the time required for correction and resubmission of defective submittals;
- (9) time required for repair of, re-testing, or re-inspection of defective Work;
- (10) enforcement of Laws by City, or outside agencies with jurisdiction over the Work;  
or
- (11) City's exercise or enforcement of any of its rights or Contractor's duties pursuant to the Contract Documents, including correction of defective Work, extra inspections or testing due to non-compliance with Contract requirements, safety compliance, environmental compliance, or rejection and return of defective or deficient submittals.

(E) **Compensable Delay.** Pursuant to Public Contract Code § 7102, in addition to entitlement to an extension of Contract Time, Contractor is entitled to compensation for costs incurred due to delay caused solely by City, when that delay is unreasonable under the circumstances involved and not within the contemplation of the parties (“Compensable Delay”). Contractor is not entitled to an extension of Contract Time or recovery of costs for Compensable Delay that is concurrent with Non-Excusable Delay. Delay due to Weather Delay Days in excess of normal for a given month, as set forth in Section 5.3(C), is not Compensable Delay, and will only entitle Contractor to an extension of time commensurate with the time lost due to such delay.

(F) **Recoverable Costs.** Contractor is not entitled to compensation for Excusable Delay unless it is Compensable Delay, as defined above. Contractor is entitled to recover only the actual, direct, reasonable, and substantiated costs (“Recoverable Costs”) for each working day that the Compensable Delay prevents Contractor from proceeding with more than 50% of the critical path Work scheduled for that day, based on the most recent progress schedule accepted by City. Recoverable Costs will not include home office overhead or lost profit.

(G) **Request for Extension of Contract Time or Recoverable Costs.** A request for an extension of Contract Time or any associated Recoverable Costs must be submitted in writing to City within 14 calendar days of the date the delay is first encountered, even if the duration of the delay is not yet known at that time, or any entitlement to the Contract Time extension or to the Recoverable Costs will be deemed waived. In addition to complying with the requirements of this Article 5, the request must be submitted in compliance with the Change Order request procedures in Article 6 below. Strict compliance with these requirements is necessary to ensure that any delay or consequences of delay may be mitigated as soon as possible, and to facilitate cost-efficient administration of the Project and timely performance of the Work. Any request for an extension of Contract Time or Recoverable Costs that does not strictly comply with all of the requirements of Article 5 and Article 6 will be deemed waived.

(1) **Required Contents.** The request must include a detailed description of the cause(s) of the delay and must also describe the measures that Contractor has taken to mitigate the delay and/or its effects, including efforts to mitigate the cost impact of the delay, such as by workforce management or by a change in sequencing. If the delay is still ongoing at the time the request is submitted, the request should also include Contractor’s plan for continued mitigation of the delay or its effects.

(2) **Delay Days and Costs.** The request must specify the number of days of Excusable Delay claimed or provide a realistic estimate if the duration of the delay is not yet known. If Contractor believes it is entitled to Recoverable Costs for Compensable Delay, the request must specify the amount and basis for the Recoverable Costs that are claimed or provide a realistic estimate if the amount is not yet known. Any estimate of delay duration or cost must be updated in writing and submitted with all required supporting documentation as soon as the actual time and cost is known. The maximum extension of Contract Time will be the number of days, if any, by which an Excusable Delay or a Compensable Delay exceeds any concurrent Non-Excusable Delay. Contractor is entitled to an extension of Contract Time, or compensation for Recoverable Costs, only if, and only to the extent that, such delay will unavoidably delay Final Completion.

(3) **Supporting Documentation.** The request must also include any and all supporting documentation necessary to evidence the delay and its actual impacts, including scheduling and cost impacts with a time impact analysis using critical path methodology and demonstrating the unavoidable delay to Final Completion. The time impact analysis must be submitted in a form or format acceptable to City.

(4) **Burden of Proof.** Contractor has the burden of proving that: the delay was an Excusable Delay or Compensable Delay, as defined above; Contractor has fully complied with its scheduling obligations in Section 5.2, Schedule Requirements; Contractor has made reasonable efforts to mitigate the delay and its schedule and cost impacts; the delay will unavoidably result in delaying Final Completion; and any Recoverable Costs claimed by Contractor were actually incurred and were reasonable under the circumstances.

(5) **Legal Compliance.** Nothing in this Section 5.3 is intended to require the waiver, alteration, or limitation of the applicability of Public Contract Code § 7102.

(6) **No Waiver.** Any grant of an extension of Contract Time, or compensation for Recoverable Costs due to Compensable Delay, will not operate as a waiver of City's right to assess liquidated damages for Non-Excusable Delay.

(7) **Dispute Resolution.** In the event of a dispute over entitlement to an extension of Contract Time or compensation for Recoverable Costs, Contractor may not stop Work pending resolution of the dispute, but must continue to comply with its duty to diligently prosecute the performance and timely completion of the Work. Contractor's sole recourse for an unresolved dispute based on City's rejection of a Change Order request for an extension of Contract Time or compensation for Recoverable Costs is to comply with the dispute resolution provisions set forth in Article 12 below.

**5.4 Liquidated Damages.** It is expressly understood that if Final Completion is not achieved within the Contract Time, City will suffer damages from the delay that are difficult to determine and accurately specify. Pursuant to Public Contract Code § 7203, if Contractor fails to achieve Final Completion within the Contract Time due to Contractor's Non-Excusable Delay, City will charge Contractor in the amount specified in the Contract for each calendar day that Final Completion is delayed beyond the Contract Time, as liquidated damages and not as a penalty. Any waiver of accrued liquidated damages, in whole or in part, is subject to approval of the City Council or its authorized delegee.

(A) **Liquidated Damages.** Liquidated damages will not be assessed for any Excusable Delay or Compensable Delay, as set forth above.

(B) **Milestones.** Liquidated damages may also be separately assessed for failure to meet milestones specified elsewhere in the Contract Documents.

(C) **Setoff.** City is entitled to deduct the amount of liquidated damages assessed against any payments otherwise due to Contractor, including progress payments, Final Payment, or unreleased retention. If there are insufficient Contract funds remaining to cover the full amount of liquidated damages assessed, City is entitled to recover the balance from Contractor or its performance bond surety.

(D) **Occupancy or Use.** Occupancy or use of the Project in whole or in part prior to Final Completion does not constitute City's acceptance of the Project and will not operate as a waiver of City's right to assess liquidated damages for Contractor's Non-Excusable Delay in achieving Final Completion.

(E) **Other Remedies.** City's right to liquidated damages under this Section applies only to damages arising from Contractor's Non-Excusable Delay or failure to complete the Work within the Contract Time. City retains its right to pursue all other remedies under the Contract for other types of damage, including damage to property or persons, costs or diminution in value from defective materials or workmanship, costs to repair or complete the Work, or other liability caused by Contractor.

## Article 6 - Contract Modification

**6.1 Contract Modification.** Subject to the limited exception set forth in subsection (D) below, any change in the Work or the Contract Documents, including the Contract Price or Contract Time, will not be a valid and binding change to the Contract unless it is formalized in a Change Order, including a “no-cost” Change Order or a unilateral Change Order. Changes in the Work pursuant to this Article 6 will not operate to release, limit, or abridge Contractor’s warranty obligations pursuant to Article 11 or any obligations of Contractor’s bond sureties.

(A) **City-Directed Changes.** City may direct changes in the scope or sequence of Work or the requirements of the Contract Documents, without invalidating the Contract. Such changes may include Extra Work as set forth in subsection (C) below, or deletion or modification of portions of the Work. Contractor must promptly comply with City-directed changes in the Work in accordance with the original Contract Documents, even if Contractor and City have not yet reached agreement as to adjustments to the Contract Price or Contract Time for the change in the Work or for the Extra Work. Contractor is not entitled to extra compensation for cost savings resulting from “value engineering” pursuant to Public Contract Code § 7101, except to the extent authorized in advance by City in writing, and subject to any applicable procedural requirements for submitting a proposal for value engineering cost savings.

(B) **Disputes.** In the event of a dispute over entitlement to or the amount of a change in Contract Time or a change in Contract Price related to a City-directed change in the Work, Contractor must perform the Work as directed and may not delay its Work or cease Work pending resolution of the dispute, but must continue to comply with its duty to diligently prosecute the performance and timely completion of the Work, including the Work in dispute. Likewise, in the event that City and Contractor dispute whether a portion or portions of the Work are already required by the Contract Documents or constitute Extra Work, or otherwise dispute the interpretation of any portion(s) of the Contract Documents, Contractor must perform the Work as directed and may not delay its Work or cease Work pending resolution of the dispute, but must continue to comply with its duty to diligently prosecute the performance and timely completion of the Work, including the Work in dispute, as directed by City. If Contractor refuses to perform the Work in dispute, City may, acting in its sole discretion, elect to delete the Work from the Contract and reduce the Contract Price accordingly, and self-perform the Work or direct that the Work be performed by others. Alternatively, City may elect to terminate the Contract for convenience or for cause. Contractor’s sole recourse for an unresolved dispute related to changes in the Work or performance of any Extra Work is to comply with the dispute resolution provisions set forth in Article 12, below.

(C) **Extra Work.** City may direct Contractor to perform Extra Work related to the Project. Contractor must promptly perform any Extra Work as directed or authorized by City in accordance with the original Contract Documents, even if Contractor and City have not yet reached agreement on adjustments to the Contract Price or Contract Time for such Extra Work. If Contractor believes it is necessary to perform Extra Work due to changed conditions, Contractor must notify the Engineer in writing, within one Working Day following the date the Contractor first encounters the circumstances giving rise to Contractor’s contention that Extra Work is necessary. Contractor’s written notice must specifically identify the Extra Work and the reason(s) the Contractor believes it is Extra Work. This notification requirement does not constitute a Change Order request pursuant to Section 6.2, below. Contractor must maintain detailed daily records that itemize the cost of each element of Extra Work, and sufficiently distinguish the direct cost of the Extra Work from the cost of other Work performed. For each day that Contractor performs Extra Work, or Work that Contractor contends is Extra Work, Contractor must submit, by no later than close of business on that same Working Day, a daily report of the

Extra Work performed that day, signed by the City and Contractor, identifying the labor, materials, and equipment used in the Extra Work ("Extra Work Report"). The Engineer may make any adjustments to Contractor's Extra Work Report(s) based on the Engineer's records of the Work. The Extra Work Report enables the parties to document and track the Extra Work, or Work that the Contractor contends is Extra Work. City's signature on the Extra Work Report is intended solely to document City's receipt of the Extra Work Report; it does not constitute any acknowledgement, acceptance, or approval of the Extra Work by City. To request compensation for Extra Work, Contractor must comply with the requirements in Section 6.2, below, including submission of the Extra Work Reports and a breakdown of the costs related to the Extra Work, together with copies of certified payroll, invoices, and other documentation substantiating the costs. Failure to submit the Extra Work Report by close of business on the same Working Day as the Extra Work is deemed a full and complete waiver for any change in the Contract Price or Contract Time for any Extra Work performed that day.

(D) **Minor Changes and RFIs.** Minor field changes, including RFI replies from City, that do not affect the Contract Price or Contract Time and that are approved by the Engineer acting within his or her scope of authority, do not require a Change Order. By executing an RFI reply from City, Contractor agrees that it will perform the Work as clarified therein, with no change to the Contract Price or Contract Time.

(E) **Remedy for Non-Compliance.** Contractor's failure to promptly comply with a City-directed change is deemed a material breach of the Contract, and in addition to all other remedies available to it, City may, at its sole discretion, hire another contractor or use its own forces to complete the disputed Work at Contractor's sole expense, and may deduct the cost from the Contract Price.

**6.2 Contractor Change Order Requests.** Contractor must submit a request or proposal for a change in the Work, compensation for Extra Work, or a change in the Contract Price or Contract Time as a written Change Order request or proposal.

(A) **Time for Submission.** Any request for a change in the Contract Price or the Contract Time must be submitted in writing to the Engineer within 14 calendar days of the date that Contractor first encounters the circumstances, information or conditions giving rise to the Change Order request, even if the total amount of the requested change in the Contract Price or impact on the Contract Time is not yet known at that time. If City requests that Contractor propose the terms of a Change Order, unless otherwise specified in City's request, Contractor must provide the Engineer with a written proposal for the change in the Contract Price or Contract Time within five working days of receiving City's request, in a form satisfactory to the Engineer.

(B) **Required Contents.** Any Change Order request or proposal submitted by Contractor must include a complete breakdown of actual or estimated costs and credits, and must itemize labor, materials, equipment, taxes, insurance, subcontract amounts, and, if applicable, Extra Work Reports. Any estimated cost must be updated in writing as soon as the actual amount is known.

(C) **Required Documentation.** All claimed costs must be fully documented, and any related request for an extension of time or delay-related costs must be included at that time and in compliance with the requirements of Article 5 of the General Conditions. Upon request, Contractor must permit City to inspect its original and unaltered bidding records, subcontract agreements, subcontract change orders, purchase orders, invoices, or receipts associated with the claimed costs.

(D) **Required Form.** Contractor must use City's form(s) for submitting all Change Order requests or proposals, unless otherwise specified by City.

- (E) **Certification.** All Change Order requests must be signed by Contractor and must include the following certification:

“The undersigned Contractor certifies under penalty of perjury that its statements and representations in this Change Order request are true and correct. Contractor warrants that this Change Order request is comprehensive and complete as to the Work or changes referenced herein, and agrees that any known or foreseeable costs, expenses, or time extension requests not included herein, are deemed waived.”

**6.3 Adjustments to Contract Price.** The amount of any increase or decrease in the Contract Price will be determined based on one of the following methods listed below, in the order listed with unit pricing taking precedence over the other methods. Markup applies only to City-authorized time and material Work, and does not apply to any other payments to Contractor. For Work items or components that are deleted in their entirety, Contractor will only be entitled to compensation for those direct, actual, and documented costs (including restocking fees), reasonably incurred before Contractor was notified of the City’s intent to delete the Work, with no markup for overhead, profit, or other indirect costs.

(A) **Unit Pricing.** Amounts previously provided by Contractor in the form of unit prices, either in a bid schedule or in a post-award schedule of values pursuant to Section 8.1, Schedule of Values, will apply to determine the price for the affected Work, to the extent applicable unit prices have been provided for that type of Work. No additional markup for overhead, profit, or other indirect costs will be added to the calculation.

(B) **Lump Sum.** A mutually agreed upon, all-inclusive lump sum price for the affected Work with no additional markup for overhead, profit, or other indirect costs.

(C) **Time and Materials.** On a time and materials basis, if and only to the extent compensation on a time and materials basis is expressly authorized by City in advance of Contractor’s performance of the Work and subject to any not-to-exceed limit. Time and materials compensation for increased costs or Extra Work (but not decreased costs or deleted Work) will include allowed markup for overhead, profit, and other indirect costs, calculated as the total of the following sums, the cumulative total of which may not exceed the maximum markup rate of 15%:

- (1) All direct labor costs provided by the Contractor, excluding superintendence, project management, or administrative costs, plus 15% markup;
- (2) All direct material costs provided by the Contractor, including sales tax, plus 15% markup;
- (3) All direct plant and equipment rental costs provided by the Contractor, plus 15% markup;
- (4) All direct additional subcontract costs plus 10% markup for Work performed by Subcontractors; and
- (5) Increased bond and insurance premium costs computed at 1.5% of the total of the previous four sums.

**6.4 Unilateral Change Order.** If the parties dispute the terms of a proposed Change Order, including disputes over the amount of compensation or extension of time that Contractor has requested, the value of deleted or changed Work, what constitutes Extra Work, or

quantities used, City may elect to issue a unilateral Change Order, directing performance of the Work, and authorizing a change in the Contract Price or Contract Time for the adjustment to compensation or time that the City believes is merited. Contractor's sole recourse to dispute the terms of a unilateral Change Order is to submit a timely Claim pursuant to Article 12, below.

- 6.5 Non-Compliance Deemed Waiver.** Contractor waives its entitlement to any increase in the Contract Price or Contract Time if Contractor fails to fully comply with the provisions of this Article. Contractor will not be paid for unauthorized Extra Work.

## **Article 7 - General Construction Provisions**

### **7.1 Permits, Fees, Licenses, Certificates, and Taxes.**

(A) **Fees, Licenses, Certificates, and Permits.** Contractor must obtain and pay for all fees, licenses, and certificates required to perform the Work, including a City business tax certificate. Contractor must obtain all permits required to perform the Work. Contractor is not responsible for the fees associated with obtaining permits unless otherwise specified in the Special Conditions or Specifications. Contractor must cooperate with and provide notifications to all government agencies with jurisdiction over the Project, as may be required. Contractor must provide City with copies of all records of permits and permit applications, payment of required fees, and any licenses and certificates required for the Work.

(B) **Taxes.** Contractor must pay for all taxes on labor, material, and equipment, except Federal Excise Tax to the extent that City is exempt from Federal Excise Tax.

- 7.2 Temporary Facilities.** Contractor must provide, at Contractor's sole expense, any and all temporary facilities for the Project, including an onsite staging area for materials and equipment, a field office, sanitary facilities, utilities, storage, scaffolds, barricades, walkways, and any other temporary structure required to safely perform the Work along with any incidental utility services. The location of all temporary facilities must be approved by the City prior to installation. Temporary facilities must be safe and adequate for the intended use and installed and maintained in accordance with Laws and the Contract Documents. Contractor must fence and screen the Project site and, if applicable, any separate Worksites, including the staging area, and its operation must minimize inconvenience to neighboring properties. Additional provisions pertaining to temporary facilities are set forth in this Article 7 and may also be included in the Specifications or Special Conditions.

(A) **Utilities.** Contractor must install and maintain the power, water, sewer, and all other utilities required for the Project site and performance of the Work, including the piping, wiring, internet and Wi-Fi connections, and any related equipment necessary to maintain the temporary facilities. Contractor may obtain water from the City's water system or from a source other than City's water system, if approved in advance by the Engineer. Before obtaining water from the City's water system, Contractor must obtain a Water Use Permit from the Water Department and rent a hydrant or bridge meter. Contractor is responsible for the cost of all water and all related deposits, permits, and fees. Contractor is prohibited from operating gate valves or fire hydrants on the City's water system. The acquisition of water from the City's water system through un-metered hydrants or other facilities is a violation of Laws. Citations and fines may be levied for violation of these and other utility regulations and may be deducted from payment otherwise due Contractor.

(B) **Removal and Repair.** Contractor must promptly remove all such temporary facilities when they are no longer needed or upon completion of the Work, whichever comes first. Contractor must promptly repair any damage to City's property or to other property caused by the installation, use, or removal of the temporary facilities, and must promptly restore the property to its original or intended condition.

**7.3 Noninterference and Site Management.** Contractor must avoid interfering with City's use of its property at or adjacent to the Project site, including use of roadways, entrances, parking areas, walkways, and structures. Contractor must also minimize disruption of access to private property in the Project vicinity. Contractor must coordinate with affected property owners, tenants, and businesses, and maintain some vehicle and pedestrian access to their residences or properties at all times. Temporary access ramps, fencing or other measures must be provided as needed. Before blocking access to a private driveway or parking lot, Contractor must provide effective notice to the affected parties at least 48 hours in advance of the pending closure and allow them to remove vehicles. Private driveways, residences and parking lots must have access to a roadway during non-Work hours. Property owners, tenants, and businesses must have full access to their driveways during non-Work hours. The Engineer may, at any time, direct or approve of opening completed sections of surfacing, pavement, or structure roadway surface for public use.

(A) **Offsite Acquisition.** Unless otherwise provided by City, Contractor must acquire, use, and dispose of, at its sole expense, any Worksites, licenses, easements, and temporary facilities necessary to access and perform the Work.

(B) **Offsite Staging Area and Field Office.** If additional space beyond the Project site is needed, such as for the staging area or the field office, Contractor may need to make arrangements with the nearby property owner(s) to secure the space and obtain a temporary use permit, in accordance with City Code § 20-52.040. Before using or occupying any property owned by a third party, Contractor must provide City with a copy of the necessary license agreement, easement, or other written authorization from the property owner, together with a written release from the property owner holding City harmless from any related liability, in a form acceptable to the City Attorney.

(C) **Traffic Management.** Contractor must provide traffic management and traffic controls as specified in the Contract Documents, as required by Laws, and as otherwise required to ensure public and worker safety, and to avoid interference with public or private operations or the normal flow of vehicular, bicycle, and pedestrian traffic.

(D) **Railroad Property.** Sonoma-Marín Area Rail Transit ("SMART") maintains railroad property within the City. Contractor will not interfere with railroad operations or perform Work on or adjacent to railroad property unless Contractor has obtained an encroachment permit from SMART. Contractor is responsible for obtaining an encroachment permit from SMART if necessary for the Work or for Contractor's traffic control. Contractor will not be entitled to an extension of time or additional compensation to obtain the SMART permit. For any excavation on or affecting railroad property, Contractor must submit Work plans to the City and SMART, if requested by SMART, showing the system to be used to protect the railroad facilities. Contractor will prevent material, equipment, and debris from falling onto railroad property.

(E) **Third Party Material Sourcing and Disposal.** If Contractor intends to procure materials from or dispose of materials on any property owned by a third party, before procuring material or disposing of material, Contractor must provide City with a copy of the agreement between Contractor and the third party authorizing the use of the property and absolving the City from responsibility in connection with the property. Contractor must obtain authorization from the third party to start sourcing or disposing of material on the property. As a condition precedent to Final Completion, Contractor must submit a

document to the City, signed by the third party property owner, stating that the Contractor complied with its agreement with the third party.

**7.4 Signs.** No signs may be displayed on or about City's property, except signage which is required by Laws or by the Contract Documents, without City's prior written approval as to size, design, and location.

**7.5 Project Site and Nearby Property Protections.**

(A) **General.** Contractor is responsible at all times, on a 24-hour basis and at its sole cost, for protecting the Work, the Project site, and the materials and equipment to be incorporated into the Work, until the City has accepted the Project, excluding any exceptions to acceptance, if any. Except as specifically authorized by City, Contractor must confine its operations to the area of the Project site indicated in the Plans and Specifications. Contractor is liable for any damage caused by Contractor or its Subcontractors to the Work, City's property, the property of adjacent or nearby property owners and the work or personal property of other contractors working for City, including damage related to Contractor's failure to adequately secure the Work or any Worksite.

(1) Subject to City's approval, Contractor will provide and install safeguards to protect the Work; any Worksite, including the Project site; City's real or personal property and the real or personal property of adjacent or nearby property owners, including plant and tree protections.

(2) City wastewater systems may not be interrupted. If the Work disrupts existing sewer facilities, Contractor must immediately notify City and establish a plan, subject to City's approval, to convey the sewage in closed conduits back into the sanitary sewer system. Sewage must not be permitted to flow in trenches or be covered by backfill.

(3) Contractor must remove with due care, and store at City's request, any objects or material from the Project site that City will salvage or reuse at another location.

(4) If directed by Engineer, Contractor must promptly repair or replace any property damage, as specified by the Engineer. However, acting in its sole discretion, City may elect to have the property damage remedied otherwise, and may deduct the cost to repair or replace the damaged property from payment otherwise due to Contractor.

(5) Contractor will not permit any structure or infrastructure to be loaded in a manner that will damage or endanger the integrity of the structure or infrastructure.

(6) All valves, hydrants, and other appurtenances of the City's water system that are the property of City and removed by Contractor in the performance of the Work must be delivered to City's Municipal Services Center (55 Stony Point Road) as a condition precedent to Final Completion, unless Contractor has obtained specific written approval from the Water Department to dispose of the items.

(B) **Securing Project Site.** After completion of Work each day, Contractor must secure the Project site and, to the extent feasible, make the area reasonably accessible to the public unless City approves otherwise. All excess materials and equipment not protected by approved traffic control devices must be relocated to the staging area or demobilized. Trench spoils must be hauled off the Project site daily and open excavations must be protected with steel plates. Contractor and Subcontractor personnel may not

occupy or use the Project site for any purpose during non-Work hours, except as may be provided in the Contract Documents or pursuant to prior written authorization from City.

(C) **Unforeseen Conditions.** If Contractor encounters facilities, utilities, or other unknown conditions not shown on or reasonably inferable from the Plans or apparent from inspection of the Project site, Contractor must immediately notify the City and promptly submit a Request for Information to obtain further directions from the Engineer. Contractor must avoid taking any action which could cause damage to the facilities or utilities pending further direction from the Engineer. The Engineer's written response will be final and binding on Contractor. If the Engineer's subsequent direction to Contractor affects Contractor's cost or time to perform the Work, Contractor may submit a Change Order request as set forth in Article 6 above.

(D) **Support; Adjacent Properties.** Contractor must provide, install, and maintain all shoring, bracing, and underpinning necessary to provide support to City's property and adjacent properties and improvements thereon. Contractor must provide notifications to adjacent property owners as may be required by Laws. See also, Section 7.15, Trenching of Five Feet or More.

(E) **Notification of Property Damage.** Contractor must immediately notify the City of damage to any real or personal property resulting from Work on the Project, including damage to City's water system. Contractor must immediately provide a written report to City of any such property damage in excess of \$500 (based on estimated cost to repair or replace) within 24 hours of the occurrence. The written report must include: (1) the location and nature of the damage, and the owner of the property, if known; (2) the name and address of each employee of Contractor or any Subcontractor involved in the damage; (3) a detailed description of the incident, including precise location, time, and names and contact information for known witnesses; and (4) a police or first responder report, if applicable. If Contractor is required to file an accident report with another government agency, Contractor will provide a copy of the report to City.

(F) **Damage to City's Water System.** Contractor must promptly repair and remediate, at its sole expense, any damage caused by Contractor to the City's water system, in a manner satisfactory to the Water Department. This includes damage to property and facilities resulting from Contractor's failure to make a written request for a markout or starting Work without providing the Water Department a reasonable opportunity to mark facilities; Contractor's destruction of markouts; Contractor's failure to perform hand digging or probing for utilities near markouts; and Contractor's failure 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. All repairs must be witnessed, inspected, and approved by the Water Department prior to backfilling the excavation. If backfilling occurs prior to inspection and approval, City may require re-excavation by Contractor, at Contractor's sole expense. Acting in its sole discretion, City may elect to have the damage remedied otherwise, including by its own forces, and may deduct the cost thereof from payment otherwise due to Contractor. If City elects to remedy damage to the water system with its own forces, the cost thereof will be in accordance with the emergency repair rate schedule of the Water Department.

## 7.6 Materials and Equipment.

(A) **General.** Unless otherwise specified, all materials and equipment required for the Work must be new, free from defects, and of the best grade for the intended purpose, and furnished in sufficient quantities to ensure the proper and expeditious performance of the Work. All materials, equipment, and tools furnished or installed by Contractor must meet or exceed applicable Occupational Safety and Health Administration ("OSHA") standards. Contractor must employ measures to preserve the specified quality and

fitness of the materials and equipment. Unless otherwise specified, all materials and equipment required for the Work are deemed to include all components required for complete installation and intended operation and must be installed in accordance with the manufacturer's recommendations or instructions. Contractor is responsible for all shipping, handling, and storage costs associated with the materials and equipment required for the Work. Contractor is responsible for providing security and protecting the Work and all of the required materials, supplies, tools and equipment at Contractor's sole cost until City has formally accepted the Project as set forth in Section 11.1, Final Completion. Contractor will not assign, sell, mortgage, or hypothecate any materials or equipment for the Project, or remove any materials or equipment that have been installed or delivered.

(B) **City-Provided.** If the Work includes installation of materials or equipment to be provided by City, Contractor is solely responsible for the proper examination, handling, storage, and installation in accordance with the Contract Documents. Contractor must notify City of any defects discovered in City-provided materials or equipment, sufficiently in advance of scheduled use or installation to afford adequate time to procure replacement materials or equipment as needed. Contractor is solely responsible for any loss of or damage to such items which occurs while the items are in Contractor's custody and control, the cost of which may be offset from the Contract Price and deducted from any payment(s) due to Contractor.

(C) **Intellectual Property Rights.** Contractor must, at its sole expense, obtain any authorization or license required for use of patented or copyright-protected materials, equipment, devices, or processes that are incorporated into the Work. Upon request, Contractor must provide proof of any such authorization or license to City. Contractor's indemnity obligations in Article 4 apply to any claimed violation of intellectual property rights.

(D) **Equipment Labeling and Information.** Contractor must label each piece of equipment, except hand tools, with the following information, at a clearly visible location on each piece of equipment using a stencil or stamp: an identifying number; and for compacting equipment, its make, model number, and empty gross weight that is either the manufacturer's rated weight or the scale weight, or for meters and on the load-receiving element and indicators of each scale, the make, model, serial number, and manufacturer's rated capacity. Upon request, Contractor must submit the manufacturer's information that designates portable vehicle scale capacities.

(E) **Measuring Devices.** For proportioning materials, Contractor must use measuring devices, material plant controllers, and undersupports that comply with 4 CCR § 4000 et seq. and Business and Professions Code § 12001 et seq. Measuring devices must be tested and approved under California Test 109 in the Engineer's presence by any of the following: County Sealer of Weights and Measures; Scale Service Agency; or Official of the Division of Measurement Standards. The indicator over-travel must be at least one-third of the loading travel. The indicators must be enclosed against moisture and dust. Contractor must group the measuring system dials such that the smallest increment for each indicator can be read from the location at which proportioning is controlled.

## 7.7 Substitutions.

(A) **"Or Equal."** Any Specification designating a material, product, or thing (collectively, "item") or service by specific brand or trade name, followed by the words "or equal," is intended only to indicate the quality and type of item or service desired, and Contractor may request use of any equal item or service. Unless otherwise stated in the Specifications, any reference to a specific brand or trade name for an item or service that is used solely for the purpose of describing the type of item or service desired, will be

deemed to be followed by the words “or equal.” A substitution will only be approved if it is a true “equal” item or service in every aspect of design, function, and quality, as determined by City, including dimensions, weight, maintenance requirements, durability, fit with other elements, and schedule impacts.

(B) **Request for Substitution.** A post-award request for substitution of an item or service must be submitted in writing to the Engineer for approval at least four weeks in advance of Contractor’s proposed order date and sufficiently in advance of the time needed to avoid delay of the Work. A request for substitution must contain a description of any proposed changes to the Work required to accommodate the substitution and drawings and details showing all such changes.

(C) **Substantiation.** Any available data substantiating the proposed substitute as an equal item or service must be submitted with the written request for substitution. Contractor’s failure to timely provide all necessary substantiation, including any required test results as soon as they are available, is grounds for rejection of the proposed substitution, without further review.

(D) **Burden of Proving Equality.** Contractor has the burden of proving the equality of the proposed substitution at Contractor’s sole cost. City has sole discretion to determine whether a proposed substitution is equal, and City’s determination is final.

(E) **Approval or Rejection.** If the proposed substitution is approved, Contractor is solely responsible for any additional costs or time associated with the substituted item or service. If the proposed substitution is rejected, Contractor must, without delay, install the item or use the service as specified by City.

(F) **Contractor’s Obligations.** City’s approval of a proposed substitution will not relieve Contractor from any of its obligations under the Contract Documents. In the event Contractor makes an unauthorized substitution, Contractor will be solely responsible for all resulting cost impacts, including the cost of removal and replacement and the impact to other design elements.

## 7.8 Testing and Inspection.

(A) **General.** All materials, equipment, and workmanship used in the Work are subject to inspection and testing by City at all times and at all locations during construction and/or fabrication, including at any Worksite, shops, and yards. All manufacturers’ application or installation instructions must be provided to the Engineer at least ten days prior to the first such application or installation. Contractor must, at all times, make the Work available for testing or inspection. City may record, including by photograph or video, all materials, equipment, and workmanship used in the Work. Neither City’s inspection or testing of Work, nor its failure to do so, operate to waive or limit Contractor’s duty to complete the Work in accordance with the Contract Documents.

(B) **Scheduling and Notification.** Contractor must cooperate with City in coordinating the inspections and testing. Contractor must submit samples of materials, at Contractor’s expense, and schedule all tests required by the Contract Documents in time to avoid any delay to the progress of the Work. Contractor will coordinate directly with the Engineer when scheduling inspections or tests, unless otherwise specified in the Special Conditions or Specifications. Contractor must notify the Engineer no later than noon of the Working Day before any inspection or testing and must provide timely notice to the other necessary parties as specified in the Contract Documents. If Contractor schedules an inspection or test beyond regular Work hours, or on a Saturday, Sunday, or recognized City holiday, Contractor must notify the Engineer at least two Working Days in advance for approval. If approved, Contractor must reimburse City for the cost of the

overtime inspection or testing. Such costs, including the City's hourly costs for required personnel, may be deducted from payments otherwise due to Contractor. Contractor will not coordinate directly with, or provide direction to, the Materials Lab.

(C) **Responsibility for Costs.** City will bear the initial cost of inspection and testing to be performed by independent consultants retained by City, subject to the following exceptions:

(1) Contractor will be responsible for the costs of any subsequent inspections or tests which are required to substantiate compliance with the Contract Documents, and any associated remediation costs.

(2) Contractor will be responsible for inspection costs, at City's hourly rates, for inspection time lost because the Work is not ready, or Contractor fails to appear for a scheduled inspection.

(3) If any portion of the Work that is subject to inspection or testing is covered or concealed by Contractor prior to the inspection or testing, Contractor will bear the cost of making that portion of the Work available for the inspection or testing required by the Contract Documents, and any associated repair or remediation costs.

(4) Contractor is responsible for properly shoring all compaction test sites deeper than five feet below grade, as required under Section 7.15 below.

(5) Any Work or material that is defective or fails to comply with the requirements of the Contract Documents must be promptly repaired, removed, replaced, or corrected by Contractor, at Contractor's sole expense, even if that Work or material was previously inspected or included in a progress payment.

(D) **Contractor's Obligations.** Contractor is solely responsible for any delay occasioned by remediation of defective or noncompliant Work or material. Inspection or testing of the Work does not in any way relieve Contractor of its obligations to perform the Work as specified. Contractor has an independent duty to test and inspect its Work and perform quality control activities to ensure that the Work and the materials, products, and equipment incorporated into the Work comply with the Contract Documents. City is not responsible for any testing performed by Contractor or a third-party retained by Contractor. Contractor will submit its testing methodology to City for review and acceptance. Any Work done without the inspection(s) or testing required by the Contract Documents will be subject to rejection by City.

(E) **Distant Locations.** If required off-site testing or inspection must be conducted at a location more than 100 miles from the Project site, Contractor is solely responsible for the additional travel costs required for testing and/or inspection at such locations.

(F) **Final Inspection.** The provisions of this Section 7.8 also apply to final inspection under Article 11, Completion and Warranty Provisions.

**7.9 Project Site Conditions and Maintenance.** Contractor must at all times, on a 24-hour basis and at its sole cost, maintain the Project site and staging and storage areas in clean, neat, and sanitary condition and in compliance with all Laws pertaining to safety, air quality, and dust control. Adequate toilets must be provided, and properly maintained and serviced for all workers on the Project site, located in a suitably secluded area, subject to City's prior approval. Contractor must also, on a daily basis and at its sole cost, remove and properly dispose of the debris and waste materials from the Project site.

(A) **Air Emissions Control.** Contractor must not discharge smoke or other air contaminants into the atmosphere in violation of any Laws. Contractor must comply with all Laws, including the California Air Resources Board's In-Use Off-Road Diesel-Fueled Fleets Regulation (13 CCR § 2449 et seq.).

(B) **Dust and Debris.** Contractor must minimize and confine dust and debris resulting from the Work. Contractor must abate dust nuisance by cleaning, sweeping, and immediately sprinkling with water excavated areas of dirt or other materials prone to cause dust, and within one hour after the Engineer notifies Contractor that an airborne nuisance exists. The Engineer may direct that Contractor provide an approved water-spraying truck for this purpose. If water is used for dust control, Contractor will only use the minimum necessary. Contractor must take all necessary steps to keep waste water out of streets, gutters, or storm drains. See Section 7.19, Environmental Control. If City determines that the dust control is not adequate, City may have the work done by others and deduct the cost from the Contract Price. Contractor will immediately remove any excess excavated material from the Project site and any dirt deposited on public streets.

(C) **Clean up.** Before discontinuing Work in an area, Contractor must clean the area and remove all debris and waste along with the construction equipment, tools, machinery, and surplus materials.

(1) Except as otherwise specified, all excess Project materials, and the materials removed from existing improvements on the Project site with no salvage value or intended reuse by City, will be Contractor's property.

(2) Hauling trucks and other vehicles leaving the Project site must be cleaned of exterior mud or dirt before traveling on City streets. Materials and loose debris must be delivered and loaded to prevent dropping materials or debris. Contractor must immediately remove spillage from hauling on any publicly traveled way. Streets affected by Work on the Project must be kept clean by street sweeping.

(D) **Disposal.** Contractor must dispose of all Project debris and waste materials in a safe and legal manner. Contractor may not burn or bury waste materials on the Project site. Contractor will not allow any dirt, refuse, excavated material, surplus concrete or mortar, or any associated washings, to be disposed of onto streets, into manholes or into the storm drain system.

(E) **Completion.** At the completion of the Work, Contractor must remove from the Project site all of its equipment, tools, surplus materials, waste materials and debris, presenting a clean and neat appearance. Before demobilizing from the Project site, Contractor must ensure that all surfaces are cleaned, sealed, waxed, or finished as applicable, and that all marks, stains, paint splatters, and the like have been properly removed from the completed Work and the surrounding areas. Contractor must ensure that all parts of the construction are properly joined with the previously existing and adjacent improvements and conditions. Contractor must provide all cutting, fitting and patching needed to accomplish that requirement. Contractor must also repair or replace, in accordance with City Standards, all existing improvements that are damaged or removed during the Work, both on and off the Project site, including curbs, sidewalks, driveways, fences, gates, signs, landscaping, drainage ditches, irrigation systems, utilities, street surfaces and structures. Repairs and replacements must be at least equal to the previously existing improvements, and the condition, finish and dimensions must match the previously existing improvements. Concrete surface treatment and score marks must match adjacent existing concrete improvements. Contractor must restore to original condition all property or items that are not designated for alteration under the Contract Documents and leave each Worksite clean and ready for occupancy or use by City.

(F) **Non-Compliance.** If Contractor fails to comply with its maintenance and cleanup obligations or any City clean up order, City may, acting in its sole discretion, elect to suspend the Work until the condition(s) is corrected with no increase in the Contract Time or Contract Price, or undertake appropriate cleanup measures without further notice and deduct the cost from any amounts due or to become due to Contractor.

**7.10 Instructions and Manuals.** Contractor must provide to City three copies each of all instructions and manuals required by the Contract Documents, unless otherwise specified. These must be complete as to drawings, details, parts lists, performance data, and other information that may be required for City to easily maintain and service the materials and equipment installed for this Project.

(A) **Submittal Requirements.** The instructions and manuals, along with any required guarantees, must be delivered to City for review prior to requesting final inspection pursuant to Section 11.1(A), unless otherwise specified.

(B) **Training.** Contractor or its Subcontractors must train City's personnel in the operation and maintenance of any complex equipment or systems as a condition precedent to Final Completion, if required in the Contract Documents.

**7.11 As-built Drawings.** Contractor and its Subcontractors must prepare and maintain at the Project site a detailed, complete and accurate as-built set of the Plans which will be used solely for the purpose of recording changes made in any portion of the original Plans in order to create accurate record drawings at the end of the Project.

(A) **Duty to Update.** The as-built drawings must be updated as changes occur, on a daily basis if necessary. City may withhold the estimated cost for City to have the as-built drawings prepared from payments otherwise due to Contractor, until the as-built drawings are brought up to date to the satisfaction of City. Actual locations to scale must be identified on the as-built drawings for all runs of mechanical and electrical work, including all site utilities installed underground, in walls, floors, or otherwise concealed. Deviations from the original Plans must be shown in detail. The exact location of all main runs, whether piping, conduit, ductwork or drain lines, must be shown by dimension and elevation. The location of all buried pipelines, appurtenances, or other improvements must be represented by coordinates and by the horizontal distance from visible above-ground improvements.

(B) **Final Completion.** Contractor must verify that all changes in the Work are depicted in the as-built drawings and must deliver the complete set of as-built drawings to the Engineer for review and acceptance as a condition precedent to Final Completion and Final Payment.

**7.12 Existing Utilities.**

(A) **General.** The Work may be performed in developed, urban areas with existing utilities, both above and below ground, including utilities identified in the Contract Documents or in other informational documents or records. Contractor must take due care to locate identified or reasonably identifiable utilities before proceeding with trenching, excavation, or any other activity that could damage or disrupt existing utilities. This may include excavation with small equipment, potholing, or hand excavation, and, if practical, using white paint or other suitable markings to delineate the area to be excavated. Except as otherwise provided herein, Contractor will be responsible for costs resulting from damage to identified or reasonably identifiable utilities due to Contractor's negligence or failure to comply with the Contract Documents, including the requirements in this Article 7.

(B) **Unidentified Utilities.** Pursuant to Government Code § 4215, if, during the performance of the Work, Contractor discovers utility facilities not identified by City in the Contract Documents, Contractor must immediately provide written notice to City and the utility. City assumes responsibility for the timely removal, relocation, or protection of existing main or trunkline utility facilities located on the Project site if those utilities are not identified in the Contract Documents. Contractor will be compensated in accordance with the provisions of the Contract Documents for the costs of locating, repairing damage not due to Contractor's failure to exercise reasonable care, and removing or relocating utility facilities not indicated in the Plans or Specifications with reasonable accuracy, and for equipment on the Project necessarily idled during such work. Contractor will not be assessed liquidated damages for delay in completion of the Work, to the extent the delay was caused by City's failure to provide for removal or relocation of the utility facilities.

(C) **Alteration or Relocation of Utilities.** If Contractor wishes to alter or relocate utilities for Contractor's convenience, and not due to a conflict that requires alteration or relocation, Contractor will be solely responsible for the time and cost required for such alteration or relocation, which may not proceed except as specified by the prior written authorization of the utility owner. Any damage to utilities or improvements caused by Contractor must be repaired by Contractor at its sole expense and to the full satisfaction of the utility owner and Engineer. Contractor will not be entitled to an extension of the Contract Time in connection with any such Work.

**7.13 Notice of Excavation.** Contractor must comply with all applicable requirements in Government Code § 4216 et seq., which are incorporated by reference herein, including, but not limited to, the requirement to notify Underground Service Alert ("USA") of a proposed excavation and provide USA all relevant data relating to the excavation, at least two Working Days before starting any excavation Work.

**7.14 Trenching and Excavations of Four Feet or More.** As required by Public Contract Code § 7104, if the Work includes digging trenches or other excavations that extend deeper than four feet below the surface, the provisions in this Section apply to the Work and the Project.

(A) **Duty to Notify.** Contractor must promptly, and before the following conditions are disturbed, provide written notice to City if Contractor finds any of the following conditions:

(1) Material that Contractor believes may be a hazardous waste, as defined in § 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with the provisions of existing Laws;

(2) Subsurface or latent physical conditions at the Project site differing from those indicated by information about the Project site made available to bidders prior to the deadline for submitting bids; or

(3) Unknown physical conditions at the Project site of any unusual nature, materially different from those ordinarily encountered and generally recognized as inherent in work of the character required by the Contract Documents.

(B) **City Investigation.** City will promptly investigate the conditions and if City finds that the conditions materially differ from those indicated, apparent, or reasonably inferred from information about the Project site made available to bidders, or involve hazardous waste, and cause a decrease or increase in Contractor's cost of, or the time required for, performance of any part of the Work, City will issue a Change Order.

(C) **Disputes.** In the event that a dispute arises between City and Contractor regarding any of the conditions specified in subsection (B) above, or the terms of a Change Order issued by City, Contractor will not be excused from completing the Work within the Contract Time, but must proceed with all Work to be performed under the Contract. Contractor will retain any and all rights provided either by the Contract or by Laws which pertain to the resolution of disputes between Contractor and City.

**7.15 Trenching of Five Feet or More.** As required by Labor Code § 6705, if the Contract Price exceeds \$25,000 and the Work includes the excavation of any trench or trenches of five feet or more in depth, a detailed plan must be submitted to City for acceptance in advance of the excavation. The detailed plan must show the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation. If the plan varies from the shoring system standards or if the trench is expected to exceed 20 feet, the plan must be prepared by a California registered civil or structural engineer. Use of a shoring, sloping, or protective system less effective than that required by the Construction Safety Orders is prohibited.

**7.16 New Utility Connections.** Except as otherwise specified, City will pay connection charges and meter costs for new permanent utilities required by the Contract Documents, if any. Contractor must notify City sufficiently in advance of the time needed to request service from each utility provider so that connections and services are initiated in accordance with the Project schedule.

**7.17 Lines and Grades.** Contractor is required to use any benchmark provided by the Engineer. Unless otherwise specified in the Contract Documents, Contractor must provide all lines and grades required to execute the Work. Contractor must also provide, preserve, and replace if necessary, all construction stakes required for the Project unless otherwise specified in the Special Conditions. All stakes or marks must be set by a California licensed land surveyor or a California registered civil engineer. All survey monuments that may be disturbed or destroyed during performance of the Work must be tied-out by Contractor prior to the start of Work. Contractor must also file a Pre-Construction Corner Record, prepared by a California licensed land surveyor, with the County of Sonoma Surveyor's Office, prior to the start of Work. Contractor must notify the Engineer of any discrepancies found between Contractor's staking and grading and information provided by the Contract Documents. Contractor must replace any survey monuments that are disturbed, damaged, or destroyed during the Work and must file a Post-Construction Corner Record, prepared by a licensed land surveyor as required by law, with the County of Sonoma Surveyor's Office. Upon completion, all Work must conform to the lines, elevations, and grades shown in the Plans, including any changes directed by a Change Order.

**7.18 Historic or Archeological Items.**

(A) **Contractor's Obligations.** Contractor must ensure that all persons performing Work at the Project site are required to immediately notify the Project Manager, upon discovery of any potential historic or archeological items, including historic or prehistoric ruins, a burial ground, archaeological or vertebrate paleontological site, including fossilized footprints or other archeological, paleontological or historical feature on the Project site (collectively, "Historic or Archeological Items").

(B) **Discovery; Cessation of Work.** Upon discovery of any potential Historic or Archeological Items, Work must be stopped within an 85-foot radius of the find and may not resume until authorized in writing by City. If required by City, Contractor must assist in protecting or recovering the Historic or Archeological Items, with any such assistance to be compensated as Extra Work on a time and materials basis under Article 6, Contract Modification. At City's discretion, a suspension of Work required due to discovery of

Historic or Archeological Items may be treated as Excusable Delay pursuant to Article 5, or as a suspension for convenience under Article 13.

**7.19 Environmental Control.** Contractor must not pollute any drainage course or its tributary inlets with fuels, oils, bitumens, acids, insecticides, herbicides or other harmful materials. Contractor must prevent the release of any hazardous material or hazardous waste into the soil or groundwater, and prevent the unlawful discharge of pollutants into City's storm drain system and watercourses as required below. Contractor and its Subcontractors must at all times in the performance of the Work comply with all Laws concerning pollution of waterways.

(A) **Stormwater Permit.** Contractor must comply with all applicable conditions of the State Water Resources Control Board National Pollutant Discharge Elimination System General Permit for Waste Discharge Requirements for Discharges of Stormwater Runoff Associated with Construction Activity ("Stormwater Permit").

(B) **Contractor's Obligations.** If required for the Work, a copy of the Stormwater Permit is on file in City's principal administrative offices, and Contractor must comply with it without adjustment of the Contract Price or the Contract Time. Contractor must timely and completely submit required reports and monitoring information required by the conditions of the Stormwater Permit. Contractor also must comply with all other Laws governing discharge of stormwater, including applicable municipal stormwater management programs.

(C) **Pest Management.** Contractor must comply with the City-Wide Integrated Pest Management ("IPM") Policy, Policy Number 000-74, which is available at <https://www.srcity.org/DocumentCenter/View/41774/Integrated-Pest-Management-Policy-030524>. Contractor will not use pesticides or herbicides in the Work without City's prior written approval. Contractor may submit a written request for use of pesticides or herbicides to the Engineer. Contractor's written request must include the location proposed for use, the proposed date and time of application, product specifications, and all other information required by the IPM policy. City reserves the right, in its sole discretion, to approve or reject the use of pesticides or herbicides, for any reason.

**7.20 Noise Control.** Contractor must comply with all applicable noise control Laws. Noise control requirements apply to all equipment used for the Work or related to the Work, including trucks, transit mixers or transient equipment that may or may not be owned by Contractor.

**7.21 Mined Materials.** Pursuant to Public Contract Code § 20676, Contractor will not purchase any sand, gravel, or other minerals for the Work from an operation subject to the Surface Mining and Reclamation Act of 1975 (Public Resources Code § 2710 et seq.) unless Contractor certifies, under penalty of perjury, that the minerals are from a mining operation included on the AB 3098 List, which may be accessed online at: <https://www.conservation.ca.gov/smgf/Pages/AB-3098-List.aspx>.

**7.22 Water Department Notification.** If Contractor requires the services of the Water Department in connection with the Work, Contractor must request such services at least two Working Days in advance of the time the services are needed. If the requested services require Water Department forces for more than eight hours or an extensive number of City-provided parts, Contractor must request services at least seven calendar days in advance of the time the services are needed.

(A) **Service Shut Down.** Contractor must minimize disruption of utility service to the greatest extent practicable. Contractor must coordinate any shut down or disruption of utility service with the Engineer, Water Department, and affected utility customers. If it is necessary to shut down or disrupt utility service to any customer of the Water Department, Contractor must request the services of the Water Department an additional three Working Days in advance of the time such services are needed, for a total of five

Working Days advance notification for a standard service request, to allow affected customers a minimum of three days' advance notice. If Contractor fails to keep field appointments, Contractor will be billed for scheduled Water Department crew standby time and for costs incurred by the Water Department for re-notification of customers.

(B) **Water Department Scheduling.** 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 authorized in advance by the Engineer. Requests by Contractor for after-hours or weekend work are to be avoided when possible. Contractor will be responsible for any overtime costs incurred by City for such work and the cost thereof may be deducted from payment otherwise due Contractor.

**7.23 Public Safety and Traffic Control.** Contractor must undertake all required and appropriate measures to ensure public safety during construction of the Project, in accordance with Laws, including, but not limited to, the Americans with Disabilities Act of 1990 (42 U.S.C. § 12101 et seq.). Contractor will ensure the safe passage of pedestrians around the Project site at all times. If Work is within a City-owned right-of-way, Contractor will ensure the safe passage of public traffic through the Project site at all times, consistent with the requirements of City Code Chapter 13-04. Contractor is solely responsible for the costs of all public safety and traffic control measures.

(A) **Warning Devices.** Contractor must furnish, install, and maintain, at its sole expense, all fences, barricades, signs, lights, and other devices necessary to prevent accidents, injuries, death, and property damage. All such devices must conform to the requirements of the current edition of the California Manual on Uniform Traffic Control Devices ("CA MUTCD") and the directions of the Engineer. Contractor's warning and safety devices will not obscure the visibility of or conflict with existing signs and traffic control devices. Contractor may be required to cover certain signs which regulate or direct public traffic to roadways that are not open to traffic, as directed by the Engineer.

(B) **Flaggers.** Contractor must also furnish, at Contractor's sole expense, trained flaggers as necessary to provide adequate warning to the public of construction conditions that may impact pedestrian or vehicular traffic.

(C) **Project Signage.** Unless otherwise specified in the Special Conditions, Contractor must install and maintain Project identification signs at each boundary of the Project site or as directed by the Engineer. Contractor must install the signs two weeks prior to the start of Work at the Project site, using sign panels furnished by City. To mount sign panels, Contractor must furnish and install 4" X 4" posts or mount by other appropriate methods as approved by the Engineer. Upon completion of the Project, Contractor will remove Project identification signs, in a timely manner, and return the City-furnished sign panels to the City Corporation Yard at 55 Stony Point Road.

(D) **Road Closure Signage.** If the Work requires road closures, Contractor must furnish and install advance notice signs for road closures at each boundary of the Project site. Panel construction and lettering are subject to advance approval of the Engineer. Contractor must install the signs two weeks prior to the start of Work at the Project site. The signs must remain in place for the duration of the road closure and must be removed by Contractor when no longer necessary for the Work.

(E) **Emergency Response Agencies.** Contractor is responsible for notifying emergency response agencies operating in the jurisdiction of the Worksite(s) of obstructions to roads resulting from Contractor's Work.

(F) **Additional Devices.** City reserves the right to require additional warning or safety devices for the Project at the Contractor's sole expense, but no actions by City to

add to or improve signage or any other public safety requirements will waive or limit Contractor's duties under the Contract Documents.

(G) **Compliance.** If Contractor fails or refuses to comply with the requirements of this Section, the Engineer may take immediate action to protect the public, including, but not limited to, furnishing the required safety measures at Contractor's expense or suspending the Work, in addition to all other remedies available to City. Any such remedial costs incurred by City may be deducted from payment otherwise due to Contractor as specified in Section 8.3, Adjustment of Payment Application. If there are insufficient Contract funds remaining to cover the remedial costs, City is entitled to recover the balance from Contractor or its performance bond surety.

## Article 8 - Payment

**8.1 Schedule of Values.** Prior to submitting its first application for payment, Contractor must prepare and submit to the Project Manager a schedule of values apportioned to the various divisions and phases of the Work, including mobilization and demobilization. If a Bid Schedule was submitted with Contractor's bid, the amounts in the schedule of values must be consistent with the Bid Schedule. Each line item contained in the schedule of values must be assigned a value such that the total of all items equals the Contract Price. The items must be sufficiently detailed to enable accurate evaluation of the percentage of completion claimed in each application for payment, and the assigned value consistent with any itemized or unit pricing submitted with Contractor's bid.

(A) **Measurements for Unit Price Work.** Materials and items of Work to be paid for on the basis of unit pricing will be measured according to the methods specified in the Contract Documents.

(B) **Deleted or Reduced Work.** Contractor will not be compensated for Work that City has deleted or reduced in scope, except for any labor, material, or equipment costs for such Work that Contractor reasonably incurred before Contractor learned that the Work could be deleted or reduced. Contractor will only be compensated for those actual, direct and documented costs incurred, and will not be entitled to any mark up for overhead or lost profits.

**8.2 Progress Payments.** Following the last day of each month, or as otherwise required by the Special Conditions or Specifications, Contractor will submit to the Project Manager a monthly application for payment for Work performed during the preceding month based on the estimated value of the Work performed during that preceding month.

(A) **Application for Payment.** Each application for payment must be itemized to include labor, materials, and equipment incorporated into the Work, and materials and equipment delivered to the Project site, as well as authorized and approved Change Orders. Each payment application must be supported by the unit prices submitted with Contractor's Bid Schedule and/or schedule of values and any other substantiating data required by the Contract Documents.

(B) **Payment of Undisputed Amounts.** City will pay the undisputed amount due within 30 days after Contractor has submitted a complete and accurate payment application, subject to Public Contract Code § 20104.50. City will deduct a percentage from each progress payment as retention, as set forth in Section 8.5, below, and may deduct or withhold additional amounts as set forth in Section 8.3, below.

**8.3 Adjustment of Payment Application.** City may adjust or reject the amount requested in a payment application, including application for Final Payment, in whole or in part, if the

amount requested is disputed or unsubstantiated. Contractor will be notified in writing of the basis for the modification to the amount requested. City may also deduct or withhold from payment otherwise due based upon any of the circumstances and amounts listed below. Sums withheld from payment otherwise due will be released when the basis for that withholding has been remedied and no longer exists.

(A) For Contractor's unexcused failure to perform the Work as required by the Contract Documents, including correction or completion of punch list items, City may withhold or deduct an amount based on the City's estimated cost to correct or complete the Work.

(B) For loss or damage caused by Contractor or its Subcontractors arising out of or relating to performance of the Work or any failure to protect the Project site, City may deduct an amount based on the estimated cost to repair or replace.

(C) For Contractor's failure to pay its Subcontractors and suppliers when payment is due, City may withhold an amount equal to the total of past due payments and may opt to pay that amount separately via joint check pursuant to Section 8.6(B), Joint Checks.

(D) For Contractor's failure to timely correct rejected, nonconforming, or defective Work, City may withhold or deduct an amount based on the City's estimated cost to correct or complete the Work.

(E) For any unreleased stop notice, City may withhold 125% of the amount claimed.

(F) For Contractor's failure to submit any required schedule or schedule update in the manner specified or within the time specified in the Contract Documents, City may withhold an amount equal to five percent of the total amount requested until Contractor complies with its schedule submittal obligations.

(G) For Contractor's failure to maintain or submit as-built documents in the manner specified or within the time specified in the Contract Documents, City may withhold or deduct an amount based on the City's cost to prepare the as-builts.

(H) For Work performed without Shop Drawings that have been accepted by City, when accepted Shop Drawings are required before proceeding with the Work, City may deduct an amount based on the estimated cost to correct unsatisfactory Work or diminution in value.

(I) For fines, payments, or penalties assessed under the Labor Code, City may deduct from payments due to Contractor as required by Laws and as directed by the Division of Labor Standards Enforcement.

(J) For any other fines, payments, or penalties assessed against the City relating to Contractor's acts or omissions, including violations of Laws, City may withhold or deduct such amounts from payment otherwise due to Contractor.

(K) For any other costs or charges that may be withheld or deducted from payments to Contractor, as provided in the Contract Documents, including liquidated damages, City may withhold or deduct such amounts from payment otherwise due to Contractor.

**8.4 Early Occupancy.** Neither City's payment of progress payments nor its partial or full use or occupancy of the Project constitutes acceptance of any part of the Work.

**8.5 Retention.** City will retain five percent of the full amount due on each progress payment (i.e., the amount due before any withholding or deductions pursuant to Section 8.3, Adjustment of Payment Application), or the percentage stated in the Notice Inviting Bids,

whichever is greater, as retention to ensure full and satisfactory performance of the Work. Contractor is not entitled to any reduction in the rate of withholding at any time, nor to release of any retention before 35 days following City's recordation of the Notice of Completion, subject to the terms of Public Contract Code § 7107.

(A) **Substitution of Securities.** As provided by Public Contract Code § 22300, Contractor may request in writing that it be allowed, at its sole expense, to substitute securities for the retention withheld by City. Any escrow agreement entered into pursuant to this provision must fully comply with Public Contract Code § 22300 and will be subject to approval as to form by City's legal counsel. If City exercises its right to draw upon such securities in the event of default pursuant to section (7) of the statutory Escrow Agreement for Security Deposits in Lieu of Retention, pursuant to subdivision (g) of Public Contract Code § 22300 ("Escrow Agreement"), and if Contractor disputes that it is in default, its sole remedy is to comply with the dispute resolution procedures in Article 12 and the provisions therein. It is agreed that for purposes of this paragraph, an event of default includes City's rights pursuant to these Contract Documents to withhold or deduct sums from retention, including withholding or deduction for liquidated damages, incomplete or defective Work, stop payment notices, or backcharges. It is further agreed that if any individual authorized to give or receive written notice on behalf of a party pursuant to section (10) of the Escrow Agreement are unavailable to give or receive notice on behalf of that party due to separation from employment, retirement, death, or other circumstances, the successor or delegee of the named individual is deemed to be the individual authorized to give or receive notice pursuant to section (10) of the Escrow Agreement.

(B) **Release of Undisputed Retention.** All undisputed retention, less any amounts that may be assessed as liquidated damages, retained for stop notices, or otherwise withheld pursuant to Section 8.3, Adjustment of Payment Application, will be released as Final Payment to Contractor no sooner than 35 days following recordation of the notice of completion, and no later than 60 days following acceptance of the Project by City's governing body or authorized designee pursuant to Section 11.1(C), Acceptance, or, if the Project has not been accepted, no later than 60 days after the Project is otherwise considered complete pursuant to Public Contract Code § 7107(c).

**8.6 Payment to Subcontractors and Suppliers.** Each month, Contractor must promptly pay each Subcontractor and supplier the value of the portion of labor, materials, and equipment incorporated into the Work or delivered to the Project site by the Subcontractor or supplier during the preceding month. Such payments must be made in accordance with the requirements of Laws pertaining to such payments, and those of the Contract Documents and applicable subcontract or supplier contract.

(A) **Withholding for Stop Notice.** Pursuant to Civil Code § 9358, City will withhold 125% of the amount claimed by an unreleased stop notice, a portion of which may be retained by City for the costs incurred in handling the stop notice claim, including attorneys' fees and costs, as authorized by law.

(B) **Joint Checks.** City reserves the right, acting in its sole discretion, to issue joint checks made payable to Contractor and a Subcontractor or supplier, if City determines this is necessary to ensure fair and timely payment for a Subcontractor or supplier who has provided services or goods for the Project. As a condition to release of payment by a joint check, the joint check payees may be required to execute a joint check agreement in a form provided or approved by the City Attorney's Office. The joint check payees will be jointly and severally responsible for the allocation and disbursement of funds paid by joint check. Payment by joint check will not be construed to create a contractual relationship between City and a Subcontractor or supplier of any tier beyond the scope of the joint check agreement.

- 8.7 Final Payment.** Contractor's application for Final Payment must comply with the requirements for submitting an application for a progress payment as stated in Section 8.2, above. Corrections to previous progress payments, including adjustments to estimated quantities for unit priced items, may be included in the Final Payment. If Contractor fails to submit a timely application for Final Payment, City reserves the right to unilaterally process and issue Final Payment without an application from Contractor in order to close out the Project. For the purposes of determining the deadline for Claim submission pursuant to Article 12, the date of Final Payment is deemed to be the date that City acts to release undisputed retention as final payment to Contractor, or otherwise provides written notice to Contractor of Final Payment or that no undisputed funds remain available for Final Payment due to offsetting withholdings or deductions pursuant to Section 8.3, Adjustment of Payment Application. If the amount due from Contractor to City exceeds the amount of Final Payment, City retains the right to recover the balance from Contractor or its sureties.
- 8.8 Release of Claims.** City may, at any time, require that payment of the undisputed portion of any progress payment or Final Payment be contingent upon Contractor furnishing City with a written waiver and release of all claims against City arising from or related to the portion of Work covered by those undisputed amounts subject to the limitations of Public Contract Code § 7100. Any disputed amounts may be specifically excluded from the release.
- 8.9 Warranty of Title.** Contractor warrants that title to all work, materials, or equipment incorporated into the Work and included in a request for payment will pass over to City free of any claims, liens, or encumbrances upon payment to Contractor.

#### Article 9 - Labor Provisions

- 9.1 Discrimination Prohibited.** Discrimination against any prospective or present employee engaged in the Work on grounds of race, color, ancestry, national origin, ethnicity, religion, sex, sexual orientation, age, disability, or marital status is strictly prohibited. Contractor and its Subcontractors are required to comply with all applicable Laws prohibiting discrimination, including the California Fair Employment and Housing Act (Govt. Code § 12900 et seq.), Government Code § 11135, and Labor Code §§ 1735, 1777.5, 1777.6, and 3077.5.
- 9.2 Labor Code Requirements.**
- (A) **Eight Hour Day.** Pursuant to Labor Code § 1810, eight hours of labor constitute a legal day's work under this Contract.
- (B) **Penalty.** Pursuant to Labor Code § 1813, Contractor will forfeit to City as a penalty, the sum of \$25.00 for each day during which a worker employed by Contractor or any Subcontractor is required or permitted to work more than eight hours in any one calendar day or more than 40 hours per calendar week, except if such workers are paid overtime under Labor Code § 1815.
- (C) **Apprentices.** Contractor is responsible for compliance with the requirements governing employment and payment of apprentices, as set forth in Labor Code § 1777.5, which is fully incorporated by reference.
- (D) **Notices.** Pursuant to Labor Code § 1771.4, Contractor is required to post all job site notices prescribed by Laws.

**9.3 Prevailing Wages.** Each worker performing Work under this Contract that is covered under Labor Code §§ 1720, 1720.3, or 1720.9, including cleanup at the Project site, must be paid at a rate not less than the prevailing wage as defined in §§ 1771 and 1774 of the Labor Code. The prevailing wage rates are on file with the City and available online at <http://www.dir.ca.gov/dlsr>. Contractor must post a copy of the applicable prevailing rates at the Project site.

(A) **Penalties.** Pursuant to Labor Code § 1775, Contractor and any Subcontractor will forfeit to City as a penalty up to \$200.00 for each calendar day, or portion thereof, for each worker paid less than the applicable prevailing wage rate. Contractor must also pay each worker the difference between the applicable prevailing wage rate and the amount actually paid to that worker.

(B) **Federal Requirements.** If this Project is subject to federal prevailing wage requirements in addition to California prevailing wage requirements, Contractor and its Subcontractors are required to pay the higher of the currently applicable state or federal prevailing wage rates.

**9.4 Payroll Records.** Contractor must comply with the provisions of Labor Code §§ 1771.4, 1776, and 1812 and all implementing regulations, which are fully incorporated by this reference, including requirements for monthly electronic submission of payroll records to the DIR.

(A) **Contractor and Subcontractor Obligations.** Contractor and each Subcontractor must keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed in connection with the Work. Each payroll record must contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

(1) The information contained in the payroll record is true and correct; and

(2) Contractor or the Subcontractor has complied with the requirements of Labor Code §§ 1771, 1811, and 1815 for any Work performed by its employees on the Project.

(B) **Certified Record.** A certified copy of an employee's payroll record must be made available for inspection or furnished to the employee or his or her authorized representative on request, to City, to the Division of Labor Standards Enforcement, to the Division of Apprenticeship Standards of the DIR, and as further required by the Labor Code.

(C) **Enforcement.** Upon notice of noncompliance with Labor Code § 1776, Contractor or Subcontractor has ten days in which to comply with the requirements of this section. If Contractor or Subcontractor fails to do so within the ten-day period, Contractor or Subcontractor will forfeit a penalty of \$100.00 per day, or portion thereof, for each worker for whom compliance is required, until strict compliance is achieved. Upon request by the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement, these penalties will be withheld from payments then due to Contractor.

**9.5 Labor Compliance.** Pursuant to Labor Code § 1771.4, the Contract for this Project is subject to compliance monitoring and enforcement by the DIR.

## Article 10 - Safety Provisions

- 10.1 Safety Precautions and Programs.** Contractor and its Subcontractors are fully responsible for safety precautions and programs, and for the safety of persons and property in the performance of the Work. Contractor and its Subcontractors must at all times comply with all applicable health and safety Laws and seek to avoid injury, loss, or damage to persons or property by taking reasonable steps to protect its employees and other persons at any Worksite, materials and equipment stored on or off site, and property at or adjacent to any Worksite.
- (A) **Reporting Requirements.** Contractor must immediately notify the City of any death, serious injury or illness resulting from Work on the Project. Contractor must immediately provide a written report to City of each recordable accident or injury occurring at any Worksite within 24 hours of the occurrence. The written report must include: (1) the name and address of the injured or deceased person; (2) the name and address of each employee of Contractor or of any Subcontractor involved in the incident; (3) a detailed description of the incident, including precise location, time, and names and contact information for known witnesses; and (4) a police or first responder report, if applicable. If Contractor is required to file an accident report with a government agency, Contractor will provide a copy of the report to City.
- (B) **Legal Compliance.** Contractor's safety program must comply with the applicable legal and regulatory requirements. Contractor must provide City with copies of all notices required by Laws.
- (C) **Contractor's Obligations.** Any damage or loss caused by Contractor arising from the Work which is not insured under property insurance must be promptly remedied by Contractor.
- (D) **Remedies.** If City determines, in its sole discretion, that any part of the Work or Project site is unsafe, City may, without assuming responsibility for Contractor's safety program, require Contractor or its Subcontractor to cease performance of the Work or to take corrective measures to City's satisfaction. If Contractor fails to promptly take the required corrective measures, City may perform them and deduct the cost from the Contract Price. Contractor agrees it is not entitled to submit a Claim for damages, for an increase in Contract Price, or for a change in Contract Time based on Contractor's compliance with City's request for corrective measures pursuant to this provision.
- 10.2 Hazardous Materials.** Unless otherwise specified in the Contract Documents, this Contract does not include the removal, handling, or disturbance of any asbestos or other Hazardous Materials. If Contractor encounters materials on the Project site that Contractor reasonably believes to be asbestos or other Hazardous Materials, and the asbestos or other Hazardous Materials have not been rendered harmless, Contractor may continue Work in unaffected areas reasonably believed to be safe, but must immediately cease work on the area affected and report the condition to City. No asbestos, asbestos-containing products or other Hazardous Materials may be used in performance of the Work.
- 10.3 Material Safety.** Contractor is solely responsible for complying with § 5194 of Title 8 of the California Code of Regulations, including by providing information to Contractor's employees about any hazardous chemicals to which they may be exposed in the course of the Work. A hazard communication program and other forms of warning and training about such exposure must be used. Contractor must also maintain Safety Data Sheets ("SDS") at the Project site, as required by Laws, for materials or substances used or consumed in the performance of the Work. The SDS will be accessible and available to Contractor's employees, Subcontractors, and City.

(A) **Contractor Obligations.** Contractor is solely responsible for the proper delivery, handling, use, storage, removal, and disposal of all materials brought to the Project site and/or used in the performance of the Work. Contractor must notify the Engineer if a specified product or material cannot be used safely.

(B) **Labeling.** Contractor must ensure proper labeling on any material brought onto the Project site so that any persons working with or in the vicinity of the material may be informed as to the identity of the material, any potential hazards, and requirements for proper handling, protections, and disposal.

**10.4 Hazardous Condition.** Contractor is solely responsible for determining whether a hazardous condition exists or is created during the course of the Work, involving a risk of bodily harm to any person or risk of damage to any property. If a hazardous condition exists or is created, Contractor must take all precautions necessary to address the condition and ensure that the Work progresses safely under the circumstances. Hazardous conditions may result from, but are not limited to, use of specified materials or equipment, the Work location, the Project site condition, the method of construction, or the way any Work must be performed.

**10.5 Emergencies.** In an emergency affecting the safety or protection of persons, Work, or property at or adjacent to any Worksite, Contractor must take reasonable and prompt actions to prevent damage, injury, or loss, without prior authorization from the City if, under the circumstances, there is inadequate time to seek prior authorization from the City.

**10.6 Confined Space Operations.** If the Work requires a confined space entry, including, but not limited to, manhole or water storage tank entry, Contractor must obtain a confined space entry permit pursuant to Cal/OSHA regulations, as set forth in 8 CCR § 5156 et seq. For any confined space entry for construction operations regulated by 8 CCR § 1502, Contractor must comply with 8 CCR § 5158. For any other confined space operations, Contractor must comply with 8 CCR § 5157. With respect to entry to any City-maintained confined space, Contractor is responsible for obtaining any available information regarding hazards and operations for any City-maintained confined spaces, pursuant to 8 CCR § 5157. The City-maintained Confined Space Entry Manual is available for viewing at the Water Department or Transportation and Public Works Department office. Contractor must immediately notify the Engineer of any previously unidentified hazards confronted or created during confined space entry.

## Article 11 - Completion and Warranty Provisions

### 11.1 Final Completion.

(A) **Final Inspection and Punch List.** When the Work required by this Contract is fully performed, Contractor must provide written notification to City requesting final inspection. The Engineer will schedule the date and time for final inspection, which must include Contractor's primary representative for this Project and its superintendent. Based on that inspection, City will prepare a punch list of any items that are incomplete, missing, defective, incorrectly installed, or otherwise not compliant with the Contract Documents. The punch list to Contractor will specify the time by which all of the punch list items must be completed or corrected. The punch list may include City's estimated cost to complete each punch list item if Contractor fails to do so within the specified time. The omission of any non-compliant item from a punch list will not relieve Contractor from fulfilling all requirements of the Contract Documents. Contractor's failure to complete any punch list item within the time specified in the punch list will not waive or abridge its warranty

obligations for any such items that must be completed by the City or by a third party retained by the City due to Contractor's failure to timely complete any such outstanding item.

(B) **Requirements for Final Completion.** Final Completion will be achieved upon completion or correction of all punch list items, as verified by City's further inspection, and upon satisfaction of all other Contract requirements, including any commissioning required under the Contract Documents and submission of all final submittals, including instructions and manuals as required under Section 7.10, and complete, final as-built drawings as required under Section 7.11, all to City's satisfaction.

(C) **Acceptance.** The Project will be considered accepted upon the date of the Engineer's issuance of a written notice of acceptance. In order to avoid delay of Project close out, the City may elect, acting in its sole discretion, to accept the Project as complete subject to exceptions for punch list items that are not completed within the time specified in the punch list.

(D) **Final Payment and Release of Retention.** Final Payment and release of retention, less any sums withheld pursuant to the provisions of the Contract Documents, will not be made sooner than 35 days after recordation of the notice of completion. If Contractor fails to complete all of the punch list items within the specified time, City may withhold up to 150% of City's estimated cost to complete each of the remaining items from Final Payment and may use the withheld retention to pay for the costs to self-perform the outstanding items or to retain a third party to complete any such outstanding punch list item.

## 11.2 Warranty.

(A) **General.** Contractor warrants that all materials and equipment will be new unless otherwise specified, of good quality, in conformance with the Contract Documents, and free from defective workmanship and materials. Contractor further warrants that the Work will be free from material defects not intrinsic in the design or materials required in the Contract Documents. Contractor warrants that materials or items incorporated into the Work comply with the requirements and standards in the Contract Documents, including compliance with Laws, and that any Hazardous Materials encountered or used were handled as required by Laws. At City's request, Contractor must furnish satisfactory evidence of the quality and type of materials and equipment furnished. Contractor's warranty does not extend to damage caused by normal wear and tear, or improper use or maintenance.

(B) **Warranty Period.** Contractor's warranty must guarantee its Work for a period of one year from the date of Project acceptance pursuant to Section 11.1(C) (the "Warranty Period"), except when a longer guarantee is provided by a supplier or manufacturer or is required by the Specifications or Special Conditions. If the City accepts the Project as complete subject to exceptions for incomplete punch list item(s) and the Contractor thereafter completes the punch list item(s), the completed punch list item(s) will be subject to the warranty provisions in this Section 11.2 for a one-year period that begins upon City's acceptance of the completed punch list item(s). Contractor must obtain from its Subcontractors, suppliers and manufacturers any special or extended warranties required by the Contract Documents.

(C) **Warranty Documents.** As a condition precedent to Final Completion, Contractor must supply City with all warranty and guarantee documents relevant to equipment and materials incorporated into the Work and guaranteed by their suppliers or manufacturers.

(D) **Subcontractors.** The warranty obligations in the Contract Documents apply to Work performed by Contractor and its Subcontractors, and Contractor agrees to be co-guarantor of such Work.

(E) **Contractor's Obligations.** Upon written notice from City to Contractor of any defect in the Work discovered during the Warranty Period, Contractor or its responsible Subcontractor must promptly correct the defective Work at its own cost. Contractor's obligation to correct defects discovered during the Warranty Period will continue past the expiration of the Warranty Period as to any defects in Work for which Contractor was notified prior to expiration of the Warranty Period. Work performed during the Warranty Period ("Warranty Work") will be subject to the warranty provisions in this Section 11.2 for a one-year period that begins upon completion of such Warranty Work to City's satisfaction.

(F) **City's Remedies.** If Contractor or its responsible Subcontractor fails to correct defective Work within ten days following notice by City, or sooner if required by the circumstances, City may correct the defects to conform with the Contract Documents at Contractor's sole expense. Contractor must reimburse City for its costs in accordance with subsection (H), below.

(G) **Emergency Repairs.** In cases of emergency where any delay in correcting defective Work could cause harm, loss or damage, City may immediately correct the defects to conform with the Contract Documents at Contractor's sole expense. Contractor or its surety must reimburse City for its costs in accordance with subsection (H), below.

(H) **Reimbursement.** Contractor must reimburse City for its costs to repair under subsections (F) or (G), above, within 30 days following City's submission of a demand for payment pursuant to this provision. If City is required to initiate legal action to compel Contractor's compliance with this provision, and City is the prevailing party in such action, Contractor and its surety are solely responsible for all of City's attorney's fees and legal costs expended to enforce Contractor's warranty obligations herein, in addition to any and all costs City incurs to correct the defective Work.

**11.3 Use Prior to Final Completion.** City reserves the right to occupy or make use of the Project, or any portions of the Project, prior to Final Completion if City has determined that the Project or portion of it is in a condition suitable for the proposed occupation or use, and that it is in its best interest to occupy or make use of the Project, or any portions of it, prior to Final Completion.

(A) **Non-Waiver.** Occupation or use of the Project, in whole or in part, prior to Final Completion will not operate as acceptance of the Work or any portion of it, nor will it operate as a waiver of any of City's rights or Contractor's duties pursuant to these Contract Documents, and will not affect nor bear on the determination of the time of substantial completion with respect to any statute of repose pertaining to the time for filing an action for construction defect.

(B) **City's Responsibility.** City will be responsible for the cost of maintenance and repairs due to normal wear and tear with respect to those portions of the Project that are being occupied or used before Final Completion. The Contract Price or the Contract Time may be adjusted pursuant to the applicable provisions of these Contract Documents if, and only to the extent that, any occupation or use under this Section actually adds to Contractor's cost or time to complete the Work within the Contract Time.

**11.4 Substantial Completion.** For purposes of determining "substantial completion" with respect to any statute of repose pertaining to the time for filing an action for construction defect, "substantial completion" is deemed to mean the last date that Contractor or any Subcontractor performs Work on the Project prior to City acceptance of the Project, except for warranty work performed under this Article.

## Article 12 - Dispute Resolution

**12.1 Claims.** This Article applies to and provides the exclusive procedures for any Claim arising from or related to the Contract or performance of the Work.

(A) **Limitations.** A Claim may only include the portion of a previously rejected demand that remains in dispute between Contractor and City. With the exception of any dispute regarding the amount of money actually paid to Contractor as Final Payment, Contractor is not entitled to submit a Claim demanding a change in the Contract Time or the Contract Price, which has not previously been submitted to City in full compliance with Article 5 and Article 6, and subsequently rejected in whole or in part by City.

(B) **Scope of Article.** This Article is intended to provide the exclusive procedures for submission and resolution of Claims of any amount and applies in addition to the provisions of Public Contract Code § 9204 and § 20104 et seq., which are incorporated by reference herein.

(C) **No Work Delay.** Notwithstanding the submission of a Claim or any other dispute between the parties related to the Project or the Contract Documents, Contractor must perform the Work and may not delay or cease Work pending resolution of a Claim or other dispute, but must continue to diligently prosecute the performance and timely completion of the Work, including the Work pertaining to the Claim or other dispute.

(D) **Informal Resolution.** Contractor will make a good faith effort to informally resolve a dispute before initiating a Claim, preferably by face-to-face meeting between authorized representatives of Contractor and City.

**12.2 Claims Submission.** The following requirements apply to any Claim subject to this Article:

(A) **Substantiation.** The Claim must be submitted to City in writing by registered or certified mail with return receipt requested and clearly identified as a "Claim" submitted pursuant to this Article 12. The Claim must include all of the documents necessary to substantiate the Claim including the Change Order request that was rejected in whole or in part, and a copy of City's written rejection that is in dispute. The Claim must clearly identify and describe the dispute, including relevant references to applicable portions of the Contract Documents, and a chronology of relevant events. Any Claim for additional payment must include a complete, itemized breakdown of all known or estimated labor, materials, taxes, insurance, and subcontract, or other costs. Substantiating documentation such as payroll records, receipts, invoices, or the like, must be submitted in support of each component of claimed cost. Any Claim for an extension of time or delay costs must be substantiated with a schedule analysis and narrative depicting and explaining claimed time impacts.

(B) **Claim Format and Content.** A Claim must be submitted in the following format:

(1) Provide a cover letter, specifically identifying the submission as a "Claim" submitted under this Article 12 and specifying the requested remedy (e.g., amount of proposed change to Contract Price and/or change to Contract Time).

(2) Provide a summary of each Claim, including underlying facts and the basis for entitlement, and identify each specific demand at issue, including the specific Change Order request (by number and submittal date), and the date of City's rejection of that demand, in whole or in part.

(3) Provide a detailed explanation of each issue in dispute. For multiple issues included within a single Claim or for multiple Claims submitted concurrently,

separately number and identify each individual issue or Claim, and include the following for each separate issue or Claim:

- a. A succinct statement of the matter in dispute, including Contractor's position and the basis for that position;
- b. Identify and attach all documents that substantiate the Claim, including relevant provisions of the Contract Documents, RFIs, calculations, and schedule analysis (see subsection (A), Substantiation, above);
- c. A chronology of relevant events; and
- d. Analysis and basis for claimed changes to Contract Price, Contract Time, or any other remedy requested.

(4) Provide a summary of issues and corresponding claimed damages. If, by the time of the Claim submission deadline (below), the precise amount of the requested change in the Contract Price or Contract Time is not yet known, Contractor must provide a good faith estimate, including the basis for that estimate, and must identify the date by which it is anticipated that the Claim will be updated to provide final amounts.

(5) Include the following certification, executed by Contractor's authorized representative:

"The undersigned Contractor certifies under penalty of perjury that its statements and representations in this Claim submittal are true and correct. Contractor warrants that this Claim submittal is comprehensive and complete as to the matters in dispute, and agrees that any costs, expenses, or delay not included herein are deemed waived."

(C) ***Submission Deadlines.***

(1) A Claim disputing rejection of a request for a change in the Contract Time or Contract Price must be submitted within 21 days following the date that City notified Contractor in writing that a request for a change in the Contract Time or Contract Price, duly submitted in compliance with Article 5 and Article 6, has been rejected in whole or in part. A Claim disputing the terms of a unilateral Change Order must be submitted within 21 days following the date of issuance of the unilateral Change Order. These Claim deadlines apply even if Contractor cannot yet quantify the total amount of any requested change in the Contract Time or Contract Price. If the Contractor cannot quantify those amounts, it must submit an estimate of the amounts claimed pending final determination of the requested remedy by Contractor.

(2) With the exception of any dispute regarding the amount of Final Payment, any Claim must be filed on or before the date of Final Payment or will be deemed waived.

(3) A Claim disputing the amount of Final Payment must be submitted within 21 days of the effective date of Final Payment, under Section 8.7, Final Payment.

(4) Strict compliance with these Claim submission deadlines is necessary to ensure that any dispute may be mitigated as soon as possible, and to facilitate cost-efficient administration of the Project. ***Any Claim that is not submitted within the specified deadlines will be deemed waived by Contractor.***

**12.3 City's Response.** City will respond within 45 days of receipt of the Claim with a written statement identifying which portion(s) of the Claim are disputed, unless the 45-day period is extended by mutual agreement of City and Contractor or as otherwise allowed under Public Contract Code § 9204. However, if City determines that the Claim is not adequately substantiated pursuant to Section 12.2(A), Substantiation, City may first request in writing, within 30 days of receipt of the Claim, any additional documentation supporting the Claim or relating to defenses to the Claim that City may have against the Claim.

(A) **Additional Information.** If additional information is thereafter required, it may be requested and provided upon mutual agreement of City and Contractor. If Contractor's Claim is based on estimated amounts, Contractor has a continuing duty to update its Claim as soon as possible with information on actual amounts in order to facilitate prompt and fair resolution of the Claim.

(B) **Non-Waiver.** Any failure by City to respond within the times specified above will not be construed as acceptance of the Claim, in whole or in part, or as a waiver of any provision of these Contract Documents.

**12.4 Meet and Confer.** If Contractor disputes City's written response, or City fails to respond within the specified time, within 15 days of receipt of City's response or within 15 days of City's failure to respond within the applicable 45-day time period under Section 12.3, respectively, Contractor may notify City of the dispute in writing sent by registered or certified mail, return receipt requested, and demand an informal conference to meet and confer for settlement of the issues in dispute. If Contractor fails to notify City of the dispute and demand for an informal conference to meet and confer in writing within the specified time, Contractor's Claim will be deemed waived.

(A) **Schedule Meet and Confer.** Upon receipt of the demand to meet and confer, City will schedule the meet and confer conference to be held within 30 days, or later if needed to ensure the mutual availability of each of the individuals that each party requires to represent its interests at the meet and confer conference.

(B) **Location for Meet and Confer.** The meet and confer conference will be scheduled at a location at or near City's principal office.

(C) **Written Statement After Meet and Confer.** Within ten working days after the meet and confer has concluded, City will issue a written statement identifying which portion(s) of the Claim remain in dispute, if any.

(D) **Submission to Mediation.** If the Claim or any portion remains in dispute following the meet and confer conference, within ten working days after the City issues the written statement identifying any portion(s) of the Claim remaining in dispute, the Contractor may identify in writing disputed portion(s) of the Claim, which will be submitted for mediation, as set forth below.

**12.5 Mediation and Government Code Claims.**

(A) **Mediation.** Within ten working days after the City issues the written statement identifying any portion(s) of the Claim remaining in dispute following the meet and confer, City and Contractor will mutually agree to a mediator, as provided under Public Contract Code § 9204. Mediation will be scheduled to ensure the mutual availability of the selected mediator and all of the individuals that each party requires to represent its interests. If there are multiple Claims in dispute, the parties may agree to schedule the mediation to address all outstanding Claims at the same time. The parties will share the costs of the mediator and mediation fees equally, but each party is otherwise solely and separately

responsible for its own costs to prepare for and participate in the mediation, including costs for its legal counsel or any other consultants.

(B) **Government Code Claims.**

(1) Timely presentation of a Government Code Claim is a condition precedent to filing any legal action based on or arising from the Contract. Compliance with the Claim submission requirements in this Article 12 is a condition precedent to filing a Government Code Claim.

(2) The time for filing a Government Code Claim will be tolled from the time Contractor submits its written Claim pursuant to Section 12.2, above, until the time that Claim is denied in whole or in part at the conclusion of the meet and confer process, including any period of time used by the meet and confer process. However, if the Claim is submitted to mediation, the time for filing a Government Code Claim will be tolled until conclusion of the mediation, including any continuations, if the Claim is not fully resolved by mutual agreement of the parties during the mediation or any continuation of the mediation.

**12.6 Tort Claims.** This Article does not apply to tort claims and nothing in this Article is intended nor will be construed to change the time periods for filing tort-based Government Code Claims.

**12.7 Arbitration.** City does not consent to arbitration unless required by Laws. It is expressly agreed, under Code of Civil Procedure § 1296, that in any arbitration to resolve a dispute relating to this Contract, the arbitrator's award must be supported by law and substantial evidence.

**12.8 Burden of Proof and Limitations.** Contractor bears the burden of proving entitlement to and the amount of any claimed damages. Contractor is not entitled to damages calculated on a total cost basis, but must prove actual damages. Contractor is not entitled to speculative, special, or consequential damages, including home office overhead or any form of overhead not directly incurred at the Project site or any other Worksite; lost profits; loss of productivity; lost opportunity to work on other projects; diminished bonding capacity; increased cost of financing for the Project; extended capital costs; non-availability of labor, material or equipment due to delays; or any other indirect loss arising from the Contract. The Eichleay Formula or similar formula will not be used for any recovery under the Contract. The City will not be directly liable to any Subcontractor or supplier.

**12.9 Legal Proceedings.** In any legal proceeding that involves enforcement of any requirements of the Contract Documents, the finder of fact will receive detailed instructions on the meaning and operation of the Contract Documents, including conditions, limitations of liability, remedies, claim procedures, and other provisions bearing on the defenses and theories of liability. Detailed findings of fact will be requested to verify enforcement of the Contract Documents. All of the City's remedies under the Contract Documents will be construed as cumulative, and not exclusive, and the City reserves all rights to all remedies available under law or equity as to any dispute arising from or relating to the Contract Documents or performance of the Work.

**12.10 Other Disputes.** The procedures in this Article 12 will apply to any and all disputes or legal actions, in addition to Claims, arising from or related to this Contract, including disputes regarding suspension or early termination of the Contract, unless and only to the extent that compliance with a procedural requirement is expressly and specifically waived by City. Nothing in this Article is intended to delay suspension or termination under Article 13.

## Article 13 - Suspension and Termination

**13.1 Suspension for Cause.** In addition to all other remedies available to City, if Contractor fails to perform or correct Work in accordance with the Contract Documents, including non-compliance with applicable environmental or health and safety Laws, City may immediately order the Work, or any portion of it, suspended until the circumstances giving rise to the suspension have been eliminated to City's satisfaction.

(A) **Notice of Suspension.** Upon receipt of City's written notice to suspend the Work, in whole or in part, except as otherwise specified in the notice of suspension, Contractor and its Subcontractors must promptly stop Work as specified in the notice of suspension; comply with directions for cleaning and securing the Worksite; and protect the completed and in-progress Work and materials. Contractor is solely responsible for any damages or loss resulting from its failure to adequately secure and protect the Project.

(B) **Resumption of Work.** Upon receipt of the City's written notice to resume the suspended Work, in whole or in part, except as otherwise specified in the notice to resume, Contractor and its Subcontractors must promptly re-mobilize and resume the Work as specified; and within ten days from the date of the notice to resume, Contractor must submit a recovery schedule, prepared in accordance with the Contract Documents, showing how Contractor will complete the Work within the Contract Time.

(C) **Failure to Comply.** Contractor will not be entitled to an increase in the Contract Time or Contract Price for a suspension occasioned by Contractor's failure to comply with the Contract Documents.

(D) **No Duty to Suspend.** City's right to suspend the Work will not give rise to a duty to suspend the Work, and City's failure to suspend the Work will not constitute a defense to Contractor's failure to comply with the requirements of the Contract Documents.

**13.2 Suspension for Convenience.** City reserves the right to suspend, delay, or interrupt the performance of the Work in whole or in part, for a period of time determined to be appropriate for City's convenience. Upon notice by City pursuant to this provision, Contractor must immediately suspend, delay, or interrupt the Work and secure the Project site as directed by City except for taking measures to protect completed or in-progress Work as directed in the suspension notice, and subject to the provisions of Section 13.1(A) and (B), above. If Contractor submits a timely request for a Change Order in compliance with Articles 5 and 6, the Contract Price and the Contract Time will be equitably adjusted by Change Order pursuant to the terms of Articles 5 and 6 to reflect the cost and delay impact occasioned by such suspension for convenience, except to the extent that any such impacts were caused by Contractor's failure to comply with the Contract Documents or the terms of the suspension notice or notice to resume. However, the Contract Time will only be extended if the suspension causes or will cause unavoidable delay in Final Completion. If Contractor disputes the terms of a Change Order issued for such equitable adjustment due to suspension for convenience, its sole recourse is to comply with the Claim procedures in Article 12.

**13.3 Termination for Default.** City may declare that Contractor is in default of the Contract for a material breach of or inability to fully, promptly, or satisfactorily perform its obligations under the Contract.

(A) **Default.** Events giving rise to a declaration of default include Contractor's refusal or failure to supply sufficient skilled workers, proper materials, or equipment to perform the Work within the Contract Time; Contractor's refusal or failure to make prompt payment to its employees, Subcontractors, or suppliers or to correct defective Work or

damage; Contractor's failure to comply with Laws, or orders of any public agency with jurisdiction over the Project; evidence of Contractor's bankruptcy, insolvency, or lack of financial capacity to complete the Work as required within the Contract Time; suspension, revocation, or expiration and nonrenewal of Contractor's license or DIR registration; Contractor's failure to procure, maintain, or renew insurance coverage or provide notice of any modifications or reductions in insurance coverage; dissolution, liquidation, reorganization, or other major change in Contractor's organization, ownership, structure, or existence as a business entity; unauthorized assignment of Contractor's rights or duties under the Contract; or any material breach of the Contract requirements.

(B) **Notice of Default and Opportunity to Cure.** Upon City's declaration that Contractor is in default due to a material breach of the Contract Documents, if City determines that the default is curable, City will afford Contractor the opportunity to cure the default within ten days of City's notice of default, or within a period of time reasonably necessary for such cure, including a shorter period of time if applicable.

(C) **Termination.** If Contractor fails to cure the default or fails to expediently take steps reasonably calculated to cure the default within the time period specified in the notice of default, City may issue written notice to Contractor and its performance bond surety of City's termination of the Contract for default.

(D) **Waiver.** Time being of the essence in the performance of the Work, if Contractor's surety fails to arrange for completion of the Work in accordance with the Performance Bond within seven calendar days from the date of the notice of termination pursuant to paragraph (C), City may immediately make arrangements for the completion of the Work through use of its own forces, by hiring a replacement contractor, or by any other means that City determines advisable under the circumstances. Contractor and its surety will be jointly and severally liable for any additional cost incurred by City to complete the Work following termination, where "additional cost" means all cost in excess of the cost City would have incurred if Contractor had timely completed Work without the default and termination. In addition, City will have the right to immediate possession and use of any materials, supplies, and equipment procured for the Project and located at the Project site or any Worksite on City property for the purposes of completing the remaining Work.

(E) **Compensation.** Within 30 days of receipt of updated as-builts, all warranties, manuals, instructions, or other required documents for Work installed to date, and delivery to City of all equipment and materials for the Project for which Contractor has already been compensated, Contractor will be compensated for the Work satisfactorily performed in compliance with the Contract Documents up to the effective date of the termination pursuant to the terms of Article 8, Payment, subject to City's rights to withhold or deduct sums from payment otherwise due pursuant to Section 8.3, and excluding any costs Contractor incurs as a result of the termination, including any cancellation or restocking charges or fees due to third parties. If Contractor disputes the amount of compensation determined by City, its sole recourse is to comply with the Claim Procedures in Article 12, by submitting a Claim no later than 30 days following notice from City of the total compensation to be paid by City.

(F) **Wrongful Termination.** If Contractor disputes the termination, its sole recourse is to comply with the Claim procedures in Article 12. If a court of competent jurisdiction or an arbitrator later determines that the termination for default was wrongful, the termination will be deemed to be a termination for convenience, and Contractor's damages will be strictly limited to the compensation provided for termination for convenience under Section 13.4, below. Contractor waives any claim for any other damages for wrongful termination including special or consequential damages, lost

opportunity costs, or lost profits, and any award of damages is subject to Section 12.8, Burden of Proof and Limitations.

**13.4 Termination for Convenience.** City reserves the right, acting in its sole discretion, to terminate all or part of the Contract for convenience upon written notice to Contractor.

(A) **Compensation to Contractor.** In the event of City's termination for convenience, Contractor waives any claim for damages, including for loss of anticipated profits from the Project. The following will constitute full and fair compensation to Contractor, and Contractor will not be entitled to any additional claim or compensation:

(1) **Completed Work.** The value of its Work satisfactorily performed as of the date notice of termination is received, based on Contractor's schedule of values and unpaid costs for items delivered to the Project site that were fabricated for incorporation in the Work;

(2) **Demobilization.** Demobilization costs specified in the schedule of values, or if demobilization costs were not provided in a schedule of values pursuant to Section 8.1, then based on actual, reasonable, and fully documented demobilization costs; and

(3) **Termination Markup.** Five percent of the total value of the Work performed as of the date of notice of termination, including reasonable, actual, and documented costs to comply with the direction in the notice of termination for convenience, and demobilization costs, which is deemed to cover all overhead and profit to date.

(B) **Disputes.** If Contractor disputes the amount of compensation determined by City pursuant to paragraph (A), above, its sole recourse is to comply with the Claim procedures in Article 12, by submitting a Claim no later than 30 days following notice from City of total compensation to be paid by City.

**13.5 Actions Upon Termination for Default or Convenience.** The following provisions apply to any termination under this Article, whether for default or convenience, and whether in whole or in part.

(A) **General.** Upon termination, City may immediately enter upon and take possession of the Project and the Work and all tools, equipment, appliances, materials, and supplies procured or fabricated for the Project. Contractor will transfer title to and deliver all completed Work and all Work in progress to City.

(B) **Submittals.** Unless otherwise specified in the notice of termination, Contractor must immediately submit to City all designs, drawings, as-built drawings, Project records, contracts with vendors and Subcontractors, manufacturer warranties, manuals, and other such submittals or Work-related documents required under the terms of the Contract Documents, including incomplete documents or drafts.

(C) **Close Out Requirements.** Except as otherwise specified in the notice of termination, Contractor must comply with all of the following:

(1) Immediately stop the Work, except for any Work that must be completed pursuant to the notice of termination and comply with City's instructions for cessation of labor and securing the Project and any other Worksite(s).

(2) Comply with City's instructions to protect the completed Work and materials, using best efforts to minimize further costs.

(3) Contractor must not place further orders or enter into new subcontracts for materials, equipment, services or facilities, except as may be necessary to complete any portion of the Work that is not terminated.

(4) As directed in the notice, Contractor must assign to City or cancel existing subcontracts that relate to performance of the terminated Work, subject to any prior rights, if any, of the surety for Contractor's performance bond, and settle all outstanding liabilities and claims, subject to City's approval.

(5) As directed in the notice, Contractor must use its best efforts to sell any materials, supplies, or equipment intended solely for the terminated Work in a manner and at market rate prices acceptable to City.

(D) **Payment Upon Termination.** Upon completion of all termination obligations, as specified herein and in the notice of termination, Contractor will submit its request for Final Payment, including any amounts due following termination pursuant to this Article 13. Payment will be made in accordance with the provisions of Article 8, based on the portion of the Work satisfactorily completed, including the close out requirements, and consistent with the previously submitted schedule of values and unit pricing, including demobilization costs. Adjustments to Final Payment may include deductions for the cost of materials, supplies, or equipment retained by Contractor; payments received for sale of any such materials, supplies, or equipment, less re-stocking fees charged; and as otherwise specified in Section 8.3, Adjustment of Payment Application.

(E) **Continuing Obligations.** Regardless of any Contract termination, Contractor's obligations for portions of the Work already performed will continue and the provisions of the Contract Documents will remain in effect as to any claim, indemnity obligation, warranties, guarantees, submittals of as-built drawings, instructions, or manuals, record maintenance, or other such rights and obligations arising prior to the termination date.

#### Article 14 - Miscellaneous Provisions

- 14.1 Assignment of Unfair Business Practice Claims.** Under Public Contract Code § 7103.5, Contractor and its Subcontractors agree to assign to City all rights, title, and interest in and to all causes of action it may have under section 4 of the Clayton Act (15 U.S.C. § 15) or under the Cartwright Act (Chapter 2 (commencing with § 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the Contract or any subcontract. This assignment will be effective at the time City tenders Final Payment to Contractor, without further acknowledgement by the parties.
- 14.2 Provisions Deemed Inserted.** Every provision of law required to be inserted in the Contract Documents is deemed to be inserted, and the Contract Documents will be construed and enforced as though such provision has been included. If it is discovered that through mistake or otherwise that any required provision was not inserted, or not correctly inserted, the Contract Documents will be deemed amended accordingly.
- 14.3 Waiver.** City's waiver of a breach, failure of any condition, or any right or remedy contained in or granted by the provisions of the Contract Documents will not be effective unless it is in writing and signed by City. City's waiver of any breach, failure, right, or remedy will not be deemed a waiver of any other breach, failure, right, or remedy, whether or not similar, nor will any waiver constitute a continuing waiver unless specified in writing by City.

- 14.4 Titles, Headings, and Groupings.** The titles and headings used and the groupings of provisions in the Contract Documents are for convenience only and may not be used in the construction or interpretation of the Contract Documents or relied upon for any other purpose.
- 14.5 Statutory and Regulatory References.** With respect to any amendments to any statutes or regulations referenced in these Contract Documents, the reference is deemed to be the version in effect on the date that bids were due.
- 14.6 Survival.** The provisions that survive termination or expiration of this Contract include Contract Section 11, Notice, and subsections 12.1, 12.2, 12.3, 12.4, 12.5, and 12.6 of Section 12, General Provisions; and the following provisions in these General Conditions: Section 2.2(J), Contractor's Records, Section 2.3(C), Termination, Section 3.7, Ownership, Section 4.2, Indemnity, Article 12, Dispute Resolution, and Section 11.2, Warranty.

END OF GENERAL CONDITIONS

## Special Conditions

### 1. Authorized Work Days and Hours.

**1.1 Authorized Work Days.** Contractor is limited to performing Work on the Project Monday through Friday excluding holidays observed by City as indicated in Article 1 of the General Conditions except as expressly authorized in writing by City or as indicated in the following conditions:

(A) Work is authorized Monday through Sunday including holidays as necessary for testing, operation, and maintenance of the Temporary Sewer Bypass Pumping Facilities.

(B) For Project Work which requires the lift station to operate on Temporary Sewer Bypass Pumping, Contractor is limited to performing such activities between the dates of **April 13, 2026 and October 31, 2026.**

**1.2 Authorized Work Hours.** Contractor is limited to performing Work on the Project between the hours of 7:00 a.m. and 4:00 p.m. except as expressly authorized in writing by City or as indicated in the following conditions:

(A) Work is authorized 24-hours a day for testing, operation, and maintenance of the Temporary Sewer Bypass Pumping Facilities.

**1.3 Generally Applicable Labor Requirements.** The provisions of this Section 1 do not permit Contractor to violate the terms of an otherwise applicable labor requirement arising under state, federal, or local law. Contractor must comply with, without limitation, any applicable requirements arising under prevailing wage law and/or the Community Workforce Agreement.

**2. Order of Work.** Contractor must complete installation and obtain PG&E approval of the new permanent electrical service, and temporarily relocate and transfer the electrical loads of the existing electrical pedestal and SCADA antenna ("Transition"), prior to disconnection of the existing PG&E electrical service, as set forth in the Contract Documents. All work shall be sequenced to ensure uninterrupted electrical and SCADA functionality throughout the Transition.

Contractor shall prepare and submit a detailed sequencing plan that at minimum shows the ordering and sequence of work potentially affecting electrical service and/or SCADA functionality ("Sequencing Plan") for review and approval by the City at least 10 days prior to beginning any work potentially affecting electrical service and/or SCADA functionality.

If Temporary Sewer Bypass Pumping Facilities are in place and operating, the site may be without electrical service for a period not to exceed 8 consecutive hours. The Contractor shall clearly identify this outage window in the Sequencing Plan and obtain written approval from the City prior to initiating the outage.

Work shall not proceed until the Sequencing Plan is approved in writing by the City.

### 3. Submittals.

**3.1 Review Time Assumptions.** Contractor's schedule and all schedule updates should reflect the following assumptions for City and Grant agency (if applicable) review. The following assumptions are provided solely for scheduling purposes and do not bind the City to complete its review of any submittal within the assumed time, and the assumed times do not account for delays attributable to Contractor's incomplete or non-compliant submittals.

(A) **City Review.** Except as otherwise set forth herein, for all submittals except Shop Drawings and samples, assume a minimum review period of 14 days following submission for City review. For Shop Drawings and samples, assume a minimum review period of 21 days following submission for City review. If corrections are necessary, assume an additional 14 days following resubmission for City review.

**3.2 Specific Submittal Deadlines.** Contractor must submit the following submittals within 15 days following receipt of the fully executed Contract from the City:

- (A) Meter/Main Switchboard
- (B) Electrical and Controls Pedestal
- (C) Generator Set

Within five days following receipt of approved submittals, the Contractor shall submit documentation to City evidencing the order, including, but not limited to, the purchase order, documentation showing that the order has been accepted by supplier(s), and the anticipated shipment and delivery date for the materials and/or equipment listed above.

**4. Construction Manager Role and Authority.** The City plans to contract with a Construction Manager for this Project. The Construction Manager will assist City in the management of the construction of the Project. The Construction Manager may perform services in the areas of supervision and coordination of the work of Contractor and/or other contractors, scheduling the Work, monitoring the progress of the Work, providing City with evaluations and recommendations concerning the quality of the Work, recommending the approval of progress payments to Contractor, or other services for the Project in accordance with the Construction Manager's contract with City.

**4.1 Communications.** Contractor must submit all notices and communications relating to the Work directly to the Construction Manager as follows:

Construction Manager:

Contact information to be provided in the Meeting Minutes following the Pre-Construction Conference.

Design Consultant:

Brelje & Race Consulting Engineers  
Ben Bryant - [bryant@brce.com](mailto:bryant@brce.com)

With a copy to the Engineer:

Lucas Bishop – [LBishop@srcity.org](mailto:LBishop@srcity.org)

**4.2 On-Site Management and Communication Procedures.** The Construction Manager will provide and maintain a management team on the Project site to provide contract administration as an agent of City and will establish and implement coordination and communication procedures among City, the Design Professional, Contractor, and others.

**4.3 Contract Administration Procedures.** The Construction Manager will establish and implement procedures for reviewing and processing requests for clarifications and interpretations of the Contract Documents, Shop Drawings, samples, other submittals, schedule adjustments, Change Order proposals, written proposals for substitutions, payment applications, and maintenance of logs.

- 4.4 Pre-Construction Conference.** Contractor will attend the pre-construction conference, during which the Construction Manager will review the Contract administration procedures and Project requirements.
- 4.5 Contractor's Construction Schedule.** The Construction Manager will review Contractor's construction schedules and will verify that each schedule is prepared in accordance with the requirements of the Contract Documents.
- 5. Survey Staking.** Contractor is not responsible for providing the construction stakes for the Project. Contractor will coordinate directly with the Engineer for City-provided construction stakes. Contractor must submit a written request for staking to the Engineer at least four Working Days in advance of the date and time stakes are needed for the Work. Contractor must promptly notify the Engineer of any discrepancies found between City-provided staking and information provided by the Contract Documents. Contractor must preserve any City-provided construction stakes. If City is required to replace City-provided construction stakes, Contractor will be responsible for the cost thereof, which may be deducted from payments otherwise due to Contractor.

END OF SPECIAL CONDITIONS



## TECHNICAL SPECIFICATIONS

FOR

### COUNTRY MANOR SEWER LIFT STATION 10 REPLACEMENT & SPRING LAKE SEWER LIFT STATION 16 GENERATOR IMPROVEMENTS

CONTRACT NO. C02387



**JULY 2025**

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# 10 GENERAL CONSTRUCTION

## **10-3 Mobilization**

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

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

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

1. Preparation of Contract by the Contractor.
2. Completion of all tasks and submittal of all documents (bonds, insurance, schedule, etc.) required as conditions of issuing the Notice to Proceed.
3. Obtaining all required permits.
4. Installation of project identification signs per Section 7.23(C) of the General Conditions. 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.

**10-3.04 Payment:** **Mobilization & Demobilization** 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 preparatory work and operations necessary for the movement of personnel, equipment, supplies and incidentals to the project sites; for the establishment of facilities; submittal of all schedules and work plans; demobilization and final clean-up; and for all other work and operations which must be performed or costs incurred prior to beginning and required for finishing work on the various contract items in the Bid Schedule, and no additional allowance will be made therefor.

The first payment for Mobilization & Demobilization shall be no more than seventy-five percent (75%) of the bid item amount indicated, contingent upon site mobilization of equipment, an

approved Construction Schedule, and proof of acquisition of all required bonds, insurance, and permits. The second payment for Mobilization & Demobilization shall be the remaining twenty-five (25%) of the bid item amount and shall be paid after completion of all contract items of work including testing and completion of the final punch list.

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

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

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

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

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

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

**10-5.04 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.

# 12 TEMPORARY TRAFFIC CONTROL

## **12-1 General**

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

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

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

## **12-3 Traffic-Handling Equipment and Devices**

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

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

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

1. Show location and limits of the work zone.
2. Give dimensions of lanes affected by traffic control that will be open to traffic.
3. Indicate sign placement, cone placement, and other methods of delineation and reference to appropriate City or Caltrans Standards.
4. Dimension location of signs and cone tapers.
5. Identify side streets and driveways affected by construction and show how they will be handled.
6. Show how pedestrian 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. Identify message board locations. A minimum of 3 changeable message boards shall be required. Location to be determined by Engineer.
8. Demonstrate how two-way traffic will be maintained.

9. Provide layout for temporary traffic control devices required for 24-hour bypass pumping operations that includes information about how pedestrian traffic will be detoured around the bypass pumping operation.

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

## **12-4 Maintaining Traffic**

### **12-4.01 Maintaining Traffic:**

1. Except for temporary traffic control along Country Manor Drive shown on the Project Plans and required specifically for 24-hour bypass pumping operations, the full width of the traveled way shall be open for use by public traffic on Saturday, Sundays and designated legal holiday(s), after 4:00 p.m. on Fridays and the day preceding designated legal holidays, and when construction operations are not actively in progress; unless work has specifically been authorized by the Engineer.
2. The location of traffic control signing, barricades, and other facilities shall be monitored frequently (four to five times per day) by the Contractor to verify their proper location. All traffic signal and other traffic control devices shall be maintained at all times.
3. The Contractor shall conduct these operations so as to cause the minimum obstruction and inconvenience to traffic and to places of business, multiple dwelling units and residences adjacent to the work. The Contractor shall notify the Engineer of his planned work and utility service interruption at least five working days in advance to allow time to notify residents and businesses.
4. When construction activities will prevent vehicle access to individual driveways the Contractor shall notify and receive permission from the affected businesses and residents. Attention is directed to Section 7-1.03 "Public Convenience" of the Standard Specifications and 7.23 "Public Safety and Traffic Control" of these General Conditions. **Full access shall be provided to all driveways during non-working hours.**
5. At locations where traffic is routed perpendicular to trench excavation, the excavation shall be conducted in a manner to provide a surface reasonably satisfactory for traffic at all times. Substructure installation or construction shall be conducted on only one-half the width of the roadway at a time, and that portion of the roadway being used by traffic shall be kept open and unobstructed until the opposite side of the roadway is ready for use. Upon completion of the rough grading, the surface of the roadbed shall be brought to a smooth, even condition free from humps and depressions and made satisfactory for traffic.

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

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

**12-4.02 Closure Requirements:** Attention is directed to Section 7-1.03 "Public Convenience" of the Standard Specifications, and Sections 7.23 "Public Safety and Traffic Control", 2.4 "Coordination of Work", and 5.4 "Schedule Requirements" of these General Conditions.

Exact locations of Project Identification signs and Advance Notice signs (7-1.03 "Public Convenience" of the Standard Specifications and 7.23 "Public Safety and Traffic Control" of these General Conditions) shall be determined in the field by the Engineer.

Lane closures will be permitted between the hours of 8:30 a.m. and 4:00 p.m. only, except along Country Manor Drive during bypass pumping operations as shown on the Project Plans. Only one lane at a time may be closed and no lanes shall be closed at any other hours unless specifically approved by the Engineer or indicated otherwise herein. The Contractor shall maintain vehicle access to homes and other properties at all times while work is in progress.

Type III barricades are required anywhere there is a lane or street closure.

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

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

The Contractor shall keep the City of Santa Rosa Fire Department informed regarding the closure of any traveled way. At a minimum, the Contractor shall call the Fire Department at (707) 543-3535 **and** the Communications Center at (707) 543-3666 **daily** to report any traveled way closure. This means immediately upon closure for that day and again immediately after removal of the closure. For closures over multiple days, the daily notification still applies. This requirement does not apply for single lane closures on multiple lane streets.

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

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

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

Notification shall be as follows:

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

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

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

Cross streets will require maintenance of at least one-half (1/2) width of each street for traffic purposes, unless an alternate route is proposed by the Contractor and approved by the Engineer. Flagging will only be allowed between the hours of 8:30 am and 4:00 pm.

Traffic control devices and flaggers shall be positioned to allow safe turns at intersections and curves.

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

#### **12-4.04 Temporary Pedestrian Access Routes**

**12-4.04A(1) Summary:** The Contractor are directed to Chapter 6D, Pedestrian and Worker Safety, in the CA MUTCD, the improvement plans and these General Conditions, Special Conditions, Technical Specifications.

Pedestrians shall be provided with a safe convenient and accessible path that, at a minimum, replicates the most desirable characteristics of the existing sidewalk, path or footpath. At no point along the road shall the sidewalks on both sides of the road be closed at the same time. This includes during the construction of pedestrian curb ramps and bypass pumping operations.

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

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

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

Work shall be sequences such that pedestrians have access past the work site using one of the following approaches:

1. Maintain the existing pedestrian pathways if the sidewalks can remain open during construction.
2. Develop an alternative pedestrian pathway that is parallel to or easily reached from the current pathway when the current pathway is closed.
  - a. For example, using temporary curb ramps and crashworthy barriers for protection, pedestrians can be detoured into a channelized pathway on the roadway adjacent to the work area.
  - b. When pedestrians are brought into the traveled way as part of a Pedestrian Traffic Control Plan, barricades, water filled barriers, k-rails, and/or approved equal barricades shall be used to provide protection form vehicular traffic and from the work.
3. Develop an alternative pedestrian pathway in advance of the temporary traffic control zone that will detour pedestrians around the work sit.
  - a. For example, if the sidewalk on the same side of the street as the construction must be closed , and a parallel pathway is not feasible, then pedestrians can be re-routed across the street to a parallel sidewalk, path, or footpath.

## **12-9 Measurement and Payment**

**12-9.01 Payment:** **Traffic Control** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in **vehicular and pedestrian** traffic control, including but not limited to, providing, placing, maintaining, and removal of temporary paths and/or ramps, temporary relocation of regulatory signs, changeable message boards, project and public notification signs, flagging, excavation, compaction, furnishing, and placement of asphalt concrete and/or PCC, barricades, toe-rails, hand rails, complying with CA MUTCD Standards for Pedestrian Safety, complying with the Caltrans Encroachment Permit requirements including fees, all other Traffic Control related coordination efforts and any other items necessary for vehicle and pedestrian traffic control not specifically enumerated in the plans or these specifications, and no additional allowance will be made therefor.

## 13 WATER POLLUTION CONTROL

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

1. The current California Water Quality Control Board, North Coast Region Order No. National Pollutant Discharge Elimination System Municipal Storm Water Permit, commonly referred to as the “Storm Water Permit”. A copy of the Storm Water Permit is available for review at the City of Santa Rosa Transportation and Public Works Department, 69 Stony Circle, Santa Rosa, CA, and at [www.srcity.org/stormwaterpermit](http://www.srcity.org/stormwaterpermit).
2. The California Stormwater Quality Association Storm Water BMP Handbook for Construction (CASQA Handbook). BMPs shall be selected, installed and maintained in accordance with the latest edition. A copy of the handbook can be viewed at the City of Santa Rosa Department of Transportation and Public Works office at 69 Stony Circle or downloaded from CASQA, <http://www.casqa.org/>.

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

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

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

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

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

### **13-2 Water Pollution Control Program**

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

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

### **13-3 Storm Water Pollution Prevention Plan**

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

#### **13-4 Job Site Management**

**13-4.03B: Spill Prevention and Control:** You shall also comply with CASQA Spill Prevention and Control (BMP WM-4). If a spill occurs at the construction site and you do 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 you hereunder.

In the event there are insufficient amounts owed to you 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:** You shall also comply with CASQA Stockpile Management (BMP WM-3). Do not block storm water flows.

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

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

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

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

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

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

**13-4.03E(4): Vehicle and Equipment Fueling and Maintenance:**

You shall also comply with CASQA Vehicle and Equipment Fueling (BMP NS-9), and CASQA Vehicle and Equipment Maintenance (BMP NS-10).

**13-4.03E(7): Paving, Sealing, Saw cutting, 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 BMPs at all susceptible storm drain inlets and manholes to prevent paving products and tack coat from entering
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
11. Protect stockpiles with a cover or sediment barriers during a rain event and
12. 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)

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

**13-4.03G: Dewatering:** Dewatering consists of discharging accumulated stormwater, groundwater, or surface water from excavations or temporary containment facilities.

Groundwater levels may change depending on the time of year and the amount of seasonal rainfall.

It should be anticipated that groundwater will be encountered within deep excavations as part of this project. If groundwater is encountered, the Contractor shall immediately notify the City. The Contractor shall **remove all water** which accumulates in excavations during the progress of work until the subgrade has been prepared and backfilling has progressed to a sufficient height above static groundwater levels. The Contractor shall have a minimum of two working pumps onsite and 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 Technical Specifications 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. An approve air gap shall be maintained at all times when dewatering from a water main trench.

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

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

The 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.

**13-4.04 Payment:** Job Site Management shall be considered as included in the price paid for **Water Pollution Control**.

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

### **13-6 Temporary Sediment Control**

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

**13-6.04 Payment:** Temporary Sediment Control shall be considered as included in the price paid for **Water Pollution Control** which includes all maintenance costs.

## 14 ENVIRONMENTAL STEWARDSHIP

**14-1.01A General Environmental Protections:** A Phase I Environmental Site Assessment has been prepared for the project and the proposed project limits are located in an area that contains no **known** subsurface contamination.

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

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

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

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

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

**14-10.03 Payment:** Full compensation for conforming to this section shall be considered as included in the prices paid for the **various contract items** of work and no additional compensation will be allowed.

### **14-11 Hazardous Waste and Contamination**

#### **14-11.06: Department Generated Contaminated Soil**

**14-11.06A General:** Should contamination be discovered during construction, the Contractor shall develop a plan for handling and disposal of potentially contaminated soils and groundwater.

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

The Contractor shall provide 40-hour OSHA-HAZWOPER certified workers in the contaminated area and 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.

**14-11.08 Payment:** Full compensation for conforming to all requirement of this section shall be considered as included in the prices paid for the **various contract items** of work and no additional compensation will be allowed.

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

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

## 15 EXISTING FACILITIES

**15-1.03A General:** Existing facilities disturbed by construction shall conform to the applicable provisions of Section 7.5 of these General Conditions. All existing active utilities found to reside in excavated areas shall be supported in place with service maintained during construction. The Contractor shall be responsible for any damage caused by the Contractor's operations and any needed repairs shall be completed to the Engineer's satisfaction.

Existing 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 elect 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.

**15-2.02C 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.

**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 82 of the Standard Specifications, City Standards, and the Plans.

**15-2.02N Asbestos Cement Pipe:** The Contractor are advised that asbestos cement pipe (ACP) will likely be encountered on the project and must be cut, handled, and disposed of according to the Contractor's State Licensing Law and all other applicable laws and regulations.

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

Protect and maintain all existing site items and protect them against damage during selective demolition operations as needed to maintain operations. Conduct demolition operations to prevent injury to people and damage to adjacent facilities, site improvements, private properties, and appurtenances that are to remain. Cover and protect equipment that has not been removed.

The Contractor shall coordinate with City operations staff prior to demolition of any items not specifically shown to be demolished on the Project Plans.

The Contractor shall salvage existing fire extinguishers and regulatory signage and reinstall on-site to meet code requirements.

The Contractor shall salvage the existing generator, sub-base fuel tank, and sound enclosure installed at the Country Manor site and reinstall at the Spring Lake Lift Station site as indicated on the Project Plans. The existing generator at the Spring Lake Lift Station site shall be temporarily relocated or a portable generator shall be provided to maintain a power source of backup power while the work is being performed. The Contractor shall fill out forms (permit to construct and permit to operate) and obtain approval from the Bay Area Air Quality Management District (phone

number (415) 749-4900) prior to relocating the existing generator. The permit to operate shall be provided prior to commissioning.

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

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

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

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

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

**15-2.04 Payment:** **SLS-10 Selective Site Demolition** shall be paid for at the contract **lump sum** price, which price shall include, full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to remove and dispose of concrete, asphalt pavement, fencing, structures, appurtenances including miscellaneous electrical and mechanical equipment, protection of existing items to remain, replacement of damaged items to remain, including, but not limited to, abandonment of existing below grade structures and piping, excavating, saw cutting, loading, hauling, disposal, backfilling, compaction, and cleanup, complete in accordance with and as shown on the Project Plans, as specified in these General Conditions, Special Conditions, Technical Specifications, and as directed by the Engineer, and no additional compensation will be made therefor.

**SLS-16 Selective Site Demolition** shall be paid for at the contract **lump sum** price, which price shall include, full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to remove and dispose of existing dual fuel generator, gas service and appurtenances, propane tank and appurtenances, housekeeping slab, and cleanup, complete in accordance with and as shown on the Project Plans, as specified in these Technical Specifications, and as directed by the Engineer, and no additional compensation will be made therefor.

**Relocate Existing Diesel Generator** shall be paid for at the contract **lump sum** price, which price shall include, full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary for site preparation and construction of new housekeeping slab, anchorage, programming changes, electrical work, and testing associated with diesel generator, and cleanup, complete in accordance with and as shown on the Project Plans, as specified in these General Conditions, Special Conditions, Technical Specifications, and as directed by the Engineer, and no additional compensation will be made therefor.

#### **15-2.10 Existing Frames, Covers, Grates, and Manholes**

**15-2.10A General:** Reset existing City facility boxes and lids to grade. The City will furnish at no cost to the Contractor new material to replace existing boxes and lids that do not comply with current City Standards or damaged prior to Contractor's operations.

**15-2.10B Adjust Frames, Covers, Grates, and Manholes:** Existing manhole frames and covers, valve boxes, mainline cleanouts and monuments adjusted to grade shall conform to City Standards.

The Contractor shall accurately locate and record the location of existing and new manholes, valve boxes, mainline cleanouts, and monuments to be adjusted to grade and shall furnish the Engineer a copy of said record prior to starting construction.

All facilities on active systems shall be accessible at all times to City personnel unless otherwise stated in these General Conditions, Special Conditions, Technical Specifications or approved by the Engineer.

After placement of the finish course of asphalt concrete, the Contractor shall mark all overlaid manholes, valve boxes, mainline cleanouts and monuments, whether new or existing, with white paint by the end of that working day.

All new and existing manholes, valve boxes, mainline cleanouts and monuments shall be accessible within 48 hours after they are covered.

Final grade adjustments and installation of concrete collars shall be done on the same working day. Final paving around manholes, valve boxes, mainline cleanouts and monuments shall be completed the following working day.

All silt and debris shall be removed from finished structures. This shall include all existing silt and debris plus material caused by The Contractor's operation.

If new or existing water valve riser pipe needs to be extended after paving to conform to City STD-877, the Contractor shall use either a slip x slip glued PVC coupling or a transition coupling with sheer bands as directed by the Engineer. Upsizing the existing riser pipe to 8-inch will not be required unless otherwise directed by the Engineer. Any added extension must be a minimum of 12 inches. The lower section of riser pipe shall be adjusted to accommodate this requirement.

In the event that the Contractor encounter water valve boxes with round lids or sanitary sewer frame and covers with open pick holes which must be adjusted to grade. The Contractor is to provide a count to the Engineer a minimum of two days prior to paving to obtain replacements that complies with current City Standards. The City will provide replacements provided The Contractor is not required to replace them as part of the contract or due to damage by the

Contractor's operations. Valve boxes and frames and covers on facilities to be abandoned shall not be included in the count provided to the Engineer. The Contractor shall be responsible for delivery of new frames, boxes, and covers from the City warehouse to the job site. Prior to removal of an existing manhole frame, a platform shall be constructed in the manhole above the top of the sewer to prevent any dirt or debris from falling into the sewer. The platform shall remain in place until all work on the manhole has been completed and the asphalt concrete has been placed around the manhole. Prior to the removal of the platform from the manhole, all dirt and debris shall be removed.

All grade rings shall be set in cement mortar the same day they are placed. All joints shall be smoothly plastered inside and out.

Existing grade rings removed in the adjustment of manhole frames shall become the property of The Contractor and if undamaged and thoroughly cleaned of mortar may be reused in the work. If not used, they shall be disposed of away from the site of work at the Contractor's expense.

Manhole frames shall be reinstalled to align directly over the grade rings. Any frames misaligned by more than ½ inch shall be removed and reinstalled.

Existing Monuments adjusted shall conform to City Standards 280 to 284 and 78-2 Survey Monuments, of the specifications.

**15-2.10C Payment:** **Adjust Existing Valve Box to Grade** shall be paid for at the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in adjust existing valve boxes to grade, including but not limited to, required excavation and backfill, coordination for replacement boxes, and removing silt and debris, as specified herein, and no additional allowance will be made therefor.

**Adjust Existing Manhole to Grade** shall be paid for at the contract unit price **each** which price shall include full compensation for furnishing all labor, materials, tools and equipment and doing all the work involved in adjusting manholes to grade, including but not limited to: required excavation and backfill ;additional grade rings if required; furnishing location of manholes and transporting new frames and covers to job site, as specified herein, 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.

All concrete which is to be removed from foundation and miscellaneous 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.

Concrete removal includes removal of any reinforcing steel embedded in the concrete and no additional allowance will be made for the removal of such steel.

Aggregate base shall be removed as required to accommodate the proposed improvements.

Landscaping and other surfaces or structures damaged or destroyed during the removal of existing concrete or asphalt concrete shall be restored to original condition at no additional cost to the City. The Contractor's attention is directed to Section 7.5 of these General Conditions.

**15-3.04 Payment:** Payment for saw cutting, removal, and disposal of concrete shall be included in the contract prices paid for **various contract items** of work and no additional allowance will be made therefor.

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

Pothole information provided on the Project Plans shall be for reference use only and shall not be considered as accurate information for any other areas within the project limits.

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

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

**15-7.01 Payment: Utility Clearances** shall be paid for at the contract **lump sum** price, which price shall not exceed 5% of the contract amount and shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in verifying utility clearances, including but not limited to: potholing to verify potential conflicts, grades and alignments of existing facilities to be connected to; excavation; backfill; notification; and coordination and redirection of crews to other contract work *if required*, as specified herein, and no additional allowance will be made therefor.

**15-9 Existing Facility Operation and Temporary Facilities:** The site improvements are located at critical pumping facilities within the City's reclamation distribution system which needs to remain operational at all times. Contractor shall carry out construction activities in a manner that does not disrupt facility operations except as indicated herein.

**15-9.04 Payment:** Payment for maintaining existing facility operation 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 one inch 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, the 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.

**15-11 Preservation of Survey Monuments:** The Contractor shall be responsible for preservation and/or perpetuation of existing survey monuments (iron pipes on lot lines and corners, centerline well monuments, etc.). Damaged or disturbed monumentation shall be replaced and reset in accordance with the business and professions code and the requirements of the Sonoma County Surveyor. A corner record shall be submitted to the Sonoma County Surveyor for any replacement or resetting of existing survey monuments.

**15-11.01 Payment:** Full compensation for Preservation of Survey Monuments shall be considered as included in the contract prices paid for **various contract items** of work and no additional allowance will be made therefor.

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

# 17 EARTHWORK AND LANDSCAPE

## **17-2 Clearing and Grubbing**

**17-2.01 General:** Clearing, grubbing, and access shall be confined to the limits shown on the plans and shall not exceed the minimum necessary to complete operations.

The Contractor shall not remove any trees, brush, shrubs, or other natural objects outside the limits of construction as shown on the plans, unless directed by the Engineer.

Any trees, brush, shrubs, or other natural objects not ordered removed by the Engineer which have been removed, altered, or damaged shall be replaced in kind by the Contractor before completion of the project.

All unsuitable material shall be disposed of away from the site by the Contractor. The Contractor shall make all necessary arrangements for disposal of material.

**17-2.03 Construction:** The area to be cleared and grubbed shall be the area within the right-of-way shown on the plans, unless otherwise specified in the General Conditions, Special Conditions, or Technical Specifications.

All stumps, large roots and other objectionable material shall be removed to a depth of three feet below finished grade in the area of construction. The resulting spaces shall be backfilled with material suitable for the planned use. Such suitable material shall be placed and compacted in layers as specified in Section 19-6 "Embankment Construction" of the Standard Specifications.

**17-2.04 Payment:** Full compensation for Clearing and Grubbing shall be considered as included in the contract prices paid for **various contract items** of work and no additional allowance will be made therefor.

# 19 EARTHWORK

## **19-1 General**

**19-1.01 General:** Earthwork shall conform to the applicable provisions of Section 19 of the Standard Specifications, with the following modifications and additional requirements. Earthwork shall include performing all operations necessary to excavate, earth and rock, regardless of character and subsurface condition; prepare foundation and subgrade materials for the placement of other material thereon; transport, place, compact and finish fill materials; mix, blend and moisture condition materials as required; remove and replace unsuitable materials; remove, transport and dispose of surplus excavated material in accordance with Section 19-2.03B, Surplus Material, of these Technical specifications.

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

**19-1.01A Summary:** Earthwork shall also include excavation for trenching.

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

1. **Excavation** - Removal of native materials below the plane established by the stripping operations from those areas upon which materials or structures will be placed. Excavation limits are defined on the Project Plans.
2. **Sub-excavation** – Removal of native materials beyond the normal limits of excavation and replacement of the material to the normal lines of excavation with a specified engineered fill, or suitable native materials. Sub-excavation limits are defined on the Project Plans.
3. **Over-excavation** – Removal of native materials beyond the normal limits of excavation and replacement of the material to the normal lines of excavation with a specified engineered fill, or suitable native materials. Over-excavation limits are not defined on the Project Plans, but are a requirement of encountering unsuitable native materials during excavation that were previously unknown.

**19-1.03B Unsuitable Material:** Stabilization of unsuitable material shall comply with the following provisions:

- A. Unsuitable material may be processed in place, may be excavated and placed on the grade or other locations suitable for further processing, or may be partially excavated and partially processed in place.
- B. Processing may consist of drying to provide a stable replacement material.
- C. Stabilized material shall be placed and compacted in layers as hereinafter specified for constructing embankments.

**19-1.03B(1) Subgrade Stabilization/Digouts:** Any area of the subgrade determined by the Engineer to be unsuitable shall be removed to the limits marked in the field by the Engineer and

to a depth below the subgrade plane in accordance with the detail indicated on the Project Plans. Soil stabilization fabric shall be placed and asphalt base shall be placed and compacted to fill the excavation in accordance with the detail indicated on the Project Plans.

The excavation shall be filled with asphalt base as defined in Section 39-1.01, "Asphalt Concrete" of these Technical Specifications, and as directed by the Engineer to return the excavation to grade after the material is compacted with a minimum 7-ton vibratory roller or approved equal and has obtained a minimum 93% relative compaction. In the situation where a roller is not able to compact the asphalt base as specified, placement and compaction shall be as directed by the Engineer.

For roadway reconstruction per section 19-2.03A of these Technical Specifications where processing of unsuitable subgrade material is not allowed, the areas to be stabilized will be marked in the field by the Engineer after roadway excavation of the area is complete. Use of a pavement grinder shall be considered an acceptable method of excavation of areas requiring subgrade stabilization.

**19-1.03C Grade Tolerance:** When aggregate subbase or aggregate base are to be placed on the grading plane, the grading plane shall not vary more than 0.05' above or 0.1' below the grade established by the Engineer.

**19-1.03E Existing Site Conditions:** The Contractor shall acquaint himself with all site conditions. If unshown active utilities are encountered during the work, the Engineer shall be immediately notified for instructions. Failure to notify immediately will make the Contractor liable for damage to these utilities arising from Contractor's operations subsequent to the Contractor's discovery of such unshown utilities.

**19-1.03F Observation:** A minimum of 24-hours notice shall be given to the Engineer by the Contractor prior to commencing or recommencing any earthwork operations; additional time may be required for review/testing of materials proposed for placement. No materials shall be placed prior to favorable field review of subgrade or previously graded surface by the Engineer.

**19-1.04 Payment:** **Subgrade Stabilization/Digouts** shall be paid for at the contract price per **square yard** as measured in the field. Price shall include full compensation for stabilization fabric, asphalt concrete base, compaction, doing all work involved in stabilizing the subgrade as specified herein including labor, materials, tools and equipment, excavation, and no additional allowances will be made therefore.

In the event of an increase or a decrease in the amount of the engineer's estimated quantity of Subgrade Stabilization, such increase or decrease shall not be considered an alteration in excess of the 25 percent of the contract amount of such items under provisions of Section 4-1.05 of the Standard Specifications and no adjustment of the contract price for Subgrade Stabilization will be made.

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 of locations other than those marked by the Engineer. Any excavation for subgrade stabilization done by The Contractor to accommodate equipment width beyond the limits of the areas marked by the Engineer shall be at the Contractor's expense.

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

The cost for the asphalt concrete base shall be included with the contract unit price for subgrade stabilization.

## **19-2 Roadway Excavation**

**19-2.03A General:** The Engineer shall provide reference points and cut sheets for the excavation of the roadway. The Contractor shall furnish an excavation and paving plan and a qualified grade setter to ensure the subgrade conforms to the lines and grades established by the Engineer.

For roadway reconstruction, Roadway Excavation shall be performed with a pavement grinder. No other construction equipment including rubber-tired equipment shall be allowed on the subgrade.

The Contractor shall select equipment and perform construction using means and methods which does not cause any damage the existing subgrade, existing facilities, and/or new improvements.

Roadway excavation and asphalt concrete base paving, including Stabilization Fabric per section 19-8.02, paving shall be completed for half the street width before beginning excavation of the remaining street.

The Contractor shall note that there are street trees near areas intended for roadway excavation. The Contractor's operation, including the size of the grinding equipment, shall be such, so as to ensure that existing street trees are not damaged. Where limited clearance under the street trees prevents the use of a grinder, excavation shall be performed by an alternate method as approved by the Engineer. Alternate methods may include jackhammering and removal of existing pavement and base materials by hand, or by use of smaller grinding equipment.

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

**19-2.03B Surplus Material:** Unless otherwise indicated on the Project Plans or in these General Conditions, Special Conditions, Technical Specifications, the Contractor shall load, haul from the site of work and properly dispose of all surplus excavated material including, but not limited to, rock, concrete, asphalt, debris and soil. All material excavated from the work sites shall be the property of the Contractor. None of the surplus materials generated from the work sites shall be disposed of on the work sites. Prior to the beginning of any earthwork, the Contractor shall submit to the Engineer written authorization for such disposal and entry permission signed by the approved disposal site. The Contractor shall comply with all disposal regulations such as City, County, and/or State permits and licenses, as may be required.

**19-2.04 Payment:** **Roadway Excavation** shall be a final pay quantity (F) paid for at the contract price per **cubic yard**, which price shall include full compensation for all work as specified herein and no additional allowance will be made therefor.

Removal of existing bituminous pavement and base materials will be paid for as roadway excavation.

## **19-5 Compaction:**

**19-5.03B Relative Compaction:** Relative compaction of not less than 95 percent shall be obtained for a minimum depth of 0.5-foot below the grading plane for the full width of the planned pavement structural section, whether in excavation or embankment.

Relative compaction of no less than 95 percent shall be obtained for embankment under bridge and retaining wall footings without pile foundations within the limits established by inclined planes sloping 1.5:1 out and down from lines one foot outside the bottom edges of the footing.

## **19-8 Subgrade Enhancement Geotextile**

**19-8.02 Materials:** Subgrade enhancement geotextile (aka soil stabilization fabric) shall be installed per manufacturer's recommendations and shall meet or exceed the following specifications:

Grab Tensile Strength (ASTM D4632)	290 lb.
Mullin Burst Strength (ASTM D3786)	500 psi
Trapezoid Tearing Strength (ASTM D4533)	113 lb.
Modulus (Load at 10% Elongation) (ASTM D4632)	120 lb.
Apparent Opening Size (ASTM D4751)	40-70 sieve
Permittivity (ASTM D4491)	0.05 sec <sup>-1</sup>

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

Prior to placement of soil stabilization fabric, the Contractor shall remove all loose dirt left from excavation operations.

Soil stabilization fabric shall be placed over the subgrade area under the reconstruct road areas. The soil stabilization fabric shall be held in place with wooden stakes driven through the fabric into the subgrade at the beginning and the end of the fabric and at 50-foot intervals. A minimum of three stakes shall be placed across the width of the fabric roll at each interval. The stakes shall be a minimum length of 8-inches and shall be driven at an angle opposite to the direction of pull exerted on the fabric by the paving machine.

**19-8.04 Payment:** **Soil Stabilization Fabric** shall be paid for at the contract price per **square yard** as measured in the field. Payment shall include full compensation for doing all work involved in placing the fabric including root pruning labor, materials, tools and equipment, and no additional allowance will be made therefor.

## 26 AGGREGATE BASE

### **26-1.01 General**

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

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

### **26-1.02 Materials**

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

### **26-1.03 Construction**

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

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

## 39 HOT MIX ASPHALT

### **39-1.01 General**

**39-1.01A Summary:** Section 39 includes specific specifications for producing and placing Hot Mix Asphalt (HMA) by mixing aggregate and asphalt binder at a mixing plant and spreading and compacting the HMA mixture.

**39-1.01B Definitions:** For these specifications, HMA and asphalt concrete shall be the same.

At the Contractor's option, and at no additional expense to the City, a Cal-trans approved Warm Mix Asphalt (WMA) technology may be added to the HMA. However, the asphalt concrete shall be manufactured at HMA temperatures (300F +/- 25F) at a dosage rate approved by the Engineer. All other HMA project specifications shall be adhered to.

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 shown on the Project Plans.

Roadway excavation and asphalt concrete base paving shall be completed for half the street width before beginning excavation of the remaining street.

Asphalt concrete surface shall be placed no more than 5 days after the placement of the asphalt concrete base.

All existing asphalt concrete that is adhered to the top of gutters shall be removed prior to placement of new asphalt concrete surface in a manner satisfactory to the Engineer and that does not damage the gutter.

Asphalt concrete base shall be placed on the same day the area is excavated so that all areas will either have existing asphalt surface or new asphalt concrete base by the end of each working day. No subgrade areas shall be exposed or open to traffic during non-working hours.

Asphalt concrete base paving shall be accomplished by use of a paving machine. The asphalt mix shall be transferred from the trucks to the hopper of the paving machine by means of a tracked material transfer vehicle similar to the Vogele MT3000-2I. Locations where only asphalt surface paving will take place shall transfer the asphalt mix with a tracked transfer vehicle similar to the Vogele MT3000-2I. Any equipment used to transfer asphalt concrete to the paving machine shall not exceed the load capacity of any surface it is driven over and shall not produce rutting or pumping of the existing roadway surface or newly placed asphalt concrete base at any time.

Construction vehicles/equipment shall not be allowed on the newly placed asphalt concrete base until the day after it is placed. Super Dumps or other trucks with liftable trailing load bearing axles shall not be allowed on the newly placed asphalt concrete base at any time. All trucks or other construction equipment to be driven on the newly placed asphalt concrete base shall not exceed the surface load bearing capacity and shall not produce rutting or pumping at any time.

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

No longitudinal vertical drop offs will be allowed between the lanes when the roadway is opened to traffic. Where a longitudinal vertical drop off occurs along the roadway crown between the existing street surface and the new asphalt concrete base, the Contractor shall grind a 10:1 taper in the existing surface to make a temporary conform to accommodate traffic. The temporary taper shall be ground after the asphalt concrete base paving has been completed each day.

Where a vertical drop off will occur between the top of the new asphalt concrete base and a valley gutter, driveway, or side street conform, the Contractor shall install a temporary 10:1 asphalt taper.

Where a vertical drop off would occur between the asphalt concrete base and a pedestrian ramp, the Contractor shall install a temporary 12:1 asphalt taper.

All ground edges adjacent to curb ramps and driveways shall have temporary asphalt concrete ramps (tapers) installed if the asphalt concrete surfacing cannot be placed back the same day the existing pavement is removed. Kraft paper or other bond breaker shall be placed under the conform ramps to facilitate removal when paving operations start.

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

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

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

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

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

The Contractor shall set a string line based on the reference points to control the grade of the paving machine along the crown line. A rotary laser level may be used in lieu of a string line provided the level can be accurately set to the design centerline slope, and the detector is directly mounted to the paving machine screed to control the grade of the paving along the crown line. The Contractor shall also furnish a grade setter to ensure that the asphalt concrete base and 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 asphalt concrete and concrete surfaces, and allowed to break immediately in advance of placing all lifts of asphalt concrete. Tack coat applied to horizontal surfaces shall be applied with a tack truck, at a minimum residual rate of 0.04 gal/sqyd. Unless otherwise shown on the Plans, tack coat shall also be applied to all vertical mating surfaces and conforms to existing pavement, curbs, gutters, and construction joints, and allowed to break immediately in advance of placing all lifts of asphalt concrete. The tack coat shall be reapplied 1) where it becomes contaminated, and 2) where it is significantly tracked (removed) from the surface.

Asphalt concrete surface must be placed and compacted at ambient temperatures of 50°F or greater.

Asphalt concrete base must be placed and compacted at ambient temperatures of 40°F or greater.

Asphalt concrete will not be placed during any form of precipitation.

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

At the end of each working day the Contractor shall place retro reflectorized signs and delineators, as required for nighttime use in accordance with the Standard Specifications and Section 12 of these Technical Specifications to warn the public of the existing conditions.

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

### **39-1.02 Materials:**

**39-1.02B Tack Coat:** Tack coat must comply with the specifications for asphaltic emulsion or asphalts. Tack coat shall be diluted SS1 or SS1h.

**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 to 1.0% 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.....½-inch Coarse HMA Type A

Base Course.....¾-inch HMA Type A

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.

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**

¾-inch HMA Type A

Sieve sizes	TV limits	Allowable tolerance
1"	100	--
¾"	95–100	TV ± 5
⅜"	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	--

½-inch Coarse HMA Type A

Sieve sizes	TV limits	Allowable tolerance
¾"	100	—
½"	94–100	--
⅜"	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	--

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.) <sup>a</sup>	California Test 217	50 <sup>b</sup>
Fine aggregate angularity (% min.)	California Test 234	45
Flat and elongated particles (% max. by weight @ 5:1)	California Test 235	10

<sup>a</sup> Reported value must be the average of 3 tests from a single sample.

<sup>b</sup> 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 weigh hopper or pugmill. After introduction to the pugmill and before asphalt binder is added, the mixing time for the virgin aggregate and RAP shall not be less than five seconds. After asphalt binder is added, the mixing time shall not be less than 30 seconds.
16. If continuous mixing is used, the RAP shall be protected from direct contact with the burner flame with a device such as a shield, separator, or second drum.
17. If any of the above criteria are not satisfied, or if the RAP HMA test result determined by the City are inconsistent, RAP HMA production shall stop for City projects until the issue(s) are corrected.

### **39-1.03 HOT MIX ASPHALT MIX DESIGN REQUIREMENTS:**

#### **39-1.03E Job Mix Formula Verification: (Not Applicable)**

#### **39-1.08 Production:**

**39-1.08A General:** During production, with approval of the Engineer, the Contractor may adjust hot or cold feed proportion controls for virgin aggregate and RAP.

#### **39-1.12 Smoothness:**

**39-1.12A General:** Determine HMA smoothness with a straightedge. The completed surfacing shall be thoroughly compacted, smooth and free from ruts, humps, depressions or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the asphalt concrete by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations or other objectionable marks in the asphalt concrete shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

#### **39-1.15 Minor Hot Mix Asphalt: (Not Applicable)**

**39-3.02 Acceptance Criteria:**

**39-3.02A Testing:** The acceptance testing requirement for Sand Equivalent shall be 50 (minimum) for asphalt concrete surface and 45 (minimum) for asphalt concrete base. HMA shall meet the following requirements.

Aggregate Micro-Deval (ASTM D6928-10) <sup>1</sup>	Tensile Strength Ratio, TSR (ASTM D7870) <sup>2</sup>
≤16.0%	Not Required
16.1-18.0%	70 (minimum)
18.1-21.0%	80 (minimum)

<sup>1</sup> Asphalt concrete with an aggregate Micro-Deval loss greater than 21.0% shall be removed and replaced at the Contractor's expense. In addition, no single source of asphalt concrete aggregate shall have a Micro-Deval loss greater than 21.0%.

<sup>2</sup> TSR testing shall be performed on re-compacted asphalt concrete (per ASTM D7870), obtained from field cores, and tested within 30 days of asphalt concrete placement. Specimens tested shall include 1 unconditioned sample, and 2 conditioned samples as follows:

- a) 20.0 hour Adhesion cycle @ 60°C
- b) 3500 cycles @ 40 psi and 60°C

A single TSR test shall not represent more than 750 tons of asphalt concrete. Asphalt concrete not meeting the above requirements shall be removed and replaced at the Contractor's expense.

**39-3.04 Transporting, Spreading, and Compacting:** Test sections shall be approved on the basis of the attainment of 93% relative compaction and a satisfactory surface condition following final rolling. The number of coverages required shall be the minimum number required to obtain 93% relative compaction. Relative density shall be the ratio of in-place density (ASTM Test Method D2950) to test maximum density (California Test 309, Method of Test for Determining Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt) determined during production paving.

The HMA may be cored during paving of the test sections, and the in-place density for each test section shall be the average of three core densities determined per California Test 308.

**39-6 Payment: Asphalt Concrete Surface** shall be paid for at the contract price per **ton**, which price shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all work involved in placing asphalt concrete surface and overlay, including tack coat and overlay conforms, and no additional allowance will be made therefor.

**Asphalt Concrete Base** shall be paid for at the contract price per **ton**, which price shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all work involved in placing asphalt concrete base, including tack coat and temporary tapers, and no additional allowance will be made therefor.

Full compensation for deep lift paving strip adjacent to curb and gutter replacement outside of reconstruct areas will be paid for at the asphalt concrete surface unit price and no additional allowance will be made therefor.

Full compensation for installing and removing temporary asphalt tapers shall be included in the contract price for asphalt concrete surface and no additional allowance will be made therefor.

Full compensation for removing existing asphalt concrete from top of gutters shall be included in the contract price for asphalt concrete surface 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 per ton for asphalt concrete surface and asphalt concrete base and no additional allowance will be made therefore.

[Revised: 03/07/17 Lab STD2010]

## 39A HOT MIX ASPHALT CONCRETE TRENCH PAVING

**39A-1.01 Description:** Hot Mix 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 Technical Specifications.

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

Temporary paving around edges of steel plates shall be a hot mix ½-inch maximum, medium graded aggregate and SC 3000 asphalt binder for use the same day or SC 250 asphalt binder for use over a one week period. Temporary Paving is included in the prices paid for various contract items and no additional allowance will be made therefor.

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. Asphalt concrete trench paving shall be per Section 39-1.02E for surface and base requirements.

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

**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 as indicated on the plans and shall use the 6-inch-thick AC alternative in Note 1 of STD-215.

The Contractor shall provide compaction of backfill and base material as the job progresses. Temporary paving, as specified in Section 39A-2.01, shall be placed over the work each day, leaving not more than 25 feet unpaved. This temporary paving shall be removed for final street reconstruction and/or trench paving. The 25 feet of unpaved trench shall be covered with skid resistant steel plates (with a coefficient of friction of 0.35 or greater per CTM342), capable of sustaining normal (H2O) traffic loads without shifting or bouncing and shall be secured per Caltrans requirements. Plates that have areas where the skid resistant material is missing shall not be used and must be removed from the job site. Hot mix asphalt concrete shall be placed and compacted around all edges of steel plates with a sufficient width and gradual slope in order to provide a smooth transition to existing pavement. The Contractor shall only be allowed to plate one lateral trench at a time.

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

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

Asphalt concrete used for temporary trench paving shall be removed and disposed of in accordance with Section 124 "Material Recycling" of these Technical Specifications.

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

**39A-6.03 Compacting:** Compaction shall be in accordance with Section 39-6.03 of the City Specifications, except as modified below.

The basis for approval shall be the attainment of 93% relative compaction and satisfactory surface condition following final rolling. The number of coverages required shall be the minimum number required to obtain 93% relative compaction in accordance with Section 39-3.04 of these Technical Specifications.

**39A-8.02 Payment:** Full compensation for furnishing and installing temporary trench paving asphalt shall be considered as included in the prices paid for the **various contract items** of work and no additional allowance will be made therefor.

Asphalt Concrete Base used per Note 1 of City Standard 215 shall be considered as included in the prices paid for the **various contract items** of work and no additional allowance will be made therefor.

**Permanent Trench Paving** shall be paid for at the contract price per **ton** of asphalt concrete surface course which price shall include full compensation for furnishing all labor, materials, tools, equipment and doing all work involved in placing permanent trench paving, including but not limited to: saw cutting, tack coat, compaction, asphalt concrete base, and any other work required for permanent trench paving not specifically enumerated in the City Standards, these General Conditions, Special Conditions, Technical Specifications or on the Project Plans and no additional allowance will be made therefor.

Asphalt concrete base used in the Permanent Trench Paving structural section shall be considered as included in the unit price paid for permanent trench paving and no additional allowance will be made therefor.

The estimated quantity of Permanent Trench Paving 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 shall be made therefor. The provisions in Section 9-1.06(B)(C) of the Standard Specifications shall not apply.

# 51 CONCRETE STRUCTURES

**51-7.01A General:** Minor Structures shall be constructed in accordance with Section 51 of the City Standards, Section 51-7 of the Standard Specifications, the Project Plans, and these Technical Specifications. Minor concrete structures include the meter manhole, valve vault, hatches, covers, and appurtenant components such as, frames, hatch collars, floor drains, traps, drain pipes, penetrations, and accessories.

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

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

Placing of concrete under water will not be permitted.

The Contractor shall provide a submittal for precast vault structures and associated covers, hatches, and appurtenances including the following:

1. Shop drawings of manhole and vault sections, base units, construction details, jointing methods, materials, and dimensions.
2. Summary of criteria used in manhole and vault design including, as minimum, material properties, loading criteria, and dimensions assumed. Include certification from manufacturer that concrete design meets or exceeds the load and strength requirements of ASTM C 478 and ASTM C 857, reinforced in accordance with ACI 440.1r-15.
3. Cover, hatch, frame, and associated accessories.
4. Materials to be used for pipe connections.
5. Materials to be used for floor drains, traps, and drain pipes.

Meter vault and valve vault structures, covers, and hatches shall be designed to withstand AASHTO H-20 traffic loading.

Meter vault and valve vault shall have clear inside plan dimensions and depth as designated on the Project Plans. Walls shall be reinforced sufficiently to withstand loads imposed by complete burial in saturate soil.

Valve vault and wet well shall be furnished with two-leaf hinged, hydraulic-assisted aluminum hatches. Each leaf shall permit full opening of the vault. Hatch shall be furnished with suitable hardware to secure the leaves in the closed position.

**51-7.01B Materials:** Portland cement concrete structures shall be constructed in accordance with Section 51 of the Standard Specifications, the details and requirements shown on the Project Plans, these Technical Specifications, and as directed by the Engineer.

Reinforcement shall conform to the provisions of Section 52 of the Standard Specifications and the requirements indicated on the Project Plans.

The Contractor shall waterproof the inside and outside of new precast concrete structures and vaults with a manufacturer approved waterproofing compound. Waterproofing compound shall be one of the following or an approved equal:

1. Xypex as manufactured by Xypex Chemicals Ltd.
2. Thoroseal as manufactured by Standard Drywall Products Inc.

Joint sealants shall meet or exceed all requirements of ASTM 990 for joints, concrete pipe, manholes and precast box sections, using Preformed Flexible Joint Sealants. Sealants shall meet the requirements of the Federal Specifications SS-S210-A, "Sealing Compound Preformed Plastic for Pipe Joints". The sealing compound shall not leak at joints, while being tested at 10 psi, for a period of 24 hours. The Sealing compound shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler, and shall contain no solvents, irritating fumes or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength. Joint sealing compound shall be RAM-NEK as manufactured by Henry Company or approved equal.

Drain piping shall be constructed of solvent welded Schedule 40 PVC.

**51-7.01C Construction:** The elevations of the bottoms of footings shown on the Project 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 secure a satisfactory foundation.

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

Placing of concrete under water will not be permitted.

Backfilling of concrete structures shall comply with the requirements of Section 19 of these Technical Specifications.

It is the Contractor's responsibility to ensure that precast structures are laid and bedded on sound materials, existing and new. Any field conditions that may affect grade shall be brought to the attention of the Engineer prior to installation.

Waterproofing compound shall be applied with two coats as recommended by the manufacturer to achieve a completely watertight wall. The Contractor shall be responsible to provide a completely watertight structure, with no visible signs of leakage.

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

Provide a minimum 12-inch wide by 12-inch thick concrete collar around hatches if the hatch is not cast into the box. Edges shall be protected from site construction.

Exposed concrete work shall be finished in accordance with Section 51-1.03F(2) of the Standard Specifications.

Where concrete cannot be poured around a pipe as part of a new structure, or where a manufactured penetration is not feasible, penetrations through a concrete structure shall be by

core drilling other approved method that will not crack or otherwise damage the concrete structure.

The Contractor shall seal the penetration with a modular mechanical seal and the annular space shall be filled with high strength non-shrink grout. Pipe penetrations on the outside of a structure shall be stabilized by a concrete collar prior to backfilling.

**51-7.01D Payment: Valve Vault and Hatch** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved in the construction of the valve vault, hatch, and associated appurtenances, including but not limited to: potholing other than as specified in Section 15 to facilitate the progress of work; excavation and disposal of excavated materials; hand digging *if needed*; penetrations; waterproofing; joint sealing; floor drain and trap; drain pipe between the valve vault and the wet well; grouting; coating and patching; supporting or removal and disposal of existing abandoned utilities in the same excavation, *if required*; placing and compacting all required bedding and backfill including control density fill *if required*; trench plates as needed; concrete collar; installing and adjusting the hatch to grade; testing; and grouting the floor to drain; complete in place and as shown on the plans and as specified herein and as directed by the Engineer, and no additional allowance will be made therefor.

**Meter Manhole** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved in the construction of the meter manhole, cover, and associated appurtenances, including but not limited to: potholing other than as specified in Section 15 to facilitate the progress of work; excavation and disposal of excavated materials; hand digging *if needed*; penetrations; waterproofing; joint sealing; floor drain and trap; drain pipe between the meter manhole and the wet well; grouting; coating and patching; supporting or removal and disposal of existing abandoned utilities in the same excavation, *if required*; placing and compacting all required bedding and backfill including control density fill *if required*; trench plates as needed; concrete collar; installing and adjusting the cast iron frame and cover to grade after final paving is complete; testing; and grouting the floor to drain; complete in place and as shown on the plans and as specified herein and as directed by the Engineer, and no additional allowance will be made therefor.

Metal frames, covers, hatches, and associated appurtenances are included in the payment for minor structures as indicated in the descriptions above.

## 56 SIGNS

**56-2.01 Description:** The work shall consist of installation, removal and reinstallation of roadside signs as indicated on the Project Plans, and where directed by the Engineer, and shall conform to Section 56 of the Standard Specifications, the current edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD), and applicable City of Santa Rosa requirements.

Where signs are shown on the plans as relocated or removed, the sign post and foundation shall be removed if no longer in use. Existing sign posts removed from sidewalks shall be ground flush with the existing sidewalk surface, and the void filled with grout.

Salvaged signs shall be returned to the City of Santa Rosa Sign Shop at 55 Stony Point Road. All poles being removed shall become the property of the Contractor.

Where traffic regulatory signs (i.e. STOP and crosswalk warning) are removed for construction, Temporary Signs shall be placed and maintained on barricades at stop controlled intersections and the crosswalk until permanent traffic regulatory signs are installed. Temporary stop bars and crosswalks shall be installed in accordance with Section 84 of the specifications.

**56-2.06 Payment: Remove and Replace Roadside Sign** shall be paid for the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools and equipment and doing all work involved in Removal, replacement, and relocation of signs and poles complete, including new poles, excavating, coring sidewalk, backfill, concrete, replacing landscaping, and sign mounting hardware, as specified herein, and no additional allowance will be made therefor.

Full compensation for installing and maintaining Temporary Sign, including all labor, materials, tools and equipment, complete as herein specified shall be included in the prices paid for various contract items of work and no additional allowance will be made therefor.

## 64 PLASTIC PIPE

**64-2.02 Materials:** Plastic pipe for sidewalk storm drain shall be schedule 80 PVC.

**64-2.02B Backfill:** Excavation and backfill shall be in accordance with Section 64-1.05 of the City Standards. All trench excavation material from trenches, including any removed portions of the existing storm drain pipe, shall be the property of the Contractor. Excavated material shall not be disposed of on the work site. Prior to disposal of any material, the Contractor shall submit to the Engineer written authorization for such disposal of material and entry permission signed by the owners of the disposal site, and shall comply with any other requirements of disposal, such as City and County permits, as may be required.

Excavation and backfill shall be as shown on Standard 215 Standard Trench Detail of the City of Santa Rosa Standard Plans.

If the specified trench widths are not sufficiently wide for the materials and methods proposed, a wider trench allowing for proper installation should be constructed.

Pipe bedding will be placed in 6-inch (maximum) lifts to six inches above the top of pipe with each lift hand or mechanically tamped. The final lift can be compacted with a plate type vibrating compactor.

**64-2.03C Laying Pipe Placement:** Laying Pipe shall be in accordance with Section 64-1.07 of the City Standards. 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 plans. When long radius curves are permitted, adjustments in horizontal alignment will be achieved through adjustments at each coupling, within manufacture's specification, and not by bending of the pipe.

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

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

### **64-2.04 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.

## 73 CONCRETE CURBS AND SIDEWALKS

**73-1.01 General:** This work shall consist of curbs, gutters, sidewalks, driveways, curb ramps, valley gutters and their appurtenances and shall be constructed in accordance with the details and at the location shown on the plans, City Standards, and in conformance to the requirements of Section 73 of the City Specifications, and the Standard Specifications.

The Contractor shall allow review of the subgrade by the Engineer prior to placement of base materials thereon. Soft or spongy material shall be removed and replaced with suitable material as required by the Engineer.

All new concrete construction joints shall be of the same type as those removed with the existing concrete unless otherwise stated herein or on the plans. The Contractor shall provide a plan showing the location of the planned construction joints for approval by the City.

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

Curb ramps will be evaluated using a 4 foot smart level. Newly constructed curb ramps with slopes exceeding those allowed by ADA standards shall be removed and replaced in their entirety including the detectable warning surface and no additional compensation will be provided. Grinding or the application of a cement mortar grout will not be an acceptable alternative to correct unacceptable grades. A single curb ramp shall be constructed for review and approval by the Engineer prior to construction of additional curb ramps.

18-inch long #4 rebar dowels shall be installed between all new and existing sidewalk and curb and gutter. Drill approximately 5/8-inch diameter holes 6-inches deep into existing concrete to provide sliding fit for rebar dowels.

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

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

**73-2.03 Curb Construction:** Curb construction shall be in accordance with Section 73-1.05 of the City Standards.

Curb and gutter shall be constructed per City STD-241, and per the details and at the locations shown on the plans, and in accordance with the City Specifications.

Expansion joint material shall be installed on both sides of new curb and gutter.

All concrete which is to be removed from curb and gutter areas shall be removed to the nearest transverse score mark or construction joint or as directed by the Engineer.

No deduction in measured length of curb and gutter to be paid for will be made for curb openings for driveways and curb ramps.

Curb and gutter installation not adjacent to roadway reconstruct areas shall include the removal of a 24-inch wide deep lift asphalt concrete pavement strip which runs along the lip of gutter. The deep lift AC strip shall be saw cut neatly with removal of a minimum of 0.5 ft depth of the existing AC. Adjacent overlays or surface paving replacement shall be performed at the same time as the final lift of the deep lift AC strip. Deep lift paving will be paid for at the per Section 39-6.

### **73-3.01D(2) Warranties**

The manufacturer shall provide a written 5-year warranty for prefabricated detectable warning surfaces, guaranteeing replacement when there is a defect in the dome shape, color fastness, sound-on-cane acoustic quality, resilience, or attachment. The warranty period shall begin upon acceptance of the contract.

**73-3.03 Sidewalk, Valley Gutter, Curb Ramp, and Driveway Construction:** Sidewalk, valley gutter, curb ramp, and driveway shall be constructed in accordance with the details and at the location shown on the plans and in conformance to the requirements of Section 73-1.07 of the City Specifications with the following modifications and additional requirements.

1-4-inch expansion material with thickened edges of 8-inches shall be applied surrounding all vertical poles, utility vaults, boxes, and base plates.

All concrete which is to be removed from sidewalk and driveway areas shall be removed to the nearest transverse score mark across the full width of sidewalk or construction joint or as directed by the Engineer. Sidewalk crack control joints shall be scored 1/4" to 3/8" wide with no finished joint larger than 1/2" wide by 1/4" deep.

Curb ramps shall be constructed at the locations specified in these technical specifications, in full compliance with the most stringent requirements of the ADA, California Building Code sections 11B-302.3, 11B-406.2, 11B-406.3, and 11B-406.5, as well as Caltrans Standard Plan A88A.

Unless noted otherwise on the Project Plans, Sidewalk conform areas are to be a minimum of 5 foot long or to the next control joint by the width of the existing sidewalk.

Trees overhanging the public right-of-way within proposed curb ramp and adjacent sidewalk areas shall be trimmed in accordance with Section 112 to provide a minimum 7 feet of vertical clearance above the finished walking surface.

Notify the Engineer 10 days prior to removal of the ramp of all anticipated conflicts at specific locations. Scheduling a "pre-curb ramp installation walk through" with the Engineer is recommended and can be requested or required by the City at the Preconstruction Meeting.

Expansion joint material shall be installed full width from gutter to back of sidewalk on both sides of the curb ramp. Expansion joint material shall comply with ASTM D2475, sized accordingly and 1/2" to 3/4" from the top of the finished grade. Fill and seal joints with a self-leveling joint sealant

complying with ASTM C920-11, Type S, Grade P, Class 25. Allow appropriate cure time prior to any contact. Finished joints shall not be greater than 1/2" wide by 1/4" deep.

Curb ramp detectable warning surfaces shall consist of prefabricated raised truncated domes constructed with curb ramps in conformance with the details shown on the plans and Caltrans Standard Plan A88 and these Technical Specifications. The color of the detectable warning surface shall be yellow conforming to the Federal Standard 595A, Co. No. 335838.

The detectable warning surface tiles shall be protected from concrete splatter while installing the cast-in-place detectable warning surface into the PCC sidewalk by a temporary 4 mil plastic sheeting or approved equal. Fire hydrants and poles shall be cleaned of concrete splatter and curing compound within 24 hours.

The finished surfaces of the detectable warning surface shall be free from blemishes. No cutting of the tiles shall be allowed unless approved in writing by the Engineer. Installation shall be per manufacturer's instructions or as directed by the engineer.

Prefabricated detectable warning surfaces shall be installed in accordance with the manufacturer's recommendations.

Valley Gutter shall be constructed in accordance with the details and at the locations shown on the plans.

Sidewalks, curb ramps, and driveways shall be cured in accordance with the requirements of Section 90-1.03B of the Standard Specifications except that a non-pigmented sealer may be used upon submittal and approval in writing of such substituted sealer by the Engineer.

Concrete with excessive surface cracking exceeding 1/16-inch in width or resulting in level changes greater than 1/4-inch in height shall be removed and replaced at no additional cost to the City. Patching or any joint fillers are not allowed for repairs to damaged concrete.

**73-3.04 Payment: Curb & Gutter** shall be paid for at the contract price per **linear foot**, which price shall include full compensation for furnishing and applying curing materials, forming and constructing curb opening for driveways, removing discoloring, furnishing all labor, materials, tools and equipment and doing all the work involved in constructing curb and gutter complete in place as specified, including furnishing and placing expansion joint filler, Class II Aggregate base, root barrier, native backfill if required, constructing weakened plane joints, excavating, and backfilling.

**Curb Ramp** shall be paid for at the contract price per **square foot**, which price shall include full compensation for furnishing and applying curing materials, removing discoloring, furnishing all labor, materials, tools and equipment and doing all the work involved in constructing curb ramp complete in place as specified, including furnishing and placing expansion joint filler, sand base layer, Class II Aggregate base, vertical curb, detectable warning surface, removal and restoration of irrigation and landscaping, constructing weakened plane joints, excavating and backfilling.

For purposes of payment, curb ramp will be measured between the outside border of the ramp, landing, and integral curb areas but will exclude the curb and gutter. The area of concrete beneath the detectable warning surface shall be paid for at the contract price per square foot of curb ramp.

**Sidewalk** shall be paid for at the contract price per **square foot**, which price shall include full compensation for furnishing applying curing materials, removing discoloring, furnishing all labor,

materials, tools and equipment and doing all the work involved in constructing sidewalk complete in place as specified, including furnishing and placing expansion joint filler, constructing weakened plane joints, excavating, and backfilling.

**4" Sidewalk Drain** 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 a new sidewalk drain complete in place as specified including precast inlet vault with grate, drain pipe, welded wire fabric, constructing weakened plane joints, excavating, and backfilling.

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

**Valley Gutter** shall be paid for at the contract price per **square foot**, which price shall include full compensation for furnishing and applying curing materials, removing discoloring, furnishing all labor, materials, tools and equipment and doing all the work involved in constructing valley gutter complete in place as specified, including furnishing and placing expansion joint filler, constructing weakened plane joints, excavating, and backfilling.

## 78 SURVEY MONUMENTS

**78-2.01 General:** Survey monuments shall conform to City Standards 280 to 282. The exact location of the monument will be established by the Engineer. The monument will be approved after it is constructed then center point stamped by the Engineer.

Damaged Monuments will be replaced per City Standard and existing components of the damaged monument may not be allowed.

**78-2.04 Payment:** **City Monument** shall be paid for at the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in constructing monuments complete in place, including removal of existing monuments disturbed during construction which shall be replaced with new monuments, and no additional allowance will be made therefor.

## 80 FENCES

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

Chain link fence shall be 8-ft tall with "anti-climb" mesh. Security fencing and gates shall consist of steel chain link mesh fabric and steel posts, both vinyl clad. Security fences and gates shall be constructed per Caltrans Standard Plan A85 with modifications as shown on the Project Plans and as modified herein.

Concrete fencing shall be constructed of precast concrete posts and panels as shown on the Project Plans.

### **80-3 Chain Link Fences**

#### **80-3.02 Materials**

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

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

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

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

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

**80-3.02C Security Fence and Gate Fabric:** Security Fence and Gate fabric shall be galvanized steel fabric conforming to the specifications of AASHTO Designation M-181. The fabric shall be #9 gauge, Type IV, Class B bonded vinyl-coated, black. Fabric shall be woven into approximately a one inch mesh.

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

### **80-3.03 Construction**

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

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

**80-3.04 Payment:** Chain link security fencing shall be considered as included in the prices paid for the **Chain Link Rolling Gate and Fence** and no additional compensation will be allowed.

### **80-5 Precast Concrete Fencing**

**80-5.01 Concrete Fence:** Concrete fence shall be designed in accordance with the California Building Code. Footing size shall be designed by the manufacturer but shall be no smaller than that shown on the Project Plans. Concrete fencing shall be designed for wind and seismic loading.

Concrete fence shall be Woodcrete by American Precast or approved equal.

**80-5.02 Precast Concrete Fencing Materials:** Posts, panels, and panel caps shall be integrally colored. Selected color shall be at the choice of the City.

Concrete shall be normal weight concrete having sand and gravel or crushed stone aggregate mixed with type I or III Portland cement per ASTM-C150. Concrete material for precast panels and posts shall have a minimum 28-day compressive strength of 3000 psi. Water used for concrete shall be clean water and free from oils, acids, and organic substances. All aggregates shall conform to ASTM C33 with a maximum aggregate size of  $\frac{3}{4}$ ".

Deformed type bar reinforcing materials shall conform to ASTM-A 615, Grade 60. Steel reinforcing wires shall meet US Steel Wire gauge, ASTM-A 82 with a minimum yield force of 70,000 psi min. All wire mesh shall be galvanized with the gauge and spacing per the manufacturer design.

**80-5.03 Construction:** Fence construction shall be in accordance with Section 80 of the Standard Specifications, the details as shown on the plans, these General Conditions, Special Conditions, Technical Specifications, and as directed by the Engineer.

**80-5.04 Payment:** **Precast Concrete Fence** shall be paid for at the contract price per **linear foot**, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in furnishing and installing posts, post assemblies, clearing the line of the fence and disposing of the resulting material, excavating high points in the existing ground, excavating and backfilling holes, disposing of surplus excavated material, and furnishing and placing concrete footings, and connecting new fences to existing fences, and no additional allowance will be made therefor.

## **80-10 Gates**

**80-10.01 Gates:** A rolling gate shall be placed as shown on the Project Plans and in locations determined in the field by the Engineer, and in accordance with these General Conditions, Special Conditions, Technical Specifications.

All gates shall be equipped with a multiple lock assembly as indicated on the project plans.

**80-10.04 Payment:** **Chain Link Rolling Gate and Fence** 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 chain link security fencing and rolling gate in place with all necessary appurtenances to create a complete and smooth operating installation, as shown on the plans and as specified herein.

[Updated: 12/18/2019 CDA STD2018]

# 81 PAVEMENT MARKERS

**81-1.01 General:** Raised pavement markers shall be placed at the locations shown on the Plans and in accordance with the applicable provisions of Section 81 of the Standard Specifications, these General Conditions, Special Conditions, Technical Specifications, and the City of Santa Rosa Traffic Standards. Attention is directed to Section 15 “Existing Facilities” of these General Conditions, Special Conditions, Technical Specifications.

**81-1.02 Materials:** All raised pavement markers (RPMs) shall conform to the most current State Specifications.

**81-1.02B Nonreflective Pavement Markers:** All non-reflective pavement markers shall be ceramic.

**81-1.02C Retroreflective Pavement Markers:** Blue reflective raised pavement markers are to be placed per City STD -857 for each fire hydrant within the construction limits of the project. Where a hydrant, whether existing or new, is located at the corner of two streets, a blue RPM shall be placed in each street.

**81-1.03 Construction:** Existing raised pavement markers to remain, which are damaged by the Contractor, shall be replaced as determined by the Engineer, at the Contractor’s expense. This includes areas outside the immediate project limits.

The exact locations and limits of raised pavement markers will be determined in the field by the Engineer.

The Contractor shall provide, install and maintain temporary markers on the same day that the existing permanent markers are removed, or as directed by the Engineer, and maintain this delineation until new permanent markers are in place. Temporary markers on non-ground surfaces shall be plastic adhesive retroreflective delineators.

Existing raised pavement markers conflicting with the proposed striping shall be removed immediately prior to placement of new markers.

Holes left in the pavement due to the removal of raised pavement markers shall be filled with enough adhesive to replace any asphalt which comes off with the removal of the pavement marker, leaving a level driving surface.

Permanent raised pavement markers shall be installed within 5 days following final pavement operations. Temporary markings shall be in place the same day of pavement operations.

**81-1.04 Payment:** The cost of retroreflective and nonreflective pavement markers, shall be included in the prices paid for the **various contract items** of work which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in placing raised pavement markers, complete in place, including adhesives, removing existing pavement markers, and no additional allowance will be made therefor.

# 84 MARKINGS

## **84-2 Traffic Stripes and Pavement Markings**

### **84-2.01 General**

**84-2.01A Summary:** Attention is directed to Section 12 “Temporary Traffic Control” and Section 15 “Existing Facilities” of these Technical Specifications. Traffic stripes and pavement markings shall conform to the applicable provisions of Section 84 of the Standard Specifications, The City Traffic Standards, and these General Conditions, Special Conditions, Technical Specifications and shall be placed at the locations shown on the Plans.

The Contractor shall provide and install temporary retro-reflective pavement markings on the same day as the existing permanent markings are removed or destroyed, or as directed by the Engineer, and maintain them until the new permanent markings are in place.

Temporary striping on all ground surfaces shall be paint (white and/or yellow) with retro-reflective glass beads or an approved equivalent and shall be installed the same day as the existing permanent striping is removed, or as directed by the Engineer. Temporary striping shall be maintained until new permanent striping is in place.

Existing pavement markings, including crosswalks, disturbed by construction activities shall be replaced in their entirety.

All striping to be replaced shall match existing sections in kind unless approved by the Engineer.

The Contractor shall remove all existing traffic striping and pavement marking in conflict with proposed improvements, as shown on the Plans, and as directed by the Engineer, and shall be responsible for the proper disposal of their grindings away from site work.

Permanent traffic stripes and pavement markings shall be installed after all iron has been raised for that particular street section, but no more than five days after final paving for that section of roadway.

Existing stripes and pavement markings to remain, which are damaged by the work shall be replaced at the Contractor’s expense. This includes areas outside the immediate project limits.

Painted curbs which are damaged or replaced as part of the work shall be repainted to match existing conditions.

**84-1.02 Inspection:** The Engineer shall inspect completed lines and markings as conditions may require and may inform the Contractor of any faulty methods or unsatisfactory results.

**84-1.03 Payment: Stripes and Pavement Markings** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all equipment, tools, and labor, and doing all the work involved, as herein specified, including but not limited to, pavement surface preparation, glass beads, thermoplastic material, tape, removal of existing and temporary stripes and pavement markings, replacement of damaged stripes and markings, raised pavement markers, painted striping and markings, all temporary traffic measures, and any other work required to install

thermoplastic and painted stripes, pavement markings, and raised pavement markers not specifically enumerate in the City Standards, the Project Plans, and these Technical Specifications, and no additional compensation will be made therefor.

[Updated: 12/19/2019 CDA STD2018]

## 90 CONCRETE

**90-1.01C(6) Mix Design:** The proportions of the water, sand and aggregate shall be regulated so as to produce a plastic, workable and cohesive mixture.

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

**90-1.01D(5) Compressive Strength:** The 28 day compressive strength of concrete shall be 4000 pounds per square inch (psi) or greater.

**90-1.01D(6) Curing Compound:** Concrete shall be cured per Section 90-1.03B of the Standard Specifications. Pigmented curing compound or any other material that will leave a noticeable residue shall not be allowed.

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

**90-1.03 Payment:** The cost of concrete, shall be included in the prices paid for the **various contract items** of work which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in forming, mixing, pouring, finishing and no additional allowance will be made therefor.

## 106 TRENCH BRACING AND SHORING

**106-1.01 General:** All bracing and shoring shall conform to Sections 7.14 and 7.15 of these General Conditions, Section 7-1.02K(6)(a and b) of the Standard Specifications, and the Division of Industrial Safety Construction Safety Orders which are currently in use.

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

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

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

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

The Contractor shall provide a **positive pressure shoring system** where adjacent structures, roadways, concrete, pavements, utilities, trees, or private property to remain are located within a 1.5(H):1(V) projection from the planned bottom of an excavation. If sheeting is used, it shall be installed with the use of vibratory type pile drivers as opposed to impact type. The width of sheeted trenches as measured between the faces of the sheeting in contact with the trench walls shall not exceed the maximum trench width indicated by City Standard 215 unless approved by the Engineer. The installation of walers, struts, and other shoring support structures shall be designed and installed to present no obstructions to proper placement of the pipe, structure, bedding, backfill, or proposed improvements.

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

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

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

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

**106-1.03 Execution:** Shoring shall be removed in such a manner as to prevent caving at the walls of excavations or damage to piping or other structures. Positive shoring systems shall be

incrementally removed as the trench is backfilled. No backfill shall be installed against the shoring system before it is removed.

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

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

**106-1.04 Payment: Trench Bracing and Shoring** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved to furnish and install sheeting, shoring and bracing for the protection of adjacent existing improvements, and the protection of life and limb conforming to applicable safety orders, including but not limited to a bracing and shoring plan, securing Cal/OSHA permits, and in accordance with the Project Plans, applicable Federal, State and Local Regulations, permits, and as specified herein, and no additional compensation will be made therefor.

# 112 TREE PROTECTION

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

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

All pruning shall be done according to International Society of Arboriculture (ISA) or National Arborists Association (NAA) standards, by qualified personnel. Pruning shall be done by ISA certified tree workers or certified arborists, or under the direct supervision of a certified arborist.

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

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

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

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

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

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

Any trees, brush, shrubs, or other natural objects not ordered to be removed by the Engineer which have been removed, altered, or damaged shall be replaced in kind by the Contractor before completion of the project.

**112-1.03 Payment:** Full compensation for pruning tree roots under an ISA certified tree workers or certified arborists, or under the direct supervision of a certified arborist shall be considered as included in the prices paid for various contract items of work and no additional allowance will be made therefor.

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

[Version: 11/6/14CDA STD2010]

## 121 NOTIFICATION

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

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

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

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

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

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

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

## 124 MATERIAL RECYCLING

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

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

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

[Version: 11/6/14CDA STD2010]

## 129 SUBMERSIBLE PUMPS

**129-1.01 General:** The Contractor shall furnish, install, test, and make fully operational all pumping equipment, complete with all necessary accessories, in compliance with the Project Plans and these technical specifications. The pumps shall be provided complete with all accessories, shims, sheaves, couplings, and other appurtenances as specified, and as may be required for a complete and operating installation.

**129-1.02 Materials:** All materials employed in the pumping equipment shall be suitable for the intended application. Material not specifically called for shall be high-grade, standard commercial quality, free from all defects and imperfection that might affect the serviceability of the product for the purpose for which it is intended, and shall conform to the following requirements unless otherwise specified.

Cast iron pump casings and bowls shall be of close-grained gray cast iron, conforming to ASTM A 48, or equal.

Bronze pump impellers shall conform to ASTM B 584, "G" bronze.

Stainless steel pump shafts shall be of Type 400, Series. Miscellaneous stainless steel parts shall be Type 316.

Suction and discharge flanges shall conform to ANSI standard B16.1 or B16.5 dimensions.

**129-1.03 Submersible Pumps:** The Contractor shall furnish and install submersible pump at the locations shown on the Project Plans. The Contractor shall also furnish and deliver one spare pump to the City, at their desired location. All pumps and pump appurtenances shall be manufactured by Flygt to match City standards.

Operating conditions and performance requirements as follows:

Pump Model	Flygt NP 3102
Pump Installation	Wet
Design Capacity (gpm)	174
Total Dynamic Head (ft)	18.8
Maximum Pump Speed (rpm)	1755
Discharge Diameter (in)	3
Guiderail System	Yes
Closed Loop Cooling	Yes
Power Rating	460 V, 3ph, 60 Hz
Horsepower	5
Insulation Class	H

The pumps shall be bottom suction, side discharge construction and shall be supplied with a foot mounted discharge connection elbow and integral sliding rail removal system of the pump manufacturer's design matched to the pumps being supplied.

Casing shall be a smooth surface devoid of blowholes, pits, burrs, and other irregularities. The casing shall have a suction cover, which can easily removed for easy access to the impeller. All non-stainless steel metal surfaces coming in contact with the pumped media shall be protected by a factory applied spay coating of Supplier's modified acrylic primer and finish. The volute shall be single piece, non-concentric design and shall have smooth fluid passages large enough at all points to pass any size solids which can pass through the impeller. Pump volute shall be provided with a cleanout port to allow for removal of any foreign material blocking or impeding performance of the pump.

All mating surfaces where watertight sealing is required shall be machined and fitted with nitrile or Viton rubber O-rings. Fitting shall be such that sealing is accomplished by metal-to-metal contact between machined surfaces. This will result in controlled compression of the O-rings without the requirement of a specific torque limit. Secondary sealing compounds, rectangular gaskets, elliptical O-rings, grease or other devices shall not be acceptable.

The impeller shall be hard alloy gray cast iron conforming to ASTM A-48 Class 30, 35, or 40. Impellers shall be dynamically balanced, closed non-clogging design with multiple vanes. The impeller shall be capable of handling solids of specified sphere size, fibrous materials, heavy sludge, and other matter found in normal wastewater applications. The impeller shall be mechanically secured to the motor shaft per manufacturer's recommendations utilizing machined stainless steel components. Adhesive or friction- type fits are not acceptable. Impeller shall be coated with the same system applied to the interior of the casing.

A wear ring system shall provide efficient sealing between the volute and impeller. Casing and impeller wear ring shall be of stainless steel construction. Supplier shall submit AISI grades of stainless steel proposed for the wear rings. Rings shall be drive fitted to the volute inlet and heat-shrink fitted to the impeller.

Shafting shall be constructed of AISI 329 stainless steel or 416 stainless steel for the pump and motor, sufficiently large in diameter to transmit safely the maximum torque developed by the drive unit and of such a design as to provide rigid support for the impeller and to prevent excessive vibration. The shaft shall be suitably heat-treated, turned, ground, and polished over its entire length.

Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies of high-pressure design. The seals shall operate in a lubricant reservoir that hydrodynamically lubricates the lapped seal faces at a constant rate. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. Seal lubricant shall be FDA Approved, nontoxic. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal. The seal system shall not be damaged when run dry. No external source of seal cooling or lubrication water shall be required. All metal components of the upper and lower seals shall be AISI Type 316 stainless steel. All elastomers shall be of Viton material.

A rail system shall be provided and installed for each pump. The pump shall be easily removed from the wet well for inspection or service without entering the pit or disconnecting piping. The pump shall be provided with a foot mounted discharge connection elbow constructed of cast iron conforming to ASTM A48-Class 30 or 35, permanently installed in the wet well along with the

discharge piping. The discharge connection elbow shall be constructed with a 125 lb. ANSI standard flat faced flange. The pump shall be automatically connected to the discharge connection elbow when lowered into place, and shall be easily removed for inspection or service. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a simple downward motion of the pump. The entire sliding rail system shall be designed to safely withstand all stresses imposed thereon by vibration, torque, shock and all possible direct and eccentric loads. No portion of the pump shall bear directly on the floor of the sump. Lower guide bar holders shall be integral with the discharge connection. Guide bars shall be of at least standard weight 316 stainless steel pipe of a conservative size adequate for its intended use. The guide bars shall not support any portion of the weight of the pump. All anchor bolts, lifting bolts, eye lugs and lifting cable, etc. necessary for a complete installation and maintenance of the pump shall be constructed of Type 316 stainless steel and shall be adequately designed for its intended use.

The following spare parts shall be provided for each pump being supplied:

1. One (1) - set of lower and upper wearing rings
2. One (1) - set of motor and pump bearings
3. One (1) - complete mechanical seal assembly (upper and lower)
4. Two (2) - complete set of gaskets and O-ring seals

Certified test curves shall be provided for all pumps.

#### **Pump Electrical and Control Requirements:**

The pump manufacturer shall provide the power and control cables between the pump and the local disconnect switch, junction box, or control panel (see Drawings) and shall be responsible for reviewing the electrical drawings as necessary to determine the required cable length. All pumps for the same pumping application shall be provided with the same length of cable. No splices shall be allowed unless specifically indicated on the Drawings. Cables shall be PVC or oil resistant chloroprene rubber jacketed type SPC cable suitable for submersible pump applications, shall be sized according to NEC and ICEA standards, and shall meet with MSHA approval. Stainless steel strain relief connectors shall be furnished for all cables.

The cable entry water seal design shall insure a watertight and submersible seal without specific torque requirements. The cable entry shall be comprised of a single cylindrical elastomer grommet, flanked by stainless steel washers all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the entry body containing a strain relief function, separate from the function of sealing the cable. The assembly shall bear against a shoulder in the pump top. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate gaining access through the pump top. The junction chamber containing the terminal board shall be sealed from the motor by an elastomer compression seal O-ring. Connection between the cable conductors and stator leads shall be made with threaded compressed type binding post permanently affixed to the terminal board and thus perfectly leak proof. Each pump shall be equipped with separate terminal board that totally isolates the incoming power supply from the pump motor.

An acceptable alternate cable entry seal shall include cable leads shall enter at the top of the motor and shall allow the cable-to-motor connection to be accomplished in the field without soldering. All power and control lead wires shall be double sealed as they enter the motor in such a manner that cable-wicking will not occur. This sealing system shall consist of a rubber grommet followed by epoxy that is high in adhesive qualities and has a low coefficient of expansion. Each

conductor shall have a small section of insulation removed to establish a window area of bare wire and each wire shall be untwisted and surrounded by epoxy potting material. A cable strain relief mechanism shall be an integral part of the sealing system. The cable sealing system shall be capable of withstanding an external pressure test of 1,200 psi as well as a cable assembly pull test as required by Underwriters Laboratories. Power and control leads shall be terminated on a sealed terminal board. The terminal board and its bronze lugs shall be O-ring sealed.

The pump motor shall be a squirrel-cage induction type, housed in a watertight chamber. The stator winding and stator leads shall be moisture resistant. The use of bolts, pins, or other fastening devices requiring penetration of the stator housing shall not be allowed.

The motor shall be guaranteed for continuous unsubmerged duty, capable of sustaining a minimum of fifteen (15) starts per hour without overheating.

Each pump motor stator must incorporate three thermal switches, one per stator phase winding and be connected in series, to monitor the temperature of the motor. Should the thermal switches open, the motor must stop and activate an alarm. Moisture detector probes shall be provided in the oil-seal chamber. The thermal switches and moisture detector probe must be connected to a Mini CAS II control and status monitoring unit. The Mini CAS unit must be designed to be mounted in the motor control center.

Power cable between the pumps and the motor control center shall be furnished by the pump supplier in a sufficient length to avoid splices.

#### **129-1.04 Execution:**

**129-1.04A Manufacturer's Field Services:** The services of a qualified manufacturer's technical representative shall be provided. Field services shall include one site visit for each of the following: Installation and Testing, Startup and Training, and Services after Startup. Assume one day per trip.

**129-1.04B Shop Testing:** Shop testing shall include the following:

1. Impeller, motor rating and electrical connections shall be checked.
2. A motor and cable insulation test for moisture content or defective insulation shall be made.
3. Prior to submergence, the pump shall be bumped to establish correct rotation and mechanical integrity.
4. The pump shall be run for 30 minutes submerged, a minimum of six (6) ft. under water.
5. After the pump test, the insulation test shall be performed again.

**129-2.01 Payment:** **Submersible Pumps** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved for the installation of the submersible pumps and appurtenances within the wet well, including but not limited to: procuring pumping equipment including pumps, pump base, discharge elbows, and guiderail system, installation of pumps,

connection of piping, installing rail system, testing and start up; as specified herein, and no additional allowance will be made therefor.

## 130 SANITARY SEWER SYSTEM

**130-1 General:** Sanitary sewer system components and related appurtenances shall conform to all applicable City of Santa Rosa standards. Contractor's attention is specifically directed to the requirements as specified in the City of Santa Rosa Sanitary Sewer Standards Specifications Section 130, the Project Plans, and modifications herein.

**130-1.02 Materials:** Gravity sewer main pipe shall be polyvinyl chloride (PVC) pipe conforming to the City Standard Specifications.

Sewer force main pipe and fittings shall be high-density polyethylene pipe or ductile iron as indicated on the Project Plans. Force main piping shall conform to the City Standard Specifications and these General Conditions, Special Conditions, Technical Specifications.

Precast manhole and wet well components including risers, cones, grade rings and base sections shall be constructed of polymer concrete as described herein. Polymer concrete manhole components shall be manufactured by Armorock LLC, U.S. Composite Pipe, or an approved equivalent.

**130-1.02A Material Submittals:** The Contractor shall submit the manufacturer's installation instructions for all sewer main pipe and sewer main fittings approved for use on this project. Instructions shall include proper procedures for laying and bedding, field cutting, and joint assembly (insertion).

**130-1.02B(1) PVC Pipe Couplings:** Couplings used to join plain end pieces of SDR 26 PVC gravity sewer pipe shall be shielded sewer repair couplings consisting of stainless steel worm drive clamps, stainless steel nut & bolt clamps, and a heavy duty stainless steel shield over a molded one-piece elastomeric sealing gasket. Couplings shall be Flex-Seal ARC Couplings as manufactured by Mission Rubber Company LLC or approved equal.

**130-1.02D Ductile Iron Pipe and Fittings:** Ductile iron sewer pipe and fittings shall comply with Section 130-1.02D of the City's Sanitary Sewer System Construction Standard Specifications.

**130-1.02F High-Density Polyethylene (HDPE) Pipe and Fittings:** All HDPE piping system components shall conform to the latest edition of ASTM D3350, ASTM D3035, ASTM F714 and these General Conditions, Special Conditions, Technical Specifications.

The pipe shall be made from polyethylene resin compound with a minimum cell classification of PE 445574C for PE 4710 materials in accordance with ASTM D3035 and F714. This material shall be a Plastic Pipe Institute (PPI) listed compound.

Pipe shall be furnished in iron pipe sizes meeting the requirements of AWWA C906. HDPE pipe shall meet ASTM D3035 standard specification for dimension ratio PE, outside diameter-controlled pipe.

HDPE pipe shall be DR11, rated to a minimum of 200 psi and shall be pressure tested to 150 psi.

Continuously indent printed along the side of each pipe segment at intervals not to exceed 5 feet shall be the name of the pipe manufacturer, nominal pipe size, dimensions ratio, the letters "P"

followed by the ASTM polyethylene grade and the hydrostatic design basis, manufacturing standard references, and a production code from which the date and place of manufacture can be determined.

Fittings for HDPE pipe shall be either butt fusion fittings or electrofusion fittings.

Butt fusion fittings shall meet all of the pipe specifications regarding dimensions and materials and conform to ASTM D3261.

Electrofusion fittings shall conform to ASTM F1055 for use with pipe conforming to ASTM D2513/3035. The fittings shall have an ISO compliant barcode label that facilitates the fusion of the fitting with any ISO compliant fusion processor.

Pipe fittings and transitions shall meet ASTM D3261. All molded and fabricated fittings shall be fully pressure rated for the pipe being attached to them. All fittings shall be molded or fabricated by the same manufacturer as the pipe. Contractor fabricated fittings shall not be used.

Sweep 45-degree ell fittings shall be molded and the centerline radius shall be at least three (3) times the pipe diameter.

### **130-1.02G Valves and Appurtenances:**

**130-1.02G(1) Swing Style Check Valves:** Check valves shall be resilient disc check valves of the full body type, with a domed access cover, a flexible disc, disc accelerator, mechanical indicator, and limit switch, suitable for working pressures of 150 psi. The valves shall be designed, manufactured, and tested in accordance with ANSI/AWWA C508 and be suitable for use in a pressurized sewage force main system.

The valve body shall be cast with integral flanges meeting ANSI B16.1, Class 125 requirements. The valve body shall be full flow equal to nominal pipe diameter at all points through the valve.

The disc shall be of one-piece construction, precision molded with an integral o-ring type sealing surface, and contain alloy steel and nylon reinforcement in the flexible hinge area. The flex portion of the disc shall be warranted for twenty-five years. Non-slam closing characteristics shall be provided.

A mechanical indicator shall be provided to indicate disc position.

The valve body and cover shall be constructed of ASTM A536 Grade 65-45-12 ductile iron. The disc shall be BUNA-N. The disc accelerator shall be Type 302 stainless steel. The exterior and interior of the valve shall be coated with a fusion bonded epoxy coating, 12 mil minimum thickness.

Check valves shall be Series 7200 by Val-Matic, or approved equal.

**130-1.02G(2) Plug Valves:** Plug valves shall be designed in accordance with AWWA C517 and be suitable for use in a pressurized sewage force main system.

Manufacturers shall be Milliken Millcentric Series 611611, DeZurik Model PEC, or approved equal.

Valve body shall be ductile iron, ASTM A536. Elastomer shall be BUNA-N or other approved material suitable for the service intended. Materials for all remaining components shall be as specified in AWWA C517. The pugs shall be of one piece solid construction with PTFE thrust bearings on the upper and lower bearings journals to reduce torque and prevent dirt and grit from entering the bearing and seal area. Shaft bearings and thrust bearings shall be replaceable sleeve-type bearings.

All wrench operated valves shall be equipped with a 2" square nut for use with removable levers or extended "T" handles.

Valves shall be designed and manufactured to shut off bubble tight at 175 psi.

Each valve shall be given a hydrostatic and seat test with the test results being certified when required by the customer. Certified copies of Proof-of-Design test reports shall be furnished as outlined in AWWA C517, when requested.

#### **132-1.02G(3) Flanged Coupling Adapters:**

Flanged coupling adapters shall be installed where indicated on plans. The flange body and follower shall be ASTM A536 ductile iron. Flange dimensions shall meet ANSI Class 150 requirements. Body and follower shall be furnished with factory applied fusion bonded epoxy coating.

Gaskets shall be natural or synthetic rubber suitable for water service between 40°F and 150°F. Bolts and nuts shall be corrosion resistant alloy steel.

Flanged coupling adapters shall be Romac Industries, Inc. model RFCA or model Alpha FC, or equal.

#### **132-1.02G(4) Pressure Gauge and Appurtenances:**

Discharge gauges shall be graduated in feet from zero to a minimum of five (5) feet of water above the respective pump shutoff head or to a minimum of 30% above the maximum operation pressure, whichever is greater. Graduation shall be in feet of water. All gauges shall be provided with isolating ring seals.

Isolating ring seals shall be full line size wafer design. Isolating ring seals shall have 316 stainless steel housing and assembly flanges and Buna N flexible cylinder lining for in line mounting. The captive liquid chamber and associated instrument(s) shall be furnished with threaded drain tap and plug. Manufacturers shall furnish seals with a quick-disconnect-type fitting for field disassembly and reassembly, however, seals shall be factory assembled prior to arriving at the job site. Isolating ring seals shall be RED Valve Series 40, Ashcroft 81 Bolt Thru Isolation Ring, or equal.

#### **132-1.02G(5) Aeration/Blower System:**

Aeration and blower system shall include, but is not limited to, the follow equipment: an air pump, air tubing, and weighted diffuser assembly.

The air pump shall be a High Performance Hiblow HP-120LL Septic Air Pump or approved equal.

The diffuser assembly shall be a fine bubble diffuser meant for aeration of wastewater. The diffuser shall be a Wonderfuser Diffuser Assembly, ECD270-E by SSI, or approved equal.

Air tubing shall be flexible reinforced PVC or HDPE piping with a working pressure of 100 psi and a maximum pressure of 400 psi.

**130-1.05 Pipe Laying:** Prior to pipe laying operations, the Contractor shall have a hard copy of each pipe and fitting manufacturer's installation procedures on hand at the jobsite. The Contractor's pipe installation crew shall be informed of the proper installation methods and have access to the hard copy documentation in the field.

As noted in Section 130-1.09 of the Sanitary Sewer System Construction Standard Specifications, bell and spigot joints, including field cut pipe, shall be prepared and assembled (inserted) per the pipe and fitting manufacturer's written instructions. Any joint deemed to be either over inserted or under inserted, per the Engineer or their designee, shall be corrected by the Contractor at no additional cost to the City, and to the satisfaction of the Engineer. Joint observation and correction may take place during pipe laying or post CCTV inspection by the City.

HDPE Pipe sections shall be joined to one another by means of thermal butt-fusion conforming to ASTM D2657. Each length of pipe to be joined shall be of the same type, grade, and class of polyethylene compound and shall be supplied from the same raw material supplier. Thermal butt-fusion joining shall provide joint weld strength equal to or greater than the tensile strength of the pipe. All welding shall be performed by a certified welder with at least three years of experience in thermal butt fusion welding. Bead thickness on pipe shall not exceed manufacturer's recommendations. No mechanical couplings of HDPE pipe will be permitted.

Due to existing conditions slight adjustments in the alignment as shown should be expected. Location of bends and other appurtenances are approximate, final alignment and locations of items shall be coordinated by the Engineer. Installed pipe radius shall not exceed manufacturer's radius recommendations.

Immediately prior to backfilling, the Contractor shall allow time for the on-site inspector to record the stationing, visually observe the installation condition, and photo document each sewer main joint.

At no additional cost to the City, the Contractor may be issued a Stop Work Notice by the Engineer or their designee if a significant deviation from the manufacturer's written installation procures or these technical specifications is noted that could, in the opinion of the Engineer, compromise the integrity of the installation. The Stop Work Notice will include the specific non-compliance issue(s) identified and the required corrective action(s) necessary before work can resume. Corrective actions may include training of all on-site personnel responsible for pipe laying by a material manufacturer or a third-party organization (PVC Pipe Association, American Water Works Association, Plastic Pipe Institute, National Association of Sewer Service Companies, or approved equivalent) as deemed necessary by the Engineer.

### **130-1.07 Sewer Structures**

Polymer concrete manhole risers, cones, grade rings and manhole base sections shall be designed by the manufacturer to meet the loading requirements and intent of ASTM C 478, ASTM C 857 and ACI 350-06 as modified for polymer concrete manhole design as follows:

1. Polymer Concrete Mix Design shall consist of thermosetting resin, sand, and aggregate. No Portland cement shall be allowed as part of the mix design matrix. All sand and aggregate shall be inert in an acidic environment.
2. Reinforcement shall use acid resistant Fiber-Reinforced Polymer (FRP Bar) in accordance with ACI 440.1R-06 as applicable for polymer concrete design.
3. Thermosetting Resin shall have a minimum deflection temperature of 158° F when tested at 264 psi (1.820 mPa) following Test Method D 648. The resin content shall not be less than 7% of the weight of the sample as determined by test method D 2584. Resin selection shall be suitable for applications in the corrosive conditions to which the polymer concrete manhole structures will be exposed.
4. Construct invert channels to provide smooth flow transition with minimal disruption of flow at pipe-manhole connections. Invert slope through manhole is as indicated on Project Plans. All precast base sections to be cast monolithically. Polymer bench and channel are to be constructed with all polymer concrete material.
5. Provide resilient connectors conforming to requirements of ASTM C 923. All connectors are to be water tight. Install approved resilient connectors at each pipe entering and exiting manholes in accordance with manufacturer's instructions.

Polymer concrete shall contain no cementitious materials and be cast in a polymer only facility that does not produce cementitious precast products.

**130-1.07B Sewer Manholes:** Precast manholes shall be manufactured of polymer concrete but otherwise conforming with City Standard 500. No internal coating of polymer concrete manholes will be required.

Polymer concrete manhole sections, monolithic base sections and related components shall conform to ASTM C 478 except that compositional and dimensional differences required for a polymer concrete product will be allowed.

Riser sections shall be joined with bell and spigot / ship-lap design seamed with butyl mastic or rubber gaskets (ASTM C 990) so that on assembly, manhole base, riser, and top section make a continuous and uniform manhole structure. Joint sealing surfaces shall be free of dents, gouges and other surface irregularities that would affect joint integrity

Riser sections for polymer concrete manholes shall be constructed from standard polymer concrete manhole sections of the diameter indicated on drawings. Use various lengths of polymer concrete manhole sections in combination to provide correct height with the fewest joints possible.

Manhole components shall be designed to withstand AASHTO HS-20 loading conditions and full submergence. Manholes shall be designed against flotation assuming the water table is at the top of the structure. Design wall sections for depth and loading conditions with wall thickness as designed by polymer concrete manufacturer.

Poured-in-place manhole bases shall be installed only where specifically indicated on the Project Plans or where a precast base cannot be used and is approved by the Engineer.

All materials needed for grouting and patching polymer concrete manholes shall be a polyester mortar compound provided by the manufacturer or an approved equal approved for use by the Engineer and the polymer concrete structure manufacturer.

Polymer concrete manhole data and details shall be submitted for review by the Engineer prior to fabrication:

1. Shop drawings of manhole sections, base units and construction details, jointing methods, materials, and dimensions.
2. Summary of criteria used in manhole design including, as minimum, material properties, loading criteria, and dimensions assumed. Include certification from manufacturer that polymer concrete manhole design meets or exceeds the load and strength requirements of ASTM C 478 and ASTM C 857, reinforced in accordance with ACI 440.1r-15.
3. Materials to be used in fabricating pipe drop connections.
4. Materials to be used for pipe connections.
5. Materials to be used for stubs and stub plugs.

**130-1.07C Wet Wells:** Precast wet well structures shall be manufactured of polymer concrete. No internal coating of polymer concrete manholes will be required.

The Contractor shall provide a submittal for precast wet well structures and associated cover and appurtenances including the following:

1. Shop drawings of manhole sections, base units and construction details, jointing methods, materials, and dimensions.
2. Summary of criteria used in manhole design including, as minimum, material properties, loading criteria, and dimensions assumed. Include certification from manufacturer that polymer concrete manhole design meets or exceeds the load and strength requirements of ASTM C 478 and ASTM C 857, reinforced in accordance with ACI 440.1r-15.
3. Materials to be used in fabricating pipe drop connections.
4. Materials to be used for pipe connections.
5. Materials to be used for stubs and stub plugs.

Wet well structure and cover shall be designed to withstand AASHTO HS-20 traffic loading.

Wet well shall have clear inside plan dimensions and depth as designated on the Project Plans. Walls shall be reinforced sufficiently to withstand loads imposed by complete burial in saturate soil.

Wet well shall be furnished with a two-leaf hinged, hydraulic-assisted aluminum cover. Each leaf shall permit full opening of the vault. Cover shall be furnished with suitable hardware to secure the leaves in the closed position.

**130-1.10 Odor Control System:** The odor control system shall consist of both rigid and flexible piping, and an activated carbon drum filter. Piping type and size shall be per the Drawings.

The carbon drum filter epoxy lined and coated steel with activated granular carbon filter media. The drum shall have a drain. The filter shall be capable of a maximum flow of at least 100 cubic feet per minute.

**130-1.11 Bypass Pumping and/or Diversion System:** See Section 131 Bypass Pumping and Conceptual Bypass Pumping Plan for additional information regarding Bypass Pumping and/or Diversion Systems.

**130-1.12 Payment:** **8" Sewer Main** shall be paid for at the contract price per **linear foot** for the specified sizes, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved for sewer main installation, including but not limited to: potholing other than as specified in Section 15 to facilitate the progress of work; excavation and disposal of excavated materials; hand digging *if needed*; root pruning; dewatering and disposal of trench groundwater; bypass pumping *if needed*; contamination awareness; fittings/couplings; felt expansion joint material *if required*; temporary connections; modifications to existing manholes to accept new mains; connections to new or existing manholes or mains, including sealing of penetrations water tight; supporting or removal and disposal of existing utilities in the same trench *if required*; placing and compacting all required bedding and backfill including control density fill *if required*; trench plates *as needed*; temporary trench paving; removal and replacement of valley gutter, median curb and island *as needed*; cleaning and flushing; testing; video inspection; as specified herein, and no additional allowance will be made therefor. Ten percent of each payment paid under this bid item shall be retained by the City until full acceptance, including final CCTV inspection, has been provided by the Engineer.

The actual quantity of sewer main to be paid for will be the length measured from center of manhole to center of manhole/wet well along the finished grade to the nearest foot. Pipe purchased by the Contractor in excess of the measured amount will not be paid for by the City.

**4" HDPE Sewer Force Main** shall be paid for at the contract price per **linear foot** for the specified sizes and trench types given in the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved for sewer main installation, including but not limited to: potholing other than as specified in Section 15 to facilitate the progress of work; excavation and disposal of excavated materials; hand digging *if needed*; root pruning; dewatering and disposal of trench groundwater; bypass pumping *if needed*; contamination awareness; fittings/couplings; felt expansion joint material *if required*; temporary connections; modifications to existing manholes to accept new mains; connections to new or existing manholes or mains, including sealing of penetrations water tight; supporting or removal and disposal of existing utilities in the same trench *if required*; placing, moisture conditioning, and compacting all required bedding and backfill including suitable native material, control density fill, class 2 aggregate base, and/or asphalt concrete base *if required*; trench plates *as needed*; temporary trench paving; removal of concrete, sidewalk, valley gutter, median curb, curb and gutter, concrete crosswalk, driveway apron, and median island *as needed*; cleaning and flushing; testing; video inspection; as specified herein, and no additional allowance will be made therefor. Ten percent of each payment paid under this bid item shall be retained by the City until full acceptance, including final CCTV inspection, has been provided by the Engineer.

The actual quantity of sewer force main to be paid for will be the length measured from center of manhole to transition flange with ductile iron lift station pipe and appurtenances. Pipe purchased by the Contractor in excess of the measured amount will not be paid for by the City.

**Lift Station Pipe and Appurtenances** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved for the installation of all ductile iron pipe and fittings in various sizes on the lift station site, plug valves, check valves, pipe supports, bubbler, emergency suction connection, magnetic flow meter, odor control system, pressure gauges, isolation rings, cleaning and flushing; testing; video inspection; as specified herein, and no additional allowance will be made therefor.

**48" Polymer Concrete Sewer Manhole** shall be paid for at the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved for the installation of polymer concrete sewer manholes, including but not limited to: potholing other than as specified in Section 15 to facilitate the progress of work; excavation and disposal of excavated materials; hand digging *if needed*; dewatering and disposal of trench groundwater; contamination awareness; couplings and pipe if connecting to existing mains; inside drop *if required*; water tight sealing of penetrations; coating and patching; supporting or removal and disposal of existing utilities in the same trench, *if required*; placing and compacting all required bedding and backfill including control density fill *if required*; trench plates as needed; temporary trench paving; concrete collar; installing and adjusting the cast iron frame and cover to grade after final paving is complete; testing; as specified herein, and no additional allowance will be made therefor.

**60" Polymer Concrete Sewer Manhole** shall be paid for at the contract unit price **each**, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved for the installation of polymer concrete sewer manholes, including but not limited to: potholing other than as specified in Section 15 to facilitate the progress of work; excavation and disposal of excavated materials; hand digging *if needed*; dewatering and disposal of trench groundwater; contamination awareness; couplings and pipe if connecting to existing mains; inside drop *if required*; water tight sealing of penetrations; coating and patching; supporting or removal and disposal of existing utilities in the same trench, *if required*; placing and compacting all required bedding and backfill including control density fill *if required*; trench plates as needed; temporary trench paving; concrete collar; installing and adjusting the cast iron frame and cover to grade after final paving is complete; testing; as specified herein, and no additional allowance will be made therefor.

**120" Polymer Concrete Wet Well** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved for the installation of polymer concrete sewer wet well, including but not limited to: potholing other than as specified in Section 15 to facilitate the progress of work; excavation and disposal of excavated materials; hand digging *if needed*; dewatering and disposal of trench groundwater; contamination awareness; couplings and pipe; inside drop; water tight sealing of penetrations; coating and patching; supporting or removal and disposal of utilities within the wet well excavation; placing and compacting all required bedding and backfill including control density fill; trench plates as needed; temporary trench paving; installing and adjusting hatch with safety grating to finished grade; concrete collar; testing; as specified herein, and no additional allowance will be made therefor.

Full compensation for **Trench Bracing and Shoring - Sewer** shall be considered as included in the prices paid for **Trench Bracing and Shoring** as indicated in Section 106 of these Technical Specifications and no additional allowance will be made therefor.

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

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

## 131 SEWER BYPASS PUMPING

**131-1.01 General:** The Contractor shall provide a bypass pumping and/or diversion system(s), when required, for installation of the sewer system. Bypass pumping shall consist of designing, (including submittals), furnishing, installing, and maintaining all equipment, tools, power, piping and incidentals required to maintain existing sewer flows and services without interruption.

Anticipated sewer peak dry weather flows are 26,000 gpd (18 gpm) with peak wet weather flows of approximately 57,000 gpd (40 gpm). Peak wet weather flows could be up to 4 times the peak dry weather flows.

Wet weather flows are defined as those occurring from October 15<sup>th</sup> to April 15<sup>th</sup>. The Contractor shall be responsible for accommodating all increased flows with the bypass system during wet weather periods. Augmentation of the bypass pumping plan to accommodate flows in excess of those specified above due to unanticipated rain during dry weather periods will be paid for as extra work.

Suggested sewer bypass pumping routes and temporary diversions shown on Project Plans are for bidding purposes only. The Contractor shall provide and operate all temporary facilities to intercept the sewage flow and maintain traffic control in the work areas.

The Contractor shall be liable for all cleanup, damages and resultant fines in the event of a spill.

**131-1.02 Bypass Pumping Plan Submittals:** The Contractor shall submit a Trunk Sewer Bypass Pumping and/or Diversion Plan for each planned bypass pumping and/or diversion operation for review by the Engineer at least 10 working days prior to commencement. The Engineer shall approve the bypass pumping plan before commencing any bypass pumping work. The Contractor shall notify the Engineer 2 working days prior to commencing with the bypass pumping operation.

Sewer Bypass Pumping and/or Diversion Plans shall be designed by a California registered professional engineer.

The plans shall include an emergency discharge response plan to be followed in the event of a failure of the bypass pumping and/or diversion system.

The Contractor shall provide a sewer spill prevention plan for disassembling, handling and removal of bypass pumping system which shall include flushing prior to disassembling.

The Sewer Bypass Pumping and/or Diversion Plan shall include the following:

1. Staging areas for pumps;
2. Flow blockage plan including number, size, location, manufacturer, type, and method of installation and removal of sewer plugs, depth of upstream manhole(s), and location of existing lateral cleanouts and how they will be monitored;
3. Number, size, material, location and method of installation of suction pipes;
4. Number, size, material, method of installation and location of installation of discharge pipes;

5. Assumed design flows;
6. Bypass pump sizes, manufacturer, age, capacity, power requirements, and number of each size to be on site;
7. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted);
8. Standby power generator size, location;
9. Downstream discharge plan;
10. Method of protecting discharge manholes or structures from erosion and damage;
11. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill;
12. Method of noise control for each pump and/or generator;
13. Any temporary pipe supports, thrust bocks, and/or anchoring required;
14. Design plans and computation for access to bypass pumping locations indicated on the project plans;
15. Location of existing lateral cleanouts and side sewers, and how they will be monitored or bypassed;
16. Address of all parcels along with name and operating hours of all businesses located upstream of blockage to the next upstream manhole.
17. Air release valves, their locations and spill containment device for same.

The Contractor shall also provide name and cell phone number of the employee(s) that will have the sole duty of monitoring all active blockages. If multiple lines are simultaneously blocked, the Contractor's submittal must show how each blockage is to be continuously monitored. For multiple blockages, the Engineer may also require devices for each blockage to give audible and/or visual alarm of a pending overflow at the Contractor's expense.

The City will contract with a third party California registered professional engineer to review the bypass pumping plan.

**131-1.03 Bypass Pumping System Description:** Bypass pumping shall consist of furnishing, installing, and maintaining all power, plugs, primary and standby pumps, appurtenances and bypass piping required to maintain maximum anticipated flows and services. While the facility is operating on electrical power, a redundant electrical power source shall be provided.

The allowable velocity in bypass pumping discharge piping shall not exceed 5 ft/sec without prior approval of the Engineer.

Bypass pumping shall be done in such a manner as not to damage private or public property or create a nuisance or public menace. The pumped sewage shall be in an enclosed hose or pipe system that is adequately protected from traffic and shall be redirected into the sewer system.

100% redundancy is required for all pumps and power sources.

100% redundancy is required for all temporary pneumatic plug applications. Plugs shall be pressure rated to withstand the pressure head in the system. Plugs shall be provided with a retrieval tag line. When plugging or blocking is no longer needed for performance and acceptance of work, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.

Surcharging of the existing sewer pipes shall not exceed three feet above the crown of the existing pipe at the proposed intake manholes. The Contractor shall provide a mark on the inside of the manhole visible from the surface for monitoring the surcharge level.

Any proposed flow diversion plan that includes a temporary connection to existing sewer components shall also comply with Section 130 of these Technical Specifications.

The Contractor shall supply traffic control in accordance with Section 12 of these Technical Specifications. Two-way traffic shall be maintained along roadways during bypass pumping operations. At no point along the bypass pumping operation shall sidewalks along both sides of the road be closed at the same time. Maintain driveway access for each property in the vicinity of the bypass area.

Where undergrounding is required, bypass pipe shall be installed to withstand compaction and traffic loading. Asphalt concrete pavement shall be removed and replaced with permanent trench paving per all applicable City Standards and Section 39A of these Technical Specifications.

All pumps shall be set into or surrounded by spill containment devices. Existing drain inlets adjacent to the proposed bypass pumping route shall be protected by sandbags to prevent flow into the storm drain system.

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

The Contractor shall take all necessary precautions to provide constant monitoring including connection of the bypass pumping system to City SCADA to ensure that no private residences or properties are subjected to sewage backup or spills. Dumping, leaks or free flow of sewage onto private property, gutters, streets, sidewalks, or into storm sewers or waterways is strictly prohibited. The Contractor shall immediately notify the City should a sanitary sewer overflow (SSO) occur. The Contractor shall be liable for all cleanup, damages, and resultant fines in the event of a spill.

The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to the actual operation. The pressure and leakage test shall be conducted at one-and-a-half times the maximum pressure the system will experience based on the approved Bypass Pumping Plan for a period of two hours. No leakage is permitted during this test.

The Contractor shall flush bypass pumping system prior to disassembling bypass pumping system.

Subsequent to removal of bypass pumping and/or diversion system, the Contractor shall verify existing sewer flows are restored to pre-existing condition.

The Contractor shall remove manhole sections only as may be required to provide adequate suction conduits.

**131-2.02 Materials:** Bypass pumping materials shall generally conform to the following requirements:

1. Discharge and suction pipes shall be sized according to flow calculations, system operation, pump size and manhole depths following manufacturer's specifications and recommendations.
2. Bypass pipe and fittings shall be HDPE (ASTM F714), high density solid wall, homogenous throughout, free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults. DR rating of the pipe and fittings shall be sufficient to withstand the external and internal loads anticipated, including pressure tests.
3. HDPE fittings shall be fully pressure rated to match the pipe DR pressure rating.
4. Flexible hoses, couplings and connectors, shall be abrasion resistant and rated for external and internal loads anticipated, including pressure tests.
5. Plugs shall be selected and installed according to size of line to be plugged, pipe and manhole configurations. Additional plugs shall be available on site in the event a plug fails.
6. Pumps shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in priming system.
7. All components of the bypass pumping system shall be sound attenuated and produce emissions in accordance with City noise ordinances.
8. Provide necessary start/stop controls for each pump. Pumps shall be able to allow dry running for long periods of time to accommodate cyclical nature of effluent flows.

**131-3.01 Payment:** Sewer Bypass Pumping shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in planning, designing, (including submittals), installing, dismantling, and operating bypass pumping and/or flow diversion as described herein, including but not limited to; notification, coordination, installation, operation and removal of all bypass pumping equipment and appurtenances as described herein *including standby equipment*, temporary ramps for driveway and sidewalk/path crossings, obtainment, usage and disposal of construction water, below ground discharge installations, temporary sanitary sewer connections, installation and removal of plugs, sound attenuation, excavation, backfill and compaction, temporary and permanent surfacing, replacement of disturbed traffic markings, spoils disposal, steel plating *if required*, removal of manhole sections *if required*, constant continued manned

monitoring during bypass pumping operations, and all efforts required to return surface conditions to pre-project condition, and any other items necessary for trunk sewer bypass pumping not specifically enumerated in these specifications, and no additional allowance will be made therefor.

Full compensation for bypass pumping and/or diversion systems to maintain sewer service for side sewers, laterals, and other incoming sewer shall be considered as included in the prices paid for the various contract items of work, and no additional allowance will be made therefor.

## 132 WATER DISTRIBUTION SYSTEM

**132-1.01 Description:** Water Distribution System and related appurtenances shall conform to the requirements as specified in the City of Santa Rosa Water Distribution System Construction Standard Specifications Section 132, the Project Plans, and modifications herein.

**132-1.02 Pipe:** Where shown on the plans and as required by the City of Santa Rosa Blanket Waiver 2, 3 or 4, water distribution pipe shall be Polyvinyl Chloride (PVC) Pipe with a minimum pressure class (PC) rating of PC305, DR 14 conforming to the requirements of AWWA C900 "Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4" through 12" for Water Transmission and Distribution."

**132-1.09 Fire Hydrants and Lateral Assembly:** Existing fire hydrants on existing mains shall be kept operational and kept protected during construction. Notify the City prior to any hydrant shut down.

**132-1.11 Excavation, Backfill, and Resurfacing:** The Contractor shall remove and replace sidewalk and concrete planter strips as required for all water work to the nearest transverse score mark on both sides and full sidewalk width. All areas of sidewalk removed for construction shall be backfilled and compacted level with temporary asphalt concrete or covered with 1 inch thick plywood, laid flat with ADA compliant temporary asphalt concrete taper on both ends, painted yellow or safety orange for visibility.

**132-1.12 Laying and Handling Pipe Materials:** If the Contractor installs a highpoint in the water system not shown on the Project Plans the Engineer may require the installation of a new combination air and vacuum valve, per City Standards, at no additional cost to the City.

**132-1.15A Water Services:** All existing meter box lids to be removed shall be salvaged and delivered to the City's Corporation Yard located at 55 Stony Point Road.

New service laterals shall be installed with a minimum horizontal clearance of 3 feet from gas laterals and a minimum of 5 feet from sewer laterals. Water services shall be installed via 'open trench' construction methods only, unless otherwise specified herein.

**132-1.30 Payment: 1" Water Service & Backflow Prevention Device** shall be paid for at the contract price **each**, which price shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and doing all work involved in water service installation and backflow prevention device, including but not limited to: excavation and disposal of excavated materials; dewatering and disposal of trench groundwater; contamination awareness; saddle and valve; proper size penetration in main; water service tubing and fittings *as required*; backflow prevention device; meter box and lid to grade; meter shut off valves; tie-in at back of sidewalk; meter transfer; placing and compacting all required bedding and backfill; trench plates *as needed*; testing and chlorination; temporary trench paving; removal and replacement of median curb and island, curb, gutter, sidewalk and driveways *as needed*; restoration/reconstruction of landscaping/irrigation *as needed*; as specified herein, and no additional allowance will be made therefor.

## **SECTION 201 ELECTRICAL SYSTEMS**

### **201-1 GENERAL**

#### **201-1.01 SCOPE OF WORK**

- A. The Contractor shall install, ready for use, the electrical system as specified herein and shown on the Contract drawings. This document describes the function and operation of the system and particular components, but does not necessarily describe all necessary devices. All components and devices shall be furnished and installed as necessary to provide a complete operable and reliable system for accomplishing the functions and meeting the performance set forth hereinafter.
  
- B. Furnish all required labor, materials, project equipment, tools, construction equipment, safety equipment, transportation, test equipment, incidentals and services to provide a complete and operational electrical system as shown on the Electrical-Series Contract Drawings, included in these Specifications, or necessary for fully operating facility. See Appendix "B" for "Device Index" for this project.
  
- C. Examine the specification and Drawings for mechanical equipment and provide all circuit breakers, switches, pushbuttons and appurtenances which are not specified to be with the mechanical equipment. Erect all electrical equipment not definitively stated to be erected by others, furnish and install conduit, wire and cable and make connections required to place all equipment in complete operation.
  
- D. It is recommended that a pre-bid site visit is requested to accomplished the following:
  - 1. Thoroughly examine existing conditions before submitting their bid proposal to perform any work. Compare site conditions with data given on the plans or in these Specifications. No allowance shall be made for any additional costs incurred by the Contractor due to their failure to have examined the site or to have failed to report any discrepancies to the Engineer prior to bid.
  - 2. It is the Contractor's responsibility to be fully familiar with the existing utility locations, conditions and local requirements and regulations.
  - 3. Verify all measurements and conditions and shall be responsible for the correctness of same. No extra compensation will be allowed because of differences between Work shown on the Drawings and measurements at the site.
  
- E. Deviations to locations and conduit routing, as shown on the Plans, must first be approved by the Engineer.
  - 1. All plan deviations made by the Contractor shall be reflected on the Contractor supplied "Record Drawings."
  - 2. All engineering, drafting, and clerical expenses associated with updating the Record Drawings due to any major unauthorized changes shall be the responsibility of the Contractor and will be deducted from the Contract.

- F. The major areas in the scope of work as illustrated on Electrical Contract drawings and Device Index located in Appendix "B", which includes both the furnishing and installation are:
1. Country Manor Sewer Lift Station:
    - a. Meter Pedestal, Pedestal, Automatic Transfer Switch (ATS) and associated hardware.
    - b. Processor Logic Controller (PLC), Operator Interface (OI) hardware, radio and programming for controlling the pumps remotely, and other miscellaneous devices. The Contractor is to provide all configuration, programming, integration and setup of the local PLC (L3000), OI and remote SCADA system.
    - c. Panelboard and panelboard transformer.
    - d. Generator System.
    - e. Instrumentation and other miscellaneous devices. This includes all wiring and cables.
    - f. Relocating existing wire, conduits and pullboxes.
    - g. New PLC programming.
  2. Spring Lake Sewer Lift Station:
    - a. Relocate existing Country Manor Sewer Lift Station standby generator to Spring Lake Sewer Lift Station.
    - b. Modifying existing PLC programming.
  3. Conduits and the field interconnection wiring between the Control Panels, instrumentation, etc. and equipment provided under all other Divisions.
  4. Provide all necessary conduits, junction boxes, grounding system, field interconnection wiring, hardware, fittings, and devices to connect the designated equipment and wiring.
  5. All necessary miscellaneous shut off, sample, and calibration valves to sensors.
  6. Provide trenching, backfilling, and compaction for all underground conduit routes, concrete pads, and pull boxes.
  7. Concrete pads and supports for electrical and instrumentation equipment.
  8. Remove and dispose of all excess dirt, paving, concrete, and other materials from site work.
  9. SCADA modifications.
- G. Existing site is limited in space. It is the Contractor's responsibility to provide an electrical and instrumentation package to fit in the allocated space.
- H. Contractor shall field verify existing conditions as required to complete the project.
- I. It is the Contractor's responsibility for obtaining PLC, OI, and SCADA configuration software, manuals and disks necessary for the Contractor to program and configure the PLC, OI and SCADA system.
- J. The following specifications incorporate specific equipment and devices that are preferred by the City because of their serviceability, to match existing equipment, because of the local availability of labor, parts and materials, or because of the ability of the City to umbrella the equipment under existing maintenance contracts.

- K. All electrical work shall conform with the National Electric Code (NEC) 2020 issue. Nothing on the Plans or in the Specifications shall be construed to permit work or materials not conforming to these codes and standards.
- L. All panels, panelboards, panelboard transformers, PLC hardware, etc. shall be supplied by one System Supplier. All panels and instrumentation listed in Electrical Section Appendix B-Device Index shall be supplied by the same System Supplier. This includes, but is not limited to all work necessary to select, furnish, supervise installation, calibrate, program, and place into operation all transmitters, instruments, controllers, alarm equipment, monitoring equipment, and accessories as specified herein.

### **201-1.02 CODES AND STANDARDS**

- A. All electrical/instrumentation equipment and materials, including installation and testing, shall conform to the following applicable codes and standards:
  - 1. ANSI - American National Standards Institute, Inc.
  - 2. EIA - Electronics Industries Association.
  - 3. ETL - Electrical Testing Laboratories.
  - 4. FM - Factory Mutual.
  - 5. GO128 - General Order No. 128, Rules for Construction of Underground Electrical Supply and Communication Systems, Public Utilities Commission of the State of California.
  - 6. IEEE - Institute of Electrical and Electronics Engineers.
  - 7. ICEA - Insulated Power Cable Engineers' Association.
  - 8. ISA - International Society of Automation (ISA) Standards (formerly Instrument Society of America).
  - 9. NEC - National Electrical Code, 2020 Edition.
  - 10. NEMA - National Electrical Manufacturers Association.
  - 11. NETA - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, International Electrical Testing Association.
  - 12. NESC - National Electrical Safety Code.
  - 13. NFPA - National Fire Protection Agency & NFPA820
  - 14. OSHA - Occupational Safety and Health Act Standards.
  - 15. UL - Underwriter's Laboratories, Inc.
- B. The revisions of these codes and standards in effect on the date of issuance of the Contract Documents shall apply.
- C. Codes and standards referenced shall be considered minimum acceptable work.
- D. In instances where two or more codes are at variance, the most restrictive requirements shall apply.

- E. Nothing on the Drawings or in the Specifications shall be construed to permit work or materials not conforming to the preceding codes and standards.
- F. All work shall also be performed in accordance with the State, County, City, and local Utility standards and codes.
- G. The Contractor shall furnish without extra charge any additional material and labor which may be required for compliance with these codes and standards, even though the work is not explicitly mentioned in the Specifications or shown on the Contract Electrical Drawings.
- H. Amperage listed on the single-line Drawings for motors are per NEC Table 430.250 and may not necessarily match that of the equipment supplied. It is the electrical system supplier and Contractor's responsibility to furnish equipment sized for the motors supplied for this project at no additional cost.

### **201-1.03 RELATED WORK IN OTHER SECTIONS**

- A. Provide an electrical system that interfaces to work performed under other Mechanical and Equipment Sections of these Specifications.
- B. The following is part of Electrical Section:
  - 1. Section 202 – Diesel Generator
  - 2. Section 203 – Electrical System Analysis

### **201-1.04 ELECTRICAL CONTRACTOR QUALIFICATIONS**

- A. It is the intent of this Division that the complete responsibility for management and installation of the electrical and instrumentation required for this project be by a qualified Electrical Contractor. This responsibility includes, but not limited to, supervision and coordination of work performed by all suppliers of Electrical Section.
- B. Uncertified electricians shall not perform electrical work for which certification is required per Labor Code Section 3099. Electricians shall be required to carry proof of certification on their person at all times. Electricians found on the jobsite without proof of certification will be asked to leave, prohibited from working on-site until proof of certification has been provided and may be reported to the Contractors State License Board (CSLB).
- C. Contractor shall submit the proposed Electrical Subcontractor and System Supplier with a complete set of bid documents that will be used on this project.
- D. If the Contractor, Electrical Subcontractor, and System Supplier listed in bid documents are deemed not qualified by the City, they will have their bid rejected at the City's sole discretion and the next qualified bidder selected.

- E. The Electrical Subcontractor shall meet the following minimum qualifications:
1. Has a current C-10 Electrical Subcontractor's License.
  2. Has regularly engaged in similar electrical contracting for the Municipal Water and Wastewater Industry.
  3. Has successfully performed work of similar or greater complexity on at least two previous projects under one company name and under the present company name.
  4. Has all persons performing work as electricians certified by the California Apprenticeship Council per California Labor Code Section 3099.
  5. Has been actively engaged in the type of electrical and instrumentation work specified in this Division for a minimum of two years.
- F. The City may request a list of five (5) completed projects of similar size and nature for water or wastewater treatment plants or pump stations that the Electrical Contractor has completed:
1. Provide completion dates of projects.
  2. References of Owner Representative in charge of project, including contact name and telephone number.

#### **201-1.05 SYSTEM SUPPLIER QUALIFICATIONS**

A. General:

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

#### **201-1.06 CONTRACT DOCUMENTS**

- A. The Contract drawings and specifications are intended to be descriptive of the type of electrical system to be provided; any error or omissions of detail in either shall not relieve the Contractor from the obligations thereunder to install in correct detail any and all materials necessary for a complete operational system, at no additional cost.
- B. The Contract drawings are generally diagrammatic; exact locations of existing equipment and proposed location for new electrical products shall be verified in the field with the Engineer. Except where special details on drawings are used to illustrate the method of installation of a particular piece or type of equipment or materials, the requirements or descriptions in this Section shall take precedence in the event of conflict.

- C. The Contract Electrical elementary, elevation and one-line diagrams are the basis of the electrical system to be provided and are for reference only. It is the Contractor's responsibility to adjust and make minor revisions to the diagrams as necessary for operational system at no additional cost to the City. Additional isolators, relays, wiring, terminal blocks, and appurtenances, shall be provided for an operation system at no additional cost to the City.
- D. Location of equipment, inserts, anchors, panels, pull boxes, conduits, stub-ups, and fittings for the electrical system are to be determined by the Contractor and Engineer at time of installation. Contractor shall make minor adjustments to locations of electrical equipment required by existing conditions and coordination with other trades at no additional cost to City.
- E. The Conduit and Wire Routing Schedule, wire fill, and number of conduits are based on the best information available.
  - 1. It is the Contractor's responsibility to modify the conduit schedule based upon approved Shop Drawings for the actual equipment. Such modifications in conduit sizes and numbers of conductors shall be at no additional cost to the City, if such changes are the direct result of the approved equipment selected by the Contractor.
  - 2. A copy of the Conduit Schedule and Electrical plans showing conduit routing shall be updated weekly by the Contractor. Progress payments will be withheld if during monthly checks it is found that the Contractor fails to maintain the Conduit Schedule updates.
- F. Electrical & instrumentation, conduit & wire lengths shown on Project Plans are approximate. The Contractor is responsible for determining actual lengths for bidding and installation purposes.
- G. The Contractor shall examine the architectural, mechanical, structural, civil, electrical and instrumentation equipment provided under other Sections of this Contract in order to determine the exact routing and final terminations for all conduits and cables. The exact locations and routing of cables and conduits shall be governed by structural conditions, physical interferences, and the physical location of wire terminations on equipment. Conduits shall be stubbed up as near as possible to equipment.
- H. All equipment shall be installed and located so that it can be readily accessed for operation and maintenance. The Engineer reserves the right to require minor changes in location of equipment, without incurring any additional costs.
- I. Provide means to furnish equipment and accessories, do the installation, complete connections, submit documentation, perform start-up, and be responsible for the warranty.
- J. Where conduits are shown as "home runs" on the Contract drawings or stated to be furnished, but not explicitly shown, as part of the scope of work; the Contractor shall provide all fittings, boxes, wiring, etc. as required for completion of the raceway system in compliance with the NEC and the applicable specifications in this Section.

- K. No changes from the Contract drawings or specifications shall be made without written approval of the Engineer. Should there be a need to deviate from the Contract documents, submit written details and reasons for all changes to the Engineer for favorable review.
- L. When existing conduits are to be used, it is the Electrical Contractor's responsibility to verify conduit size and routing. This includes all potholing or other location methods. Existing conductors and conduits damaged by Contractor during construction shall be repaired or replaced at no cost to City.
- M. The resolution of conflicting interpretation of the Contract documents shall be determined by the Engineer.
- N. The Contractor shall coordinate with other Suppliers on the project for a complete and operable system.
- O. It is the System Supplier's responsibility for obtaining instrumentation transmitter configuration software, manuals and disks necessary for the Contractor to program and configure the instrumentation transmitters. All software and manuals shall be licensed and turned over to the City following construction.
- P. The Electrical Contractor shall maintain a separate set of neatly and accurately marked set of Record Documents, consisting of spreadsheets, specifications and full size blue-line Electrical Contract Drawings.
  - 1. These documents are to be used specifically for recording the as built locations and layout of all electrical and instrumentation equipment, routing of raceways, junction and pull boxes, and other diagram or document changes.
  - 2. These Record documents shall be kept up-to-date during the progress of the job, with all "change orders", submittal modifications, and construction changes shown and stamped with "As-Built" at end of job.
  - 3. These Record documents shall not be used for daily construction use and shall not contain any mark-ups that are unrelated to as-built corrections.
  - 4. The following lists the record documents shall be as-built by Electrical Contractor:
    - a. Electrical Drawings.
    - b. Panelboard schedules.
    - c. Conduit and Wire Routing Schedule.
      - 1) A copy of the Conduit and Wire Routing Schedule and Electrical plans showing conduit routing shall be updated weekly by the Contractor. Progress payments will be withheld if during monthly checks it is found that the Contractor fails to maintain the Conduit Schedule updates.
    - d. Lighting Schedule.
    - e. Duct banks and their routing with offset measurement and indicate changes in depth.

5. The following lists the record documents that shall be as-built by System Supplier to be maintained by Electrical Contractor:
  - a. I-Series Drawings
  - b. Instrumentation Index.
6. Record documents shall be kept current weekly with all "change orders", submittal modifications, and construction changes shown. Record Documents shall be subject to the inspection by the Engineer at all times, progress payments or portions thereof may be withheld if Record Documents are not accurate or current.
7. When documents are changed, they shall be marked with erasable colored pencils using the following coloring scheme:
  - a. Additions - red
  - b. Deletions - green
  - c. Comments - blue
  - d. Dimensions – black
8. Show the following on the Electrical Record Contract Drawings by dimension from readily obtained base lines:
  - a. Exact location, type and function of electrical and instrumentation equipment and devices.
  - b. Precise routing and locations of underground conduits, pullboxes, junction boxes, and appurtenances that make-up the raceway system.
  - c. Show the dimensions, location and routing of electrical work, which will become permanently concealed.
  - d. Show complete routing and sizing of any significant revisions to the systems shown.
9. Prior to acceptance of the work, the Contractor shall deliver to the Engineer one set of record full size drawings neatly marked accurately showing the information required above.

#### **201-1.07 COORDINATION**

- A. The Contractor shall coordinate the electrical work with the other trades, code authorities, utilities, and the Engineer; with due regard to their work, and towards promotion of a rapid completion of the project. If any cooperative work must be altered due to lack of proper supervision of such, or failure to make proper provisions, then the Contractor shall bear expense of such changes as necessary to be made in work of others.
- B. Manufacturer's directions and instructions shall be followed in all cases where such is not shown on the Contract Drawings or herein specified.
- C. The Contractor shall be responsible for coordinating PLC/SCADA design review meetings specified herein.
- D. The Contractor shall coordinate with PG&E and AT&T for connections.

- E. The Contractor shall coordinate with the City, PLC programmer, Engineer, and System Supplier to test the entire system.
- F. The Contractor shall schedule all the required work with the City, including each shutdown period as indicated in Section 121 of these Specifications. Each shutdown shall be implemented to minimize disruption of the existing operations. The work to be provided under this Contract shall not disrupt any of the existing operations without prior approval.
  - 1. Contractor shall make provisions for portable generators and automatic transfer switches when areas of the lift station will be without power.
  - 2. The City reserves the right to delay, change, or modify any shutdown at any time, at no additional cost to the City, when the risk of such a shutdown would jeopardize the operation of system.
  - 3. Contractor is advised that during change out of existing PLC, demolition of existing conduits, installation of new conduits, etc., Contractor is responsible to keep equipment running for all necessary station operation. The Contractor shall install temporary generators, motor controls, panelboards, power panelboards, wiring, etc. to keep all station equipment powered and automatic controls functional.
- G. Schedule within 20 days after award of Contract all service installations and connections with utilities. Delays due to lack of effort by the Contractor which delay the project completion for lack of utility services will not be considered valid and Contract liquidated damages will be assessed.
  - 1. The Contractor is made aware that once PG&E has conducted the final inspection of their facilities, it may take up to four weeks for the related meter installations and each system to become active. It is expected that the Contractor will schedule their operations accordingly and working days will only be suspended during this timeframe if, in the opinion of the Engineer, all items of work are complete except those that need these active systems for completions.
- H. The Contractor shall cease work at any particular point, temporarily, and transfer his operations to such portions of work as directed, when in the judgment of the Engineer it is necessary to do so.
- I. Prior to commencing construction, the General Contractor shall arrange a conference with the General Contractor, Electrical Contractor, System Supplier, Resident Engineer & City as well as all equipment and system suppliers vital to the current phase of work. During the meeting, the equipment supplier shall verify types, sizes, locations, installation requirements, controls and diagrams of all equipment furnished. The Equipment and System Suppliers shall, in writing, inform the Engineer that all phases of coordination of this equipment have been covered and if there are any unusual conditions, they shall be enumerated at this time.
- J. At the City's discretion, Contractor shall stop work for a period of time (without incurring delay costs) in an event where there is a large storm event and the City had determined they need to continuously monitor the station.

### **201-1.08 SUPERVISION**

- A. The General Contractor shall schedule all activities, manage all technical aspects of the project, coordinate submittals and drawings, and attend all project meetings associated with the electrical work.
- B. The General Contractor shall supervise all electrical work, from the beginning to completion and final acceptance.
- C. The General Contractor shall supervise and coordinate all electrical work to ensure each phase of the project, submittal, delivery, installation, and acceptance testing, etc. is completed within the allowable scheduled time frames.
- D. The General Contractor shall be responsible for obtaining, preparing, completing, and furnishing all paper work specified in this Section; which shall include transmittals, submittals, forms, documents, manuals, instructions, and procedures.

### **201-1.09 INSPECTIONS**

- A. All work or materials covered by the Contract documents shall be subject to inspection at any and all times by the Engineer. If any material does not conform to the Contract documents, or does not have a favorably reviewed submittal status; then the Contractor shall, within three days after being notified by the Engineer, remove said material from the premises; and if said material has been installed, the entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the Contractor.
- B. Work shall not be closed in or covered over before inspection and approval by the Engineer. All costs associated with uncovering and making repairs where non-inspected work has been performed shall be borne by the Contractor.
- C. The Contractor shall cooperate with the Engineer and provide assistance at all times for the inspection of the electrical system under this Contract. The Contractor shall remove covers, provide access, operate equipment, and perform other reasonable work that, in the opinion of the Engineer, will be necessary to determine the quality and adequacy of the work.
- D. Before request for final inspection is made, the Contractor shall submit to the Engineer in writing, a statement that the Contractor has made his own thorough inspection of the entire project enumerating punch list items not complete and that the installation and testing is complete and in conformance with the requirements of this Section.
- E. The City may arrange for a facility inspection by Cal-OSHA Consultation Service at any time. The Contractor shall make the necessary corrections to bring all work in conformance with Cal-OSHA requirements, all at no additional cost to the City.
- F. Contractor will be Responsible for any Additional Cost for Overtime, Weekend Overtime or Differential Time, Expenses for Inspection of Defective Work that has to be re-inspected.

### **201-1.10 JOB CONDITIONS**

- A. The Contractor shall make all arrangements and pay the costs thereof for temporary services required during construction of the project, such as temporary electrical power and telephone service. Upon completion of the project, remove all temporary services, equipment, material and wiring from the site as the property of the Contractor.
- B. The Contractor shall provide adequate protection for all equipment and materials during shipment, storage and construction. Equipment and materials shall be completely covered with two layers of plastic and set on cribbing six inches above grade so that they are protected from weather, wind, dust, water, or construction operations. Equipment shall not be stored outdoors without the approval of the Engineer. Where equipment is stored or installed in moist areas, such as unheated buildings, etc., provide an acceptable means to prevent moisture damage, such as a uniformly distributed heat source to prevent condensation.
- C. The normal outdoor, not in direct sunlight, ambient temperature range of the job site will vary between 0 to 110 degrees Fahrenheit. All equipment shall be rated to operate in these temperature ranges or provisions for adequate heating and cooling shall be installed, at no additional cost to City.
- D. The jobsite is prone to vandalism and theft. Contractor shall be responsible for securing all materials and equipment against theft and vandalism for the duration of the project.
- E. Contractor & Subcontractors shall utilize temporary services during construction of the project.

### **201-1.11 SUBMITTAL AND DRAWING REQUIREMENTS**

- A. Electrical submittals shall be submitted by the General Contractor for review by the Engineer per this subsection. They shall be complete giving all details of connections, wiring, instruments, enclosures, materials and dimensions. Standard sales literature will not be acceptable.
- B. A copy of the appropriate Specification Sections, with addendum updates included and with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
  - 1. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated and, therefore, requested by the Contractor, each deviation shall be underlined and denoted by a unique number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the Specifications.
  - 2. The submittal shall be accompanied by a detailed, written justification for each numbered item explaining variance or non-compliance with specifications.
  - 3. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no review.

- C. The electrical submittals shall include but not be limited to data sheets and drawings for each product together with the technical bulletin or brochure. No FAX copies of documents are allowed. The electrical submittals shall include:
1. Product (item) name used herein and on the Contract Drawings.
  2. The manufacturer's model or other designation.
  3. Tag name/number per the drawings or schedules.
  4. Index Binder Tab Dividers.
  5. Detailed electrical one line, elementary control diagrams showing all wiring requirements for each system.
  6. Complete documentation with full description of operation.
  7. Complete catalog cuts with full description of equipment. General sales literature will not be acceptable. The part or model number with options to be provided shall be clearly identified. Where more than one item or catalog number appears on a catalog cut, the specific item(s) or catalog numbers(s) proposed shall be clearly identified.
  8. Location of assembly at which it is installed.
  9. Input-output characteristics.
  10. Range, size, and graduations as required.
  11. Physical size with dimensions and mounting details.
  12. Enclosure fabrication and color.
  13. Enclosure layout and elevation drawings to scale.
  14. Quantity and quality requirements for electric power, air, and/or water supply.
  15. Materials of construction of components.
  16. Nameplate schedule.
  17. Failure to provide submittals with heavy duty permanent plastic labeled index tabs may be grounds for immediate rejection without review.
  18. A complete Bill of Materials list shall be provided at the inside of the front cover.
    - a. The Contractor shall provide Bill of Material formatted as shown in Appendix "A." A separate set of Material Listing forms shall be provided for each MCC bucket, control panel and another listing all field equipment.
    - b. Generic names or part numbers used by a distributor or Systems House are not acceptable; originating manufacturer's name and part number shall be listed.
  19. A separate instrument data sheet shall be provided for each instrument per ISA S20 standards or approved equal. Provide an index with proper identification and cross-referencing of each data sheet.
  20. Submit DVD disk copies of all submitted drawing in AutoCAD format.
  21. For each resubmittal, provide a copy of submittal comments and a separate letter, on Company letterhead, identifying how each submittal comment has been addressed in the resubmittal.

22. PLC software program & documentation: Submittal content shall include the following:
    - a. Listing of all setpoints with proposed initial numeric entry values and corresponding Engineering Units for control strategies.
    - b. Listing of all digital and analog registers, bits, timers etc., their respective description and full addresses.
    - c. Complete commented ladder logic program.
  23. Electronic PDF version of submittals shall be provided with table of contents regardless of hard copy format of submittal. PDF shall be "bookmarked" at each index, subtab, transmittal letter, copy of appropriate check marked Specification Section, bill of materials, copy of submittal comments (for resubmittals), Contractor's response to submittal comments (for resubmittals), drawings, etc. Bookmarks shall be descriptive of actual document, tab, etc. Failure to bookmark PDF or broken bookmarks may be grounds for immediate rejection without review. Bookmarks shall not be out of order; the English description shall match that listed in the Submittal's Table of Contents.
  24. Electronic submissions of submittals may be provided for submittals less than 40 pages and without drawings. Submittals equal to or over 40 pages or those that contain drawings shall be provided in a hardcopy format. Drawings shall be printed at 11 inches by 17 inches. Hardcopy submittals shall be provided in binders as specified herein. The Owner reserves the right to reject submittals that fail to be organized as described herein.
- D. All drawings shall be drawn using AutoCAD, drawn in a professional manner and submitted on 11" x 17" sheets of paper. Shop drawings shall be provided with minimum drafting details as illustrated on the Contract "electrical" series drawings. Diagrams shall carry a uniform and coordinated set of wire colors, wire numbers, and terminal block numbers. The shop drawings shall include:
1. Electrical one-line diagrams detailing all devices associated with the power distribution system. The following applicable information or data shall be shown on the one-line diagram: location, size and amperage rating of bus; size and amperage rating of wire or cable; breaker ratings, number of poles, and frame sizes; standby generator; automatic transfer switch, utility metering, voltage, amperage, number of wires and phases; fault interrupt ratings; ground size and connections; neutral size and connections; power fail and other protective devices; fuse size and type; distribution transformer; panelboard; starters; contactor size and overload range; motor full load amperage of submitted motor and horsepower; rating for miscellaneous loads; etc. Submit a list for each piece of equipment containing the motor voltage, phase and full load amps with one-lines for verification of accuracy of submitted one line drawings.
  2. Elementary diagrams shall be provided for all relay logic, power supplies, PLC I/O and other wiring. All elementary diagrams shall be drawn in EMP/EGP format and standards similar to those shown on the Electrical elementary diagrams showing ladder rung numbers and coil and contact cross referencing numbers.
  3. Analog and digital PLC I/O wiring diagrams shall be provided showing the wiring requirements for each instrument loop. Graphic symbols shall conform with ISA S5.4 drawing standards. A loop diagram shall be furnished for each analog and digital I/O process and all PLC I/O points. Loop diagrams shall include the following as a minimum:
    - a. The loop diagram shall be drawn with sufficient detail to express control philosophy. The diagram shall show all components and accessories of the instrument loop, highlighting special safety and other requirements. These diagrams shall be arranged

- to emphasize device elements and their functions as an aid to understanding the operation of a system and for maintaining or troubleshooting that system.
- b. Analog and digital I/O shall be arranged on the diagram in the same order as the physical arrangement of the group terminations. All termination points on the diagram shall be shown with the actual equipment identification, device and relay terminal number or letter, and I/O point P&ID English descriptor and tag name.
  - c. A separate drawing shall be prepared for each analog and digital card. Each card shall be arranged on the diagram in the same order as the physical arrangement of the card terminations.
  - d. Energy sources – electrical power, air supply, pneumatic and hydraulic fluid supply, designating voltage, current, pressure, etc. shall be shown in detail on the diagram. Input and output signals (e.g., 1-5 VDC, 4-20 mA DC, 3-15 psig, etc.), power and instrument supplies to devices (e.g. 120 VAC, 24 VDC, 80 psig, etc.) shall be shown.
  - e. Engineering units shall be shown on the diagram. Each wire label, equipment identification terminal number or letter and color code shall be shown. Signal and DC polarities shall be shown.
  - f. All spare wires, cables and termination points shall be shown. All jumpers, grounding, shielding, power supply details shall be shown.
4. 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.
  5. Analog and digital I/O wiring diagrams showing the wiring requirements for each instrument loop. Graphic symbols shall conform with ISA S5.4 drawing standards. A loop diagram shall be furnished for each analog and digital I/O process and all PLC I/O cards. Loop diagrams shall include the following as a minimum:
    - a. The loop diagram shall be drawn with sufficient detail to express control philosophy. The diagram shall show all components and accessories of the instrument loop, highlighting special safety and other requirements. These diagrams shall be arranged to emphasize device elements and their functions as an aid to understanding the operation of a system and for maintaining or troubleshooting that system.
    - b. A separate drawing shall be prepared for each analog and digital card. Each card shall be arranged on the diagram in the same order as the physical arrangement of the card terminations. All termination points on the diagram shall be shown with the actual equipment identification, device and relay terminal number or letter, and I/O point P&ID English descriptor and tag name. A separate drawing shall be prepared for each card.
    - c. Energy sources - electrical power, air supply, pneumatic and hydraulic fluid supply, designating voltage, current, pressure, etc. shall be shown in detail on the diagram. Input and output signals (e.g., 1-5 VDC, 4-20 mA DC, 3-15 psig, etc.), power and instrument supplies to devices (e.g. 120 VAC, 24 VDC, 80 psig, etc.) shall be shown.
    - d. Engineering units shall be shown on the diagram. Each wire label, equipment identification terminal number or letter and color code shall be shown. Signal and DC polarities shall be shown.
    - e. All spare wires, cables and termination points shall be shown. All jumpers, grounding, shielding, power supply details shall be shown.

6. Submit drawings of all nameplates and tags, as specified herein, to be used on project. The Engineer has the right to adjust nameplate engraving titles during submittals at no additional cost to the City. Submittal to include the following:
    - a. Dimensions of nameplate.
    - b. Exact lettering and font for each nameplate.
    - c. Color of nameplate.
    - d. Color of lettering.
    - e. Materials of construction.
    - f. Method and materials for attachment.
    - g. Drawing showing location of nameplate on each panel.
  7. Copying contract drawings and providing them as submittals will be considered unresponsive and the submittal will be rejected without review.
- E. Each submittal shall be bound in a three ring binder, which is sized such that when all material is inserted, the binder is not over 3/4 full. Binder construction shall allow easy removal of any page without complete manual disassembly; spiral ring type binders are not acceptable.
1. Each binder shall be appropriately labeled on the outside spine & front cover with the project name, contract number, equipment supplier's name, specification section(s), and major material contained therein.
  2. An index shall be provided at the inside of the front cover. This index shall itemize the contents of each tab and sub tab section. Also, list the project name, contract number and equipment supplier's name, address, phone number, and contact person on the index page. Index dividers (tabs) shall be provided to separate each section.
  3. All copies shall be clear and legible. Data sheets shall be provided for each instrument, with an index and proper identification and cross-referencing.
  4. Exceptions to the Contract specifications or drawings shall be clearly defined by the equipment supplier.
    - a. Data shall contain sufficient details so a proper evaluation may be made by the Engineer. Contractor shall provide separate letter (located in the front of the submittal) detailing specific exceptions to the Contract Specifications or Drawings.
    - b. Exceptions that are noted in the marked-up Drawings or Specifications, but not listed on the Exceptions/Clarifications letter, will be considered as non-responsive and not accepted as changes to the Contract Documents.
  5. Request for information (RFIs) shall not be included in submittals. RFIs shall be submitted separately in its individual submittal number.
  6. Resubmittals shall be provided with a copy of the previous submittal comments and a separate letter, on company letterhead, identifying how each submittal comment has been addressed in the resubmittal.
  7. Failure to provide submittals with heavy duty permanent plastic labeled index tabs may be grounds for immediate rejection without review.
- F. Field equipment shop documents, panel equipment shop documents, drawings, and bill of materials shall be grouped under separate tabs. Catalog cuts shall be ordered in the same sequence as their corresponding Contract specification subsection.

- G. Catalog cuts shall be submitted grouped together by material and not scattered throughout the submittal intermingled with other material cut sheets (i.e. do not submit cut sheet for specific size conduit followed by cut sheet for specific size wire, and then cut sheet for different size conduit and different size wire. Group conduits together, group wires together, etc.)
- H. Drawings shall be submitted in a separate hole-punched binder that covers the entire 11" X 17" length of the Drawing:
1. Shop Drawings with less than 20 sheets total in the submittal, may be provided in an 11½-inch by 17½-inch reinforced folder.
  2. All Interconnection Drawings or Shop Drawings of 20 sheets or more shall be provided in separate heavy duty three-ring binder to allow drawings to be easily removed. Binder shall be Cardinal D-Ring Easy Open Ledger Binder with locking D-Rings or approved equal.
  3. Failure to provide drawing submittal in correct binder format may be grounds for immediate rejection without review.
  4. Each drawing title block shall contain the English description name for drawing contents (i.e. Lift Pump No. 1 Interconnect Drawing) and drawing number. All pages and drawings in the submittal shall be numbered sequentially (with no number skipped) in lower right hand corner.
  5. Drawings that are "C" or "D" size shall be folded, with the title block visible and placed in reinforced clear plastic pockets.
- I. Catalog cuts and drawings shall be submitted for all devices and components in the electrical system.
- J. The Supplier shall coordinate submittals with the work so that project will not be delayed. This coordination shall include scheduling the different categories of submittals, so that one will not be delayed for lack of coordination with another.
- K. No submittal documents shall be labeled as proprietary. Labeling documents as proprietary will be sufficient cause for rejection of entire submittal. The City reserves the right to copy or duplicate any and all portions of the documents provided for the project including copyrighted documents as desired.
- L. Approval of submittals shall not relieve Contractor of their obligation to perform the work in strict accordance with this Contract and the Contract Documents or of their responsibility to provide a complete and reliable system.
- M. No material or equipment shall be allowed at the job site until the submittal for such items has been favorably reviewed by the Engineer and marked "No Exceptions Taken" or "Make Corrections Noted."
- N. Identify all submittals by submittal number on letter of transmittal. Submittals shall be numbered consecutively and resubmittals shall have a letter suffix. For example:
1. 1st submittal: 1.

2. 1st resubmittal: 1A.
3. 2nd resubmittal: 1B, etc.

- O. The equipment specifications have prepared on the basis of the equipment first named in the Specifications. The Supplier shall note that the second named equipment, if given, is considered acceptable and equal equipment, but in some cases additional design, options, or modifications may be required, at no additional cost, to meet Specifications.
- P. The decision of the Engineer governs what is acceptable as a substitution. If the Engineer considers it necessary, tests to determine equality of the proposed substitution shall be made, at the Supplier's expense, by an unbiased laboratory satisfactory to the Engineer.
- Q. Electrical submittals shall be complete giving all details of connections, wiring, instruments, enclosures, materials and dimensions. Standard sales literature will not be acceptable.

## **201-2 PRODUCTS**

### **201-2.01 QUALITY**

- A. It is the intent of the Contract specifications and drawings to secure the highest quality in all materials and equipment in order to facilitate operation and maintenance of the facility. All equipment and materials shall be new and the products of reputable suppliers having adequate experience in the manufacture of these particular items. For uniformity, only one manufacturer will be accepted for each type of product.
- B. All equipment shall be designed for the service intended and shall be of rugged construction, of ample strength for all stresses that may occur during fabrication, transportation, erection, and continuous or intermittent operation. All equipment shall be adequately stayed and braced and anchored and shall be installed in a neat and workmanlike manner. Appearance and safety, as well as utility shall be given consideration in the design of details. All components and devices installed shall be standard items of industrial grade, unless otherwise noted, and shall be of sturdy and durable construction suitable for long, trouble free service. Light duty, fragile and competitive grade devices of doubtful durability shall not be used.
- C. Products that are specified by manufacturer, trade name or catalog number established a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are favorably reviewed by the Engineer prior to installation.
- D. Underwriters Laboratories (UL) listing is required for all substituted equipment when such a listing is available for the first named equipment.
- E. When required by the Contract specifications or requested by the Engineer, the Contractor shall submit equipment or material samples for test or evaluation. The samples shall be furnished with information as to their source and prepared in such quantities and sizes as may be required for proper examination and tests, with all freight and charges prepaid. All samples shall be submitted before shipment of the equipment or material to the job site and in ample

time to permit the making of proper tests, analyses, examinations, rejections, and resubmissions before incorporated into the work.

- F. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without manual resetting or operator interaction when power is restored.
- G. Signal transmission from remote or field electric and electronic devices shall be 4-20 mA, sourced by a 12 VDC or 24 VDC loop supply from the panel that is to receive the signal. Nonstandard transmission methods such as impulse duration, pulse rate, and voltage regulated will not be permitted except where specifically noted.
- H. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission.
- I. It is the System Supplier's responsibility to visit jobsite to collect and document existing conditions and equipment device part numbers in order for all similar called out new equipment to match existing.

#### **201-2.02 NAMEPLATES AND TAGS**

- A. Equipment exterior nameplates - Nameplate material shall be rigid laminated black phenolic with beveled edges and white lettering; except for caution, warning, and danger nameplates the color shall be red with white lettering. The size of the nameplate shall be as shown on the drawings. No letters are allowed smaller than 3/16". Securely fasten nameplates in place using two stainless steel screws if the nameplate is not an integral part of the device. Epoxy cement or glued on nameplates will not be acceptable.
  - 1. For each major piece of electrical equipment provide a manufacturer's nameplate showing the Contract specified name and number designation, the manufacturer's name, model designation, part number, serial number, and pertinent ratings such as voltage, amperage, # of phases, range, calibration, etc.
  - 2. For each device with a specific identity (pushbutton, indicator, instrument, etc.) mounted on the exterior or deadfront of a piece of equipment provide a nameplate with the inscription as shown in the Contract documents. Where no inscription is indicated in the Contract documents, furnish nameplates with an appropriate inscription providing the name and number of device.
  - 3. For all receptacles and switches (including devices located on Switchboard or MCC), provide a faceplate engraved or stamped with the panelboard and circuit number it is fed from. Also, include on faceplate or on a separate nameplate for each light switch identification use such as "OUTSIDE BUILDING LIGHTS," "PERIMETER LIGHTS," "MCC ROOM," etc.
  - 4. All field instruments and devices shall be labeled with designation shown on P&ID diagrams.
  - 5. All transformers and panelboards shall have nameplates with 1/2" high letters and be engraved with designations as shown on one-line Drawings.

6. All safety and disconnect switches shall have nameplates with 1/2" high letters and be engraved with designations as shown on one-line drawings.
  7. Underground Pull Box and Vault Cover Identification: Engrave or bead weld pull box covers with minimum 1/4" thickness and 1/2" letters and Covers shall be engraved with designations as shown on Contract drawings or as directed by Engineer.
  8. Aboveground Pull Box Cover Identification: 316 stainless steel screws attached stamped 316 stainless steel plate nameplates with 1/2" letters and be engraved with designations as shown on Contract drawings or as directed by Engineer.
  9. Provide engraved nameplate at service entrance equipment (red with 1" white lettering) indicating type and location of standby generator per NEC 702.7 (A).
  10. Provide engraved nameplate at service entrance equipment per NEC 702.7(B)
  11. METERING – Service Equipment Label: Per NEC 110.24 (A) Service equipment shall be legibly marked in field with the maximum available fault current. Field marking shall include date the fault current calculation was performed and be weather & UV rated. Service equipment shall not be hand labeled.
  12. All subpanels shall be identified with an engraved phenolic label of the power source location feeding it (i.e. MCC-100, Panelboard LP-1, etc.)
  13. Specific equipment fed from more than one feeder shall be properly identified ("Fed from Pedestal and the standby generator") with 1" lettering.
  14. Provided engraved nameplate, with 1/2" lettering, describing phase rotation at the main breaker. Nameplate shall be installed prior to start-up.
- B. Equipment Interior Nameplates - Nameplate material shall be clear plastic with black machine printed lettering as produced by a KROY or similar machine; except caution, warning, and danger nameplates shall have red lettering.
1. The size of the nameplate tape shall be no smaller than 2" in height with 3/8" lettering unless otherwise approved by the Engineer. Securely fasten nameplates in place on a clean surface using the adhesion of the tape. Add additional clear glue to hold the nameplate securely in place when necessary.
  2. For each device with a specific identity (relay, module, power supply, fuse, terminal block, etc.) mounted in the interior of a piece of equipment provide a nameplate with the inscription as shown in the Contract documents. Where no inscription is indicated in the Contract documents, furnish nameplates with an appropriate inscription providing the name and number of device used on the submittal drawings.
  3. Nameplates shall not be attached to wireway covers or to removable devices.
  4. For all receptacles and switches (including devices located in Control Panel, provide a faceplate printed with the panelboard and circuit number it is fed from.
  5. Provide nameplate on all deadfront doors indicating panelboard and circuit number(s) it is fed from. When multiple panelboard circuits are feeding panel, identify which components are fed from which panelboard circuits.
  6. Provide nameplate next to all backpan mounted heater or fan thermostat indicating panelboard and circuit number(s) it is fed from.

- C. Equipment Tags - When there is no space or it is impractical to attach an engraved phenolic nameplate with screws, as is the case with most field devices and instruments, the Contractor shall attach a tag to the equipment with the same inscriptions as specified above in paragraph A. The tag shall be made from stainless steel material and the size of the nameplate shall be no smaller than 3/8"h x 2"w with 3/16" machine printed or engraved lettering unless otherwise approved by the Engineer. Securely fasten tags in place using 316 stainless steel 0.048 inch diameter wire of the type normally used for this purpose (catalog cut sheet shall be submitted). Stainless steel wire shall be crimp connected. Twisting ends together is not acceptable.
- D. Engrave or machine print the tags with inscriptions as approved by the Engineer in the nameplate submittal.
- E. Provide temporary labels for all instruments and devices immediately when installed. Temporary labels shall be provided with 1/2" letters minimum and labeled with P&ID tag number.

### **201-2.03 WIRE**

- A. This section applies to all wires or conductors used internal for all electrical equipment or external for field wiring. All wires shall be properly fused or protected by a breaker at the amperage rating allowed by the NEC.
- B. Material - Wire shall be new, plainly marked with UL label, gauge, voltage, type of insulation, and manufacturer's name. All wire shall conform to the following:
  - 1. Conductors shall be copper, with a minimum of 98% conductivity.
  - 2. Wire shall be Class B stranded.
  - 3. Insulation of all conductors and cables shall be rated 600 volt.
  - 4. Insulation type for conductors smaller than #10 AWG shall be moisture and heat resistant thermoplastic THWN, rated 90 °C in dry locations and 75 °C in wet locations, or approved equal aboveground. Conductors #10 AWG and larger shall be RHW-XLP insulation rated unless otherwise noted 90 °C in dry locations and 75 °C in wet locations.
  - 5. Field wire minimum AWG sizes:
    - a. #12 for wires used for individual conductor circuits 100 volt and above, except for PLC I/O which may be #14 AWG.
    - b. #14 for wires used for individual conductor circuits below 100 volt.
  - 6. Nonfield or equipment wire minimum AWG sizes:
    - a. #14 for wires used for individual conductor circuits 100 volt and above.
    - b. #18 for wires used for individual conductor circuits below 100 volt.
  - 7. Instrument wiring:
    - a. General: Instrument cables shall have 600V rated insulation and 100% individual shielded twisted pair #18 conductors with drain wire. Single twisted shielded pair (T.S.PR.) cables shall be Belden, or approved equal.

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

**WIRES COLOR CODE TABLE**

DESCRIPTION	PHASE/CODE LETTER	FIELD WIRE WIRE OR TAPE COLOR	NON-FIELD WIRE COLOR
480 V, 3 PHASE	A	BROWN	BROWN
	B	ORANGE	ORANGE
	C	YELLOW	YELLOW
240 V or 208 V, 3P	A	BLACK	-
	B	RED (ORANGE if high leg)	-
	C	BLUE	-
240 / 120 V, 1 P	L1	BLACK	BLACK
	L2	RED	-
12V POSITIVE	12P	DARK BLUE	DARK BLUE
12V NEGATIVE	12N	BLACK/RED STRIPE	BLACK/RED STRIPE
24V POSITIVE	24P	PINK	PINK
24V NEGATIVE	24N	BLACK/WHITE STRIPE	BLACK/WHITE STRIPE
AC CONTROL		VIOLET	RED (YELLOW FOR FOREIGN CIRCUITS)
DC CONTROL		BLUE	BLUE
NEUTRAL	N	WHITE	WHITE
GROUND	G	GREEN	GREEN
SHIELDED PAIR	+	BLACK	RED
	-	CLEAR (WHITE)	BLACK

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

D. Wire Marking:

1. Wire identification: All wire terminations including field interconnect as well as wiring interior MCC cubicles, switchboard, panels, equipment, junction panels and boxes shall be identified with machine printed labels. Hand lettered labels are not acceptable and shall

be replaced at the Contractor's expense. The wire identification code for all field interconnect and panel interior wiring, shall be similar to the designations shown on the Contract example drawings.

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

#### E. SPECIAL PURPOSE WIRING

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

## **201-2.04 CONDUIT, RACEWAYS, AND WIREWAYS**

- A. GENERAL - Conduit, raceways, and wireways, wiring methods, materials, installation shall meet all requirements of the NEC, be UL labeled for the application, and meet the minimum following specifications.
1. All wiring shall be installed in conduits, raceways, or wireways when interconnecting equipment and devices.
  2. The Contractor shall use special conduit, raceways, wireways, construction methods, and materials as shown on the Contract drawings; which shall take precedence over any general methods and materials specified in this Section.
  3. The minimum size conduit shall be ¾-inch unless indicated otherwise on the Drawings or for special connections to equipment. Buried, encased, or conduits located in walls shall be 1-inch minimum.
  4. Conduit stubs for future use shall be capped with coupling, nipple, plug and cap and each end identified with conduit labels.
  5. Conduits to be abandoned that protrude above graded shall be cut flush and filled with grout
  6. Conduits shall not be filled to more than 50% of their total cross – sectional area.
  7. Conduit Marking
    - a. All conduits and raceways listed in Conduit & Wire Routing Schedule shall have conduit tags at both ends of each conduit segment. This includes all conduits in pullboxes and vaults.
    - b. Tag material shall be aluminum with machine stamped lettering. The size of the tag shall be 2" diameter. No letters are allowed smaller than 7/16". Securely fasten tags in place using 316 stainless steel 0.048 inch diameter wire of the type normally used for this purpose (catalog cut sheet shall be submitted). Stainless steel wire shall be crimp connected. Twisting ends together is not acceptable. Engrave the tags with the conduit number as listed in the conduit schedule on the Contract "E"-series Drawings. Labeling shall be neatly installed for visibility and shall be clearly legible.
    - c. Prior to encasement, concealment, backfilling of conduits, temporary conduit labels shall be provided at each end of conduit. Temporary conduit labels shall have ½-inch (minimum) lettering at all transition points. After encasement and concealment temporary conduit labels shall be placed at each exposed end.
  8. Warning Tapes
    - a. Plastic tape shall be colored for particular underground service, 3-inch minimum width, utilize tape made of material resistant to corrosive soil. Tape shall have aluminum backing to facilitate locating it underground using a non-ferrous locator. Use red tape for "Electric" service and orange tape for "Communication" service. Use tape with printed wording listing type of service. Manufacturers and types: Seton, Blackburn, Griffolyn Co., Terra-Tape, Brady or equivalent.
- B. Galvanized Rigid Steel Conduit (GRS)
1. Rigid steel conduit, couplings, bends and nipples shall be in accordance with ANSI C80.1 and UL-6.

2. Hotdip galvanized inside and outside after fabrication and then coated with a zinc bichromate finish. Provide threaded type fittings, couplings, and connectors; set screw type and compression type are not acceptable.
3. Minimum trade size - three-quarters inch ( $\frac{3}{4}$ "") unless otherwise shown on Contract Drawings.
4. Conduits entering enclosures shall be fitted with locknut and insulated grounding bushing; O-Z "HBLG", Appleton "GIB", or approved equal. All grounding bushings shall be tied to the grounding system with properly sized bonding conductors per the NEC code.
5. Galvanized rigid steel factory elbows for 90 degree transitions.
6. EMT or IMC is not considered an equivalent to GRS.
7. GRS conduit is allowed only when specifically called out in the "Conduit and Wire Routing Schedule."

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

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

D. PVC Conduit, (PVC-80)

1. Shall be high impact polyvinylchloride suitable for use underground, direct burial and for use with 90 C wires, and shall conform to UL 651. Shall be UL listed and labeled for "direct" burial. PVC-40 is unacceptable.
2. A copper bonding conductor shall be pulled in each raceway and bonded to equipment at each end with approved lugs.
3. Each underground run shall be placed in a trench with a minimum of four (4) inch sand bed evenly compacted on all sides, top and bottom.

4. Bends, elbows, and risers shall be made with galvanized rigid steel (GRS) conduit using threaded adapters. Bond each metallic portion to each other and to equipment connected at each end of conduit run.
5. PVC fittings shall have solvent-weld-type conduit connections.
6. PVC conduit shall be stored on a flat surface and shielded from the sun.
7. PVC conduit shall not be used above grade.
8. PVC-40 conduit shall not be used in place of PVC-80 conduit.

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

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

**201-2.05 DEVICES**

A. Fuses

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

B. Switches and Pushbuttons

1. Switches (HS) and pushbuttons (HC) for general purpose applications shall be water and oil tight as defined by NEMA 4X, corrosion resistant as defined by NEMA ICS 6-110.58, U.L. listed, standard 30 mm diameter, with round plastic clamp ring. Switches shall be Allen-Bradley 800H, IDEC ITE, or equal.
2. Switches and pushbuttons shall have contacts rated 10 amperes continuous and 600 VAC. Contract blocks shall have IP2X finger-safe protection.

3. Manufacturer's standard size legend plates shall be provided and engraved to specify each switch and pushbutton function. The legend plate color shall be black.
4. Selector switch handles and pushbutton caps shall be black.
5. Selector Switch Positions
  - a. Hand-off-auto (HOA) applications shall have the hand position to the left, off in center, and auto in the right position.
  - b. On/Off shall have the ON position to the right.
  - c. Local/Remote shall have the REMOTE position to the right.
  - d. Open-Close-Auto applications shall have the open position to the left, close in center, and auto in the right position.
6. Lockout stop shall be a pushbutton with red cap and pad locking assembly for pushbutton.
7. Potentiometers shall be 10K ohm, single turn, finger safe.
8. Illuminated Switches (HS) for general purpose applications shall be water and oil tight as defined by NEMA 4, U.L. listed, standard 22 mm diameter, with round plastic clamp ring, maintained switch, blue lens. Switches shall be Schneider XB4 with LED lamp module, GE, or equal.

#### C. Relays and Timers

1. General: Relays and timers shall be provided with N.O. or N.C. contacts as shown on the Contract drawings. All spare contacts shown shall be provided. Contacts shall be rated 10 amps minimum at 120 VAC, 60 Hz unless otherwise stated. Supply power or coil voltage shall be 120 VAC unless shown otherwise on the Contract drawings. Relays and timers shall be designed for continuous duty. All relays shall be U.L. listed. The following is a summary of abbreviations associated with relays and timers:
  - CR - Control Relay
  - ISR - Intrinsic safe 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. Intrinsic safe relay (ISR) shall be two (2) channel Pepperl+Fuchs KFA5-SR2-Ex series operating from 120VAC power or approved equal. ISR shall have Form "C" dry contacts rated to switch 120VAC and be DIN rail mounted. Sensitivity shall be adjustable. ISR shall be rated for Class 1, Division 2 applications.
5. 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.

6. The power fail relay (PFR) shall monitor the three phase voltages and phases. It shall monitor low-voltage, voltage unbalance, phase reversal and harmful power line conditions. Relay shall have adjustable trip delay between 2-30 seconds for unbalance and phasing trip delays. Phase Monitor Relay shall be Littlefuse 102A series or approved equal.

#### D. Indicating Lights

1. Indicating Lights for general purpose applications shall be water and oil tight as defined by NEMA 4X, corrosion resistant as defined by NEMA ICS 6-110.58, U.L. listed, High intensity multi-chip LEDs, full voltage (unless shown otherwise), standard 30 mm diameter, with round plastic lens and miniature bayonet lamp base. Indication lights shall be Allen-Bradley 800H, IDEC ALD, or approved equal.
2. Manufacturer's standard size legend plates shall be provided and engraved to specify each light's function. The legend plate color shall be black.
3. Indicating lights designated "PTT" shall be provided with a push-to-test switch and wiring.
4. Indicating light type and color of lens shall be as shown on the Drawings or specified in the Contract documents.

#### E. Motor Starter

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

#### F. Elapsed Time Meter

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

## G. 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.

## H. Terminal Blocks

1. Control Panel Terminal Blocks
  - a. Terminal blocks to be clamp type, 6mm spacing, and 600 volt, minimum rating of 30 amps, and mounted on DIN rail, Entrelec M4/6 colored, Weidmuller 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 alphabetical 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.

#### I. Boxes

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

#### J. Switches

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

#### K. Receptacles

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

#### L. Device Plates and Covers

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

#### **201-2.06 CONTROL PANEL**

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

1. New Tesco L3000 liquid level controller (LLC) with Operator Interface no equal as shown on the I-series Drawings. L3000 to be programmed by System Supplier as described herein.
  - a. Group all telemetry tables together for future efficient data transfer to SCADA Central. Submit proposed communications data tables in Excel format for approval by City.
  - b. All wiring from the PLC I/O terminals shall be wired to interface terminal blocks, including all spares, as shown on Contract drawings to match the I/O of the City's Standard PLC, Program Configuration and I/O wiring.
2. PAPERLESS CHART RECORDER
  - a. The Paperless recorder shall be a fully microprocessor based unit with all setup parameters programmable from a full keypad and displayed on a SVGA Touchscreen. The paperless recorder shall have inputs to record 20 channels (minimum) of process variables, 400MG standard memory, compact flash, 12 alarm outputs, RS-232C serial interface, math and report function, USB interface and 120VAC power.
  - b. Chart recorder shall be Yokogawa DX20 match City Standard.
3. Provide Barnett B1285 -M1 autodialer per City Standard.
4. Provide metal data pocket within each enclosure and box to hold as-built drawings.

##### B. Miscellaneous Devices:

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

2. Connection between Ethernet Port and Ethernet hub shall be made with Cat 5 patch cable. Patch cable shall be 4 pair stranded PVC cable with HI-FLEX conductors. Length shall be 5 feet minimum. Color of cable shall be red.
3. RFI filters to be for power line radio frequency protection, Eaton Aegis series AGPH 12015 to match City standard.
4. Receptacle to be duplex and rated 20 amps, 120 VAC, 2 pole, 3 wire grounding, NEMA 5-20R configuration, specification grade, and side wired to screw terminals.
5. DC power supplies to be linear type and rated per Contract drawings at 24VDC and 12VDC, Power One to match City Standard.
6. Isolator shall provide complete isolation of the 4-20 mA output signal from the input signal and isolator power supply. Each isolator shall have all solid state circuitry mounted in a plug-in module. The 4-20 mA output signal shall be capable of driving a 600 ohm load. Both accuracy and linearity shall be +/- 0.10% of span. The isolator shall be powered as shown on Contract Drawings. Each isolator shall be as manufactured by AGM Electronics, Action Instruments, or approved equal.
7. Intrusion bypass pushbutton (blue) shall be Allen-Bradley 800H, IDEC ITE, or approved equal.
8. Batteries And Charger:
  - a. Batteries shall be sealed, rechargeable lead acid type, containing no liquid. The batteries shall be completely maintenance free, requiring no additional water or electrolyte. An internal lead dioxide system shall eliminate danger of permanent cell reversal and resulting loss of ability to recharge.
  - b. Batteries shall not be affected by memory or previous use history. Each battery shall be maintenance-free, non spillable. Each battery shall have a minimum 36 ampere-hour capacity at a nominal 12 VDC.
  - c. The charger shall provide dual rate charging, automatically switching between fast and float rates. The charger shall be specifically designed to match the battery rating and size. The float charge shall be low rate so that the batteries can be left on charge continuously. The charger shall have a fast charging rate that will fully recharge a discharged battery in 24 hours or less. Battery and charger shall be rated operate in a temperature range to 122 degrees Fahrenheit.
  - d. Batteries shall be Power-Sonic PG-12V-35Fr to match City Standard. Charger/Regulator shall be Power-Sonic PSC-124000A.
  - e. DC-DC converter shall be Rhino PSP series 12VDC to 24VDC, 1A to match City Standard.
9. Future device and component mounting space shall be provided on door, backpan, and subpanel where detailed on Drawings. Where no detail is shown, provide a minimum of 10 percent usable future space.
10. Provide label on Control Panel door, below door handle, identifying all sources of foreign power (i.e. "Control Panel Fed from LP1-Ckt#4", "Fans & Lights Fed from LP1-Ckt#2", etc.). Label shall be white plastic with black machine printed lettering as produced by a KROY or similar machine with lettering no smaller than 3/8". Securely attach to door with clear tape
11. 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 Panduit High Bond Adhesive back mounts SGABM series, or approved equal.

## **201-2.07 FIELD DEVICES**

### **A. Bubbler System**

1. A complete air system consisting of an air compressor assembly, controls, and associated hardware matching existing City Standard. The air control system shall be of the pressure transmitter type which operates from the level back pressure of compressed air through air tubing from an air pipe connected to the existing system installed in the wet well.
2. The pressure transmitter shall incorporate a high-accuracy capacitance sensor. With this sensor, process pressure is transmitted through the isolating diaphragm and fill fluid to the sensing diaphragm in the center of the capacitance cell. Capacitor plates on both sides of the sensing diaphragm detect its position. The differential capacitance between the sensing diaphragm and the capacitor plates shall be directly proportional to process pressure. Pressure transmitter shall be provided with LCD of pressure value. The pressure transmitter shall be Rosemount to display match City standard.
3. Each calibration valve assembly shall have integral stainless steel block and bleed valving. Valve shall have a non-rotating tip stem and a fully back-seated bonnet. Block and bleed valve shall be Hex HB59 (phone 800-543-7311) or approved equal.
4. Provide air flowmeter 0-5.2SCFH, with adjustable steel valve, stainless steel float & fittings, Buna-N O-ring, SCFH scale, 316 inlet valve, and latching inductive ring sensor King Instruments 7430 series (74C-1-23-G-081-322514) with inductive ring sensor to match City Standard.
5. The air system shall utilize 1/4" diameter polyethylene tubing, Imperial Paraflex #44P-Black or an approved equal. All valves and fittings for tubing shall be brass, Eastman Poly-Flo, Swagelok or approved equal.
6. Air sensing tube to wet well shall be run in conduit as shown on plans.
7. Wiring and piping of the air compressor assembly shall be so arranged that the unit is easily removed without removing any other equipment.
8. All miscellaneous pneumatic system accessories shall be furnished and installed by the Contractor to provide the operations specified herein and shown on the Drawings.

### **B. Intrusion System**

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

### **C. Photocell**

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

#### D. Float Switch

1. Each level switch shall utilize a Polypropylene float which moves with liquid level to actuate a hermetically sealed (non-mercury) microswitch. The level switch shall have Form "C" contacts with a minimum electrical with switch rating of 16 Amp at 120VAC. The float switch shall be suspended mounted with a weight. The level switch shall be MJK7030, Danfoss 7030, or approved equal.

#### E. Magnetic flowmeter:

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

accidental submergence proof for forty-eight hours under 30 feet of water. Conduits between flowmeter element and electronics shall be sealed to retain submergence rating per flowmeter manufacturer's requirements.

9. Conduit entry shall be 1-2-14NPT.
10. The flow meter shall be Rosemount with converter/indicator 8750W to match City Standard.

## **201-2.08 RADIO SYSTEM**

### A. Radio/Antenna:

1. Radio shall be Trio QR-150 half-duplex radio to match Owner standard.
2. Radio shall be programmed by Contractor with parameters provided by owner.
3. Install radio within Control Panel such that LED lights are visible with panel door open.

### B. Antenna:

1. Each antenna system shall be furnished and installed complete and functional for the intended use. An antenna system shall include but not be limited to, mounting hardware, lightning arrestor, and coaxial cables with connectors.
2. Antenna shall be installed and supported as shown on the Contract Drawings. Support members shall have sufficient strength to withstand local wind conditions and shall be protected from sun exposure and corrosive chemical damage.
3. Support hardware such as clamps, orientation mounts, and offset brackets shall be steel protected with a hot dip galvanized finish or stainless steel. Clamps and mounts shall be heavy duty in order to transfer the full antenna load to the support tower or mast. Bolts and screws shall be stainless steel.
4. Antenna mast as shown on Contract Drawing.
5. Antenna shall be Kathrein YA7-155 to match Owner Standard.

### C. Transmission cable:

1. Provide 50 Ohm, 1/2-inch weatherproof coaxial cable from lightning arrestor to antenna. The coax cable shall have a corrugated outer conductor of multi-ply bonded Aluminum Tape, copper-clad aluminum inner conductor with foam dielectric. The coax cable shall be jacketed for corrosive environment and ultra-violet exposure. The coax cable shall be super flexible, with a minimum bending radius of 5 inches. The cable shall be installed as one continuous length from the antenna to the flange mounted lightning arrestor. Use Times Microwave Systems LMR400 1/2-inch coax cable, or approved equal.
2. A backpan mount antenna lightning "N" connector arrestor shall be furnished on the antenna coaxial transmission line. The lightning arrestor shall be grounded to the panel ground bus with a #8 AWG or larger bonding wire. The lightning arrestor shall be a PolyPhaser IS-50NX-C2 or approved equal.
3. Provide miscellaneous hardware such as grounding kits, hanger kits, and feed through assemblies.

4. The cable shall be carefully installed to prevent damage to the jacket and routed with a minimum bending radius of 8 inches.
5. Provide connector weatherproofing kits for outdoor exposed connectors and grounding strap attachments. All mating connectors that are exposed to weather shall be wrapped with a sealing material designed to protect against water and dirt entry into the connectors.

## **201-2.09 AUTOMATIC TRANSFER SWITCH**

### A. Switch Unit

1. The transfer switch unit shall be electrically operated and mechanically held. The electrical operator shall be a single solenoid mechanism, momentarily energized to minimize power consumption and heat generation.
2. ATS types utilizing components of molded-case circuit breakers, contactors, or parts thereof, are not acceptable.
3. The switch shall be true double-throw with inherently interlocked construction. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.
4. Wide contact gaps shall be provided to ensure positive isolation of the normal and emergency power sources.
5. The switch shall be rated to withstand symmetrical short circuit current at the ATS terminals in combination with normal or emergency feeder breakers rated equal to or greater than RMS symmetrical amperes shown on Contract Drawings.
6. The switch shall be fully rated at amperage as shown on Contract Drawing, when mounted in switchboard/pedestal, for switching all types of loads, including induction motors, at the specified amperage and voltage.
7. Switches that are not rated for continuous duty, repetitive switching of all types of loads or transfer between two active power sources, are not acceptable.
8. The main power contacts shall have silver alloy construction with wiping action and shall be protected by arc chutes or arcing contacts.
9. The main contact design shall allow repeated making and breaking of full load current, in a combination of motor and other loads, without damage to the main contacts.
10. All main power contacts and auxiliary contacts shall be mechanically attached to a common actuator shaft.
11. The operating transfer time shall be adjustable time delayed open transition type with intentional load disconnect position for an adjustable period of time when transferring from Source 1 to Source 2 or from Source 2 to Source 1.
12. Silver plated copper shall be used in the construction of the bus work.
13. Inspection of all contacts (movable and stationary) linkages and moving parts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors.
14. All switch and relay contacts, coils, mechanical linkages, and control elements shall be serviceable or removable from the front of the mounted switch and accessory assembly

without removal of the switch or assembly from the compartment and without disconnection of the power cables or control wiring.

15. The switch shall have a manual operating handle for maintenance purposes.
16. Screw-type solderless terminals or lugs shall be provided for connecting all external line & load power cables and control wiring. All connections shall be accessible from the front without removal of internal components.
17. A terminal strip shall be provided for terminating all control wiring. Number all terminals with machine printed lettering matching the wire number of the terminated wire.
18. All control wiring shall have permanent identification at each point of connection. Wire identification shall be by machine printed numbered wiring sleeves. Electrically common wires shall have the same wire number. Electrically different wiring shall have unique wire numbers.
19. Control wiring shall be neatly bundled and secured in place by plastic cable ties. Wiring shall be protected with plastic spiral wrap where it is subject to mechanical damage or crosses over to a hinged door.
20. The switch assembly shall be in an enclosure as shown on Contract Electrical Drawings.
21. NEMA 3R rated ATS shall have padlockable outer door and all devices, operator interfaces, controllers, etc. mounted on an inner deadfront door.
22. Top of operator interface (pilot devices / breaker) to be maximum 66" above finished floor.
23. The automatic transfer switch shall be ASCO 7000 series with options to meet specified requirements, to match City Standard.
24. Provide copper lugs including grounding lugs of quantity and size for conductors listed in the Conduit and Wire Routing Schedule.
25. 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 Panduit High Bond Adhesive back mounts SGABM series, or approved equal.

#### B. ATS Control Panel

1. A control panel shall be provided to direct the operation of the transfer switch. The modules sensing and logic shall be controlled by a built-in microprocessor. Control panels that do not utilize microprocessor electronics to control the operation of the switch are not acceptable.
2. The transfer switch control panel shall be mounted separately from the transfer switch and shall be supplied with a quick disconnect plug for ease of maintenance.
3. The control panel shall meet or exceed the voltage surge withstand capability in accordance with IEEE Standard 472-1974 (ANSI C37.90a 1974) and the withstand voltage test in accordance with the proposed NEMA Standard ICS1-109.21.
4. The under-voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85% to 100% of nominal and the dropout adjustable from 75% to 98% of pickup setting, both in increments of 1%. These adjustments shall be factory set at 85% dropout, and 90% pickup.

5. The voltage of each phase of the emergency source shall be monitored, with pickup adjustable from 85% to 100% of nominal. This adjustment shall be factory set at 95% pickup.
6. Frequency sensing of the emergency source shall be provided, with pickup adjustable from 90% to 100% of nominal. This adjustment shall be factory set at 97% pickup.
7. The control panel shall include the following field adjustable time delays:
  - a. Time delay to override momentary normal source outages, adjustable from 0 to 5 minutes. This adjustment shall be field set to place emergency generator on-line in 10 seconds.
  - b. Transfer to emergency time delay for controlled timing of load transfer to emergency, adjustable from 0 to 5 minutes. This adjustment shall be field set to place emergency generator on-line in 2 seconds.
  - c. Emergency source failure time delay to ignore momentary transients during initial generator set loading, adjustable from 0 to 6 seconds. Set at 2 seconds.
  - d. Retransfer to normal time delay, adjustable 0 to 60 minutes. This adjustment shall be factory set at 5 minutes. The time delay is automatically bypassed if the emergency source fails and normal source is acceptable.
  - e. Delayed transition time delay for setting the dead time when all power is removed from the load side of ATS, adjustable 0 to 5 minutes. Set at 5 seconds.
  - f. Generator Exercise Timer: Timer provided for operator adjustment of day of week, time of day and run duration for exercising the generator under operating loads by activating the automatic transfer switch. This timer shall be field set by the Contractor with date and time as specified by City. Timer shall be mounted on the ATS outer deadfront door. Timer shall be able to be disabled.
8. Provide full voltage LED type lights with push-to-test feature, in oil-tight units with lenses. Nameplates shall be provided with each light to identify each light's function. Lights indicating when Utility Service is available, when Emergency Service is available, when MCC is powered from Utility source, when MCC is powered from Emergency source and when load disconnect is active.
9. Two auxiliary contacts shall be provided. One that closes when the switch is in the normal position and one that closes when the switch is in the emergency position. These auxiliary contacts shall be rated 1 amp at 120 volts.
10. Circuitry shall be provided to allow for connection of a remote contact to inhibit transfer to emergency source and/or retransfer to normal source, ignoring the associated timing relays.
11. All adjustments shall be fully field adjustable without the use of tools, meters, power supplies, or special test equipment.
12. Each adjustment resolution shall be settable within minimum increments of 1%.
13. Repetitive accuracy of timer, voltage and frequency settings over a temperature range of  $-20^{\circ}$  C to  $70^{\circ}$  C shall be within  $\pm 2\%$ .
14. The control panel shall be arranged such that adjustments to time delay settings can be safely made without personal exposure to live parts.
15. The control panel and power terminals shall be completely covered to protect against accidental contact, foreign matter, and tampering.

16. The wire harness for connection of the control panel to the transfer switch shall have sufficient length to reach between the mounting locations shown on the design Drawings.
17. Provide the following displays on the controller display unit with keypad:
  - a. Event log to display 99 logged events with the time and date of the event, event type and event reason.
  - b. Total number of ATS transfers.
  - c. Number of ATS transfers caused by power source failures.
  - d. Total number of days ATS has been in operation.
  - e. Total number of hours that the normal and emergency sources have been available.
  - f. Each phase voltage and amperage.

#### **201-2.10 SURGE PROTECTIVE DEVICE**

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

#### **201-2.11 POWER MONITOR**

- A. Each digital power monitoring system to be as manufactured by Electro Industries Shark 200, to match Owner Standard. Power monitor shall display: Voltage (phase A-B, A-C, B-C); current (Phases A, B & C); power (KW, KVA); power factor, total harmonic distortion and frequency. Monitor shall have 10 amp secondary, multifunction meter only. Provide three (3) external current transformers with rating as indicated on the drawing or sized for incoming service. Provide three (3) external potential transformers (when necessary) with rating as indicated on the drawing or sized for incoming service. Power monitor shall include communications module and Modbus serial port for connection to PLC.

#### **201-2.12 PULL BOXES**

- A. Underground pull boxes, where shown or required by length of conduit runs, shall be prefabricated concrete type with the size shown on the Drawings or larger to allow for adequate pull area. Extension sections shall be provided as necessary to reach the depth of underground conduits. All boxes shall have galvanized steel hold down bolts and hardware. Boxes located in paved areas or other areas which vehicles may travel shall be H/20 loading rated and have diamond plate steel traffic covers. Steel covers or lids shall be galvanized. Pull box covers shall be bead welded with pull box designation. If the cover cannot be bead welded, the Contractor shall propose other permanent marking options. All underground pull boxes shall have a 12-inch bedding of  $\frac{3}{4}$ -inch nominal crushed rock. Pull boxes shall be Christy Concrete Products, Brooks, or approved equal.

### **201-2.13 ELECTRICAL ENCLOSURES AND BOXES**

- A. Enclosures and boxes to be wall mounted, minimum 14 gauge, type 316 stainless steel with seams continuously welded & ground smooth, and fast access door latches. A copper ground bus shall be provided in the enclosure. Outer door shall have provisions for locking enclosure with standard padlock. Provide white backpan in box.
- B. Provide larger enclosure as required to accommodate the supplied equipment at no additional cost to the City.
- C. Provide accessories consisting of breaker to disconnect incoming power, heater, fan, louvers, ground bus, and thermostats.
- D. Provide metal data pocket within each enclosure and box to hold as-built drawings.
- E. All panel doors shall be installed with ground straps.
- F. Panels shall be provided with engraved nameplate identifying name of panel, voltage and location of power source feeding it (i.e. MCC-100, Panelboard LP-1, etc.). Engraved nameplate shall be as specified herein.
- G. Enclosure shall be Hoffman, Circle AW or approved equal.

### **201-2.14 PANELBOARD**

- A. The Contractor shall furnish a panelboard of the type indicated on the Contract E-series Plans and specified herein. Panelboard to be provided with breakers shown on Contract Drawings. Panelboard with a 240V high-leg (stinger) shall not be used.
- B. The panelboard shall comply with the applicable sections of UL, NEC, W.U.E.S.S.C., OSHA and NEMA and shall be manufactured by Eaton, Square D, ITT or approved equivalent.
- C. Provide a removable machine typed circuit directory with clear plastic cover on inside of panelboard of door breaker identification when panelboard is delivered to site. Update the panelboard legend at end of project to reflect as-built conditions. "Sticker" type panelboard schedules are not acceptable.
- D. Update the panelboard legend at end of project to reflect as-built conditions.
- E. Provide circuit number tags next to each circuit breaker, including existing panelboards.
- F. Panelboards mounted external of MCCs shall be provided with engraved nameplates listing Panelboard name, voltages, and power source location feeding it (i.e. "MCC-100 via Transformer XFMR-100," "Power Panel 100," etc.). Engraved nameplate shall be as specified herein

### **201-2.15 PANELBOARD TRANSFORMER**

- A. The panelboard transformer shall be ventilated dry type. Voltage, phase and KVA ratings shall be as shown on the Contract One-line drawing. The transformer shall be as manufactured by G.E. Type QL, Eaton, Jefferson, or approved equal.
- B. The transformer shall have 115 degrees Celsius rise, insulation 220 degrees Celsius rise class H insulation system.
- C. Vibration isolators shall be installed between the transformer and its mounting surface to reduce case vibration and compensate for slight unevenness of the mount. They shall be sized for the appropriate loading at twice the fundamental frequency. The Transformer housing shall be securely fastened to the mounting surface to eliminate possible sound generation.
- D. The transformer shall be finished with two coats of heavy enamel to resist rust and corrosion.
- E. Transformers that require neutral grounding shall be grounded in accordance with NEC 250.26, 450.10 and any applicable local ordinances. Protection of the grounding attachments shall be per NEC 250.24.
- F. Transformers mounted external of MCCs shall be provided with engraved nameplates listing name, voltages, and size.
- G. Provide an engraved nameplate for each external transformer as specified herein.

### **201-2.16 GROUNDING SYSTEM**

- A. Ground clamps shall be bolt-on type as manufactured by ILSCO type AGC, O-Z Gedney Type GRC, Burndy Type GAR or GP, or approved equal.
- B. All ground rod, pipe, and steel plate and buried bond connections shall be made by welding process equal to Cadweld.
- C. Ground rods shall not stub up more than 4" in the concrete pad.
- D. Provide a 13-inch diameter, 9-inch nominal throat, concrete ground rod box, minimum 12 inches deep, with a cast iron traffic cover embossed or engraved "GROUND."
- E. Ground buses shall be provided in all electrical enclosures. Each ground bus shall be sized as shown on the Contract drawings or specified herein. The ground bus shall be adequately sized for the connection of all grounding conductors required per NEC. Screw type lugs shall be provided on all ground busses for connection of grounding conductors.
- F. Grounding conductors shall be sized as shown on the Plans or in accordance with NEC table 250.122, whichever is larger.

- G. Conduit grounding bushings and locknuts shall be installed on all metallic conduits. Conduit grounding bushings shall be set screw locking type electra-galvanized malleable iron with insulation collar and shall be provided with a feed through compression lug for securing the ground bonding wire.
- H. Bonding wires shall be installed on all conduits with grounding bushings, expansion joints and for continuity of raceways transitions. Bonding wires shall be solid bare copper sized and installed per NEC 250.102. Bonding wires at endpoints shall be connected to enclosure ground bus or equipment grounding lug.
- I. Each ground bus shall be copper. Screw type fasteners shall be provided on all ground busses for connection of grounding conductors. Ground bus shall be a Challenger GB series, ILSCO D-167 series or approved equal.
- J. Attachment of the grounding conductor to equipment or enclosures shall be by connectors specifically provided for grounding. Mounting, support, or bracing bolts shall not be used as an attachment point for ground conductors.
- K. All raceway systems, supports, enclosures, panels, motor frames, and equipment housings shall be permanently and effectively grounded.
- L. One side of the secondary on all transformers shall be grounded to the ground bus.
- M. The system neutral conductor and all equipment and devices required to be grounded by the National Electrical Code shall be grounded in a manner that satisfies the requirements of the National Code.
- N. The system neutral (grounded conductor) shall be connected to the system's grounding conductor at only a single point in the system. This connection shall be made by a removable bonding jumper sized in accordance with the applicable provisions of the National Electrical Code if the size is not shown on the Drawings. The grounding of the system neutral shall be in the enclosure that houses the service entrance main overcurrent protection.
- O. All receptacles shall have their grounding contact connected to a grounding conductor.
- P. Branch circuit grounding conductors for receptacles or other electrical loads shall be arranged such that the removal of a lighting fixture, receptacle, or other load does not interrupt the ground continuity to any other part of the circuit.
- Q. Negative side of all VDC power supplies shall be grounded.

#### **201-2.17 GENERATOR RECEPTACLE**

- A. 240V Generator receptacle (pin/sleeve) shall be 3 phase, 3 wire, 4 pole, 240VAC, 200A, Crouse-Hinds Artite, 200A cast aluminum receptacle with spring door, reverse interior – S22 and 200A feed through 15° backbox junction box (2" NPT) to match City standard.

## **201-2.18 GENERATOR CONNECTORS**

- A. 240V Sites: Provide 400A, 600V, 4 wire, silver-plated copper contact, GRN, BLK, RED, and BLU, generator plug panels with sequential interlocks to ensure ground mates first and breaks last. Panel shall be UL listed and NEMA 3R rated. Provide Crouse-Hinds Posi-Lok male and female receptacles with spring cover, panel with matching E0400 plugs to match Owner Standard.
- B. Provide with permanent operating instructions affixed to panel.

## **201-2.19 APPLICATIONS PROGRAM AND CONTROL STRATEGIES**

- A. Provide applications programs in the PLC to implement the control strategies. Note, PLC references the entire PLC, OI, communications module and SCADA system. The Contractor is responsible to provide an application program that meets the intent of the descriptions given along with any additional implementations for a fully operational system at no additional cost to City.
- B. PLC Software Configuration: The Supplier shall provide the PLC completely configured and programmed for the monitoring and control of the system. The PLC shall be setup as defined herein. The PLC shall be ready to be placed in operation at the time of factory test. The programming, setup and configuration of the PLC shall be performed by the System Supplier. All programming shall be performed by an application programmer with prior experience on similar PLC projects. City reserves the right to judge if the application programmer assigned to this project is adequate for the task. If the programming performed is deemed inadequate by City, then the Supplier shall provide a qualified application programmer to meet these requirements.
- C. The setup details given for the PLC, Operator Interface (OI), communications conversion module and SCADA are intended as guidelines for the Supplier to use to configure the system. The setup details were prepared with the available information on the software package and may not be the best way to accomplish the task. The opposite logic of that shown, is implied that the programmer will include it in the ladder logic. Errors and omissions in these details shall be the System Supplier's responsibility to correct, at no additional cost to City. The System Supplier shall meet the intent of the setup specified, making modifications as necessary to provide an operational system, at no additional cost to the City.
- D. The PLC ladder logic applications program and the SCADA OI configuration shall meet the intent of the P&ID on I-Series Contract Drawings and the Control Strategies described herein. The following additional program functions shall be provided (minimum):
  - 1. Enable/disable and settable time delays for all alarms.
  - 2. All setpoints, enable/disable, time delays, registers and scaling shall be adjustable from Central SCADA, OI and PLC.
  - 3. Real Time and historical trends for all analog inputs and digital pump runs or like digital equipment.
  - 4. Add to Central overview graphic screens all new I/O data.

- E. Tagname and I/O point designations shall match those used on the existing SCADA graphic screens and listed in Control Strategies.
- F. Coordinate with City to identify existing and spare I/O at each site.
- G. Disk copies of existing PLC programs will be supplied by the City to the Contractor during construction for Contractor to utilize for SCADA, OI & PLC programming format. All PLC programs and graphic additions shall match the existing SCADA system look and feel. OI graphic configuration shall be done by System Supplier on existing SCADA computer PC. Setpoints and timer values are to be entered by Contractor via OI. Contractor shall add and modify existing database, historical trends, and Screens to meet the intent of the P&IDs on I - Series Contract Drawings. Pump station shall be controllable from Central.

### **201-3 EXECUTION**

#### **201-3.01 WORKMANSHIP**

- A. All work in this Section shall conform to the codes and standards outlined herein.
- B. The Contractor shall employ personnel that are skilled and experienced in the installation and connection of all elements, equipment, devices, instruments, accessories, and assemblies. All installation labor shall be performed by qualified personnel who have had experience on similar projects. Provide first class workmanship for all installations.
- C. Ensure that all equipment and materials fit properly in their installations.
- D. Perform any required work to correct improper installations at no additional expense to the City.
- E. The Engineer reserves the right to halt any work that is found to be substandard or being installed by unqualified personnel.

#### **201-3.02 ELECTRICAL CONSTRUCTION METHODS, GENERAL**

- A. All wiring shall be neatly bundled and laced with plastic tie-wraps, anchored in place by screw attached retainer. Where space is available, such as in electrical cabinets, all wiring shall be run in slotted plastic wireways or channels with dust covers. Wireways or channels shall be sized such that the wire fill does not exceed 60%. Wires carrying 100 volts and above shall be physically separated from lower voltage wiring by using separate bundles or wireways with sufficient distance to minimize the introduction of noise, crossing only at 90 degree angles. Tie-wraps shall be T & B TY-RAP's or approved equal.
- B. All devices shall be permanently labeled and secured in accordance with subsections labeled "NAMEPLATES AND TAGS."
- C. All field wires and panel wires have wire markers as specified in the "WIRE" subsection.

- D. All components associated with a particular compartment's or enclosure's function shall be mounted in that compartment or enclosure.
- E. Spacing and clearance of components shall be in accordance with UL, and NEC standards.
- F. Wires shall not be spliced except where shown. Devices with pigtails, except lighting fixtures, shall be connected at terminal blocks. Equipment delivered with spliced wires shall be rejected and the Contractor required to replace all such wiring, at no additional cost to the City.
- G. No wires shall be spliced without prior approval by the Engineer.
- H. Where splices are allowed or approved by the Engineer they shall conform with the following:
  - 1. Splices of #10 and smaller, including fixture taps, shall be with wire caps or approved equal. "Piggys" are not acceptable.
  - 2. Splices of #8 and larger shall be hex key screw two way connectors, with built in lock washers; T & B "Locktite", O-Z type XW, or approved equal, insulated with 3M Scotch Super #88, Plymouth, or approved equal.
  - 3. Splices in underground pullboxes shall be insulated and moisture sealed with 3M "Scotchcast" cast resin splice kits and shall have a date marking for shelf life. Do not use splice kits with a date marking for shelf life that has expired.
  - 4. Wire splicing devices shall be sized according to manufacturer's recommendations.
  - 5. Split-bolt splice connectors are not acceptable.
- I. Tapes shall conform to the requirements of UL 510 and be rated: 105 degrees C, 600V, flame retardant, hot and cold weather resistant. Vinyl plastic electrical tape shall be 7 mil black. Phase tape shall be 7 mil vinyl plastic, color coded as specified. Electrical insulation putty shall be rubber-based, elastic putty in tape form. Varnished cambric shall not be used.
- J. Connections to terminals shall be as follows:
  - 1. Use connector or socket type terminals furnished with component.
  - 2. Connections to binding post screw, stud or bolt use:
    - a. For #10 and smaller wire, T & B "Sta-Kon", Buchanan "Termend" or approved equal, self-insulated locking forked tongue lug.
    - b. For #8 to #4/0 wire, T & B "Locktite," Burndy QA or approved equal lug of shape best suited.
  - 3. Use ratchet type crimping tool which does not release until proper crimp pressure has been applied.
  - 4. Connections for all terminals shall be made with insulation stripped per manufacturer's instructions.
- K. Equipment shall be wired and piped by the manufacturer or supplier. Major field modifications or changes are not allowed without the written "change order" authority by the Engineer. When field changes are made, the components, materials, wiring, labeling, and construction

methods shall be identical to that of the original supplied equipment. Contractor's cost to replace or rework the equipment to match original manufacturer or supplier methods shall be done at no additional cost to the City.

- L. Mating fittings, bulkhead fittings, plugs, lugs, connectors, etc. required to field interface to the equipment and panels shall be provided by the supplier when the equipment is delivered.
- M. All electrical and instrumentation factory as-built drawings associated with the equipment shall be provided with the equipment when it is delivered to the job site. Drawings for each piece of equipment shall be placed in clear plastic packets of sufficient strength that will not tear or stretch from drawing removal and insertion.

### **201-3.03 ELECTRICAL EQUIPMENT, GENERAL**

- A. Panel cutouts for devices (i.e. indicating lights, switches) shall be cut, punched, or drilled and smoothly finished with rounded edges. Exposed metal from cutouts that are made after the final paint finish has been applied shall be touched up with a matching paint prior to installing device. Do not paint nameplates, labels, tags, switches, receptacles, conductors, etc.
- B. All doors shall be fully gasketed with nonshrinkable, water and flame resistant material.
- C. Bolts and screws for mounting devices on doors shall be as specified by the manufacturer; otherwise they shall have a flush head which blends into the device or door surface. No bolt or screw holding nuts shall be used on the external surface of the door.
- D. No fastening devices shall project through the outer surfaces of equipment.
- E. Each component within the equipment shall be securely mounted on an interior cubicle or backpan and arranged for easy servicing, such that all adjustments and component removal can be accomplished without removing or disturbing other components. Mounting bolts and screws shall be front located for easy access and removal without special tools. Access behind the sub panel or backpan shall not be required for removing any component.
- F. HARNESS: Where space is available, all wiring shall be run in slotted plastic wire ways or channels with dust covers. If space is not available for wireways, then all wiring shall be neatly bundled and laced with plastic tie-wraps, anchored in place by stainless steel screw attached retainer. Wire ways or channels shall be sized such that the wire fill does not exceed 60%. Tie-wraps shall be T&B TY-RAP or approved equal.
- G. HINGE LOOPS: Where wiring crosses hinged surfaces, provide a "U" shaped hinge loop protected by clear nylon spiral wrap. The hinge loop shall be of sufficient length to permit opening and closing the door without stressing any of the terminations or connections. Spiral wrap shall be Graybar T25N or approved equal.
- H. RETAINERS: Wire ways, retainers, and other devices shall be screw mounted with round-head 316 stainless steel screws or mechanically mounted by push-in or snap-in

attachments. Glue or sticky back attachment of any type or style shall not be used. Retainers shall be Panduit High Bond Adhesive back mounts SGABM series, or approved equal.

- I. ROUTING: Wires shall be routed in slotted plastic wire-ways with snap covers.
  1. Wires carrying 120 VAC shall be separated as much as possible from other low voltage wires and signal cables, and shall be routed only in ducts for 120 VAC. If the power wiring has to cross the signal wiring, the crossing shall be as close to a right angle as possible.
  2. Ducts for 24 VDC wiring shall be used for all other wires and cables. Routing of 120 VAC in combined ducts is not allowed without prior written approval of the City.
  3. Wires and cable shall be routed along the shortest route between termination points, excepting routes which would result in routing 120 VAC and other wires and cables in the same duct. Wires and cables shall have sufficient length to allow slack and to avoid any strain or tension in the wire or cable.
  4. Wires and cables shall be placed in the ducts in a straight, neat and organized fashion and shall not be kinked, tangled or twisted together. Additional wire ducting shall be provided for use by the electrical subcontractor for routing field wires to their landing points in the each electrical and instrumentation panel.
  5. Wiring not routed in duct work shall be neatly bundled, treed, and laced with plastic ties. Wiring across door hinges shall be carefully made up and supported to avoid straining and chafing of the conductors or from putting any strain on their terminals.
- J. TERMINATIONS: Single wire and cable conductors shall be terminated according to the requirements of the terminal device. All terminations must be made at terminals or terminal blocks. Use of spring or buttsplice connectors is not allowed. Terminal blocks and same equipment type termination wiring shall have wiring terminated with appropriate sized ferrules with insulation collars. Ferrule crimping (full ratcheting) tool with proper sized jigs shall be used per manufacturer's recommendations.
  1. Provide 2" minimum separation between wireway and terminal blocks. Installation of wireways too close to terminal blocks will be required to be completely reworked to the satisfaction of the City.
  2. For captive screw pressure plate type terminals, the insulation shall be removed from the last 0.25 inches of the conductor. The conductors shall be inserted under the pressure plate to full length of the bare portion of the conductor and the pressure plate tightened without excess force. No more than two conductors shall be installed in a single terminal. All strands of the conductor shall be captured under the pressure plate.
  3. For screw terminals, appropriately sized locking forked spade lugs shall be used. Lugs shall be crimp on type that forms gas tight connections. All crimping shall be done using a calibrated crimping tool made specifically for the lug type and size being crimped.
  4. On shielded cables, the drain wire shall be covered with insulating tubing along its full bare length between the cable jacket and the terminal lug or terminal pressure plate.
  5. For screwless terminals, wire shall be stripped back and inserted per the manufacturer's instructions. When stripping insulation from conductors, do not score or otherwise damage conductor.
  6. Heat shrink shall be placed on ends of shielded cable to cover foil.

7. Additional condulets with terminal blocks shall be supplied for wire termination to devices with leads instead of terminals. (i.e. solenoid valves, level probe, etc.)
  8. Terminate all status, control, and analog I/O wiring on terminal blocks, including spares. Provide additional relay, DIN rails, terminal blocks and side panels as required.
- K. A ground bus shall be provided in each enclosure or cabinet. It shall have provisions for connecting a minimum of ten grounding conductors. Screw type lugs shall be provided for connection of grounding conductors. All grounding conductors shall be sized as shown on plans or in accordance with NEC Table 250.122, whichever is larger.
  - L. Minimum wire bending space at terminals and minimum width of wiring gutters shall comply with NEC Tables 312.6 (a) & (b).
  - M. Future device and component mounting space shall be provided on the door, backpan, and subpanel where detailed on the Drawings. Where no detail is shown, provide a minimum of 25 percent usable future space.
  - N. Doors shall swing freely and close with proper alignment.
  - O. Provide larger motor termination boxes and lugs as required to accommodate conduit and wires.
  - P. All conduits entering outdoor panels and enclosures shall use watertight hubs. These hubs shall be located on sides or bottom only. Top entry of outdoor panels or enclosures is not allowed unless specifically shown on Contract Drawings.
  - Q. All panels and enclosures be delivered with as-built drawings in clear plastic packets within each panel and enclosure.

#### **201-3.04 DELIVERY**

- A. Contractor shall inspect each electrical and instrumentation item delivered to the jobsite.
- B. Contractor shall unpack each item for inspection within two (2) days of arrival.
- C. Complete written inventory shall be produced by Contractor and submitted to Engineer within (2) days after arrival on jobsite for record keeping prior to any payment for the item.

#### **201-3.05 DAMAGED PRODUCTS**

- A. Damage products will not be accepted. All damaged products shall be replaced with new products at no additional cost to the City.

### **201-3.06 FASTENERS & LUGS**

- A. Fasteners for securing equipment to walls, floors, and the like shall be 316 stainless steel. The fastener size shall match equipment mounting holes.
- B. Stainless steel anchor bolts, ½” minimum size, shall be installed for the Electrical Equipment in the front and back of each section at locations recommended by Electrical Equipment manufacturer.
- C. Concrete pad with stainless steel anchor bolts shall be provided for all electrical freestanding equipment.
- D. All wall mounted panels or enclosures shall be spaced out from wall by stainless steel unistrut or stainless steel spacers with minimum depth of 1/2”.
- E. All wire & cable lugs shall be copper; aluminum or aluminum alloy lugs shall not be used. The Electrical Contractor shall supply all lugs to match the quantity & size of wire listed in the conduit & wire routing schedule.

### **201-3.07 INSTALLATION, GENERAL**

- A. System:
  - 1. Install all products per manufacturer's recommendations and the Drawings.
  - 2. Contract Drawings are intended to show the basic functional requirements of the electrical system and instrumentation system and do not relieve the Contractor from the responsibility to provide a complete and functioning system.
- B. Provide all necessary hardware, conduit, wiring, fittings, and devices to connect the electrical equipment provided under other Sections. The following shall be done by the Contractor at no additional cost to the City:
  - 1. Provide additional devices, wiring, conduits, relays, signal converters, isolators, boosters, and other miscellaneous devices as required to complete interfaces of the electrical and instrumentation system.
  - 2. Changing normally open contacts to normally closed contacts or vice versa.
  - 3. Adding additional relays to provide more contacts as necessary.
  - 4. Installing additional terminal blocks to land wires.
  - 5. Provide larger circuit breakers, conduit and wire, as required for the horsepower of the supplied equipment, when the supplied equipment is larger than that specified, at no additional cost to the Owner.
  - 6. When generator supplier provides block heaters that do not match Contract Drawings, modify panelboard schedule, circuit breaker sizes, wire sizes, conduit sizes, etc.
- C. All programmable devices (except PLC & Operator Interface) shall be programmed, set-up and tested by the Contractor prior to startup at the Contractor system supplier facility. This

includes digital displays and instrumentation. Programming and set-up parameters shall be adjusted or changed as directed by the Engineer during start-up and throughout the warranty period, at no additional cost to the City.

D. Coordinate with the City and setup all alarm, process, and operation setpoints.

E. Panels and Enclosures:

1. Install panels and enclosures at the location shown on the Plans or approved by the Engineer.
2. Install level and plumb.
3. Seal all enclosure openings to prevent entrance of insects and rodents.
4. Seal around bottom edge of all pad mounted enclosures to prevent entrance of insects, rodents, dirt, debris, etc.
5. Clearance about electrical equipment shall meet the minimum requirements of NEC 110.26.
6. Box supports shall be located and oriented as directed in field by City.

F. Conduits and Ducts:

1. Bury detectable warning tapes approximately 12 inches above all underground conduit runs of two or more outside of building. Align parallel to and within 3 inches of the centerline of the conduit or duct bank.
2. Care shall be exercised to avoid interference with the work of other trades. This work shall be planned and coordinated with the other trades to prevent such interference. Pipes shall have precedence over conduits for space requirements. Exposed conduits shall be neatly arranged with runs perpendicular or level and parallel to walls. Bends shall be concentric.
3. Install conduit free from dents and bruises.
4. Conduit label:
  - a. All conduits shall be labeled on all ends; at junction boxes, panels, pull boxes, transitions, enclosures, stub-outs, or other terminations.
  - b. Conduit labels shall not be installed on conduits that are located behind generator sub-base fuel tank panel.
  - c. Each conduit listed in Conduit and Wire Routing Schedule shall have permanent tags where it enters an open transition point, enclosures, junction boxes, terminal boxes, pullboxes, vaults, and manholes.
  - d. 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.
5. A maximum of three equivalent 90 degree elbows are allowed in any continuous runs. Install pull boxes where required to limit bends in conduit runs to not more than 270 degrees or where pulling tension would exceed the maximum allowable for the cable.
6. Route all above grade outdoor conduits or conduits in rated areas parallel or perpendicular to structure lines and/or piping.

7. Conduits installed outdoor or in NEMA 4X rated areas above grade shall be braced in place with stainless steel Unistrut stanchions or PVC coated clamps with backplates.
8. Duct-taping conduits together is not acceptable. Conduits, installed into concrete pads, shall be installed with a minimum of 2" distance between conduits to allow installation of bushings.
9. Conduit entrances: Seal each conduit entrance from below grade into the Panels, and other electrical enclosures with plugging compound sealant to prevent the entrance of insects and rodents.
10. Special "Soft-Jaw" type pipe clamps shall be used to prevent damage to PVC-coated conduits while field threading, cutting to length, and coupling sections.
11. Conduits shall be painted to match the color of surface attached to as directed by Engineer.
12. Spare or Future Conduits:
  - a. All spares conduits shall be labeled; the conduits shall be mandrelled and have pull ropes (pull tapes) installed.
  - b. Pull rope shall be ½" wide, polyester, rated 1250 pounds tensile strength. Provide a waterproof label on each end of the pull rope to indicate the destination of the other end. Pull tape shall be printed with sequential footage. Pull tape shall be Neptco Muletape WP1250P or approved equal.
  - c. All spares shall be mandrelled and have pull ropes installed.
13. For conduit runs over 100', Contractor shall have a mandrel pulled through the entire conduit run to prove the length contains no blockages or obstructions. Mandrelling shall be witnessed by the Owner.
14. All existing conduits that are reused shall have a mandrel pulled through the entire conduit run to prove the length contains no blockages or obstructions. Mandrelling shall be witnessed by the Owner.
15. Provide caps on conduit ends to prevent entrance of dirt or insects.
16. Conduits shall be painted to match the color of surface attached to as directed by Engineer.

G. Conduit and Wire Routing Schedule:

1. Conduit material, wire size, and quantity listed in Schedule take precedence over Electrical Section Specifications.
2. All of the entries for each line in the conduit schedule apply to each conduit when multiple quantity of conduits (quantity of which are indicated by number entered in conduit no. column in schedule) are listed in the schedule.
3. Wire sizes listed are in AWG or Kcmil and are copper conductors.
4. Extra wire was intentionally placed in the "Conduit & Wire Routing Schedule," which shall be labeled on both ends with a unique wire label. "Spare" to be on separate tag or included in wire label.
5. Contractor to supply and install all conduits and wiring as shown on Utility Engineered Design drawings. Utility primary and secondary conduit and wiring shown in "Conduit and Wire Routing Schedule" is for bid purposes only.

6. All control and signal wiring terminations shall have the correct wire label applied prior to making connection.
7. Conduit entries listed as "GRS-PVC" in the Conduit & Wire Routing Schedule are to be "Galvanized Rigid Conduits with PVC coating" the entire length.
8. Vertical offsets and sloping of conduits are not detailed on plans; the Electrical Contractor shall include in his bid the price for the complete conduit run utilizing the civil and mechanical plans to measure vertical & slope distances.
9. Exposed conduits runs shall not be run directly on the ground. Secure conduits to stainless steel unistrut.

#### H. Excavation and Back Filling:

1. The Electrical Contractor shall provide the excavation for equipment foundations and trenches for conduits or buried cables.
2. Trenches for all underground utility lines shall be excavated to the required depths.
3. Repave any area that was paved prior to excavation. Backfill and surface all areas as shown on the Drawings or where not shown to the original condition that was present prior to the excavation.
4. Underground conduits outside of structures shall have a minimum cover of 24 inches except for utility conduits depth shall be as required by the governing utility requirements. Back filling shall be done only after conduits have been inspected.
5. Contractor shall uncover any uninspected covered conduit trenches, at no additional cost to City, to verify proper installation.
6. Excavation and back fill conduit trenches shall conform to the requirements of the Earthwork Section of these Specifications, unless modified on plans, and to other entities as required. Backfill shall consist of 3/4 inch class 2 aggregate base material, unless otherwise noted.
7. At all times during the installation of the electrical distribution system, the Contractor shall provide barricades, fences, guard rails, etc., to safeguard all personnel, including small children, from excavated trenches.

I. Wiring, Grounding, and Shielding - It is important to observe good grounding and shielding practices in the generally noisy environment in this application. The shield of shielded cables shall be terminated to ground at one end only (source end), the shield at the other end (receive end) shall be encased in an insulated material to isolate it from ground.

J. Cutting and Patching - The Contractor shall do all core drilling, cutting and patching required to install his work. Any cutting which may impair the structure shall require prior approval by the Engineer. Cutting and patching shall be done only by skilled labor of the respective trades. All surfaces shall be restored to their original condition after cutting and patching. Paint patched surfaces to match the original color.

#### K. Seals

1. Seal around all conduits, wires, and cables penetrating between walls, ceilings, and floors in all buildings with a fire stop material. Seal shall be made at both ends of the conduit

with a fire-stop putty. Seal shall have a minimum two hour rating. Fire stop sealing shall be International Protective Coatings Flamesafe, or approved equal.

2. Seal around conduits entering outside to inside structures and around bottom of free standing enclosures to maintain watertight integrity of structure.
3. Place conduit seal inside each underground conduit riser into panels and enclosures to prevent entrance of insects and rodents.
4. Conduit entrances: Seal each conduit entrance from below grade into the panel and other electrical enclosures with plugging compound sealant to prevent the entrance of insects and rodents. Conduits between the enclosures shall be sealed with plugging compound sealant on each end. Plugging compound sealant shall be PRC-DeSoto (formerly Courtaulds) Aerospace Semco PR-868 or approved equal.
5. Seal conduits entering any electrical instrument. Install conduit drain boxes and plug conduit interior to form an effective barrier to keep out water traveling into equipment or instrumentation from conduit installed higher than equipment or instrumentation.

#### L. Housekeeping Pads

1. Concrete housekeeping pads are required for all free standing electrical equipment. Housekeeping pads shall be 3-1/2" inches above surrounding finished floor or grade unless otherwise shown and shall be 4 inches (minimum) larger in width on all sides of equipment. The depth of housekeeping pads shall be 18 inches (minimum).
2. Housekeeping pads shall be installed for future units as shown on the Contract Drawings.
3. Housekeeping pad shall be Class "A" concrete with rebar crossway network. The minimum size rebar allowed is #4. Concrete shall be precisely leveled so that equipment set in place will not require shimming.

#### M. Cleaning and Touch up:

1. Prior to startup and at completion of the work prior to final acceptance, all parts of the installation, including all equipment, exposed conduit, devices, and fittings shall be cleaned and given touch up by Contractor, as follows:
  - a. Remove all grease and metal cuttings.
  - b. Any discoloration or other damage to parts of the building, the finish, or the furnishings, shall be repaired.
  - c. Thoroughly clean any of his exposed work requiring same.
  - d. Vacuum and clean the inside of all MCC and electrical and instrumentation enclosures prior to applying power and a second time immediately prior to the final acceptance inspection. Removing debris with an air blower is not permitted.
  - e. Clean all above and below ground pull boxes, junction boxes, and vaults from all foreign debris prior to final acceptance.
  - f. Paint all scratched or blemished surfaces with the necessary coats of quick drying paint to match adjacent color, texture, and thickness. This shall include all prime painted electrical equipment, including enclosures, panels, poles, boxes, devices, etc.
  - g. Remove all decals and lettering from both sides of support plates.
  - h. Repair damage to factory finishes with repair products recommended by Manufacturer.

- i. Repair damage to PVC or paint finishes with matching touchup coating recommended by Manufacturer.

## **201-3.08 ELECTRICAL TESTING**

### **A. GENERAL REQUIREMENTS**

1. It is the intent of these tests to assure that all equipment is operational within industry and manufacturer's tolerances and is installed in accordance with design plans and specifications.
2. All equipment setup and assembled by the Contractor shall be in accordance with the design plans and Drawings and the manufacturer's recommendations and instructions and shall operate to the Engineer's satisfaction.
  - a. Follow all manufacturer's instructions for handling, receiving, installation, and pre-check requirements prior to energization.
  - b. After energization, follow manufacturer's instructions for programming, set-up and calibration of equipment.
  - c. The Contractor shall be responsible for, and shall correct by repair or replacement, at his own expense, equipment which, in the opinion of the Engineer, has been caused by faulty mechanical or electrical assembly by the Contractor.
  - d. Necessary tests to demonstrate that the electrical and mechanical operation of the equipment is satisfactory and meets the requirements of these Specifications shall be made by the Contractor at no additional cost to the City.
3. The testing shall not be started until the manufacturer has completed fabrication, wiring, and setup; performed satisfactory checks and adjustments; and can demonstrate the system is complete and operational. Certification of completion of Contractor's in-house tests shall be submitted prior to scheduling of factory testing.
4. Factory Tests Scheduling:
  - a. The testing shall not be scheduled until:
    - 1) The manufacturer has completed fabrication, wiring, and setup; performed satisfactory checks and adjustments; and can demonstrate the system is complete and operational.
    - 2) Submittals associated with the equipment have been approved by the Engineer.
    - 3) PLC Design review meetings have taken place to the satisfaction of the Owner.
    - 4) Certification of completion of Contractor's in-house tests shall be submitted prior to scheduling of factory testing.
  - b. If equipment is significantly different from submittal drawings, this shall be grounds for cancellation and rescheduling of factory tests at no additional costs to City or extension of Contract time.
  - c. Engineer reserves the right to postpone the factory test, at no additional cost to the City, until the submittal associated with the factory test has been reviewed by the Engineer and marked "No Exceptions Taken" or "Make Corrections Noted." No extension of Contract time will be allowed.
5. The first Pre-Energization tests shall be performed to determine the suitability for energization and shall be completed with all power turned off and complete prior to the start of any of the Post-Energization Tests. The Electrical Contractor shall have qualified personnel on the job site for all Pre-Energization and Post-Energization tests.

6. All tests shall be witnessed by the Engineer and/or City personnel. The test forms shall be completed by the testing person for field checkout, testing, and calibration of all equipment and instruments.
  - a. All filled in test forms shall be given to the Engineer and/or City the day of the test. Fill in two sets of test forms if Contractor wants to keep a copy.
  - b. All tests shall be documented in writing by the supplier and signed by the Engineer as satisfactory completed. The supplier shall keep a detailed log of all tests that failed or did not meet specifications, including date of occurrence and correction.
  - c. Completed forms with proper signatures and dates shall be included and become a component of the Operations and Maintenance Manual for each of the respective systems.
7. The Contractor shall notify the Engineer of the Supplier's readiness to begin all factory and field tests in writing (a minimum of ten working days prior to start), and shall schedule system checkout on dates agreed to by the Engineer in order that the testing be scheduled and witnessed.
8. The Contractor shall fill in & submit for approval the "Scheduled Test Request Form" located in Appendix "A" for each requested inspection, factory and field test.
9. The supplier shall submit for approval, the proposed factory & field testing sheets at least 2 weeks prior to the start of the tests. Each testing sheet shall have a title giving the type of test and entry spaces for the name of the person who performed the test, name of the person who witnessed the test, and the date. Tests performed without approved forms shall be retested at no additional cost to City.
10. Separate test procedures in separate binders shall be submitted for approval for the Factory and Field Tests. Testing shall not commence until the test procedures have been reviewed and approved by the Engineer. Tests forms shall be similar to those shown on Appendix "A."

#### B. FAILURE-TO-MEET TEST

1. If the results of any of tests are unacceptable to the Engineer, the Contractor shall make corrections and perform the tests again until they are acceptable to the Engineer; these additional tests shall be done at no additional cost to the City.
2. Any system material or workmanship which is found defective on the basis of acceptance tests shall be reported to the Engineer. The Contractor shall replace the defective material or equipment and have tests repeated until test proves satisfactory to the Engineer without additional cost to the City.
3. If testing, installation or configuration work performed is deemed inadequate by Owner or Engineer, then the Contractor shall provide a qualified technician to meet these requirements. No extension of Contract time will be allowed.
4. If Owner Representative determines that the System Set-up is not ready for testing, the Owner Representative reserves the right to cancel the Factory Test as the equipment is found to be not fully and completely ready for factory testing. The Contractor shall be responsible for paying for the Owner and Engineer to return for the factory testing when it has been cancelled.

### C. SAFETY

1. Testing shall conform to the respective manufacturer's recommendations. All manufacturers' safety precautions shall be followed.
2. The procedures stated herein are guidelines for the intended tests, the Contractor shall be responsible to modify these tests to fit the particular application and ensure personnel safety. Absolutely no tests shall be performed that endanger personal safety.
3. The Contractor shall have two or more personnel present at all tests.
4. Two non-licensed portable radios are to be made available by the Contractor for the testing organization to conduct tests.
5. California Electrical Safety Orders (ESO) and Occupational Safety and Health Act (OSHA): The Contractor is cautioned that testing and equipment shall comply with ESO and OSHA as to safety, clearances, padlocks and barriers around electrical equipment energized during testing.
6. Field inspections and pre-energization tests shall be completed prior to applying power to equipment.

### D. ELECTRICAL FACTORY TEST

1. The System supplier shall conduct a thorough and complete factory test by qualified factory-trained personnel witnessed by Engineer per the criteria specified herein. Factory test shall be held within 150 miles of project location.
2. The "System set-up" for factory testing shall consist of, but is not limited to:
  - a. Meter Pedestal
  - b. Pedestal
  - c. Any miscellaneous associated electrical equipment.
3. Temporary wiring and equipment shall be setup during these tests to simulate the complete assembled system.
4. The length of the factory testing for the "System setup" shall be a minimum of one (1) working day.
  - a. If in the opinion of the Engineer the factory testing is not completed at the end of the working day, the testing shall be extended, at no additional cost to the City or extension in Contract time.
5. All factory tests shall be conducted at the Supplier's facility. All factory tests shall be completed prior to shipment of any of the "System set-up" to the jobsite. The "System set-up" shall be fully assembled, programmed, and connected as it will be installed in the final configuration. If the "System set-up" is found to be not fully and completely ready for factory testing, the Contractor shall be responsible for paying for the Engineer to return for the factory testing. Factory testing is to ensure that there are no defects. The hardware and software shall be tested for compliance with the plans and Specifications included herein and for the ability to perform the control functions.
6. The testing shall not be started until the manufacturer has completed fabrication, wiring, setup, and programming; performed satisfactory checks and adjustments; factory testing sheets approved by Engineer; and can demonstrate the system is complete and operational.

7. All components of the system setup shall be completely assembled and thoroughly pre-tested by the supplier or manufacturer before start of factory test.
8. Provide a complete clean copy of System Supplier drawings for and the Engineer's use during Factory Test. These drawings shall reflect the equipment being tested. If the Engineer determines that these drawings do not adequately reflect the actual equipment being tested or differs substantially from the approved equipment submittal, the Engineer reserves the right to cancel the Factory Test as the equipment is found to be not fully and completely ready for factory testing. Equipment that differs substantially from the approved equipment submittal shall be resubmitted. Factory test will be rescheduled after revised submittals have been reviewed by the Engineer and marked "No Exceptions Taken" or "Make Corrections Noted". No extension of Contract time will be allowed.
9. Vacuum and clean the inside of all MCC and electrical and instrumentation enclosures prior to the start of the factory test.
10. The associated factory tests for each of the factory testing sheets that are to be performed by the supplier and witnessed by the Engineer shall include the following for the "System set-up" as a minimum:
  - a. Visual and mechanical Inspections of the panels as follows:
    - 1) Inspect for physical damage, proper support, and wiring.
    - 2) Check all starters, breakers, and other components for proper sizes.
    - 3) The Contractor shall fill in test form TF4 located in Appendix "A."
  - b. Testing of the Electrical Equipment as follows:
    - 1) Each line of control logic on the elementary or loop diagrams shall be checked. After a line of control logic is tested, the person performing test shall initial the corresponding line on the elementary diagram. When the complete elementary diagram has been checked, it shall be signed and dated by testing person and person witnessing test.
    - 2) I/O points to terminal blocks shall be simulated for the complete checkout of PLC interfaces.
    - 3) The tests, as a minimum, shall simulate all operating conditions including steady state, transients, upsets, startup, shutdown, power failure, and equipment failure conditions (for control logic).
    - 4) Testing of Control as follows:
      - a) To facilitate testing and system simulation of the "System Set-up", the Supplier shall connect a separate toggle two position on-off switch to each status and alarm digital input. Three digital multi-meters (minimum +/- 0.2% accuracy) with clip-on leads shall be supplied and utilized during testing for measurement of digital and analog outputs. The supplier shall use simulated input signals to replicate varying field device signals during the factory tests in order to verify the proper functioning of hardware and software.
    - 5) The structured factory tests to be performed by the System Supplier and witnessed by the Engineer shall include the following as a minimum:
      - a) Control Checkout Tests: Simulate the digital or analog signals (or combination thereof) at the panel field terminals using the test hardware to verify that each control is functional and properly configured. Verify that all parameters (i.e.,

relay logic operations, relay timing, controller setpoints, etc.) of the control system are defined and operate according to the design documents.

- b) Alarm Checkout Tests: Simulate the digital or analog signals (or combination thereof) at the panels using the test hardware to verify that each I/O point is functional and properly configured. Verify that all parameters (i.e., description, engineering units, span, enable/disable, setpoints, runtimes, totalization, logic type, etc.) of the alarms are defined and operate according to the Specifications.
- 6) Unstructured factory tests are required as part of the factory testing phase. These additional tests shall include any and all unstructured tests as directed by the Engineer. The various unstructured tests shall include, but are not limited to, the following:
- a) Verify the correct inventory of hardware, etc. All spare parts shall be included in the inventory.
  - b) The factory tests, as a minimum, shall simulate all normal and abnormal operating conditions including steady state, change of state, variable changes, fluctuations, transients, upsets, start-up, shutdown, power failure, and equipment failure conditions.
11. The factory test will be considered complete only when the system setup has successfully passed all tests, both structured and unstructured, to the satisfaction of the Engineer and the Factory Test checkout form TF11 has been signed & dated by Engineer. No equipment shall be shipped to jobsite without authorization from the Engineer that the factory test has been completed.
12. Acceptance and witnessing of the factory tests does not relieve or exclude the Contractor from conforming to the requirements of the Contract Documents.
13. The testing personnel shall provide all material, equipment, labor and technical supervision to perform such tests and inspections.
14. During the testing period, under the supervision of the supplier, the Engineer shall have unlimited and unrestricted access to the usage and testing of all hardware and software in the system.
15. The Contractor shall pay all expenses incurred by his personnel, including labor, material, transportation, lodging, daily subsistence, and other associated incidental costs during the factory testing.
16. Faulty and/or incorrect hardware operation of major portions of the system may, at the discretion of the Engineer, be cause for suspension or restarting of the entire factory test, at no additional cost to the City or extension in contract time.
17. The factory test will be considered complete only when the system setup has successfully passed all tests both structured and unstructured to the satisfaction of the Engineer. No equipment shall be installed without authorization from the Engineer that the factory test has been completed.
18. All modifications to drawings and documentation as a result of the factory tests shall be corrected and completed before shipment of drawings with equipment and the submittal and delivery of "operation and maintenance" manuals.

19. Copies of the completed, signed, and witnessed factory testing forms shall be placed in the Operation and Maintenance Manual.

#### E. ELECTRICAL FIELD TESTS

1. Prior to any field testing, Operation & Maintenance Manuals shall have been submitted by the Contractor and approved by the Engineer.
2. The Contractor shall engage and pay for the services of an approved qualified testing company for the purpose of performing inspections and tests as herein specified. The testing company shall provide all material, equipment, labor and technical supervision to perform such tests and inspections. The Electrical Contractor shall be present on site for all field tests.
3. The Electrical Contractor shall complete and submit "Schedule Test Request Form" as illustrated in Appendix "A" for each electrical field test.
4. Vacuum and clean the inside of all electrical and instrumentation enclosures prior to pre-energization tests and again prior to energization tests. Removing debris with an air blower is not permitted.
5. The Electrical Contractor shall be at the jobsite to assist with all Electrical Field Tests.
6. PRE-ENERGIZATION TESTS: These tests shall be completed prior to applying power to any equipment.
  - a. INSPECTIONS
    - 1) Visual and mechanical inspections:
      - a) Inspect for physical damage, proper anchorage and grounding.
      - b) Compare equipment nameplate data with design plans and starter schedule.
      - c) Compare overload setting with motor full load current for proper size.
    - 2) Performed NETA acceptance testing for each piece of equipment.
    - 3) The Contractor shall compile, by visual inspection of equipment installed for each motor, the following data in neatly tabulated form:
      - a) Equipment driven
      - b) Motor horsepower
      - c) Nameplate amperes
      - d) Service factor
      - e) Temperature rating
      - f) Overload catalog number
      - g) Overload current range and setting
      - h) Circuit breaker rating

- i) Circuit breaker trip setting, for magnetic only circuit breakers.
- 4) The Contractor shall fill in, for each piece of equipment, Test Form TF4 located in Appendix "A."
- b. TORQUE CONNECTIONS
  - 1) All electrical, mechanical and structural threaded connections inside equipment shall be tightened in the field after all wiring connections have been completed. Every worker tightening screwed or bolted connections shall be required to have and utilize a torque screwdriver/wrench at all times. Torque connections to the value recommended by the equipment manufacturer. If they are not available, use NEC Annex I for torque values as guidelines.
- c. WIRE INSULATION & CONTINUITY TESTS
  - 1) All devices that are not rated to withstand the 500V megger potential shall be disconnected prior to the megger tests.
  - 2) Megger insulation resistances of all 600 volt insulated conductors using a 500 volt megger for 10 seconds. Make tests with circuits installed in conduit and isolated from source and load. Each field conductor shall be meggered conductor to conductor and conductor to ground. These tests shall be made on cable after installation with all splices made up and terminators installed but not connected to the equipment.
  - 3) Each megger reading shall not be less than 10 Meg-ohms resistive. Corrective action shall be taken if values are recorded less than 10 Meg-ohms. Values of different phases of conductors in the same conduit run showing substantially different Meg-ohm values, even if showing above 10 Meg-ohms shall be replaced.
  - 4) Each instrumentation conductor twisted shielded pair shall have the conductor and shield continuity measured with an ohmmeter. Conductors with high ohm values, that do not match similar lengths of conductors the same size, shall be replaced at no additional cost to the City.
  - 5) The Contractor shall fill in test forms Power and Control Conductor Test Form TF1 and Instrumentation Conductor Test Form TF2 located in Appendix "A."
- d. GROUNDING SYSTEM TESTS
  - 1) Visual and Mechanical Inspection:
    - a) Verify ground system is in compliance with Drawings and Specifications.
  - 2) Electrical Tests:
    - a) Before backfilling trenches, and placement of sidewalks, landscape and paving, measure the resistance of each electrode to ground using a ground resistance tester. Perform the test not less than two days after the most recent rainfall and in the afternoon after any ground condensation (dew) has evaporated.
    - b) After all individual ground electrode readings have been made, interconnect as required and measure the system's ground resistance.
    - c) The grounding test shall be in conformance with IEEE Standard 81.

- d) Measurements shall be made at 10 feet intervals beginning 25 feet from the test electrode and ending 75 feet from it in a direct line between the system being tested and the test electrode.
  - e) Point-to-Point: Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points.
- 3) Test Values:
- a) The resistance between the main grounding electrode and equipment ground shall be no greater than five ohms per IEEE Standard 142.
  - b) Investigate point-to-point resistance values that exceed 0.5 ohms.
  - c) Plots of ground resistance shall be made and submitted to the Engineer for approval.
- 4) The Contractor shall fill in Grounding System Test Form TF3 located in Appendix "A."
- e. PANELBOARD TESTS
- 1) Visual and Mechanical Inspection:
- a) Inspect for physical damage, proper anchorage and grounding.
  - b) Compare equipment nameplate data with design plans and panelboard schedules.
  - c) Compare breaker legend for accuracy.
  - d) Check torque of bolted connections.
- 2) The Contractor shall fill in Panelboard Test Form TF5 located in Appendix "A."
- f. BREAKER TEST
- 1) All breakers shall be checked for proper mounting, conductor size, and feeder designation. Operate circuit breaker to ensure smooth operation. Inspect case for cracks or other defects. Check tightness of connection with torque wrench in accordance with manufacturer's recommendations.
- 2) All breakers 100 amps and above shall be tested. Time current characteristic tests shall be performed bypassing three hundred percent (300%) rated current through each pole separately. Trip amps and time shall be measured. Instantaneous pickup current shall be determined by run up or pulse method. Clearing times should be within four (4) cycles or less. All trip times shall fall within NETA Table values. Instantaneous pickup current levels should be within 20% of manufacturer's published values. Certification stickers, listing date and company who performed the tests, shall be attached to the inside of the breaker compartment door right after the breaker has passed all tests.
- 3) Contact and Insulation Resistance: Contact resistance shall be measured and be compared to adjacent poles and similar breaker. Deviations of more than 50% shall be reported to Engineer. Insulation resistance shall be measured and shall not be less than 50 megohms.

- 4) At end of test the all breakers trip settings shall be set by Contractor to values listed in protective device coordination study to properly protect equipment.
- 5) The Contractor shall fill in MCC Device Test Form TF8 and Breaker Test Form TF9 located in Appendix "A."

## 7. POST ENERGIZATION TESTS

- a. Vacuum and clean the inside of all MCC and electrical and instrumentation enclosures prior to all energized testing. Removing debris with an air blower is not permitted.
- b. PANELS AND ENCLOSURE TESTS
  - 1) During these tests, test all local and remote control operations and interlocks.
  - 2) Electrical Tests:
    - a) Perform operational tests by initiating control devices to affect proper operation.
    - b) The Contractor shall fill in Operational Device Checks and Tests Form TF6.
- c. PHASE ROTATION TESTS
  - 1) Check connections to all equipment for proper phase relationship. During this test, disconnect all devices which could be damaged by the application of voltage or reversed phase sequence. Three phase equipment shall be tested for the phase sequence "ABC" front to back, left to right, and top to bottom.
  - 2) All three phase motors shall be tested for proper phase rotation. Revise wire color codes to indicate correct phase color if wires are swapped.
  - 3) The Contractor shall fill in Phase Rotation Test Form TF7 located in Appendix "A."
- d. MOTOR TESTING
  - 1) Prior to start-up, record low ohm phase to phase and phase to ground readings for future baseline.
  - 2) Record the amperage draw on all phases of each motor operating under full load. Ensure that these values do not exceed the motor nameplate full load amperage.
  - 3) Record the voltage between all phases of each motor operating under full load. If the voltage balance is not within plus or minus 5 percent of nominal, request the Utility power company or other responsible party to correct the problem.
  - 4) The Contractor shall compile, by visual inspection of equipment installed for each motor, the following data in neatly tabulated form and be placed in the O&M manual:
    - a) Equipment driven.
    - b) Motor horsepower.
    - c) Nameplate amperes.
    - d) Service factor.
    - e) Temperature rating.
    - f) Overload catalog number.

- g) Overload current range and setting.
    - h) Circuit breaker rating.
    - i) Circuit breaker trip setting, for magnetic only circuit breakers.
  - 5) The Contractor shall fill in Motor Test Form TF10, located in Appendix "A."
  - 6) Additional motor testing requirements per Division 11.
- 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.
  - 2) The Testing Company shall fill in Panelboard Test Form TF5 located in Appendix "A."
- f. INSTRUMENTATION TESTS
  - 1) The Contractor shall provide a minimum of two (2) hours of field acceptance testing for each instrument. If any instrument has not been fully tested during its allotted time, the Contractor shall provide additional hours for finishing testing of the instrument, to be paid by the Contractor.
  - 2) The overall accuracy of each instrument loop shall be checked to ensure that it is within acceptable tolerance.
    - a) As a minimum, all the tests indicated/specified on the test form TF14 in Appendix "A" shall be performed by the Contractor for each of the instruments listed in Appendix "B" Device Index.
  - 3) Test equipment used for testing shall be of suitable quality so as not to mask performance deficiencies. All test equipment shall be traceable to National Bureau of Standards and have been calibrated within six months of test date.
  - 4) Testing shall be accomplished using simulated inputs only with prior written approval of the Engineer.
  - 5) Calibration stickers shall be supplied for all equipment and instruments. Calibration stickers shall list the following information:
    - a) Tag number.
    - b) Calibrated by who (name), firm, city and telephone number.
    - c) Date calibrated.
    - d) Calibration range.
    - e) Comments.
- g. CONTROL SYSTEM TESTS
  - 1) All the I/O points for the PLC shall be tested by the System supplier with assistance from Contractor in the field for proper operation of alarms, status, analog, control, autodialer and operator interface (OI) display functions, etc.

Where practical, the final element shall be used, i.e. trip the intrusion switch or change levels. Testing shall be accomplished using simulated inputs only when necessary.

- 2) During this task the System supplier shall have:
    - a) Qualified field technician with experience in the startup of similar systems with PLC controls, and other field devices.
    - b) PLC/OI/SCADA programmer for modifying or adjusting all PLC registers and setpoints to tune the system.
    - c) Test instruments as required.
    - d) A pair of radios for communication.
    - e) Portable PC loaded with diagnostic, configuration, programming PLC software. The latest application programs shall have been loaded on the PLC.
  - 3) All SCADA graphics shall be tested during the field tests.
  - 4) Contractor to fill in "I/O Point Checkout Sheet" TF13 located in Appendix "A."
  - h. PROGRAM PARAMETER RECORD:
    - 1) The Contractor shall fill in "VFD or Soft Starter Program Parameter Record Sheet" TF12 for each VFD provided on this project. These parameter record sheets shall be filled out by a qualified Contractor field technician when power in field is first applied to each VFD. Completion of VFD record sheets shall be witnessed by Owner and copies provided to Owner on day records are filled in by Contractor. A copy of all completed VFD parameter record sheets shall be placed in O&M manual.
8. TRIAL OPERATIONS:
- a. The entire electrical installation shall be either tested or trial operated to verify Contract compliance. That is, controls, heaters, fans, light switches, convenience receptacles, lights, etc. shall be trial operated. Contractor shall conduct trial operations in the presence of the Engineer and Operations and Maintenance personnel.

## F. OPERATIONAL TESTING

1. After all the previous tests in this subsection are complete, the Contractor shall conduct operational testing.
2. The Contractor shall demonstrate operation of each part of the control and instrumentation system to the satisfaction of the Engineer. Tests shall be repeated by the Contractor at no additional cost to the City and at the discretion of the Engineer to resolve whether the system has been demonstrated that it will operate under all modes of operations and varying conditions.
3. For the operational testing the new equipment shall be activated to automatically run for 5 days, Monday through Friday 24 hours a day. During this five day period the City will run the different combinations of the pump control options. If equipment failure occurs during the 5 days of operational testing, the Contractor shall repair or replace the defective equipment and shall begin another 5 day operational test, Monday through Friday 24

hours a day. This shall be continued until the new equipment functions acceptably for 5 consecutive days.

4. The Electrical Contractor, testing firm and System Supplier shall re-visit the jobsite as often as necessary until all field tests, start-up and operation tests are completed and approved.

### **201-3.09 TRAINING**

- A. All training sessions shall be held on dates and times agreeable to Owner. A total of 6 or fewer Owner personnel shall be trained.
- B. Training sessions shall not take place on dates when field testing is occurring.
- C. Acceptable Operation and Maintenance Manuals shall be on site and available when training sessions are implemented.
- D. The following training sessions shall be provided:
  1. 8 hours – After Operation Testing has started the Contractor shall provide training for instruction of operation and maintenance personnel in the use of all the new control and instrumentation systems. The Contractor shall make necessary arrangements with manufacturer's representative. Provide product literature and application guides for user's reference during instruction.
  2. 4 hours – Arc Flash Training: Electrical Engineer, who sealed the Electrical System Analysis, shall train Owner personnel of the potential arc flash hazards associated with working on energized equipment. Maintenance procedures shall be in accordance with the requirements of NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces and shall be provided in the equipment manuals.
  3. 2 hours – "ATS" operating and maintenance procedures by System Supplier.
  4. 40 hours (minimum) – "Operator" hands on SCADA and Operator Interface training. Training shall also include training on the new Operator Interfaces.
  5. 8 hours (minimum) – "Diagnostic and calibration" training shall demonstrate PLC hardware diagnostic routines, test equipment, PLC communication setup, and test procedures as required to enable the personnel to detect and isolate system faults to the circuit board or module level and to implement repairs by replacing failed circuit boards or modules. Demonstrate uploading and downloading software to make backups and restore programs.

### **201-3.10 OPERATION AND MAINTENANCE MANUALS**

- A. Four (4) sets of operating manuals covering instruction and maintenance on each type of equipment shall be furnished prior to completion of the project.
- B. These instructions shall provide the following as a minimum:
  1. Each set bound in a three ring binder, hard tab separators and organized as specified herein.

2. A complete "Record" set of favorably reviewed electrical submittals as provided under SUBMITTAL AND DRAWING REQUIREMENTS.
  3. As-built one-line, elevation, loop, and elementary drawings with all field changes included.
  4. A complete list of the equipment supplied, including serial numbers, ranges, options, and pertinent data necessary for ordering replacement parts.
  5. Instrument data sheets for all instruments supplied on the project, clearly identifying the instrument tagname, range, part number, serial number, size, etc.
  6. Full, technical specifications on each item.
  7. Detailed service, maintenance and operation instructions for each item supplied. Schematic diagrams of all electronic devices shall be included. A complete parts list with stock numbers shall be provided on the components that make up the assembly.
  8. Record of the following:
    - a. Each motor nameplate data including manufacturer, full part number, size, voltage, amps, service factor, bearings, etc.
    - b. Each breaker and overload heater element including manufacturer, full part number, size, setting etc.
    - c. Spread sheet listing all setpoints and programmable parameters entered for this project for VFD, UPS, HIM, etc.
  9. Safety precautions and procedures.
  10. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
  11. No photo copies are allowed of standard published manuals available from manufacturers, such as for the RTU. All of the manuals shall be originals.
  12. 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.
  13. Software program & documentation including complete as-installed PLC ladder logic, and PLC configuration printouts.
  14. All completed and signed test data and forms from factory and field tests.
  15. Warranty certificate with start dates, duration and contact information.
  16. Troubleshooting instructions.
  17. Record of all settings or parameters for all programmable devices.
- C. At the end of the project these manuals shall be updated to show "as-built or as-installed" conditions.
- D. Provide to the City two sets of flash drives (flash drives shall contain all documents in both PDF format and unlocked AutoCAD - DWG format, version 2010 or later):
1. As-built Contract electrical and instrumentation drawings prepared for this project.
  2. As-built set of all required Drawings for the project.

3. As-built sets of other computer generated documents prepared for this project, including PLC ladder logic files, and Bill of Materials prepared for this project.
4. Electronic PDF version of O&M manual. Version format shall follow the hard copy submittal of the O&M, including index, equipment record sheet, warranty information, theory of operation, maintenance instruction, etc. PDF shall be "bookmarked" at each index, subtab, transmittal letter, equipment record sheet, warranty information, theory of operation, maintenance instruction, etc. Failure to bookmark PDF may be grounds for immediate rejection without review. Bookmarks shall be descriptive of actual document, tab, etc. Bookmarks shall not be out of order; the English description shall match that listed in the Submittal's Table of Contents.
5. These flash drives shall be the property of the City, for its use on this and future projects.
6. Label drives with site name using clear plastic with black machine printed lettering as produced by a KROY or similar machine. The size of the nameplate tape shall be with 3/8-inch lettering unless otherwise approved by the Engineer. Securely fasten nameplates in place on the USB drive using the adhesion of the tape.

### **201-3.11 WARRANTY**

- A. The Contractor shall have a staff of experienced personnel available to provide service on 2 working days' notice during the warranty period. Such personnel shall be capable of fully testing and diagnosing the hardware, software and implementing corrective measures.
- B. If the Contractor "fails to respond" in 2 working days, the City at its option will proceed to have the warranty work completed by other resources; the total cost (direct and indirect) for these other resources shall be reimbursed in full by the Contractor.
  1. "Fail to respond" shall be defined as: The Contractor has not shown a good faith effort and has not expended adequate resources to correct the problem.
  2. The use of other resources, as stated above, shall not change or relieve the Contractor from fulfilling the remainder of the warranty requirements.
- C. The Contractor shall warrant all electrical and instrumentation equipment including video surveillance system, PLC, OI and SCADA software programming for the full warranty period of this contract as specified herein.
- D. The Contractor shall provide all labor and material to troubleshoot, program, replace, or repair any hardware or software that fails or operates unpredictably during the warranty period, at no additional cost to the City.
- E. Each time the Supplier's repair person responds to a system malfunction during the warranty period, he or she must contact the City Project Manager for scheduling of the work, access to the jobsite, and permission to make repairs. Operation of facilities necessary to test equipment shall only be performed by or under the direction of City staff. City reserves the right at its sole discretion to deny operations requested by the Supplier. A written description of all warranty work performed shall be documented on a field service report to be given to City prior to the repair person leaving job site. This field service report shall detail and clearly state

problem, corrective actions taken, additional work that needs to be done, data, repair person name and company.

- F. Prior to "final acceptance", the Contractor shall furnish to the Engineer a listing of warranty information for all manufacturers of materials, instruments, and equipment used on the project. The listing shall include the following:
  - 1. Manufacturer's name, service contact person, phone number, and address.
  - 2. Material and equipment description, equipment number, part number, serial number, and model number.
  - 3. Manufacturer's warranty expiration date.
  
- G. Software support which shall be provided by the Supplier:
  - 1. Free technical PLC software and hardware configuration phone support for a period of one year after acceptance of project completion. PLC phone support shall be provided directly from the group that configured the PLC. Phone support shall be available between 8 a.m. and 5 p.m. Pacific Standard Time Monday through Friday.
  - 2. The Supplier shall correct any PLC software configuration error that is discovered within the warranty period, at no additional cost to City. Updated documentation for each "operation and maintenance" manual and two sets of new floppy disks of updated software shall be provided for each correction.
  - 3. Program changes made by City or under direction of City by others shall not relieve or void Contractor of warranty requirements for parts of software programmed under this Contract.

### **201-3.12 FINAL ACCEPTANCE**

- A. Final acceptance will be given by the Engineer after the equipment has passed the "operational testing trial period," each deficiency has been corrected, final documentation has been provided, and all the requirements of design documents have been fulfilled.
  
- B. Upon completion of the project, prior to final acceptance, remove all temporary services, equipment, material, and wiring from the site.
  
- C. At the end of the project, following the completion of the field tests, and prior to final acceptance, the Supplier shall provide the following to the City:
  - 1. Verify Service equipment has been legibly marked in field with the maximum available fault current per NEC 110.24 (A). Field marking shall include date the fault current calculation was performed and be weather & UV rated. Service equipment shall not be hand labeled
  - 2. Listing of warranty information.
  - 3. Each "operation and maintenance" manual shall be modified or supplemented by the Supplier to reflect all field changes and as-built conditions.
  - 4. Four (4) USB drives with copies of all final documentation to reflect as-built conditions.

5. Two sets of all keys for locks supplied on this project. Wire all keys for each lock securely together. Tag and plainly mark with lock number or equipment identification, and indicate physical location, such as panel or switch number.
6. Verify that as-installed drawings have been placed in all new or modified panels in reinforced clear plastic pockets.
7. Resubmit all Electrical System Analysis studies with all calculations rerun, data and graphs updated to reflect as-left conditions. Provide new Arc Flash labels to reflect as-constructed equipment and as-left circuit breaker settings.
8. Record full size drawings neatly marked accurately showing the information required herein

#### **201-4 PAYMENT**

- A. **General Electrical Work and Lighting** shall be paid for at the contract **lump sum** price, which price 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, lighting, underground conduits and conductors, ground rods and underground grounding connections, receptacles, power feeders, control wire, wiring connections, all necessary control programming, modifications and testing to the City's SCADA system, and all other miscellaneous work, complete and in place as specified herein and in accordance with the Project Plans and as specified in these Technical Specifications, and no additional compensation will be made therefor.
- B. **Electrical and Control Pedestal** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing, testing, and starting up the electrical and controls, including but not limited to, anchorage, transportation, testing, permits, electrical connections, temporary relocation of the existing electrical and control pedestal, removal and disposal of the existing electrical and control pedestal, controls equipment, bubbler level equipment, automatic transfer switch, and all other related items, complete and in place and operating as shown on the Project Plans, as specified in these Technical Specifications, and as directed by the Engineer, and no additional compensation will be made therefor.
- C. **Meter Pedestal and Electrical Service** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing, testing, and starting up the meter and electrical service, including but not limited to, underground conduits, anchorage, transportation, testing, permits, electrical connections, and removal and disposal of the existing electrical service, complete and in place and operating as shown on the Project Plans, as specified in these Technical Specifications, and as directed by the Engineer, and no additional compensation will be made therefor.

## **APPENDIX "A"**

### **TEST FORMS**

#### Index of Forms:

Bill of Materials

Schedule Test Request Form

TF1 Power and Control Conductor Test Form

TF2 Instrumentation Conductor Test Form

TF3 Grounding System Test Form

TF4 Visual and Mechanical Inspection Form

TF5 Panelboard Test Form

TF6 Operational Device Checks and Tests Form

TF7 Phase Rotation Test Form

TF8 MCC Device Test Form

TF9 Breaker Device Test Form

TF10 Motor Test Form

TF11 Factory Test Checkout Form

TF13 I/O Point Checkout Test Sheet

TF14 Instrument Data Sheet and Calibration Record

TF15 Radio Test Report



## 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: \_\_\_\_\_







# VISUAL AND MECHANICAL INSPECTION FORM

## TEST FORM (TF4)

### EQUIPMENT

NAME : \_\_\_\_\_ LOCATION : \_\_\_\_\_

### NAMEPLATE DATA

MFGR. :	_____	SERIES # :	_____
MODEL # :	_____	U.L. # :	_____
VOLTAGE :	_____	PHASE :	_____
AMPERAGE :	_____	SERVICE :	_____
BUS TYPE :	_____	BUS BRACING:	_____
VERT. BUS :	_____	HORZ. BUS :	_____
GND. BUS :	_____	NEU. BUS :	_____
ENCLOSURE :	_____		_____
	_____		_____

### INSPECTION CHECK LIST

ENTER: A-ACCEPTABLE R-NEEDS REPAIR OR REPLACEMENT NA-NOT APPLICABLE

TIGHTEN ALL BOLTS AND SCREWS	_____
TIGHTEN ALL WIRING AND BUS CONNECTIONS	_____
VERIFY ALL BREAKERS AND FUSES HAVE PROPER RATING	_____
CHECK BUS BRACING AND CLEARANCE	_____
CHECK MAIN GROUNDING CONNECTION AND SIZE	_____
INSPECT GROUND BUS BONDING	_____
CHECK EQUIPMENT GROUNDS	_____
CHECK CONDUIT GROUNDS AND BUSHINGS	_____
INSPECT NEUTRAL BUS AND CONNECTIONS	_____
CHECK HEATERS AND THERMOSTATS	_____
CHECK VENTILATION AND FILTERS	_____
CHECK FOR BROKEN OR DAMAGED DEVICES	_____
CHECK DOOR AND PANEL ALIGNMENT	_____
INSPECT ANCHORAGE	_____
CHECK FOR PROPER CLEARANCES AND WORKING SPACE	_____
REMOVE ALL DIRT AND DUST ACCUMULATION	_____
INSPECT ALL PAINT SURFACES	_____
CHECK FOR PROPER WIRE COLOR CODES	_____
INSPECT ALL WIRING FOR WIRE LABELS	_____
CHECK FOR PROPER WIRE TERMINATIONS	_____
CHECK FOR PROPER WIRE SIZES	_____
INSPECT ALL DEVICES FOR NAMEPLATES	_____
CHECK IF DRAWINGS MATCH EQUIPMENT	_____
CHECK ACCURACY OF OPERATION & MAINTENANCE	_____
	_____

TESTED BY : \_\_\_\_\_

DATE : \_\_\_/\_\_\_/\_\_\_

WITNESSED BY: \_\_\_\_\_

# PANEL-BOARD TEST FORM

## TEST FORM (TF5)

PANEL NAME: \_\_\_\_\_ LOCATION : \_\_\_\_\_

### NAMEPLATE DATA

MFGR. : _____	SERIES # : _____
MODEL # : _____	U.L. # : _____
VOLTAGE : _____	PHASE : _____
AMPERAGE : _____	SERVICE : _____
BUS TYPE : _____	BUS BRACING: _____
VERT. BUS : _____	HORZ. BUS : _____
GND. BUS : _____	NEU. BUS : _____
ENCLOSURE : _____	MAIN BKR : _____

CALIBRATION EQUIPMENT DESCRIPTION : \_\_\_\_\_ DATE: \_\_\_\_\_

INSULATION RESISTANCE TESTS - MEGOHMS					
A-GND	B-GND	C-GND			

### INSPECTION CHECK LIST

ENTER: A-ACCEPTABLE R-NEEDS REPAIR OR REPLACEMENT NA-NOT APPLICABLE

- TIGHTEN ALL BOLTS AND SCREWS \_\_\_\_\_
- TIGHTEN ALL WIRING AND BUS CONNECTIONS \_\_\_\_\_
- VERIFY ALL BREAKERS AND FUSES HAVE PROPER RATING \_\_\_\_\_
- CHECK BUS BRACING AND CLEARANCE \_\_\_\_\_
- CHECK MAIN GROUNDING CONNECTION AND SIZE \_\_\_\_\_
- INSPECT GROUND BUS BONDING \_\_\_\_\_
- CHECK EQUIPMENT GROUNDS \_\_\_\_\_
- CHECK CONDUIT GROUNDS AND BUSHINGS \_\_\_\_\_
- INSPECT NEUTRAL BUS AND CONNECTIONS \_\_\_\_\_
- CHECK FOR BROKEN OR DAMAGED DEVICES \_\_\_\_\_
- CHECK DOOR AND PANEL ALIGNMENT \_\_\_\_\_
- INSPECT ANCHORAGE \_\_\_\_\_
- CHECK FOR PROPER CLEARANCES AND WORKING SPACE \_\_\_\_\_
- REMOVE ALL DIRT AND DUST ACCUMULATION \_\_\_\_\_
- INSPECT ALL PAINT SURFACES \_\_\_\_\_
- CHECK FOR PROPER WIRE COLOR CODES \_\_\_\_\_
- INSPECT ALL WIRING FOR WIRE LABELS \_\_\_\_\_
- CHECK FOR PROPER WIRE TERMINATIONS \_\_\_\_\_
- CHECK FOR PROPER WIRE SIZES \_\_\_\_\_
- INSPECT ALL DEVICES FOR PROPER LEGEND NAMEPLATES \_\_\_\_\_

CALIBRATION TEST EQUIPMENT PART NO.	DATE CALIBRATED:

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_  
 WITNESSED BY: \_\_\_\_\_





## MCC DEVICE TEST FORM

### TEST FORM (TF8)

MCC # : \_\_\_\_\_ CUBICLE : \_\_\_\_\_  
 EQUIP NAME: \_\_\_\_\_ EQUIP # : \_\_\_\_\_

MOTOR DATA	CONTACTOR DATA		
H.P. : _____	MFGR. : _____	PART # : _____	
F.L.A. : _____	NEMA SIZE : _____	COIL VOLT : _____	

CALIBRATION EQUIPMENT \_\_\_\_\_ DATE: \_\_\_\_\_  
 DESCRIPTION : \_\_\_\_\_

**OVERLOAD TESTS**

MFGR. : \_\_\_\_\_ HEATER # : \_\_\_\_\_ RANGE : \_\_\_\_\_  
 PART # : \_\_\_\_\_ FINAL OVERLOAD SETTING: \_\_\_\_\_

TEST AMPS	MEASURE TRIP TIME @ TEST AMPS			MFGR LISTED TRIP TIME	AMBIENT COMPENSATION
	PHASE A	PHASE B	PHASE C		

**BREAKER TESTS**

MRGR. : \_\_\_\_\_ PART # : \_\_\_\_\_ FRAME # : \_\_\_\_\_

CONTACT RESISTANCE TESTS - OHMS			INSULATION RESISTANCE TESTS-MEGOHMS		
PHASE A	PHASE B	PHASE C	A-GND	B-GND	C-GND

MFGR TRIP TIME @300% MIN: \_\_\_\_\_ BREAKER RATING / RANGE: \_\_\_\_\_  
 MFGR TRIP TIME @300% MAX: \_\_\_\_\_ FINAL BREAKER SETTING: \_\_\_\_\_  
 MFGR INST. PICKUP AMPS: \_\_\_\_\_

TIME-CURRENT TEST			INSTANTANEOUS TRIP TEST - AMPS		
TRIP TIME IN SECONDS @ 300% AMPS			INSTANTANEOUS TRIP TEST - AMPS		
PHASE A	PHASE B	PHASE C	PHASE A	PHASE B	PHASE C

NOTES:  
 \_\_\_\_\_  
 \_\_\_\_\_

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_  
 WITNESSED BY: \_\_\_\_\_

## BREAKER DEVICE TEST FORM

### TEST FORM (TF9)

FEEDER : \_\_\_\_\_ LOCATION : \_\_\_\_\_  
 EQUIP NAME: \_\_\_\_\_ EQUIP # : \_\_\_\_\_  
 EQUIP H.P. : \_\_\_\_\_ EQUIP KVA : \_\_\_\_\_

MFGR. : \_\_\_\_\_ PART # : \_\_\_\_\_ FRAME # : \_\_\_\_\_  
 VOLTAGE : \_\_\_\_\_ INTERRUPT : \_\_\_\_\_ CHARACTER: \_\_\_\_\_  
 RATING CURVE

CALIBRATION EQUIPMENT \_\_\_\_\_ DATE: \_\_\_\_\_  
 DESCRIPTION : \_\_\_\_\_

#### CONTACT RESISTANCE TESTS - OHMS INSULATION RESISTANCE TESTS - MEGOHMS

PHASE A	PHASE B	PHASE C	A-GND	B-GND	C-GND

MFGR TRIP TIME @300% MIN : \_\_\_\_\_ BREAKER RATING / RANGE: \_\_\_\_\_  
 MFGR TRIP TIME @300% MAX: \_\_\_\_\_ FINAL BREAKER SETTING : \_\_\_\_\_  
 MFGR INST. PICKUP APMS: \_\_\_\_\_

TEST-CURRENT TESTS			INSTANTANEOUS TRIP TEST - AMPS		
TRIP TIME IN SECONDS @ 300% AMPS					
PHASE A	PHASE B	PHASE C	PHASE A	PHASE B	PHASE C

#### ADDITIONAL TESTS AND SETTING AS APPLICABLE

FUNCTION	PICKUP		DELAY-TIME		
	RANGE	SETTING	RANGE	SETTING	
LONG TIME					
SHORT TIME					
GROUND FLT.					

NOTES:  
 \_\_\_\_\_  
 \_\_\_\_\_

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_  
 WITNESSED BY: \_\_\_\_\_

## MOTOR TEST FORM

### TEST FORM (TF10)

EQUIPMENT

NUMBER : \_\_\_\_\_ NAME : \_\_\_\_\_

CALIBRATION EQUIPMENT

DATE: \_\_\_\_\_

DESCRIPTION : \_\_\_\_\_

#### NAMEPLATE DATA - FIELD RECORDED

MANUFACTURER		MODEL #		SERIAL #		FRAME #	
H.P.	R.P.M	F.L.A	VOLTS	PHASE	FREQ.	P.F.	S.F.
CODE	N.E.M.A.	INSUL.	ENCLOSUR.	DUTY	DESIGN		

CALIBRATION EQUIPMENT

DESCRIPTION : \_\_\_\_\_ DATE: \_\_\_\_\_

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

#### MOTOR TESTS - MEASURED VALUES

AMPERAGE			VOLTAGE			POWER FACTOR	WATTAGE
A	B	C	AB	BC	CA		

NOTES:

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

TESTED BY : \_\_\_\_\_

DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_

WITNESSED BY: \_\_\_\_\_

**FACTORY TEST  
MCC/CONTROL PANEL CHECKOUT FORM (TF11)**

**Manufacturer:** \_\_\_\_\_ **Location:** \_\_\_\_\_

**Tel:** \_\_\_\_\_

**Test Equipment:** Description \_\_\_\_\_ Calib Date: \_\_\_\_\_

**MCC / Control Panel:** \_\_\_\_\_ **TEST RESULT**

**OVERALL PANEL INSPECTION** **Pass** **Fail**

- |  |                          |                          |
|--|--------------------------|--------------------------|
| 1. All front panel and back panel components mounted securely.....             | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. All wiring terminated and labeled correctly.....                            | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. All components, wiring, and labeling accurately reflected on the drawings.. | <input type="checkbox"/> | <input type="checkbox"/> |

**POWER-UP INSPECTION**

- |  |                          |                          |
|--|--------------------------|--------------------------|
| 1. Voltage levels on load side of circuit breakers.....        | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Voltage levels at the DC terminals of the power supply..... | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Voltage levels at the DC power distribution terminals.....  | <input type="checkbox"/> | <input type="checkbox"/> |

**POWER DISTRIBUTION AND GENERAL COMPONENT TESTING**

- |   |                          |                          |
|---|--------------------------|--------------------------|
| 1. Power distribution to the appropriate components.....                        | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Operation of the ancillary components such as receptacles, work lights, etc. | <input type="checkbox"/> | <input type="checkbox"/> |

**CONTROL COMPONENTS CHECKS**

- |   |                          |                          |
|---|--------------------------|--------------------------|
| 1. Operators (push buttons, selector switches, pilot lights)..... | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Inputs from External Sources.....                              | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Outputs to External Sources.....                               | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Relay Logic.....   | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. PLC I/O and Program Verification.....                          | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. O/I Display Verification.....                                  | <input type="checkbox"/> | <input type="checkbox"/> |

**Notes:**

1. For relay logic checks, each rung of the elementary or loop diagram is to be highlighted in yellow as they are verified for correct control functions.
2. For PLC I/O and program verification, the control strategies shall be highlighted in yellow as each logic function is tested.

**Tested by:** \_\_\_\_\_

**Witnessed by:** \_\_\_\_\_

**Date:** \_\_\_\_\_





# RADIO TEST REPORT

TEST FORM (TF15)

RADIO FREQUENCY : \_\_\_\_\_ RADIO MANUFACTURER : \_\_\_\_\_  
RADIO MODEL # : \_\_\_\_\_ SERIAL # : \_\_\_\_\_  
LOCATION : \_\_\_\_\_

PARAMETER	INITIAL VALUE	FINAL VALUE
CHANNEL/HOP PATTERN		
SYSTEM ADDRESS		
OPERATING MODE		
DATA RATE		
BUFFER		
CTS TIMER		
TIME-OUT TIMER		
LOOPBACK CODE		
SOFTWARE REVISION		
HOPPER BOARD REVISION		
FREQUENCY LOCKOUTS		
DC VOLTAGE WHEN TRANSMITTING		
RADIO POWER OUTPUT (WATTS)		
MATCH EFFICIENCIES		
RETURN LOSS		
ANTENNA VSWR (REFLECTED POWER)		
EFFECTIVE ISOTROPIC RADIATED POWER (EIRP)		

NOTES: CHECK OUT ALL COMPONENTS FOR PROPER GROUNDING.

TESTED BY : \_\_\_\_\_  
WITNESSED BY: \_\_\_\_\_

DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_

**APPENDIX "B"**

**DEVICE INDEX**

**SECTION 201 -APPENDIX "B" DEVICE INDEX**

E-DWG	P&ID DWG	TAG	NO.	DESCRIPTION	TYPE	SPECIFICATION	MINIMUM NEMA RATING	SIZE	SP / RANGE	UNITS	DWG REF DET MOUNTING	NOTES AND ACCESSORIES	201 TEST FORM
-	I10.1	MSH	1011	Moisture Switch	N.C.	Civil	-	-	-	-	Motor		TF-7
-	I10.1	TSH	1011	Temperature Switch	N.C.	Civil	-	-	-	-	Motor		TF-7
-	I10.1	MSH	1012	Moisture Switch	N.C.	Civil	-	-	-	-	Motor		TF-7
-	I10.1	TSH	1012	Temperature Switch	N.C.	Civil	-	-	-	-	Motor		TF-7
-	I10.1	LIT	1051	Level Indicating Transmitter	Press	201-2.07.A	4X	-	34.60	FT	PANEL		TF-7
E10.3	I10.1	LSHH	1051	Level Switch	Float	201-2.07.D	6P	-	See Civil	FT	See Civil		TF-7
E10.3	I10.1	LSLL	1051	Level Switch	Float	201-2.07.D	6P	-	See Civil	FT	See Civil		TF-13
-	I10.2	LSH	1055	Level Switch	Float	203	EXPL	-	90%	Elev	Per Mnfr		TF-7
-	I10.2	LSHH	1055	Level Switch	Float	203	EXPL	-	90%	Elev	Per Mnfr		TF-7
-	I10.2	LSL	1055	Level Switch	Float	203	EXPL	-	10%	Elev	Per Mnfr		TF-7
-	I10.2	LSX	1055	Level Switch	Leak	203	EXPL	-	-	-	Per Mnfr		TF-7
-	I10.2	LT	1055	Level Transmitter	Float	203	EXPL	-	Per Mnfr	In	Per Mnfr		TF-7
E10.3	I10.1	FE	1071	Flow Element	Mag	Existing	6P	-	-	-	E10.9 - "F"		-
-	I10.1	FIT	1071	Flow Indicating Transmitter	Mag	201-2.07.E	3R	-	0-400	GPM	PANEL		TF-14
-	I10.1	FI	1072	Flow Indicator	Vane	201-2.07.A	3R	-	0.52-5.2	SCFM	PANEL		TF-14
-	I10.1	FSL	1072	Flow Indicator	Roto	201-2.07.A	3R	-	0.99	SCFM	PANEL		TF-14
-	I10.2	ZS	1091	A~D Position Switch	N.C.	201-2.09.B	-	-	-	-	Panel Door		TF-7
-	I16.1	LSH	1655	Level Switch	Float	203	EXPL	-	90%	Elev	Per Mnfr		TF-7
-	I16.1	LSHH	1655	Level Switch	Float	203	EXPL	-	90%	Elev	Per Mnfr		TF-7
-	I16.1	LSL	1655	Level Switch	Float	203	EXPL	-	10%	Elev	Per Mnfr		TF-7
-	I16.1	LSX	1655	Level Switch	Leak	203	EXPL	-	-	-	Per Mnfr		TF-7
-	I16.1	LT	1655	Level Transmitter	Float	203	EXPL	-	Per Mnfr	In	Per Mnfr		TF-7

**\*\*END OF SECTION 201\*\***

## **SECTION 202**

### **DIESEL GENERATOR ELECTRICAL SYSTEM**

#### **202- 1 GENERAL**

##### **202-1.01 SCOPE OF WORK**

- A. These specifications describe the minimum requirements for pad mounted, standby duty, three-phase diesel generators. Larger generators shall be supplied when necessary to meet the requirements of this section, however Contractor shall be made aware of the limited size of the site. Appendix "A" contains the "Generator Data Form" which lists the minimum sizing for the generator and accessories. The Contractor shall submit the "Generator Data Form" form with proposed values and include this form with the generator submittal.
- B. The diesel generator shall include a diesel engine, control & instrument panel, batteries, battery charger, brushless alternator, excitor, voltage regulator, generator main breaker, fuel pump, sub-base fuel tank, radiator, blower fan, vibration isolators, load breaker, weatherproof housing when shown intrusion switches (on all outer doors, wired to control panel terminal blocks), and accessories.
- C. The major areas in the scope of work include providing for and installation of complete standby power systems:
  - 1. Standby Generator Systems
  - 2. All piping associated with connecting fuel system
  - 3. Intake/exhaust air system and ducts.
  - 4. Fuel tank and housing per location.
  - 5. A 120VAC powered battery charger shall be mounted to the generator skid.
  - 6. All auxiliary apparatus and accessories shall be provided, at no additional cost to the City of Santa Rosa, as required for a fully functional diesel generator.
  - 7. The diesel generators shall be delivered as a skid mounted unit, piped and wired for operation.
  - 8. Install steel reinforced concrete pads, adequately sized to support the diesel generator and load bank (where shown) being supplied.
  - 9. Provide the field installation, startup, testing and training for the diesel generator and associated equipment as part of this scope of work.
- D. The diesel generator shall be provided as described in the following specification and as shown on the Contract drawings, herein designated as the design documents.
- E. All equipment shall be new, of current production by a U.S. firm which manufactures and/or assembles the components of the diesel generator as a matched unit so that there is one-source responsibility for warranty, parts, and service through a manufacturer's local representative.

- F. The Contractor shall:
1. Thoroughly examine conditions before submitting his bid proposal to perform any work. He shall compare site conditions with data given on the 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 City.
  2. 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 described in these specifications and measurements at the site.
  3. Coordinate with the other trades the exact location for the engine generator, load bank (where shown) and routing of piping, cable and conduits.
  4. Conflicts between the Contract drawings and the specifications shall be brought to the attention of the Engineer.
- G. The manufacturer's local representative shall be an authorized distributor who maintains a stock of spare parts for the supplied diesel generator and has a service facility with factory-trained service personnel authorized to perform diagnostics and repair for the entire generator set. The manufacturer's local representative shall be located within a radius of 50 miles of the of the project site and shall offer 24hr/7 day per week emergency service with 1 hour on-site and shall offer the availability of rental generator sets.
- H. Unit shall meet all current, Local, State and Federal emissions requirements for the location the engine generator will be installed at time of installation.
- I. The manufacturer shall provide an Environmental Protection Agency (EPA) certified engine-generator unit. Submit proof that engine-generator unit is EPA certified.
- J. The engine generator shall meet all local Sonoma County and Environmental Protection Agency (EPA) emission and noise requirements at final inspection. Obtain permits, provide all information, fill out forms (permit to construct and permit to operate) and obtain approval from the Bay Area Air Quality Management District (phone number (415) 749-4900. Permit to construct shall be provided with generator submittal. Permit to operate shall be provided prior to construction.
- K. Sub-Base fuel tank shall meet UL142. Aboveground fuel tank shall meet UL2085.
- L. The diesel generator shall be as manufactured by Caterpillar to match City standard.

### **202-1.02 Plans And Specifications**

- A. The Contractor shall examine carefully the plans, specifications, and contract forms. It is assumed that the Contractor has investigated and is satisfied as to the conditions to be encountered, as to the character, quality and quantities of work to be performed and materials to be furnished, and as to the requirements of these specifications and the Contract. After the signing of the Agreement, no consideration will be given to any claims of misunderstanding of the work to be done, or of any provisions of the proposal, plans, specifications and contract documents.

- B. All equipment/options are to be factory installed. If the equipment/options are not available factory installed, dealer installed equipment/accessories may be acceptable. The bidder is to specify those items which will be dealer installed in the submitted bid document.
- C. Only new models in current production, that meet the requirements of these specifications and which are cataloged by the manufacturer and for which manufacturer's published literature and printer specifications are currently available, will be considered. Special options may be included only when recommended by the manufacturer of the unit approved by the City.
- D. The Contractors price shall include tax, licenses, freight, delivery expenses, fuel, installation of all components and other miscellaneous charges.

#### **202-1.03 Qualification**

- A. Acceptable equipment suppliers will be considered only for those represented by a reliable California firm carrying an adequate supply of repair parts in the State.
- B. The supplier shall have represented both the engine and generator manufacturers for at least three years prior to the bid award.
- C. By entering into this Contract, the suppliers shall guarantee the availability of service for this engine-generator set by the supplier during the warranty period.

#### **202-1.04 Submittals And Drawings**

- A. Submit shop documents and drawings for approval in accordance with this subsection and as specified in Section 201 - Electrical. All non-relevant items not provided for on this project shall be crossed-off on all documents and drawings.
- B. Submit data sheets and catalog cuts for:
  - 1. Engine:
    - a. Make and model
    - b. Number of cylinders and cylinder arrangement
    - c. Bore, Inches
    - d. Stroke, Inches
    - e. Compression ratio
    - f. Piston displacement, Cubic Inches
    - g. Piston speed, Feet per Minute, at rated RPM
    - h. HP at rated KW output
    - i. Rated RPM
    - j. Number and type of bearings
    - k. Fuel type and consumption at full load
    - l. Cylinder head and block material
    - m. Crankshaft material
    - n. Valves material
    - o. Governor type
    - p. Block heater

2. Generator:
    - a. Make and type
    - b. Generator full load electrical rating, KVA, KW, Voltage, Amperage, Hz, # of Phases, # of Wires, Power Factor
    - c. Peak motor starting, KVA
    - d. Number of leads
    - e. Number and type of bearings
    - f. Voltage regulator type
    - g. Exciter type
    - h. Generator winding insulation class and temperature rise
    - i. Generator transient ( $X'd$ ) and subtransient ( $X'd$ ) reactance in per unit
    - j. Frequency regulation, %, from no-load to full load
    - k. Frequency regulation, %, at steady state full load
    - l. Ambient temperature range
    - m. Voltage regulation from no load to full load
  3. Electrical:
    - a. Control and instrument panel
    - b. Generator breaker
    - c. Batteries and battery charger
    - d. Standby system three-line diagrams which include the generator equipment and load bank (where shown)
    - e. Standby system interconnection diagrams for all generator and load bank (where shown) wiring. Standard internal connection diagrams for each piece of equipment shall only be accepted when modified to indicate corresponding wire and cable numbers on drawings for external pieces of equipment.
  4. Accessories:
    - a. Exhaust silencer, stack, and piping system
    - b. Fuel tank and piping system
    - c. Vibration isolation system
    - d. Heater systems
    - e. Load Bank breaker
    - f. Weatherproof Housing. Submit sizing of sound attenuating enclosure. Coordinate sizes with available lengths.
    - g. Run Cycle Timer
    - h. Paint Finish
- C. Submit electrical schematics and wiring diagrams for:
1. Generator control panel
  2. Battery charging system
  3. Generator main breaker

4. Voltage regulator
  5. Governing system
  6. Auxiliary electrical devices
  7. Generator Main Breaker
  8. Fuel system pipe heat trace or leak detection as required in other Divisions
  9. Load Bank Feed breaker (where shown)
  10. Weatherproof housing for auxiliary electrical devices (where shown)
- D. Submit dimension drawings for:
1. Diesel generator and load bank side, front, and top
  2. Pad construction and size, anchor details
  3. Fuel tank and containment basin
  4. Exhaust muffler and air intake baffle
  5. Conduit stub-up areas under generator frame, fuel tank and load bank (where shown)
  6. Weatherproof housing (where shown)
- E. Submit reports, calculations, and curves for:
1. Engine horsepower curves. These curves shall show the manufacturer's approval of the engine rating for standby application per the specifications stated herein.
  2. Engine generator fuel consumption curves.
  3. Concrete pad seismic calculations. The Contractor shall submit seismic calculations signed by a California Registered Professional Structural Engineer for the proposed construction of the bolt tie-down to concrete pad to anchor the engine generator, load bank (where shown) and fuel tank.
  4. Calculations showing that the unit meets the specified emission requirements.
  5. Generator load report showing that the unit shall start the loads as shown on Contract Drawings without exceeding the maximum allowable voltage dip.
  6. Submit typed statement that the generator has been sized to operate the specified loads. Submit calculations and back-up to shown the generator is properly sized.
  7. Sound level data showing that the complete generator package meets the sound attenuating requirements stated herein.
  8. Provide fuel tank pressure testing as required by the local jurisdiction.
- F. Descriptive literature shall be provided that describes the diesel generator and all accessories. This literature shall provide sufficient detail to determine that the diesel generator has all the accessories, options, features, and characteristics specified herein. Items that are not provided shall be neatly lined out.

- G. The Contractor shall include in writing as part of the submittal details any proposed departures from the design documents and the reasons therefore. Incorporate no such departures into the work without prior written approval of the City. The approval of departures which substantially deviate from the design documents shall be evidenced by a "change order" directive by the City. Any cost differential associated with this change order must be negotiated with the City to amend the scope of work to reflect the costs or savings.
- H. A copy of this specification section, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. 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. The submittal shall be accompanied by a detailed, written justification for each numbered item explaining variance or non-compliance with specifications. 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.
- I. The Contractor shall note that the named generator equipment, if given, is considered acceptable, but in some cases additional design, options, or modifications may be required, at no additional cost to the City, to meet Specifications.
- J. The decision of the City governs what is acceptable as an approved equal. If the City considers it necessary, tests to determine equality of the proposed substitution shall be made, at the Contractor's expense, by an unbiased laboratory satisfactory to the City. Equality will be judged on the basis of the following:
1. Conformance with description or performance required.
  2. Equal in quality.
  3. Comparable in operation and maintenance.
  4. Equal in longevity and service under conditions of climate and usage for given application.
  5. Conformance with space allocations.
  6. Comparable in appearance and artistic effect.
  7. Compatible with mechanical and electrical construction of related work without necessitating changes in detail.
- K. No material or equipment shall be allowed to be delivered to the City until the submittal for such items has been reviewed by the City and approved.
- L. 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  $\frac{3}{4}$  full. Binder construction shall allow easy removal of any page without complete manual disassembly; spiral ring type binders are not acceptable. Each binder shall be appropriately labeled on the outside with the project name, job number, equipment Contractor's name, specification section(s), and major material contained therein. An index shall be

provided at the front of all sections which itemizes the contents of each tab and subtab section and lists the project name, job number and equipment's Contractor's name, address, phone number, and contact person. Drawings that are "C" or "D" size shall be folded with the title block visible and placed in clear plastic pockets. Faxed documents shall not be used in any manuals.

- M. Submit complete and specific information with regard to equipment representatives and service facilities.
- N. The generator manufacturer (representative is not acceptable) shall submit and provide the following letters in the manufacturer's letterhead prior to shipment of generator from the factory:
  - 1. Letter certifying that the manufacturer has reviewed the connected loads power and certifies that the generator to be provided shall start the loads, in any combination or sequence, without generator voltage dropping below any of the connected equipment ratings. The connected equipment is shown on the Contract one-line diagram.
  - 2. Letter shall state that the generator to be supplied was verified to be compatible, without any adverse effects with other major equipment to be supplied for this project in load configuration as shown on Contract One-Line diagrams. This letter shall state the name and manufacturer of each major piece of equipment and proof of verification of compatibility.

#### **202-1.05 Operation And Maintenance Manuals**

- A. Prior to the delivery of the equipment, the Contractor shall submit five (5) sets of "operation and maintenance" (O&M) manuals for approval. O&M manuals shall be per this subsection.
- B. At least one of these sets of O&M manuals shall be made up of "original" (no copies or reproductions) documents. In addition, a full set of O&M manuals that are also professionally copied to a CD or DVD format shall be provided.
- C. Manufacturers' or Contractor's standard brochures or manuals shall be edited to reflect only that model or series of equipment installed on this project, including any modifications. All extraneous material shall be crossed out or otherwise removed in a manner acceptable to the City. All text, tables, graphs, and drawings shall be clear and legible. Black and white copies of color originals are not acceptable. Color originals or true color copies of these originals shall be provided in each set.
- D. All information required herein shall be provided even though it may be considered proprietary. If any of the information herein is considered proprietary, the City will enter into a proprietary agreement with the Contractor. This agreement will stipulate that all such information will be kept confidential by the City and the City will use the information only for its internal use and will not reproduce any proprietary information for distribution.
- E. O&M manuals shall be contain the following:
  - 1. All submittal documentation required under this section with all corrections and changes made to reflect final as-built conditions.

2. Operation, maintenance, troubleshooting, instruction, calibration, user, and other manuals available for "equipment" from the manufacturer. Subtab and index the different manuals for easy location.
3. These manuals shall include or be amended to include the following:
  - a. An itemized list of all data provided.
  - b. Name and location of the manufacturer, the manufacturer's nearest distributor and spare parts warehouse.
  - c. Recommended installation, adjustment, modes of operation, startup, calibration, and troubleshooting procedures.
  - d. Warnings and cautions to prevent equipment damage and to ensure personnel safety.
  - e. Complete internal wiring, component layout, connection, and schematic diagrams. All "proprietary" diagrams shall be included.
  - f. Complete parts lists, by generic title and identification number, cross-referenced to component layout diagram.
  - g. Disassembly and assembly instructions.
  - h. Recommended preventive maintenance procedures and schedule.
  - i. Recommended lubrication and an estimated quantity for a year duration.
  - j. Recommended spare parts list, including the unit price of each. The Contractor shall provide an availability policy listing the location of where spare parts are stocked and the delivery time for each of the recommended spare parts.
  - k. All test data and test forms completed for this project.

## **202- 2 MATERIALS**

### **202-2.01 Quality**

- A. It is the intent of these design documents to secure a diesel generator of the latest commercial design that has been prototype tested, factory built, production tested, site tested, as a total unit together with all accessories.
- B. All materials, components, and parts supplied shall be highest grade, unused, new, and in current production.
- C. Provide all of the features, options, and accessories specified herein and shown on the design drawings.
- D. All rotating parts shall be guarded against accidental contact. In accordance with Federal OSHA and Cal-OSHA requirements.
- E. Generator shall be rated for use with reduced voltage starters.
- F. Generator Data Form in Appendix "A" lists the minimum requirements to meet specification. Contractor shall submit this form complete with generator data of submitted generator. Contractor shall submit cover letter documenting reasons explaining why any values are less than that specified.

### **202-2.02 Rating**

- A. The engine generator shall have a minimum continuous standby rating as listed in Appendix "A". Standby rated shall mean that generator starts within 60 seconds upon being called to operate at continuous uninterrupted operation for the total duration of a power outage. Rating of the diesel generator shall be based on operation when equipped with all necessary operating accessories such as radiator, fan, air cleaners, lubricating oil pump, governor, exhaust silencer, etc.
- B. The engine horsepower rating shall be a minimum HP/KW listed in Section 202 Appendix "B".
- C. No derating from the ratings specified shall occur for ambient temperatures below 122°F or installation elevation below 1,000 feet.
- D. The diesel generator will be installed at the elevation shown on the Contract Drawings. The diesel generator shall operate successfully at ambient temperatures between 40 degrees Fahrenheit and 110 degrees Fahrenheit.
- E. The engine/generator shall accept 100% of the nameplate KW rating in one step, in compliance with NFPA 110, Paragraph 5-13.2.6.
- F. The diesel generator shall be capable of successfully providing three phase, 60 hertz power as shown on Contract One Line Drawings to start and continuously run the squirrel cage motors in addition to the lighting and control loads. The maximum step voltage dip shall be as listed in Appendix "A" below line voltage, as measured line to line at the generator terminals, during start of any of the station loads.

### **202-2.03 Engine**

- A. The engine shall be a turbocharged compression ignition engine type, four cycle, with vertical inline or V-type cylinders and an overhead valve configuration.
  - 1. The engine shall utilize only No. 2 diesel fuel.
  - 2. Piston displacement shall be a minimum cubic inches listed in Appendix "A" of this Section.
  - 3. The engine shall be of direct injection design, i.e. pre-combustion chambers shall not be incorporated in the cylinder heads. Glow plugs shall not be used for engine starting.
  - 4. The engine shall deliver a minimum HP listed in Appendix "A" of this Section.
  - 5. The engine shall have sufficient power to produce the specified ratings when operating with all accessories including exhaust, fuel, cooling, and battery charging systems, etc.
- B. The engine shall be equipped with:
  - 1. Engine driven or electric fuel transfer pump, water/oil separator and particulate type fuel filters, and electric fuel shutoff valve. The fuel transfer pump shall be capable of lifting the fuel from the subbase or adjacent fuel tank. Primary and secondary fuel filters shall be provided. The fuel filters shall be replaceable and conveniently located for servicing.

2. Electrical governor; consisting of a magnetic pickup speed sensor, adjustable electronic control, and an electrical actuator mounted integrally with the fuel pump. The governor shall provide automatic engine generator set frequency regulation adjustable from isochronous to 5% droop. Governors using external throttle linkages are not acceptable.
3. Positive engagement solenoid shift-starting VDC starter rated for amps cranking current as listed in Appendix "A."
4. Battery charging alternator with a minimum ampere output as listed in Appendix "A."
5. Positive displacement, full pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain. The oil pump shall be capable of supplying adequate lubricating oil under pressure to the main bearings, crankshaft bearings, pistons, piston pins, timing gears, camshaft bearings, and valve rocker mechanism. The cartridge oil filters shall be full flow type, conveniently located for servicing. Filters shall be equipped with a spring loaded bypass valve to ensure oil circulation if filters are clogged.
6. Dry type replaceable air cleaner elements. The dry-type air cleaner shall be equipped with a self-cleaning dust and water evacuator and a vacuum restriction gauge to indicate maximum allowable restriction of the air cleaner system according to the engine manufacturer's recommendations. The air cleaner elements shall be conveniently located for servicing.
7. Unit mounted radiator, blower fan, water pump, and thermostat. The radiator with blower type fan shall be sized to maintain safe operation at 122° F ambient temperature. The engine cooling system shall be filled with a solution of 50/50 ethylene glycol/water antifreeze or equivalent as recommended by the manufacturer.
8. Removable type cylinder liners.
9. Replaceable insert main bearings.
10. Heater system. The engine shall be equipped with an engine jacket water preheaters. Each preheater shall be a "Kim Hotstart", with a thermostat range 120° - 160° F, or comparable to allow the engine to be readily started at 10° F. Block heater sizing and voltage, listed in Appendix "A" for "hot" start of engine.
  - a. A circulation pump shall be provided if recommended by the manufacturer for this application.
  - b. When the generator block heater power, voltage, amps, wire, conduit, etc. differs from that specified on Contract documents, Contractor shall modify power feed arrangements (any necessary hardware, circuit breaker, conduit, wiring, fittings, devices, engineering, etc.) as directed in field at no additional cost to the City.
  - c. Identify Power Source of Block Heater: Install engraved nameplate on receptacle indicating shore power source (i.e. Panelboard LP-1, CKT #15,17, MCC-1, section 2, 100A breaker, etc.) Nameplate shall be secured with stainless steel screws.

## **202-2.04 GENERATOR**

- A. The generator alternator shall be brushless permanent magnet-excited generator (PMG), with skewed stator windings and amortisseur rotor windings skewed for smooth voltage waveform. The generator shall have the following features:
1. Self-ventilated cooling.
  2. Drip-proof housing construction.
  3. 105° C alternator temperature rating.
  4. Voltage regulation under load from no load to full load within +/- 1%.
  5. Random voltage variation for constant loads, from no load to 100% load shall not exceed +/-1 % of its mean value.
  6. Frequency variation shall isochronous under varying loads from no load to 100% load.
  7. Random frequency variation shall not exceed +/- 0.25% of its mean value from no load to full load.
  8. The insulation material shall meet the NEMA standard (MG1-22.40 and 16.40) for class H and be vacuum impregnated with epoxy varnish to be fungus resistant per MIL I-24092.
  9. The excitation system shall be of brushless construction controlled by a solid state voltage regulator with adjustable volts-per-hertz operation capable of maintaining voltage within +/- 1% at any constant load from 0 to 100% of rating. The regulator shall be sealed from the environment and isolated from the load to prevent tracking when connected to loads producing high harmonic voltage and current distortion.
  10. Semi-flexible disc direct coupling to engine flywheel.
  11. Maintenance free bearings.
  12. Radio interference suppression to meet the BS.800 and VDE Class G and N standards.
  13. Telephone interference factor of less than 50 per NEMA MG1-22.43.
  14. AC voltage waveform total harmonic distortion of less than 5% total from no load to full load. Any individual harmonic shall have less than 3% THD.
- B. On starting each listed load, the unit shall recover to +/- 1% of rated voltage within one second.
- C. The generator shall be capable of sustaining at least 250% of rated current for at least 10 seconds.
- D. The generator shall be capable of providing a minimum of KVA for motor starting with maximum dip listed in Appendix "A" and KW for continuous operation as listed in Appendix "A."

## **202-2.05 CONTROLLER & INSTRUMENT PANEL**

- A. Provide a generator-set mounted controller & instrument panel installed facing the direction shown on the design drawings. The panel mounting shall be vibration isolated from the rest of the engine / generator set.
- B. The controller unit shall be of all solid state construction, except for relays used as alarm followers to provided dry contacts or in switching high current circuits. The controller shall utilize a microprocessor for logic control. All printed circuit boards shall be conformably coated and moisture proof. Circuitry shall be of plug-in design for quick replacement. The controller shall be equipped to accept a plug-in device capable of allowing maintenance personnel to test controller performance without operating the engine. The controller shall be capable of operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .
- C. The controller shall include:
  - 1. Fuse DC control circuits.
  - 2. Complete two-wire start/stop control wired to terminal blocks which shall operate on closure of a contact from a remotely located automatic transfer switch.
  - 3. Engine starter control for:
    - a. Speed sensing and a second independent starter motor disengagement systems to protect against the starter engaging with a moving flywheel. Battery charging alternator voltage will not be acceptable for this purpose.
    - b. Starting system designed for restarting in event of a false engine start, by permitting the engine to completely stop rotating before reengaging the starter.
    - c. Cranking cyler with 15 second ON and OFF cranking periods or as recommended by the manufacturer. Cranking shall cease upon engine starting and running. Two means of cranking termination shall be provided, one as a backup to the other. Failure to start after three cranking cycles shall shut down and lockout the engine, and visually indicate an over-crank shutdown on the indicator panel.
    - d. Circuitry and sensing devices for emergency shutdown of the engine on any occurrence of the following conditions:
      - 1) High coolant temperature.
      - 2) Low oil pressure.
      - 3) Over speed.
      - 4) Over-crank.
      - 5) Low coolant level.
      - 6) Remote manual stop station.
      - 7) Shutdown shall be initially inhibited for a time delay period as necessary to allow the engine start for shutdown conditions 1, 2, and 5 or as recommended by the manufacturer.

4. The following dry contacts, normally open, shall be provided and brought out to terminals for remote from the unit status monitoring
    - a. Generator running
    - b. Generator ready
    - c. Generator trouble
    - d. Load Bank Trouble (where shown)
  5. Engine cool down timer factory set at five (5) minutes to permit unloaded running of the generator set after transfer of the load to normal.
  6. Three position (RUN-OFF-AUTO) selector switch with two complete sets of spare normally open contacts for the "RUN" and "AUTO" positions. In the RUN position the engine shall start and run regardless of the position of the remote starting contact. In the AUTO position, the engine shall start when contacts in the remote control circuit close and stop five minutes after those contacts open. In the OFF position the engine shall not start even though the remote start contact closes. This position shall also provide for immediate engine shutdown in case of emergency.
  7. Emergency Stop maintained pushbutton located at maximum 5 feet above grade after installation on vibration isolators and sub-base fuel tank. Provide additional Emergency Stop pushbutton as necessary to meet this requirement.
- D. The instrument panel shall meet NFPA-110 Controller Accessories Requirements and shall include the following (digital display may be provided in place of analog instruments). Units shall read in US units (°F, PSI, etc.):
1. Indicating lights to signal:
    - a. System Ready
    - b. Low oil pressure.
    - c. High engine temperature.
    - d. Low water temperature.
    - e. Overcrank.
    - f. Overspeed.
    - g. Low engine temperature.
    - h. Fuel tank leak.
    - i. Low fuel level.
    - j. Low battery voltage.
    - k. Battery charger fail.
    - l. Alarms lights shall latch-in on occurrence of an alarm unit manually reset by an operator. A test button shall be provided for testing the operation of all the lights listed above. A follower dry contact (normally open which closes on an abnormal condition) shall be provided and brought out to terminals for remote from the unit status indication of a common alarm which is activated on the occurrence of any of the alarm and shutdown conditions.
  2. AC voltmeter.
  3. AC ammeter.

4. Voltmeter/ammeter phase selection.
5. Direct reading pointer-type frequency meter.
6. Water temperature gauge.
7. Oil pressure gauge.
8. Battery charging current gauge.
9. Engine running time meter, non-resetting, with a minimum display capability of 9999 hours.
10. Voltage adjust rheostat.
11. Panel light shall be provided to illuminate all gauges, meters, and controls on the instrument panel. Graphical display (with 9 lines of data) in place of gauges and meters is acceptable.

**202-2.06 ACCESSORIES**

A. The following diesel generator accessories shall be provided and installed:

1. Exhaust System:

- a. Exhaust Silencer: A hospital grade type silencer including flexible stainless steel exhaust piping & fittings properly sized and installed according to the manufacturer's recommendation. The silencer shall be coated to be temperature and rust resistant. Gasproof, seamless, stainless steel, flexible exhaust connector(s) ending in pipe thread or SAE flange shall be used. Support for exhaust silencer is not to be carried by the exhaust manifold. Silencer shall have the following minimum attenuation:

Minimum Silencer Attenuation	
Frequency (Hz)	Attenuation (dBA)
63	17
125	42
250	42
500	24
1000	25
2000	25
4000	25
8000	26

- b. Exhaust Stack Pipe: An exhaust stack pipe to connect to the engine exhaust silencer. The silencer, stack, and exhaust piping shall be sized to ensure that measured exhaust back pressure does not exceed the manufacturer's minimum or maximum limitation. Install a spring loaded galvanized rain cap at end of exhaust pipe.

2. Exhaust Stack Pipe
  - a. Description
    - 1) The system will be comprised of a flexible coupling at turbocharger, piping to connect flexible coupling to silencers, piping to carry gases through a rain cap. The silencer, stack, and exhaust piping shall be sized to insure that measured exhaust back pressure does not exceed the manufacturer's minimum or maximum limitation.
  - b. Materials:
    - 1) Contractor to furnish black steel extra strong weight discharge pipe conforming to ASTM A53 grade A or ASTM A120 for engine exhaust system.
    - 2) Flexible metal connections for junctions between turbocharger, piping and silencer. Spring loaded galvanized rain cap at end of exhaust pipe.
  - c. Rain cap shall be stainless steel with adjustable counter weights.
3. Fuel tank piping shall vent outdoors 12 feet (minimum) above grade to meet Code.
4. Vibration Isolation: Vibration isolation dampeners between the engine-generator and steel mounting skid. The engine-generator isolation shall be galvanized steel compression spring type; seismic rated with earthquake restraints in both lateral and vertical directions. The specified exhaust silencer shall be mounted on the top of the unit with vibration isolators. The enclosure shall be mounted with vibration isolators which effectively isolate the enclosure from all vibration frequencies of the engine-generator. In addition, snubbers shall limit and cushion extreme excursions due to shocks encountered when the engine-generator is in transit. Isolation dampeners may be built into the generator skid.
5. Sub-Base Fuel Tank (where shown)
  - a. Fuel Tank: The fuel tank, sized for 24 hours – fully loaded, shall be skid sub-base mounted. The fuel tank shall have the following features:
    - 1) State Tank including five (5) gallon overfill containment, and 12 foot venting extension.
    - 2) Steel construction.
    - 3) Steel channel side supports.
    - 4) 3/8" minimum drain.
    - 5) 1-1/4" mechanical fuel level gauge.
    - 6) Internal baffles.
    - 7) 2" fill-locking vented fill cap.
    - 8) Flexible fuel line(s) rated 300°F and 100 PSI ending in pipe thread.
    - 9) 3/8" minimum suction connection.
    - 10) 3/8" minimum return connection.
    - 11) Primer and enamel exterior.

- 12) Meet UL 142.
  - 13) 1/4" minimum fitting for fuel sensor.
  - 14) High and Low fuel sensors with independent set of contacts for high and low fuel alarm indication wired to generator control panel.
  - 15) Fuel tank leak sensor with independent set of contacts wired to generator control panel.
  - 16) Sub-base rupture containment basin. This containment basin shall be sized to contain a minimum of 110% of the capacity of the fuel tank. A 3/8" minimum drain plug shall be provided in each rupture containment basin. Extend exterior enclosure to cover basin.
  - 17) Level Transmitter: The ultrasonic transmitter shall be a 4-20 mA linear transmitting device proportional to the level. Case material and mounting material shall be stainless steel suitable for this application. Provide conduit extensions as required to meet minimum banking distance. Level transmitter shall be ToughSonic 14 (TSPC) to match Owner Standard.
- b. The fuel tank shall not be filled in excess of 90 percent of its capacity. An overfill prevention system shall be provided for the tank. During tank filling operation, the system shall:
- 1) Provide an independent means of notifying the person filling the tank that the fluid level has reached 85 percent of tank capacity by providing a tank level gage marked at 85 percent of tank capacity.
  - 2) Visual and audible operator notification when the quantity of liquid in the tank reaches 90 percent of tank capacity.
  - 3) A permanent sign shall be provided at the fill point for the tank documenting the filling procedure and the tank calibration chart. The filling procedure shall require the person filling the tank to determine the gallonage required to fill it to 90 percent of capacity before commencing the fill operation.

6. Batteries:

- a. Battery rack with tie down clamps, battery cables, and batteries all located mounted to the engine/generator skid. The batteries shall be capable of delivering the cold-cranking amps required at zero degrees Fahrenheit per SAE Standard J-537.
- b. Provide and install a 2-pole padlockable-knife switch adjacent to batteries that will disconnect both the positive and negative leads of the batteries that feed all the generator circuits.
- c. Install engraved nameplate on knife switch indicating shore power source (i.e. Panelboard LP-1, CKT #15,17, MCC-1, section 2, 100A breaker, etc.) Nameplate shall be secured with stainless steel screws.
- d. The batteries shall be sized a minimum as listed in Appendix A.

7. Battery Charger: A current limiting minimum ampere, at VDC as listed in Appendix "A", completely solid state battery charger to automatically recharge the starting batteries. The charger shall be a float and equalize type. The complete charger unit shall be U.L. listed. The charger shall be mounted to the engine/ generator skid. The charger shall be operational through an ambient temperature range of  $-40^{\circ}\text{F}$  to  $140^{\circ}\text{F}$ . It shall include the following features:
  - a. Fused AC input and DC output overload & short circuit protection.
  - b. DC ammeter and voltmeter, 5% full scale accuracy, to indicate battery charging rate.
  - c. "Power on" lamp to indicate when the charger is powered.
  - d. Reverse polarity protection to prevent the charger from operating if improperly connected.
  - e. Charger circuitry protection from line or load voltage transients. Provide a "Battery Charger Fail" dry contact to be connected to generator control panel.
  - f. Charger temperature compensation. The charger shall provide temperature compensation of  $-2\text{ mv}/^{\circ}\text{C}$  per cell over the ambient temperature of  $-40^{\circ}\text{C}$  up to  $60^{\circ}\text{C}$ . This shall automatically adjust the "float" and "equalize" voltage settings to prevent the batteries from overcharging at high temperature and under charging at low ambient temperatures.
  - g. DC voltage regulation  $\pm 1\%$  from no load to full load and over AC input line variations of  $\pm 10\%$ .
  - h. Current limiting. Current limiting circuitry shall be provided to prevent damage to the charger from being overloaded at low battery voltage such as occurs during short circuit conditions or during engine starter cranking.
  - i. Automatic "high rate" constant current charge circuit with automatic switchover to a lower "equalize" constant voltage charging rate and finally to a "float" charging rate. When the batteries has lost charge and AC power is applied to the charger input, the charger shall operate in the "high rate" constant current mode until the batteries voltage rises to the preset "equalize" level. At the preset "equalize" level, the charger shall switch to the "equalize" constant voltage mode until the current required to maintain this voltage drops to 50% of the charger's high rate current. The charger shall now switch to the lower constant voltage "float" mode (fully charged batteries). The charger shall continue to operate in this mode until AC input power is lost or the current required to maintain the batteries at float voltage setting exceeds a preset amperage.
  - j. Receptacle powering battery charger shall be provided with a faceplate engraved or stamped with the panelboard and circuit number it is fed from.
  - k. The battery charger shall be powered from 120 VAC.
8. Noise Reducing Weatherproof Housing: This enclosure shall house the engine, generator, control & instrument panel, battery charger, generator breaker, and all accessories. (where shown)

- a. The enclosure shall have galvanized steel or aluminum construction, painted inside and out with two (2) coats each of rust inhibiting primer and two (2) coats of exterior rated enamel. Color to be standard color as normally supplied by generator manufacturer. The side and rear panels shall be removable for easy servicing.
- b. Provide urethane foam coating on interior of housing, double wall construction, or equal sound attenuating treatment.
- c. All panels shall have lockable latches to prevent tampering and unauthorized entry.
- d. Sound attenuating louvers and/or intake and exhaust silencers shall be provided at generator and radiator ends to control noise levels. Louvers shall prevent any water entrainment into intake air during generator operation. Water shall be prevented from entering the enclosure at all times. Devices shall be sized to provide ample air flow to insure proper cooling, without having to remove side panels. The specified exhaust silencer shall be mounted in or on the roof of the enclosure with vibration isolators.
- e. Pressure drops through the enclosure shall not exceed limits set by the manufacturer of the diesel-driven standby electric generator.
- f. The enclosure shall be free standing, attached to unit or resting on the concrete pad supporting the engine generator.
- g. The engine exhaust silencer shall be attached to the enclosure and exhaust out of the top of enclosure.
- h. The enclosure including exhaust system shall be designed so that sound levels measured at 25 feet from any face of the enclosure, 3 feet above ground level, shall not exceed dB(A) listed in Appendix "A" when the engine generator is running with no load and full load at full speed.
- i. Provide screenings on intake and exhaust to prevent rodent intrusion into generator. Generator supplier is responsible for examining all Contract drawings for falling debris prior to submitting on vertical intake or exhaust systems.

9. Circuit Breaker

- a. A resettable line current sensing safeguard thermal-magnetic circuit breakers with inverse time versus current response shall be provided mounted to the engine/generator unit. This breaker shall have adjustable long time, short time instantaneous and ground fault (LSIG) settings when shown to allow selective tripping of downstream fuses or circuit breakers under a fault condition. "TM" indicates a non-adjustable thermal magnetic circuit breaker.
- b. This breaker shall protect the generator from damage that could occur due to the generator's own high current capability. This breaker shall not automatically reset preventing restoration of voltage if maintenance is being performed. The breaker size shall be three-pole with interrupt KAIC and amps rating (maximum size listed in Appendix "A") to match the rating of the wiring and automatic transfer switch.

- c. Circuit breaker shall have copper lugs. Circuit breakers shall located at maximum 5 feet above platform after installation on vibration isolators and sub-base fuel tank.
- 10. Receptacles
  - a. Install receptacles for Generator supplier provided block heater, battery charger, etc. when a receptacle is required.
  - b. 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 stainless steel. General purpose receptacles shall be Bryant, Hubbell, or approved equal.
  - c. Provide engraving or stamping as specified herein.
- B. Generator Load Center
  - 1. A maximum of two (2) load carrying 120/240V circuits will be provided to generator for shore power. Generator requiring more than two (2) load carrying circuits shall be provided with a generator mounted panelboard (and panelboard transformer if necessary) consolidating the shore power circuits at no additional cost to City.
  - 2. Where listed in Appendix "B", provide panelboard(s) and transformer mounted to generator skid for power distribution to generator equipment. Load center system minimum size shall be per Appendix "B".
  - 3. Panelboard and panelboard transformer shall be provided Electrical Section. Panelboard shall be provided with local disconnect main breaker.
  - 4. Coordinate with Electrical Contractor to provide larger wire, conduit, breakers, etc. to accommodate load center, at no additional cost to City.
  - 5. Load center shall feed the following minimum equipment:
    - a. Generator Block Heater
    - b. Battery Charger
    - c. 20A GFI receptacle
    - d. Two each (minimum) 3000k LED lights; locate light switches near main access panels

## **202- 3 EXECUTION**

### **202-3.01 GENERAL**

- A. The diesel generator shall not be delivered to the job site until the certified factory test report as specified under testing has been reviewed and accepted by the City. Missing or non-reviewed certified factory test report shall be sufficient cause for the unit to be rejected.
- B. The City reserves the right at any time to reject any equipment that is not in conformance with design specifications and drawings.
- C. Rejected equipment shall be immediately removed from the delivery jobsite by the Contractor.

### **202-3.02 CONSTRUCTION METHODS**

- A. The construction methods specified herein shall be followed by the manufacturer of the diesel generator. If the manufacturer fails to comply then the Contractor shall pay all costs required to make the changes to the equipment to conform with these construction methods.
- B. Screw-type, solderless terminals or lugs shall be provided for connecting all external line & load power cables, control and instrument wiring. All connections shall be accessible from the front without removal of internal components.
- C. A terminal strip shall be provided for terminating all control and instrument wiring. Number all terminals with machine printed lettering matching the wire number of the terminated wire. Numbered terminal blocks shall be installed for landing all field wiring.
- D. All control and instrument wiring shall have permanent identification at each point of connection. Wire identification shall be by machine printed numbered wiring sleeves. Electrically common wires shall have the same wire number. Electrically different wiring shall have unique wire numbers.
- E. Control and instrument wiring shall be neatly bundled and secured in place by plastic cable ties. Wiring shall be protected with plastic spiral wrap where it is subject to mechanical damage or crosses over to a hinged door.
- F. Workmanship: The equipment and any accessories shall be a product of good workmanship and shall be free from any defects that will affect their appearance or serviceability.
- G. Ground generator neutral per generator manufacturer's installation instruction since this is a 3 wire distribution system.

### **202-3.03 FACTORY INSPECTION AND TESTS**

- A. Factory Inspection: Prior to delivery to the City, the Contractor shall notify and give the City/Engineer the opportunity to inspect and witness each factory test of the completed diesel generator assembly at the factory location. A written notice shall be given to the City seven (7) days prior to the date for the factory test. City/Engineer costs to attend factory inspection and test will be paid by the City, if the City elects to attend. The diesel generators shall not be shipped from the supplier to the City without acceptance of factory test report and written authorization from the City/Engineer.
- B. Factory Tests: Each diesel generator to be supplied shall be tested by the manufacturer prior to shipment. All tests shall be made with all accessories installed. The factory tests shall be made under varying loads for a minimum of four hours total. The factory testing shall include the following tests:
  - 1. Single step load pickup.
  - 2. Transient and steady state governing.
  - 3. Safety shutdown device testing.
  - 4. Voltage regulation.
  - 5. Rated power.

6. Maximum power.
  7. Test all generator control panel alarms and status lights & indicators.
  8. Test all status and alarm points' contacts for remote monitoring utilizing ohmmeter.
  9. Simulate remote ATS start/stop of generator utilizing jumper.
- C. A typewritten factory test report shall be provided which lists the factory tests performed, results of the each test, name & phone number of person who performed the tests, date(s) of when tests were performed, serial & part number of equipment tested, all adjustment or setting values, and failures encountered & repairs made during testing. This factory test report shall be certified by a Public Notary as to its authenticity and accuracy. A Factory Test Report, as shown on sheet TFG1 in Appendix "B," shall be completed and submitted to the City for review and approval prior to shipment of generator to the job site.

#### **202-3.04 INSTALLATION**

- A. Battery Mounting: Mount batteries on steel battery rack attached to generator skid in a clean, dry location protected from falling hazards, but accessible to permit ease of inspection of electrolyte level. Provide and install a 2-pole padlockable-knife switch adjacent to batteries that will disconnect both the positive and negative leads of the batteries that feed all the generator circuits.
- B. Install condensation drain in exhaust piping and weather hood at end of exhaust for each engine generator.
- C. Equip all fuel lines with manual and automatic shutoff valves.
- D. Mount engine, generator and radiator on a common structural steel sub-base capable of maintaining unit alignment suitable for mounting unit on a concrete foundation. Equip with vibration isolators between generator set and sub-base.
- E. Mount generator breaker, battery charger, batteries, heater and control panel to generator set unit.
- F. Install all drain lines and valves for access without removal of any equipment.

#### **202-3.05 FIELD TESTS**

- A. The Contractor shall take all precautions necessary to ensure the safety of all personnel during the tests. Absolutely no tests shall be ran that could potentially cause injury or jeopardize personnel safety.
- B. Submit test procedures per Section 201 "Electrical" for approval two (2) weeks (minimum) prior to start of field tests.
- C. Fuel System Testing prior to being placed in service – Fuel tank and associated piping shall be field tested prior to being placed in service if required by local jurisdiction or code. Provide Initial Testing and Tightness Testing per NFPA 30.
- D. The initial setup of each diesel generator shall be performed by a factory-trained service person of the manufacturer's local representative. The factory-trained service person shall furnish and fill the engine fuel, lubricants, and cooling system. The factory-trained service person shall make all preliminary tests and checks

required before engine start-up the day prior to witness field testing. Portable load bank shall be set-up the day before the start of each generator load bank testing.

- E. The Contractor shall be responsible and pay the costs for the necessary fuel to fill each diesel generator tank prior to the start of the field tests. This fuel shall be No. 2 Diesel fuel with a fuel conditioner, FirePrep 1000 (available from Pacific Detroit Diesel Allison Inc.) or as recommended by the manufacturer. Contractor shall fill each generator fuel tank, at the end of each test, and after all tests have been accepted at no additional cost to the City. Contractor shall fill all fuel tanks prior to final acceptance.
- F. The Contractor shall pay for a factory-trained service representative to perform one (1) 8-hour day (minimum) of field tests for each generator, beginning at 8:00 a.m. any weekday, except Monday and Friday.
- G. Each failure mode, alarm, and control function shall be demonstrated to City by the Contractor's factory-trained service representative prior to performing any other field tests.
- H. The following Generator Field Checklist shall be filled out by the generator factory-trained service representative and given to the City at the end of the field tests. Each item on the "Generator Field Test Checklist" sheet in Appendix "C" shall be marked with a check (✓) or "N/A" (not-applicable).
- I. A resistive load shall be applied for a four (4) hour, full-load test for each generator.
  - 1. The load bank is to provide a load equal to 100 percent of the generator nameplate kW. The full-load test shall be initiated immediately upon reaching rated rpm, pickup percent of nameplate kW rating on one step, less applicable derating factors for site conditions.
  - 2. Portable load bank shall be connected to generator main breaker and not to load bank breaker that is intended only to exercise the generator.
  - 3. Generator supplier shall provide load bank during test. Unity power factor is acceptable for on-site testing, provided that rated load tests at rated power factor have been performed by the manufacturer of the generator at factory test prior to shipment. The factory-trained service person shall be responsible for running the diesel generator during these load tests.
  - 4. Any defects or failures discovered during these tests shall be corrected or adjusted by the factory-trained service person. The engine generator load test shall be restarted after each repair or adjustment that required shutdown of the diesel generator as many times as necessary until the complete diesel generator runs without shutdown or failure for four (4) continuous hours. After the four hour full load test is completed, the City will start and stop the loads during the tests to simulate normal operating conditions.
- J. All field tests shall be witnessed by City.
- K. Generator voltage shall adjusted to be left to match incoming Utility voltage.
- L. Record the data listed on Field Generator Report Test Form TFG2 in Appendix "B" at first load acceptance and every 15 minutes thereafter until the completion of the four hour test period.

### **202-3.06 TRAINING**

- A. The local representative's factory-trained service person shall instruct up to six of the City's personnel in the proper operating and maintenance procedures for all components of the diesel generator. This instruction shall be given for a minimum length of six (6) hours for each generator and on a date acceptable to the City's schedule. Two (2) hours of the training shall cover "operation" and four (4) hours of the training shall cover "maintenance". Training shall not be given until the City has received and approved the operation and maintenance manuals and field tests have been completed.

### **202-3.07 SPARE PARTS**

- A. The Contractor shall supply sufficient spare parts to support the diesel generator throughout the warranty period.
- B. The following spare parts shall be provided to the City for each generator:
  - 1. 10 each of each type and size of fuse.
  - 2. 2 sets of all fuel, lube oil and coolant filters.
  - 3. 2 each indicating lights for each type of light.
  - 4. 8 oz of touch up paint for each color of housing.
- C. Spare parts shall be packaged for safe shipping and storage and clearly labeled with part name & number.

### **202-3.08 WARRANTY**

- A. The Contractor shall have a staff of experienced personnel available to provide service on two (2) working days' notice during the warranty period. Such personnel shall be capable of fully testing and diagnosing the equipment delivered; and of implementing corrective measures.
- B. If the Contractor fails to respond in two (2) working days, the City at its option will proceed to have the warranty work completed by other resources; the total cost for these other resources shall be reimbursed in full by the Contractor. The use of other resources, as stated above, shall not change or relieve the Contractor from fulfilling the remainder of the warranty requirements.
- C. Prior to final acceptance, the Contractor shall furnish to the City a listing of warranty information for all manufacturers of materials and equipment supplied under the scope of work covered in these design documents. 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. Warranty expiration date.

- D. Hardware support:
1. The Contractor shall warrant all equipment 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.
  2. The Contractor shall provide all labor and material to replace or repair any hardware that fails during the warranty period, at no additional cost to the City.
  3. Free technical phone support on equipment for a period of one year. Support shall be provided directly from the manufacturer. Phone support shall be available between 8 a.m. and 5 p.m. Monday through Friday.
  4. Each time the Contractor'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. The City reserves the right at its sole discretion to deny operations requested by the Contractor.

#### **202-3.09 FINAL ACCEPTANCE**

- A. Final acceptance will be given by the City after the equipment has been field tested satisfactorily, each deficiency has been corrected, documentation has been provided, and all the requirements of design documents have been fulfilled.
- B. Generator is successfully permitted by all local air resource authorities.
- C. All Fuel tanks have been refilled.
- D. At the end of the project, following the completion of the field tests, and prior to final acceptance, the Contractor shall provide the following to the City:
  1. Each "operation, maintenance and parts" manual shall be modified or supplemented by the Contractor to reflect all field changes and as-built conditions.
  2. Manufacturer's field representative shall furnish a letter of compliance for the engine generator:
    3. Has been properly installed and lubricated.
    4. Is in accurate alignment and all leaks fixed.
    5. Has been operated satisfactorily under full-load conditions and all tests have been completed.
    6. Personnel trained in all operations.
    7. Electrical system is completely corrected and properly functioning.
    8. Ready for City's usage as a standby generator.
    9. Generator unit cleaned and touchup painted.
    10. Two sets of keys for all locks turned over to City.
    11. Punch list items have been corrected.

12. Warranty information provided.
13. O&M manuals completed.
14. Electronic documentation given to City.

## **202- 4 PAYMENT**

### **202-4.01 BACKUP GENERATOR**

- A. **Diesel Generator Set** shall be paid for at the contract **lump sum** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing, testing, and starting up a diesel generator with a sub-base fuel tank and sound enclosure, complete in place and operating as shown on the plans, and as specified in these Special Provisions, and as directed by the Engineer, including, but not limited to placement of the tank on the new concrete slab, anchoring, permits, and all other related items, complete and in place, and no additional allowance will be made therefor.

**SECTION 202 - APPENDIX "A"**  
**GENERATOR DATA FORM**

# GENERATOR DATA FORM - SLS-10

Description	Specification Minimum	Submitted Value	Units
<b>GENERATOR</b>			
Generator Continuous Output Power	40		KW
	50		KVA
Amperage	120		AMPS
Three Phase Voltage	240		VAC
Power Frequency	60		Hz
Motor Starting (max. 35% voltage dip)	194		KVA
Maximum Step Voltage Dip	15		%
<b>BREAKERS &amp; LOAD BANK</b>			
Generator Main Breaker Rating	100		Amps
Generator Main Breaker Type	TM		-
Generator Main Breaker Interrupt Rating	50		KAIC
<b>ENGINE</b>			
Horsepower at Rated RPM	64		HP
Rated RPM	1800		RPM
HP Rating	1.60		HP/KW
Displacement	177		Cubic In.
Fuel Type	No. 2 Diesel		-
Engine Type	Turbo		-
<b>ENGINE ELECTRICAL SYSTEM</b>			
Starter/Battery/Voltage	12		VDC
Cold Cranking Current	640		A
Alternator Output	55		A
Battery Charger Output	12		A
<b>ENGINE BLOCK HEATER</b>			
Size	1000		W
Phase	1		ø
Voltage	120		VAC
<b>FUEL TANK</b>			
Capacity (Minimum)	137		Gallons
Fuel Tank Type	Sub-Base		-
Fuel Consumption at 100% Load	3.2		Gal/Hr
Runtime at 100% Load	42.8		Hr

## **SECTION 202 - APPENDIX "B"**

### **GENERATOR TEST FORMS**

Index:

TFG1 Factory Generator Test Report

TFG2 Field Generator Test Report

# FACTORY GENERATOR TEST REPORT

## TEST FORM 1 (TFG1)

JOB # _____	ENG MODEL: _____	S/N: _____
SERIAL# _____	GEN MODEL: _____	S/N: _____
MODEL # _____	VOLT REG MODEL: _____	S/N: _____
KW: _____ KVA: _____ Hz: _____	ELECT GOV CONT P/N: _____	S/N: _____
VOLTS: _____ PH: _____	ELECT GOV ACT P/N: _____	S/N: _____
AC CONNECT: _____	CONTROL MODULE/SPEED SWITCH #: _____	

### PRELOAD CHECKS

<input type="checkbox"/> CRANK CUT-OUT	<u>CKD</u>	<u>N/A</u>	
<input type="checkbox"/> OVERSPEED SET 67HZ <span style="float: right;"><input type="checkbox"/> LIGHT</span>	<input type="checkbox"/>	<input type="checkbox"/>	GENERATOR RUN LIGHT
<input type="checkbox"/> HI WATER TEMP SHUTDOWN <span style="float: right;"><input type="checkbox"/> LIGHT</span>	<input type="checkbox"/>	<input type="checkbox"/>	PANEL LIGHT
<input type="checkbox"/> LO OIL PRESSURE SHUTDOWN <span style="float: right;"><input type="checkbox"/> LIGHT</span>	<input type="checkbox"/>	<input type="checkbox"/>	LAMP TEST SWITCH
OIL PRESSURE SHUTDOWN DELAY @ _____ SEC	<input type="checkbox"/>	<input type="checkbox"/>	ALARM HORN & SILENCE SW.
CRANK @ _____ CYCLES ON _____ SEC, OFF _____ SEC	<input type="checkbox"/>	<input type="checkbox"/>	SWITCH NOT IN AUTO LIGHT
MAG P/U VOLTS: _____ DC VOLTS: _____	<input type="checkbox"/>	<input type="checkbox"/>	EMERGENCY STOP PB
<b>VOLTAGE CHECKS</b>	<input type="checkbox"/>	<input type="checkbox"/>	PRE LOW OIL PRESSURE LIGHT
L1 TO L2: _____ L1 TO N: _____	<input type="checkbox"/>	<input type="checkbox"/>	PRE HIGH WATER TEMP LIGHT
L2 TO L3: _____ L2 TO N: _____	<input type="checkbox"/>	<input type="checkbox"/>	LOW COOLANT LEVEL CONTACT
L3 TO L1: _____ L3 TO N: _____	<input type="checkbox"/>	<input type="checkbox"/>	LOW FUEL LEVEL CONTACT
VOLT ADJUST MIN @ _____ MAX @ _____	<input type="checkbox"/>	<input type="checkbox"/>	TACH CALIBRATE
1 STEP LOAD PICK-UP _____ AMPS @ _____ PF	<input type="checkbox"/>	<input type="checkbox"/>	BLOCK HEATER
	<input type="checkbox"/>	<input type="checkbox"/>	REMOTE START CONTACTS
	<input type="checkbox"/>	<input type="checkbox"/>	LOW COOLANT TEMP

### LOAD TEST @ 1.0 POWER FACTOR

TIME HRS	% LOAD	VOLTS Ø B	AMPS Ø B	HZ	KW	AMB °F	WATER °F	OIL PSI	ENGR HRS
WARM UP	0								
0.1	25								
0.1	50								
0.2	75								
0.2	100								
0.2	100								
0.2	MAX								

COMMENTS:

TESTED BY : \_\_\_\_\_ PHONE: \_\_\_\_\_ DATE : \_\_\_/\_\_\_/\_\_\_

CERTIFIED BY : \_\_\_\_\_ PHONE: \_\_\_\_\_ DATE : \_\_\_/\_\_\_/\_\_\_



## **SECTION 202 - APPENDIX "C"**

### **GENERATOR FIELD TESTS**

### **CHECKLIST**

**The Following (minimum) Installation Checks Must Be Made by Service Representative Before Start-Up in addition to those recommended by Generator manufacturer:**

**NOTE: This form is to be used as a general guide, follow the manual supplied with generator along with reference to any applicable codes or standards. Ultimate compliance must be with applicable generator manual and codes and standards.**

- 1. Emergency Stop pushbutton located 5' (maximum) above finished floor?
- 2. Battery-powered emergency lighting installed in equipment room?
- 3. Adequate clearance on all sides to allow ease of maintenance?
- 4. Proper construction and leveling of mounting bases?
- 5. Adequate heating for equipment room?
- 6. Adequate incoming and outgoing air (louver motors adjusted and of proper voltage)?
- 7. Radiator duct flange properly sized and connected?
- 8. Cooling system properly filled?
- 9. Proper level of specified oil in crankcase?
- 10. Adequate/dedicated fuel supply?
- 11. Flexible sections installed in cooling water lines?
- 12. Manually-operable fuel and cooling water valves installed, allowing manual operation of, or bypass of solenoid valves, when used?
- 13. Flexible fuel lines installed between engine and fuel piping?
- 14. Fuel tanks and piping installed in accordance with applicable codes and standards?
- 15. Adequate fuel transfer tank pump lift and pump motor properly wired?
- 16. Proper size exhaust line and flexible connector(s)? Flexible connector(s) should not be bent.
- 17. Exhaust line condensate trap with drain installed?

- 18. Exhaust line installed with proper downward outgoing incline?
- 19. Proper-specified muffler installed with hangers and mounts tight?
- 20. Exhaust line free of excessive bends and restrictions? Back pressure under specified limit?
- 21. Exhaust line protected from entry by rain, snow, and animals?
- 22. Approved heat-isolating thimble(s) installed at points where exhaust line passes through combustible wall(s) or partition(s)?
- 23. Exhaust system termination located to prevent entry of exhaust gases into structures?
- 24. Battery(ies) of proper size and voltage?
- 25. Battery(ies) filled with electrolyte and properly connected to charger?
- 26. Battery charger AC circuit properly connected and charger operational?
- 27. Battery(ies) properly mounted with adequate ventilation?
- 28. Starting cables of proper length and gauge?
- 29. Battery isolation disconnect knife switch installed?
- 30. Starting cables properly connected to battery(ies)?
- 31. Generator load conductors of proper ampacity, and properly connected to circuit breakers, and/or emergency side of transfer switch?
- 32. Load conductors, engine start leads, battery and heater power source leads installed in separate conduits?
- 33. Nameplate voltage and frequency of both generator set and transfer switch matching normal/utility source ratings?
- 34. Transfer switch AC conductors properly connected (Normal to NL1, NL2, NL3; Emergency to EL1, EL2, EL3; Load to LL1, LL2 and LL3)?
- 35. Transfer switch switching mechanism free from binding? NOTE: Disconnect all AC sources, and operate manually to check.
- 36. All other wiring, including customer added options, connected properly?
- 37. Equipment room clean with all material not related to Generator Supply System operation removed?

\_\_\_ 38. Earthquake rated anchoring adequate for equipment and support systems?

Tested by: \_\_\_\_\_

Witnessed by: \_\_\_\_\_

Date of Test: \_\_\_\_\_

**END OF SECTION 202**

**\*\*END OF SECTION 202\*\***

# **SECTION 203**

## **ELECTRICAL SYSTEM ANALYSIS**

### **203- 1 GENERAL**

#### **203-1.01 Scope Of Work**

- A. Provide the following submittals, per Section 16010, for the entire electrical power system at both Country Manor SLS and Spring Lake SLS, including the 208/120V distribution system:
  - 1. Short Circuit Study
  - 2. Protective Device Coordination Study
  - 3. Arc Flash Study
- B. Electrical System Studies shall be prepared, stamped and signed by a professional Electrical Engineer registered in the State of California and in accordance with IEEE 242, IEEE 399, ANSI/IEEE C37.13 and IEEE 519.
- C. Exceptions / Clarifications
  - 1. Itemize all exceptions and clarifications to the Contract Documents in a letter (located in the front of the submittal) on Owner letterhead.
  - 2. Exceptions that are noted in the study, but not listed on the Exceptions/Clarifications letter, will be considered as non-responsive and not accepted as changes to the Contract Documents.
  - 3. All exceptions taken from the Drawings and specifications shall be documented with justifications. When noting the exception, list which Drawings or which Specification Subsection number the exception is taken.
  - 4. Clarification requests shall list which Drawing or Specification Subsection number the clarification is required for.
- D. Provide two (2) DVDs at the completion of the project. One DVD will contain the as-built set of studies, reports, settings, etc. The other DVD will contain the original source format of input data used for the PC based computer software, including all SKM files used to create the studies. Provide all setup information used for the computer based study and report.
- E. For each resubmittal, provide a copy of submittal comments and a separate letter, on Owner letterhead, identifying how each submittal comment has been addressed in the resubmittal.
- F. When submittals are provided in PDF format, utilize the "Bookmark" feature of the Adobe Acrobat and clearly bookmark locations in the report to locations identified in the Report's Table of Contents. Bookmarks shall not be out of order; the English description shall match that listed in the Report's Table of Contents.

#### **203-1.02 Sequencing And Scheduling**

- A. It is the responsibility of those performing the electrical system analysis to collect and field verify all data. This includes verifying existing electrical distribution and obtaining all data from the Utility Owner and Vendors necessary for completing the requested studies.
  - 1. Utilize proposed load data for the Studies obtained from submittals, Utility Owner, Generator manufacturers, field verifications, etc.
  - 2. Include copy correspondence with Utility showing fault data used in report.
  - 3. Include copy correspondence with Generator supplier showing generator data used in report.

- B. A complete Protective Device Coordination Study shall be submitted within 60 days after approval of Short Circuit Study.
- C. At the completion of the project, all studies shall be resubmitted with all calculations rerun, data and graphs updated to reflect as-left conditions. Provide new Arc Flash labels to reflect as-constructed equipment and as-left circuit breaker settings.
- D. When previous electrical system analysis studies are available and provided to the Contractor, it is the Contractor's responsibility to verify the accuracy of the data used and to update it to match existing conditions. Contractor shall assume that electrical system analysis studies are not available.

## **203- 2 MATERIALS**

### **203-2.01 General**

- A. Equipment and component titles and numbers used in the Studies shall be identical to the equipment and component titles and numbers shown on the Drawings.
- B. Perform Studies using PC based computer software. State program name and version (e.g. version 2.1) in report.
- C. Perform complete fault calculations for Utility and generator sources. Equipment shall not be grouped as a single large load; they shall be treated as individual loads. When generators are incorporated into the system, develop two separate networks: one with utility only (no generator attached) and one with generator only (no utility attached)
- D. Complete protective device coordination study listing all device settings shall be utilized during start-up of electrical equipment.
- E. Provide unique page numbers for every sheet in all Studies. Unique page numbers to be manually placed by Study Owner after printout if study report doesn't assign page numbers.
- F. One line diagrams
  - 1. Shall be readable on 11" x 17" paper. One-line diagrams shall be redrawn in AutoCAD on multiple sheets if necessary or as requested by Owner.
  - 2. Buses and branches shall have descriptive names matching one line diagram or existing system (i.e. not Bus-0084).
  - 3. Automatic transfer switches (ATSs), Main Switchboards (MSBs), shall not have multiple node buses.
  - 4. Primary and secondary for transformers, Variable Frequency Drives (VFDs), etc. shall be changed to node buses.
- G. Multiple scenarios for the short circuit and arc flash reports shall be provided.
  - 1. Maximum available fault current from utility transformer.
  - 2. Generator (when shown) with all motors contributing.
  - 3. Do not combine networks when multiple sites are modeled.
  - 4. All studies shall be repeated with the arc flash reduction switch enabled (where applicable).

### **203-2.02 Short Circuit Study**

- A. Include the following in the short circuit study:
  - 1. Cable impedances based on copper conductors.
  - 2. Bus impedances based on copper bus bars.
  - 3. Transformer impedances based on tolerances specified in ANSI C57.12.00.

4. Source data (i.e. cable lengths, sizes, and quantity, for all runs in study, listing of bus loads, etc.).
  5. Utility data:
    - a. Size of Utility transformer.
    - b. Impedance of Utility transformer.
    - c. Primary voltage of Utility transformer.
    - d. Fault information on primary side of Utility transformer:
      - 1) Three phase bolted fault.
      - 2) X/R ratio (positive sequence).
      - 3) Line to ground fault.
      - 4) X/R ratio (zero sequence).
    - e. Protective relays (type & settings).
  6. Voltage drop and current flow at each node and load in system.
- B. Calculate Short Circuit interrupting duties for an assumed three-phase bolted fault and line-to-ground fault at each of the following locations:
1. Power transformer's primary
  2. Main Switchboard.
  3. All Motor Control Centers (MCCs).
  4. All panelboards.
  5. All 480V, 3-phase motor and equipment loads.
  6. All 3-phase transformer secondaries.
  7. All 240/208V equipment.
- C. Verify:
1. Equipment and protective devices are applied within their ratings.
  2. Adequacy of switchboard, panelboard and MCC bus bars to withstand Short Circuit stresses.
  3. Adequacy of transformer windings to withstand Short Circuit stresses and over-current.
  4. Cable sizes for ability to withstand normal and fault load currents.
- D. Provide the following in the Short Circuit study report:
1. Calculation methods and assumptions.
  2. Input data.
  3. Short circuit data.
    - a. Impedances.
    - b. X to R ratios.
    - c. Asymmetry factors.
    - d. Motor contributions.
    - e. Short Circuit kVA.
    - f. Symmetrical and asymmetrical line-to-line and line-to-ground fault currents.

- g. Device evaluation including rating of equipment.
  - h. Bus evaluation including rating of equipment.
  - i. Source data, from Electric Utility Owner. Include copy of correspondence with Utility Owner indicating values used.
  - j. Source data from Generator Supplier (where applicable). Include copy of Generator provided values used.
- 4. Tabulations of calculated quantities.
  - 5. Results, conclusions and recommendations.
  - 6. One line diagrams of distribution system.
  - 7. Impedance diagram showing the resistances and reactances for all cables of the distribution system.

### **203-2.03 Protective Device Coordination Study**

- A. Provide Protective Device Coordination drawings for each section of distribution system that includes the following:
  - 1. Graphically diagram displaying coordination time-current curves on conventional log-log curve sheets. Each time-current curve shall have a unique identifier label. This identifier shall be used in the tabulated settings spreadsheet and on the associated one-line diagram.
  - 2. Time-current curves shall include the following curves (minimum):
    - a. Utility relays (phase & ground) and high voltage switchgear relays (phase and ground).
    - b. All upstream protective devices and breakers.
    - c. All mechanical overloads.
    - d. All MCP breaker and associated motor or equipment load. Duplicates of the same sized protective device and motor size may be omitted (i.e., when there are 3 pumps for same application).
    - e. All transformers and associated primary and secondary protection.
    - f. Unique identifier for each protective device.
    - g. Provide separate TCC for phase and ground curves.
    - h. TCC for Ground curves shall include the transformer magnetizing inrush currents for all transformers downstream of the circuit breaker. Ground shall clear the inrush currents.
  - 3. One-line diagram that applies to specific portion of distribution system associated with time-current curves. One-line diagram shall include the following:
    - a. Location of each device.
    - b. Power and voltage ratings, primary and secondary transformers amperages.
    - c. All significant circuit elements such as transformers, cables, breakers, fuses, relays, etc. with their corresponding amperage ratings.
    - d. Tag of each branch and node (shall be the same tags used in short circuit study).
    - e. Mechanical overload and contactor.
    - f. English description, equipment name, HP, and full load amp rating of motors and other 3 phase loads.



4. Do not include the motor contribution of motors fed by VFDs in the arc flash hazard study.
- B. Safe working distances shall be specified for calculated fault locations based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm<sup>2</sup>.
- C. Study shall include the following:
1. All significant locations in 480 volt, 240 volt and 208 volt systems fed from transformers equal to or greater than 125 kVA.
  2. Incident energy and flash protection boundary calculations in spreadsheet format in the Arc Flash Hazard study report.
  3. Provide the following incident energy and flash protection boundary calculations in spreadsheet format in the Arc Flash Hazard study report (values shall be calculated for all electrical equipment in the power distribution system):
    - a. Arcing fault magnitude
    - b. Device clearing time
    - c. Duration of arc
    - d. Boundary for:
      - 1) Arc flash limited shock approach
      - 2) Limited shock approach
      - 3) Restricted shock approach
    - e. Working distance
    - f. Incident energy at 18 inches (in cal/sq.-cm)
    - g. Recommendations for arc flash energy reduction for each location having more than 8 cal/sq.-cm. Provide preliminary cost estimate for implementing recommendations.
    - h. Provide separate spreadsheets for all scenarios listed in subsection 2.01.G. Do not combine the spreadsheet values nor only provide the worst case scenario. Clearly list on each spreadsheet the English description of the Scenario presented.
  4. Provide recommendations for the Personal Protective Equipment (PPE) that the Owner should maintain on site for the level of hazard.
  5. Provide recommendations for safety label design that should be posted on electrical equipment.

### **203-2.05 Study Reports**

- A. Written reports submitted for approval shall contain:
1. Scope of Studies performed.
  2. Explanation of bus and branch numbering system.
  3. Report calculations, tabulations and spreadsheets.
  4. Selected equipment deficiencies.
  5. Results of Studies.
  6. Comments, recommendations or suggestions regarding:
    - a. Changes and additions to equipment rating and/or characteristics.

- b. Circuit protective devices improperly rated for overload or fault conditions.
  - c. Arc Flash protective equipment and safety labels.
7. Tabulation spreadsheet for all protective device settings with the following column entries (minimum):

Device Code	Description	MFR	Type	Plug Trip	Frame	KAIC	Long Time		Short Time		Inst	Ground	
							Amps	Time	Amps	Time	Amps	Amps	Time

- B. Stamped, signed and dated by Electrical Engineer registered in the State of California who performed the analysis.
- C. Reports are to be updated to reflect as-built conditions and placed in O&M manual, per Section 201 requirements.

**203- 3 EXECUTION**

**203-3.01 General**

- A. Make minor modifications to equipment settings as required to accomplish conformance with the Short Circuit and Arc Flash Studies.
- B. Notify Engineer in writing of any required major equipment modifications.

**203-3.02 Field Tests**

- A. Provide field testing of protective equipment.
- B. Adjust relay and protective device settings according to values established by Coordination Study.

**203-3.03 Arc Flash Warning Labels**

- A. All Arc Flash warning labels shall meet NEC requirements, OSHA standards and NFPA recommendations.
- B. Provide and install 4 in. x 6 in. thermal transfer type labels of high adhesion polyester for each work location analyzed and as required by the NEC for flash protection on power distribution equipment.
- C. Each label shall have an orange header with the wording, "WARNING, ARC FLASH HAZARD," and shall include the following machine printed information:
  - 1. Location Designation
  - 2. Nominal system voltage
  - 3. Arc Flash boundary
  - 4. Available incident energy and working distance (in inches)
  - 5. Minimum arc rating of clothing
  - 6. Site specific level of PPE
  - 7. Engineering report number, revision number and issue date
  - 8. Contractor preparing report and contact phone number.
- D. Labels shall not be hand labeled.
- E. For all areas, Contractor shall post the following:
  - 1. Working distances

2. Shock hazard voltage
  3. Shock Approach Boundaries:
    - a. Limited
    - b. Restricted
- F. Provide Arc Flash labels for the each of the following pieces of equipment (including existing):
1. 480V and applicable 208V panelboards
  2. MCCs
  3. Switchboard
  4. Switchgears
  5. Control Panels
  6. All electrical equipment with an incident energy level greater than 1.2 Cal/cm<sup>2</sup>.
  7. Where Switchgear, Switchboard, MCC, Panelboard, Distribution Panel, etc. feed multiple circuit breakers from the enclosure, provide separate line and load side Arc Flash Labels for the Main Circuit Breaker.
  8. Provide separate labels at each circuit breaker that has arc flash reduction switches indicating the appropriate values when the switch is enabled.
- G. Labels shall be submitted for approval. No labels shall be installed without prior approval by Owner or Owner representative.

#### **203-3.04 ARC FLASH TRAINING**

- A. Electrical Engineer, who sealed the Electrical System Analysis, shall train Owner personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours). Arc Flash training shall not be performed by general or electrical contractor. Maintenance procedures shall be in accordance with the requirements of NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces and shall be provided in the equipment manuals.

#### **203- 4 PAYMENT**

- A. Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for the various contract items of work and no additional allowances will be made therefor.

**\*\*END OF SECTION 203\*\***

## **SECTION A FEES AND PERMITS**

All electrical service charges or fees that may be required by Pacific Gas and Electric Company (PG&E) will be paid for by an appropriate City department. The Contractor shall coordinate a pre-construction meeting with PG&E and the City. PG&E construction drawings for the new electrical service are included on the next page. The Contractor shall schedule and coordinate all PG&E work.

The City has obtained a permit from the City of Santa Rosa Water 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 Environmental Compliance Section is (707) 543-3369.

The Contractor shall obtain a permit from the State of California Division of Industrial Safety. Attention is directed to Sections 7.15 and 7.15 of these General Conditions.

Full compensation for securing, complying, and the cost of all permits shall be considered as included in the contract prices paid for the various items of work and no additional allowance will be made therefor.

**NOTES:**

09-18-18

REFER TO ELECTRIC & GAS SERVICE REQUIREMENTS (GREEN BOOK) OR SEPARATE PG&E STANDARD DRAWINGS. CONTACT YOUR PG&E REPRESENTATIVE FOR COPIES, OR ACCESS [www.pge.com/greenbook](http://www.pge.com/greenbook)

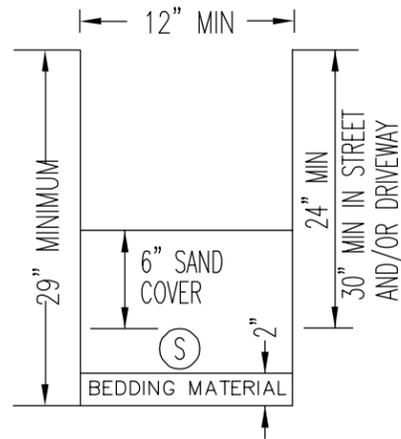
**CONDUIT, TRENCHING, AND BACKFILL:**

- 1) ALL DIMENSIONS AND LOCATIONS ARE ESTIMATED, APPROXIMATE AND MAY BE SUPERSEDED BY A JOINT TRENCH DRAWING. REFER TO THE JOINT TRENCH COMPOSITE DRAWING FOR EXACT TRENCH LOCATION
- 2) MAINTAIN MAXIMUM PRACTICABLE HORIZONTAL CLEARANCE BETWEEN PG&E FACILITIES AND "WET" UTILITIES (WATER, SEWER, STORM DRAIN, ETC.). THE MIN. ALLOWABLE SEPARATION BETWEEN PG&E FACILITIES AND ANY PARALLEL "WET" UTILITY IS 3/FT. WITH A PRESENCE OF 1/FT. OF UNDISTURBED EARTH OR THE INSTALLATION OF A SUITABLE BARRIER. THIS MEASUREMENT IS BETWEEN THE OUTER EDGE OF THE PG&E FACILITY AND THE OUTER EDGE OF THE PARALLEL "WET" FACILITY. IF 3/FT. CANNOT BE MAINTAINED, A FORMAL VARIANCE MUST BE OBTAINED FROM PG&E WORK WITH THE PG&E INSPECTOR (REFERENCE PG&E UO STANDARD S5453).
- 3) BOX, PAD, AND CONDUIT SIZES AND LOCATIONS SHALL CONFORM TO THE PG&E ELECTRIC CONSTRUCTION DRAWING.
- 4) PROVIDE LONG CONDUIT SWEEPS WHERE INDICATED. RECOMMENDED SWEEP RADIUS (10' OF RADIUS PER INCH OF CONDUIT DIAMETER) EXAMPLE: 4" CONDUIT = 40' RADIUS
- 5) DO NOT EXCEED 300 DEGREES OF BENDS IN ANY CONDUIT RUN (INCLUDING FEED LOCATION). NOTE: SECONDARY AND SERVICE RUNS OF 200 FEET OR LESS MAY HAVE UP TO 315 DEGREES OF BENDS (REFERENCE PG&E DOCUMENT 038193).
- 6) MANUFACTURED BENDS OR APPLICATION OF HEAT SHALL NOT BE USED TO OBTAIN LONG CONDUIT SWEEPS.
- 7) ALL CONDUITS SHALL BE PROVEN AND A POLYESTER PULLING TAPE INSTALLED.
- 8) MANUFACTURED BENDS ARE NOT TO BE CUT, SHORTENED, OR ALTERED IN ANY WAY.
- 9) IDENTIFY ENDS OF BURIED CONDUIT WITH AN ELECTRONIC MARKER AND A VERTICAL CONDUIT SCRAP INSTALLED FROM RIGID CAP TO GROUND LEVEL.
- 10) CONDUITS ENTERING PRIMARY BOXES SHALL BE AT A RIGHT ANGLE TO THE WINDOW OR WALL.
- 11) STUB CONDUITS AT RISER POLES IN QUADRANTS AS SHOWN. AT IDENTIFIED POLE LOCATIONS, THE TRENCHING AGENT IS TO EXCAVATE TO TRENCH DEPTH AND INSTALL A 30" DIAMETER CARDBOARD TUBE. THE RISER CONDUIT BEND IS TO BE PLACED OUTSIDE AND ADJACENT TO THE TUBE AT THE POLE QUADRANT INDICATED. BACKFILL AROUND AND INSIDE TUBE WITH CLEAN NATIVE FILL.
- 12) LS2 STREET LIGHT CONDUIT GOING TO PG&E BOXES OR PEDESTALS NOT DESIGNATED AS P.O.S. (INCLUDING TRANSFORMERS) WILL NOT BE ACCEPTED OR CONNECTED.
- 13) ONLY ONE LS2 STREET LIGHT (P.O.S.) CONNECTION PER BOX OR PEDESTAL.

**SAFETY AND WORKMANSHIP:**

- 14) CALL 811 (UNDERGROUND SERVICE ALERT) 48 HOURS PRIOR TO EXCAVATION FOR UNDERGROUND UTILITY LOCATION MARKING.
- 15) 48 HOUR NOTICE REQUIRED FOR UNDERGROUND INSPECTION.
- 16) MATERIALS AND WORKMANSHIP SHALL BE FIRST QUALITY IN EVERY RESPECT, PLUMB AND TRUE, AND ACCORDING TO THE SPECIFIC REQUIREMENTS OF THE DRAWINGS AND THE ABOVE APPLICABLE NOTES AND SPECIFICATIONS.
- 17) THE APPLICANT IS TO VERIFY ALL PROPOSED INSTALLATIONS, CONDITIONS & SPECIFICATIONS PRIOR TO COMMENCING WITH ANY PORTION OF WORK. ANY DISCREPANCIES, DELETIONS OR INCONSISTENCIES ARE TO BE REPORTED TO THE PG&E REPRESENTATIVE IMMEDIATELY. THE APPLICANT SHALL COMPLY WITH ALL APPLICABLE SPECIFICATIONS. ANY VARIATIONS FROM PLANS OR SPECIFICATIONS RELIEVES PG&E OF ALL RESPONSIBILITY FOR THE SUBSTRUCTURE OR DESIGN.

**TYPICAL ELECTRIC ONLY TRENCH**



FLEXIBLE STEEL MANDREL

ALL CONDUITS WILL BE PROVEN TO BE FREE OF DEFECTS BY SUCCESSFULLY PULLING A MANDREL THROUGH THE ENTIRE CONDUIT SYSTEM. APPLICANT WILL PROVIDE THE MANDREL, APPLICANT WILL PROVIDE LABOR AND TWO LENGTHS OF PULLING TAPE, WHICH WILL BE ATTACHED TO BOTH ENDS OF MANDREL. (PG&E CODE FOR PULLING TAPE-560154). GREENBOOK SECTION 3.4.1

**INSTALL**

xx'/xx'/xx'

sv

✕

✕

✕

✕

**REMOVE**

✕

✕

✕

✕

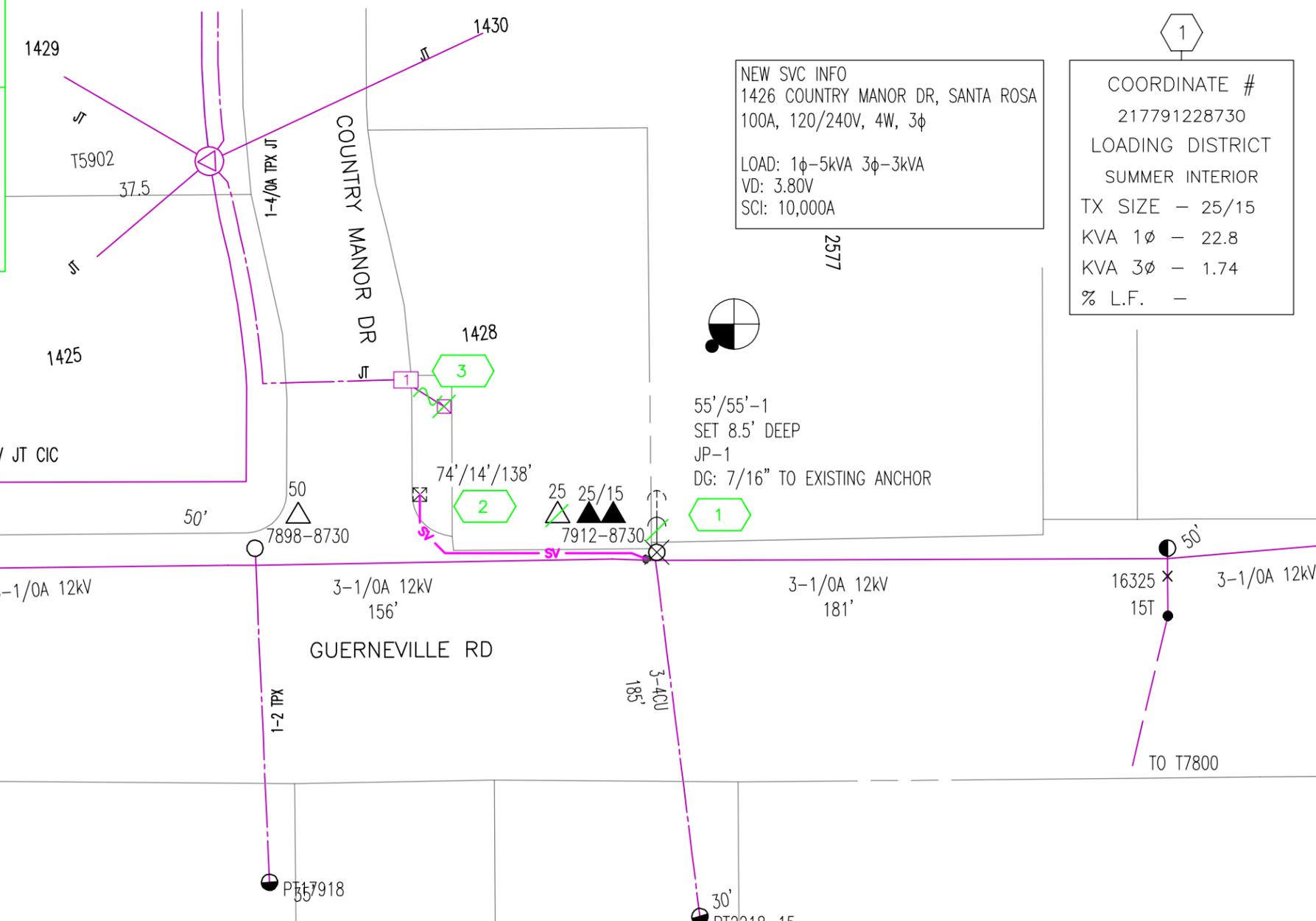
✕

**DESCRIPTION**

FRANCHISE - 3RD PARTY CONDUIT/  
PRIVATE PROPERTY/ TOTAL CABLE LENGTH  
1-1/0A QPX SVC IN NEW 3" DUCT BY APPLICANT  
CL200, 120/240V, 4W, 3φ METER  
JOINTLY OWNED POLE (SIZE AS SHOWN)  
SOLELY OWNED ANCHOR (SIZE AS SHOWN)  
OPEN DELTA TX BANK (SIZE AS SHOWN)

**DESCRIPTION**

1/0 TPX SVC  
CL200, 120/240V, 3W, 1φ  
SOLELY OWNED POLE (SIZE AS SHOWN)  
SOLELY OWNED ANCHOR  
OH PB TX (SOZE AS SHOWN)



EST: RILEY FEWELL	707-291-0800	<b>CONSTRUCTION SKETCH</b> 1426 COUNTRY MANOR DR, SANTA ROSA 1-PH TO 3-PH CONVERSION	NO ENVIRONMENTAL ISSUES	NEAR LOC:
ADE: CRYSTAL O'KEEFE	628-253-8958		Know what's below. Call before you dig. 811	GAS CONFLICT:
SUPV: JAQUELINE ALVARADO	408-747-9217		Know what's below. Call before you dig. 811	
REP: ALEX IVAKHNENKO	707-328-0950		Know what's below. Call before you dig. 811	
PLNR:				
NOTIF: 130826344	JPAF: PG255085NR			
SCALE: 1"=50'	DATE: 04/03/2025			
PM: 35621206	SHEET: 1 OF 1 REV. 0			
PRIMARY VOLTAGE: 12 kV	VOLTAGE AREA: 2			
LATITUDE: 38.45274	LONGITUDE: -122.77290			
SOURCE SIDE DEVICE: 590				
SUB & CIRCUIT: MONROE 1105				
DSGN SAG:	RAPTOR ZONE: YES			
LOADING AREA: LIGHT	ARRESTER DIST: 3			
CORROSION AREA: NON	INSULATION DIST: B			
EXEMPT EQUIP. INST.:	FIRE AREA:			



**ONE-TIME DISCHARGE PERMIT  
SR-1X09934**

**Issued To:**

**Lucas Bishop  
City of Santa Rosa Public Works  
69 Stony Circle  
Santa Rosa, CA 95401**

**Located At:**

**1426 Country Manor Drv  
Santa Rosa, CA 95401**

**EFFECTIVE DATE: 03/18/2025**

**EXPIRATION DATE: Notice of Completion Date**

**CIP Project Name: CIP-IX Country Manor Sewer Lift Station 10 Replacement**

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

**PERMITTEE SHALL COMPLY WITH ALL ITEMS BELOW:**

1. Sediment must be removed prior to any discharge to the sanitary sewer.
2. The permittee shall be responsible for all liability imposed by law for personal injury or property damage caused by work done by permittee under this permit, including work beyond the scope of this permit. If any claim of such liability is made against the City, its officers or employees, permittee shall defend, indemnify and hold them, and each of them, harmless from such claim and liability insofar as permitted by law.
3. The discharge rate to the sanitary sewer shall be at a discharge rate that will not result in any spillage or surcharging of the sewer system.
4. Permit does not cover accumulated stormwater on construction site unless prior approval is granted by City Quality Control Associates and Senior Environmental Specialist.

Environmental Compliance Supervisor:

*Mark St. George*

Date:

*March 17, 2025*

**SUBREGIONAL WATER RECLAMATION SYSTEM**

**Environmental Compliance Section, 4300 Llano Road, Santa Rosa, CA 95407  
PH (707) 543-3369 FX (707) 543-3398 email: envcompliance@srcity.org**

**SECTION B**  
**STORM WATER CORRECTION SITE INSPECTION FORM**

# STORM WATER CORRECTION NOTICE

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

PROJECT NAME: \_\_\_\_\_  
JOB ADDRESS: \_\_\_\_\_  
PROJECT / PERMIT #: \_\_\_\_\_ DATE: \_\_\_\_\_

No storm water deficiencies identified.

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

## STORMWATER BMPs:

- |                          |                                |  |                           |                         |
|--------------------------|--------------------------------|--|---------------------------|-------------------------|
| <input type="checkbox"/> | <b>Storm Drain Protection:</b> | Install                                      | Maintain                  | Replace                 |
| <input type="checkbox"/> | <b>Perimeter Controls:</b>     | Install                                      | Maintain                  | Replace                 |
| <input type="checkbox"/> | <b>Housekeeping:</b>           | Sweep  | Clean                     | Remove Garbage & Debris |
| <input type="checkbox"/> | <b>Stockpiles:</b>             | Cover  | Perimeter Controls        | Remove                  |
| <input type="checkbox"/> | <b>Debris Bins:</b>            | Cover  | Perimeter Controls        |                         |
| <input type="checkbox"/> | <b>Tracking:</b>               | Clean-Up                                     | Install Tracking Controls |                         |
| <input type="checkbox"/> | <b>Portable Toilet:</b>        | Secondary Containment Required               |                           |                         |
| <input type="checkbox"/> | <b>Concrete:</b>               | Install BMPs for Pumper or Concrete Truck    |                           |                         |
| <input type="checkbox"/> |                                | Cover / Maintain Concrete Washout Containers |                           |                         |
| <input type="checkbox"/> | <b>Sediment &amp; Erosion:</b> | Install Appropriate Controls                 | Dust Controls             |                         |
| <input type="checkbox"/> | <b>Other:</b>                  |  |                           |                         |

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

DATE REQUIRED (SEE NOTE\*): \_\_\_\_\_

INSPECTOR: \_\_\_\_\_ PH #: ( ) \_\_\_\_\_

CONTRACTOR SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

- Inspection Type:**
- |   |   |
|---|---|
| <input type="checkbox"/> Monthly (Oct 1 <sup>st</sup> -April 30 <sup>th</sup> ) | <input type="checkbox"/> Deficiency Re-Inspection                               |
| <input type="checkbox"/> Pre-Rain (Sept 1 <sup>st</sup> -Oct 1 <sup>st</sup> )  | <input type="checkbox"/> Following First 0.25" Rain<br>(within 2 business days) |