



MARIN COUNTY, CALIFORNIA

CONTRACT DOCUMENTS FOR

## SECONDARY EFFLUENT LINE MODIFICATIONS

JOB NO. 12600-07

AUGUST 2023

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### DISTRICT BOARD

Megan Clark – President  
Craig K. Murray – Vice President  
Crystal J. Yezman  
Ronald Ford  
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Curtis Paxton – General Manager  
Michael P. Cortez, PE – District Engineer  
Mel Liebmann – Plant Manager  
Dale McDonald – Administrative Services Manager  
Greg Pease – Collection System/Safety Manager



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# ACKNOWLEDGEMENT

ACKNOWLEDGEMENT OF THE CONTRACT DOCUMENTS MUST BE RECEIVED BY THE DISTRICT IN ORDER FOR YOU TO RECEIVE ADDENDUMS (i.e., updates or changes to the Contract Documents). PLEASE COMPLETE BELOW AND FAX TO 415-499-7715, OR EMAIL TO [ihuang@lgvsd.org](mailto:ihuang@lgvsd.org) IMMEDIATELY UPON RECEIPT OF THIS PACKET so that you will receive any changes or updates as they occur. If we do not receive this form from you, any updates or changes that you do not receive are not the responsibility of the District.

## PROJECT: SECONDARY EFFLUENT LINE MODIFICATIONS

**Date Received:** \_\_\_\_\_

**Recipient:** \_\_\_\_\_ (BIDDER)

\_\_\_\_\_ (ADDRESS)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (PHONE)

\_\_\_\_\_ (FAX)

\_\_\_\_\_ (EMAIL)

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Signature

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## CERTIFICATIONS PAGE

The various portions of the specifications and other contract documents for project "SECONDARY EFFLUENT LINE MODIFICATIONS," JOB NO. 12600-07, have been prepared under the direction of the following design professionals, licensed in the State of California.

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*LGVSD:*



Responsible for the following sections:

All, except as noted below.

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*AQUA ENGINEERING:*

Justin R. Logan, PE  
Lic. No. C73749

Responsible for the following sections:

Volume 3 – Technical Specifications

Volume 4 – Drawings

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**VOLUME 1**  
**CONTRACT REQUIREMENTS**

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**NOTICE INVITING SEALED BIDS**

1. The Las Gallinas Valley Sanitary District hereby invites bids for the SECONDARY EFFLUENT LINE MODIFICATIONS project, in accordance with California Public Contract Code Section 20804 and other applicable law, and the following:
2. All bids must be delivered to the **Engineering Department, Las Gallinas Valley Sanitary District, 101 Lucas Valley Road, Suite 300, San Rafael, California 94903** on or before **11:00 AM, September 11, 2023**. Bids will be opened and read publicly at that time. Bids must be made on the bid forms included in the bid package. Bids that are submitted late according to the official time kept by the District Engineer or a designee will be returned unopened. Bids submitted by facsimile or other electronic means will not be accepted. Bids that are incomplete or that otherwise do not conform to the requirements specified in the bid package may be deemed non-responsive.
3. A pre-bid meeting is scheduled for **August 31, 2023 at 10:00 AM, 300 Smith Ranch Road, San Rafael, CA 94903**. The pre-bid meeting is **not mandatory**. **Please call 415-472-1734 or email [pquinn@lqvsd.org](mailto:pquinn@lqvsd.org) to RSVP**. In addition, this Project requires Bidders to submit a notarized copy of a Site Visit Affidavit to be submitted with the Bid. See required form under Bidding Requirements section of the Contract Documents. A site visit will follow after the pre-bid meeting. Special site visits may be scheduled 24 hours in advance a minimum of five (5) working days before bid opening.
4. The project Contractor shall furnish all tools, equipment, apparatus, facilities, labor and material necessary to perform and complete in a good and workmanlike manner the construction of the SECONDARY EFFLUENT LINE MODIFICATIONS project as shown in the project Technical Specifications and plans and in accordance with the Contract Documents within **60 calendar days** of the project commencement date specified in the Notice to Proceed for the project.
5. SCOPE OF WORK.  
The project consists of 3 phases and the work is generally described as:
  1. Phase 1
    - a) Install approximately 33' of new 36" line from existing 24" blind flange to existing 36" Chlorine Contact Chamber (CCC) piping.
    - b) Install new 24" isolation gate valve at the existing tee fitting/spool.
    - c) Install a new manhole (8-foot diameter with cast-in-place floor) over existing 36" CCC piping.
  2. Phase 2
    - a) Install 8-foot diameter manhole with cast-in-place floor over existing 42" secondary effluent piping. Remove dual reducers at this location once the work is completed.
    - b) Remove approximately 16' of 24" line at the CCC Weir Box along with associated concrete covering as needed.

- c) Core hole for 42" HDPE pipe in CCC Weir Box.
  - d) Install approximately 50' of 42" HDPE line from new manhole to CCC Weir Box.
  - e) Install new doppler ultrasonic flow meter (Hach Submerged Area/Velocity Sensor and AV9000 or similar) in 42" line adjacent to new manhole.
3. Phase 3
- a) Remove reducers in new manhole, cap pipe, and remove existing flow meter.
6. All the project work shall be completed in accordance with the bid packages on file at the District. Complete bid packages may be obtained at the **Engineering Department, Las Gallinas Valley Sanitary District, 101 Lucas Valley Road, Suite 300, San Rafael, California 94903**. There will be a fifty dollar (\$50) non-refundable charge for each bid package. Checks and money orders must be made payable to the Las Gallinas Valley Sanitary District. Requests for information on receiving bid packages should be directed to the District Offices at (415) 472-1734. Bid packages will be mailed upon request and receipt of the non-refundable charge and the bidder's UPS or FedEx account number.
7. In accordance with California Public Contract Code Section 20804.5, all bids must be presented under sealed cover and include one of the following forms of bidder's security: cash, cashier's check made payable to the District, certified check made payable to the District, or a bidder's bond. The amount of bidder's security provided must equal at least ten (10) percent of the total of the bid price for the base bid and the additive or deductive items listed in this notice. The successful bidder must submit to the District complete, executed copies of all documents specified in the contract checklist included in the bid package within seven (7) calendar days of receiving written Notice of Award of the project. Bidder's security of any successful bidder that fails to do so will be forfeited to the District. The documents required pursuant to the contract checklist include, but are not limited to, a payment or labor and materials bond in an amount of at least 100 percent of the amount payable by the terms of the project contract and that satisfies the requirements of California Civil Code Section 3248, and a performance bond in an amount of at least 100 percent of the amount payable by the terms of the contract. All project bonds must be executed by an admitted surety insurer in accordance with applicable law and acceptable to the District. **The Engineer's estimate is \$750,000.**
8. Pursuant to California Public Contract Code Section 3300, a **Class A General Engineering** California contractor's license is required to bid on the project. In accordance with California Business and Professions Code Section 7028.15, all project work must be performed by properly licensed contractors and subcontractors with active licenses in good standing as of the date and time specified for bid opening. However, in accordance with California Public Contract Code Section 20103.5, if the project involves federal funds, project contractors and subcontractors must have active licenses in good standing no later than the time the project contract is awarded. Bids that do not satisfy applicable licensing requirements will be considered non-responsive. Licenses must be issued by the Contractor's State License Board of California and must be maintained in good standing throughout the project term. In accordance with California Business and Professions Code Section 7030.5, bidders must verify their Contractor's License number

and license expiration date on the bid forms under penalty of perjury.

9. In accordance with California Public Contract Code Section 6109, contractors and subcontractors who are ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7 may neither bid on, be awarded or perform work as a subcontractor on the project.
10. In accordance with California Labor Code Section 1771, not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the project is to be performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work fixed as provided in the California Labor Code shall be paid to all workers engaged in performing the project. In accordance with California Labor Code Section 1770 and following, the Director of Industrial Relations has determined the general prevailing wage per diem rates for work in the locality in which the project is to be performed. In accordance with California Labor Code Section 1773, the District has obtained the general prevailing rate of per diem wages and the general rate for holiday and overtime work in the locality in which the project is to be performed for each craft, classification or type of worker needed to perform the project. In accordance with California Labor Code Section 1773.2, copies of the prevailing rate of per diem wages are on file at the District Engineer's Office and will be made available on request. A copy of said wage rates is available online at [www.dir.ca.gov/DLSR/PWD](http://www.dir.ca.gov/DLSR/PWD). In accordance with California Labor Code Section 1777.1, contractors and subcontractors that are found guilty of willfully violating Chapter 1 of Part 7 of Division 2 of the Labor Code (except for Section 1777.5), or that are found guilty of such violations with intent to defraud, and entities in which such contractors or subcontractors have any interest, may be ineligible to bid on, be awarded, or perform project work as a subcontractor.
11. In accordance with California Public Contract Code Section 3400, bidders may propose equals of products listed in the Technical Specifications or Drawings by manufacturer name, brand or model number unless the Technical Specifications or plans specify that the product is necessary to match others in use. Complete information for products proposed as equals must be submitted to the District Engineer's Office for review at least seven (7) working days before the time specified for bid opening in accordance with the bidders instructions contained in the bid package.
12. In accordance with California Public Contract Code Section 22300, except where prohibited by federal regulations or policies, the successful bidder may, on request and at its expense, substitute securities in lieu of amounts withheld by the District from progress payments to ensure performance under the contract in accordance with the Contract Documents. Such securities will be subject to the terms of the escrow for security deposit agreement contained in the Contract Documents.
13. The District reserves the right to reject any and all bids and/or to waive any bid irregularities to the extent permitted by law. If the District elects to award a contract for performance of the project, the contract will be awarded in accordance with California Public Contract Code Section 20803 and other applicable law to the responsible bidder submitting a responsive bid

with the lowest total bid price for the base bid and the following additive or deductive alternate items as further described in the bid package.

14. Questions regarding the bid package should be directed in writing as soon as possible (but no later than five (5) working days prior to the opening of bids to: Irene Huang, PE, Associate Engineer, 101 Lucas Valley Road, Suite 300, San Rafael, CA 94903. Where appropriate, the District may respond to such questions by addenda transmitted to all bid package recipients.
15. All bids will remain valid for ninety (90) calendar days after the bid opening. Except as permitted by law and subject to all applicable remedies, including forfeiture of bidder's security, bidders may not withdraw their bid during the ninety (90) day period after the bid opening.

Las Gallinas Valley Sanitary District

By:           /s/ Michael P. Cortez          

Michael P. Cortez PE, District Engineer

Date: August 24, 2023

## **INSTRUCTIONS TO BIDDERS**

### **1. DEFINITIONS**

- 1.1 Bid forms. The bid forms are the forms contained in Volume 2 of the bid package.
- 1.2 Bid package. A complete bid package consists of the following documents: Volume 1 – Contract Forms, Notice Inviting Sealed Bids, Instructions to Bidders, Contract Check List, Contract, Performance Bond, Payment/Labor Bond, Maintenance Bond, and Escrow for Security Deposit Agreement. Volume 2 – Bid Forms, includes the Bidder's Check List, Bid Label, Proposal Cover Page and Bid Schedule, Bid Bond, Contractor License Information, List of Proposed Subcontractors, Workers Compensation Insurance Certification, Non-Collusion Affidavit, Drug-Free Workplace Certification, Debarment Certification, Statement of Experience of Bidder, Financial Qualifications, Site Visit Affidavit, and Bidder's Signature Page. Volume 3 – Technical Specifications, and Supplemental Reports or Data (if any). Volume 4 – Drawings.
- 1.3 Contract Documents. The Contract Documents refer to all of the documents incorporated into the final Project contract as listed in the contract.
- 1.4 Project. The Project is the SECONDARY EFFLUENT LINE MODIFICATIONS project as described in the Technical Specifications and Drawings included in the project bid package.
- 1.5 Drawings. The Drawings are primarily graphic detailed requirements concerning the Project and are contained in Volume 4 of the bid package.
- 1.6 Technical Specifications. The Technical Specifications provide detailed requirements concerning the Project and are contained in Volume 3 of the bid package.

### **2. BIDDER'S REPRESENTATIONS**

Each bidder by submitting a bid represents that:

- 2.1 The bidder has read and understands the bid package and the bid is in accordance with all of the requirements of the bid package and applicable law.
- 2.2 Neither the bidder nor any subcontractor included on the list of proposed subcontractors submitted with the bid, are ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7.
- 2.3 The bidder understands that quantities of unit price items may vary from the estimates provided in the Technical Specifications.
- 2.4 Representatives of the bidder have visited the Project site and have familiarized themselves with the conditions under which the Project work is to be performed so as to ensure that the Project work may be performed for the amount bid.

2.5 The bidder has informed the District in writing no later than five (5) working days prior to the time specified for bid opening of any apparent conflicts, errors, or ambiguities contained in the bid package or between the contents of the bid package and the Project site.

### 3. PRE-BID COMMUNICATION AND INTERPRETATION OF THE BID PACKAGE

3.1 Any bidder that discovers any apparent conflicts, errors, or ambiguities contained in the bid package or between the contents of the bid package and the Project site, or that has questions or requires clarification concerning the bid package or its intent must inform the District in writing as soon as reasonably possible, but no later than five (5) working days before the date specified for bid opening. Such notice to the District must be sent to the address specified in the Notice Inviting Sealed Bids for questions concerning the bid package. Questions received less than five (5) working days before the time specified for opening bids may not be answered.

3.2 Any interpretation, correction or change of the bid package prior to bid opening will be made by addendum signed by an authorized representative of the District and transmitted to all bid package recipients. No other interpretation or information concerning the bid package issued prior to the date specified for opening bids will be binding. All addenda signed by an authorized representative of the District and issued prior to the time and date specified for opening bids will form a part of the Contract Documents and must be acknowledged on the bid forms. Any changes, exceptions or conditions concerning the Project and/or the bid package submitted by any bidder as part of a bid may render that bid non-responsive.

### 4. PRE-BID ACCESS TO THE PROJECT SITE

4.1 Prior to submitting a bid, it will be the sole responsibility of each bidder to conduct any additional examination, investigation, exploration, test, study or other inquiry and to obtain any additional information pertaining to the physical conditions (including surface, subsurface, and underground utilities) at or near the Project site that may affect the cost, progress, or performance of the Project, and that the bidder deems are necessary to prepare its bid for performance of the Project in accordance with the bid package and Contract Documents. Bidders seeking any such additional examination or other inquiries or information concerning the Project will do so at the bidder's sole expense.

4.2 Bidders seeking to conduct any additional examination or other inquiry at the Project site must request site access from the District at least two (2) working days in advance. The location of any excavation, boring or other invasive testing will be subject to approval on behalf of the District and any other agencies with jurisdiction over such testing. Bidders may not conduct tests at the Project site prior to obtaining District approval. The District may require bidders to execute an access agreement prior to approving testing at the Project site. Once approved testing is complete, Bidders must fill all trenches or holes, restore all pavements to match existing structural section, and otherwise clean up and restore the test site to its pre-test condition.

## 5. BIDDING PROCEDURE

- 5.1 Bids must be delivered to the **Engineering Department, Las Gallinas Valley Sanitary District, 101 Lucas Valley Road, Suite 300, San Rafael, California 94903**, no later than the time and date specified in the Notice Inviting Sealed Bids. Bids will be opened and read publicly at that time. Bids that are submitted late according to the official time kept by the District Engineer or a designee will be returned unopened. Telephones for use by bidders are not available at the District offices.
- 5.2 In accordance with California Public Contract Code Section 20804.5, bids must be presented under sealed cover. A completed bid label form furnished with the bid forms must be affixed to and visible on the outside of the sealed bid cover at the time the bid is submitted. Bids must be submitted using the bid forms furnished with the bid package. Bids must include all documents listed in the Bidder's Check List contained in Volume 2 completed in accordance with the bid package. Bids must bear the bidder's legal name and be signed by a representative authorized to bind the bidder. Bids must be typed or written in ink. Corrections may be made if initialed by the individual signing the bid. No oral or telegraphic modifications of bids, including facsimile modifications, will be considered. Bids that are incomplete or that are not presented on the bid forms furnished with the bid package may be deemed non-responsive.
- 5.3 Each bid must give the full business address of the bidder. Bids of partnerships must furnish the full name of all partners and must be signed in the partnership name by one of the members of the partnership, or by an authorized representative, followed by the printed name and title of the person signing. Bids of corporations must be signed with the legal name of the corporation, followed by the name of the state of incorporation and by the signature and designation of the president, secretary or other person authorized to bind the corporation. The name of each person signing shall also be typed or printed below the signature. Upon request of the District, bidders will furnish satisfactory evidence of the authority of the person signing the bid. Bids of joint ventures must include a certified copy of the legal agreement constituting the joint venture.
- 5.4 No person, firm, corporation, partnership or legal joint venture may submit more than one bid for the Project. However, a person, firm, corporation, partnership or legal joint venture that has submitted a subcontract proposal to a bidder, or that has quoted prices on materials to a bidder may submit a subcontract proposal, quote prices to other bidders and submit its own bid.
- 5.5 In accordance with California Public Contract Code Section 20804.5, all bids must include one of the forms of bidder's security specified in the Notice Inviting Sealed Bids in an amount of at least ten (10) per cent of the total of the bid prices for the base bid and those additive or deductive items specifically identified in the Notice Inviting Sealed Bids for the purpose of determining the lowest price bid. Bidders that elect to provide bidder's security in the form of a bid bond must execute a bid bond using the form provided in the bid forms. The bidder's security is tendered as a guarantee that the successful bidder, if awarded the Project contract, will execute and submit to the District all required bonds, certificates of insurance, completed contract forms and other documents listed in the Contract Check List in Volume 1 of the bid package and enter into a contract with the District within seven (7) calendar days of receipt of the Notice of Award. The bidder's security of any successful bidder that fails to do so will

be forfeited to the District. All bidders' security not forfeited to the District will be returned once a successful bidder provides all required documents and enters a contract with the District in accordance with all applicable bid package requirements. Forfeiture of the bidder's security to the District will not waive or otherwise limit any other remedy available to the District under applicable law.

- 5.6 In accordance with California Business and Professions Code Section 7028.15, Public Contract Code Section 20103.5, and as specified in the Notice Inviting Sealed Bids, all Project work must be performed by properly licensed contractors and subcontractors with active licenses in good standing as of the date and time specified for bid opening, or, if the project involves federal funds, no later than the time the Project contract is awarded. Bidders must verify their Contractor's License number and license expiration date on the proposal cover page under penalty of perjury. Bids that do not satisfy applicable licensing requirements will be considered non-responsive and rejected and may subject the bidder to criminal and/or civil penalties.
- 5.7 If the bid forms include a bidder's questionnaire, all bids must include a completed bidder's questionnaire on the forms provided. By submitting a bid, bidders authorize District representatives to verify any and all information provided on the bidder's questionnaire and agree to indemnify, defend and hold harmless the District and its officials, officers, employees, agents and volunteers to full the extent permitted by law from and against any claims, liability or causes of action, including, without limitation, legal fees and costs, arising out of verification of the information provided on the bidder's questionnaire, and/or arising out of use of information provided in the bidder's questionnaire to determine, in accordance with applicable law, the qualification of the bidder for performing the Project.
- 5.8 Bids may be withdrawn prior to the time set for bid opening by a written request signed by an authorized representative of the bidder filed with the District Engineer. The bid security submitted with bids so withdrawn will be returned to the bidder. Bidders that have withdrawn their bid in accordance with this provision may submit a new bid prior to the time set for bid opening in accordance with all applicable bid package requirements. Bids may not be withdrawn during the ninety (90) day period after the time set for bid opening except as permitted by law pursuant to California Public Contract Code Section 5100 and following. Any other bid withdrawal will result in forfeiture of the bidder's bid security to the District.

## 6. BID PROTESTS

Any protest of the proposed award of Bid to the bidder deemed the lowest responsible bidder must be submitted in writing to the District, no later than 3:00 PM on the third (3<sup>rd</sup>) business day following the date of the Bid opening.

- 6.1 The initial protest must contain a complete statement of the basis for the protest.
- 6.2 The protest must state the facts and refer to the specific portion of the document or the specific statute that forms the basis for the protest. The protest must include the name, address, and telephone number of the person representing the protesting party.
- 6.3 The party filing the protest must concurrently transmit a copy of the initial protest to the bidder deemed the lowest responsible bidder.

- 6.4 The party filing the protest must have actually submitted a Bid on the Project. A subcontractor of a party filing a Bid on this Project may not submit a Bid Protest. A party may not rely on the Bid Protest submitted by another Bidder, but must timely pursue its own protest.
- 6.5 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. The Bidder's failure to fully comply with these procedures shall constitute a waiver of any right to further pursue the Bid Protest, including filing of a challenge of the award pursuant to the California Public Contracts Code, filing of a claim pursuant to the California Government Code, or filing of any other legal proceedings.
- 6.6 The District shall review all timely protests prior to formal award of the Bid. The District shall not be required to hold an administrative hearing to consider timely protest, but may do so at the option of the General Manager. At the time of the District Board's consideration of the award of the bid, the District Board shall also consider the merits of any timely protests. The District Board may either accept the protest and award the bid to the next lowest responsible bidder or reject the protest and award to the lowest responsible bidder. Nothing in this section shall be construed as a waiver of the District Board's right to reject all bids.
- 6.7 The District reserves the right to waive any bid irregularities not affecting the amount of the bid, except where such waiver would give the low bidder an advantage or benefit not allowed other bidders.

## 7. AWARD

- 7.1 In accordance with applicable law, the District reserves the right to reject any or all bids and to waive any informality in any bid. The District reserves the right to accept any portion of any bid, unless the bid package expressly provides that the award will be made as a whole. If the District elects to award a contract for performance of the Project, the contract will be awarded in accordance with California Public Contract Code Section 20803 and other applicable law to the responsible bidder submitting a responsive bid with the lowest total bid price for the base bid and the additive or deductive alternate items listed in the Notice Inviting Sealed Bids. In accordance with the Contract Documents and other applicable law, the District may add or deduct items of work from the Project after the lowest responsible bidder is determined.
- 7.2 The successful bidder must submit to the District complete, executed copies of all documents specified in the contract checklist included in Volume 1 of the bid package within seven (7) calendar days of receiving written Notice of Award of the Project. Bidder's security of any successful bidder that fails to do so will be forfeited to the District.
- 7.3 The successful bidder and any subcontractors and others engaged in performance of the Project must have valid local business license(s), as applicable, before commencing work on the Project.
- 7.4 Upon verifying that the successful bidder has provided complete, executed copies of all documents specified in the contract checklist included in Volume 1 of the bid package, an authorized District representative will execute the Project contract, and the District

will issue to the successful bidder a Notice to Proceed specifying the Project commencement date. The number of working days within which the Project must be complete begins to run on the Project commencement date.

## 8. PRICING

- 8.1 If an inconsistency exists between the amount listed for a unit price in a bid and the total listed for that bid item (e.g., if the total listed for a bid item does not equal the unit price listed in the bid multiplied by the quantity listed), subject to applicable law, the unit price will be deemed to accurately reflect the bidder's intent concerning the bid item and the intended total for the bid item will be deemed to be the unit price as listed in the bid multiplied by the quantity listed.
- 8.2 If the Project bid price is a lump sum total made up of smaller individual bid item prices and an inconsistency exists between the lump sum total bid price and any individual bid item price, subject to applicable law, the individual bid item prices as listed in the bid will be deemed to accurately reflect the bidder's intended bid for the Project and the intended lump sum total bid for the Project will be deemed to be the sum of the individual bid item prices as listed in the bid, even if that sum is different from the amount actually listed as the lump sum total bid for the Project.
- 8.3 Any federal, state, or local tax payable on articles to be furnished for the Project shall be included in the lump sum total bid price and paid by the Contractor under the contract.

## 9. QUANTITIES

- 9.1 Quantities, including but not limited to, material or labor quantities, that are provided in the bid package concerning the Project are estimates only and are provided solely as a general indication of the Project scope. The District does not warrant that such quantity estimates provided in the bid package represent the actual quantities required to perform the Project in accordance with the Contract Documents. Such quantity estimates do not bind the District, and bidders should not rely on them in preparing their bids. Each bidder is solely responsible for determining the quantities on which to base their bids in light of information contained in the bid package, bidder investigation and analysis of the Project and the Project site, and any other analysis or expertise of the bidder concerning the Project.
- 9.2 The District may amend, decrease or increase the Project work in accordance with the bidding package and the Contract Documents. If the District amends, decreases or increases the Project work prior to award of the Project each bidder will be solely responsible for determining the revised quantities, if any, on which to base their bid in light of information contained in the bid package and any amendments or addenda to the bid package, bidder investigation and analysis of the Project as amended, decreased or increased, the Project site, and any other analysis or expertise of the bidder concerning the Project.

## 10. SUBSTITUTION OF "OR EQUAL" ITEMS

- 10.1 In accordance with California Public Contract Code Section 3400, where the Drawings list products by manufacturer's name, brand or model number such information indicates the quality and utility of the items desired and does not restrict bidders to that

manufacturer's name, brand or model number, unless the Technical Specifications or Drawings specify that the listed product is necessary to match others in use on a particular public improvement either completed or in the course of completion. Except where the Specifications indicate that a particular brand product is necessary to match others in use, when a manufacturer's name, brand or model number is listed, it shall be construed to be followed by the words "or equal" whether or not those words in fact follow the manufacturer's name, brand name or model number listed in the Technical Specifications or Drawings. Unless the Technical Specifications or Drawings indicate that a particular brand product is necessary to match others in use, bidders may propose equals of products listed by manufacturer name, brand name or model number.

- 10.2 Complete information for products proposed as equals must be submitted to the District Engineer for review at least seven (7) calendar days before the time specified for opening bids. To be considered, proposals concerning products proposed as equals must include sufficient information to permit the District to determine whether the products proposed as equals will satisfy the same performance requirements as products listed by manufacturer's name, brand or model number. Such performance requirements may include, but are not limited to, size, strength, function, appearance, ease of maintenance and repair, and useful life requirements. Proposals concerning products proposed as equals that are submitted less than seven (7) calendar days before the time specified for opening bids will not be considered. Failure to bid products specified by manufacturer name, brand name or model number where the Technical Specifications or Drawings specify that a particular product is necessary to match others in use, or where no proposal concerning products proposed as equals has been submitted in accordance with this provision may render a bid non-responsive.

## 11. SUBCONTRACTING

- 11.1 Bids must be in accordance with the requirements of the Subletting and Subcontracting Fair Practices, Act, California Public Contract Code Section 4100 and following. Bids must include a completed list of proposed subcontractors on the form included in the bid package. In accordance with California Public Contract Code Section 4104, completed lists of proposed subcontractors must include the name, business location, the portion (type or trade), and dollar amount of the Project work to be subcontracted for each subcontractor that will perform a portion of the Project work (including special fabrication and installation of a portion of the work) valued in excess of one half ( $\frac{1}{2}$ ) of one (1) percent of the total Project bid price. If the Project work includes construction of streets or highways, the completed list of proposed subcontractors must include the subcontractor name, business location, type of work and dollar amount to be subcontracted for each subcontractor that will perform a portion of the Project work (including special fabrication and installation of a portion of the work) valued in excess of one half ( $\frac{1}{2}$ ) of one (1) percent of the total Project bid price, or ten thousand dollars (\$10,000), whichever is greater. Bids that fail to include complete lists of proposed subcontractors in accordance with Public Contract Code Section 4100 and following and this provision may be deemed non-responsive.
- 11.2 In accordance with California Public Contract Code Section 4106, for any portion of the Project work with a value of more than one half ( $\frac{1}{2}$ ) of one (1) percent of the total Project bid price for which no subcontractor is listed, or for which more than one subcontractor is listed, bidders certify by submitting their bids that they are qualified to

perform that portion of the Project work and that they will perform that portion of the Project work with their own forces. Bidders may not substitute another subcontractor for a subcontractor listed in their bid except as permitted by the District in accordance with Section 4107 and following of the California Public Contract Code.

## 12. ASSIGNMENT

Bidders may not assign, sublet, sell, transfer, or otherwise dispose of their bid or any right, title or interest in their bid, or their obligations under their bid, without the written consent of an authorized representative of the District. Any purported assignment, subletting, sale, transfer or other disposition of a bid or any interest in a bid, or of any obligations under a bid without such written consent will be void and of no effect.

## 13. BONDS

The successful bidder must submit to the District a performance bond within seven (7) calendar days of receiving written Notice of Award. If the Project involves expenditures in excess of twenty five thousand dollars (\$25,000), the successful bidder must submit to the District a payment or labor and materials bond within seven (7) calendar days of receiving written Notice of Award. Prior to issuance of the final Project payment, the successful bidder must submit a warranty or maintenance bond. All bonds must be executed by corporate sureties who are admitted surety insurers in the State of California in accordance with applicable law and acceptable to the District. Individual sureties will not be accepted. All project bonds must be executed using the forms provided in the bid package.

13.1 In accordance with California Civil Code Section 3247, the payment or labor and materials bond must be in the amount of one hundred percent (100%) of the total amount payable by the terms of the Project contract and guarantee payment to persons listed in California Civil Code Section 3181 for work performed and for charges for materials, supplies, and equipment provided under the Project contract (including amounts due under or subject to the Unemployment Insurance Code) in accordance with the requirements of California Civil Code Section 3248.

13.2 The performance bond must be in the amount of one hundred (100) percent of the amount payable by the terms of the Project contract to guarantee the faithful performance of the Project work.

13.3 The warranty or maintenance bond must be in the amount of ten (10) percent of the final Project contract amount and guaranty the Project work against defects in materials, equipment, workmanship, or needed repair for **one (1) year** from the District's acceptance of the Project work.

## 14. LABOR LAWS

14.1 Bidders shall comply with applicable provisions of Chapter 1 of Part 7 of the California Labor Code, beginning with Section 1720.

14.2 In accordance with California Labor Code Section 1861, bids must include a workers' compensation insurance certification on the form included in the bid package.

14.3 In accordance with California Labor Code Section 1771, not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the project is to be performed, and not less than the general prevailing rate of per diem

wages for holiday and overtime work fixed as provided in the California Labor Code shall be paid to all workers engaged in performing the project.

14.4 In accordance with California Labor Code Section 1770 and following, the Director of Industrial Relations has determined the general prevailing wage per diem rates for work in the locality in which the project is to be performed. A copy of said wage rates is available online at [www.dir.ca.gov/DLSR/PWD](http://www.dir.ca.gov/DLSR/PWD). Said prevailing rate of per diem wages will be made available to any party upon request, and a copy thereof shall be posted at the jobsite by the Contractor.

14.5 In accordance with California Labor Code Section 1777.1, contractors and subcontractors that are found guilty of willfully violating Chapter 1 of Part 7 of Division 2 of the Labor Code (except for Section 1777.5), or that are found guilty of such violations with intent to defraud, and entities in which such contractors or subcontractors have any interest, may be ineligible to bid on, be awarded, or perform project work as a subcontractor.

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**CONTRACT CHECK LIST**

Complete, accurate, executed copies of the following documents must be submitted to the Las Gallinas Valley Sanitary District in accordance with the bid package issued by the District for the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, within seven (7) calendar days of receiving written Notice of Award of the project. The bidder's security of any successful bidder that fails to do so will be forfeited to the District.

Contract Check List:

- \_\_\_\_\_ 2 copies of the signed Agreement
- \_\_\_\_\_ Performance Bond
- \_\_\_\_\_ Payment/Labor and Materials Bond
- \_\_\_\_\_ Maintenance Bond
- \_\_\_\_\_ Certificates of Insurance and Endorsements
- \_\_\_\_\_ Escrow for Deposit Agreement, if applicable
- \_\_\_\_\_ Safety Manual
- \_\_\_\_\_ Appendix E: DIR Form PWC-100 Supplemental Questionnaire. Submit a completed form for the Contractor and each Subcontractor listed in the List of Proposed Subcontractors submitted with the bid. List Contractor's and all Subcontractors' license number, name, address, phone number, email address, and classification of workers they are providing at the time of the contract signing.

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**AGREEMENT**

The Las Gallinas Valley Sanitary District, ("District") enters into this agreement, dated \_\_\_\_\_, with \_\_\_\_\_ ("Contractor"), whose address is \_\_\_\_\_.

RECITALS

1. NOTICE INVITING SEALED BIDS. The District gave Notice Inviting Sealed Bids on \_\_\_\_\_ for bids to be submitted for the SECONDARY EFFLUENT LINE MODIFICATIONS project by published notice and/or posting in accordance with California Public Contract Code Section 20804 and other applicable law.
2. BID OPENING. On \_\_\_\_\_, District representatives opened the bids for the SECONDARY EFFLUENT LINE MODIFICATIONS project and read the bids aloud.
3. PROJECT AWARD. On \_\_\_\_\_, the District Board awarded the SECONDARY EFFLUENT LINE MODIFICATIONS project to the Contractor and directed District staff to send the Contractor written Notice of Award of the project. The District Board conditioned award of the project on the Contractor's providing executed copies of all documents specified in the contract check list included in the bid package within seven (7) calendar days of receiving written Notice of Award of the project.
4. REQUIRED DOCUMENTS. The Contractor has provided the District executed copies of all documents specified in the contract check list included in the bid package within seven (7) calendar days of receiving written Notice of Award, unless noted otherwise.

AGREEMENT TERMS

The District and the Contractor agree as follows:

1. THE WORK. The Contractor shall furnish all equipment, tools, apparatus, facilities, material labor, and skill necessary to perform and complete in a good and workmanlike manner the SECONDARY EFFLUENT LINE MODIFICATIONS project ("Work") as shown in the Technical Specifications and Drawings in accordance with the Contract Documents and applicable law.
2. LOCATION OF WORK. The Work will be performed at the following location:  
  
**300 Smith Ranch Road, San Rafael, CA**
3. TIME FOR COMPLETION. The Contractor must complete the Work in accordance with the Contract Documents within **60 calendar days** from the date specified in the District's Notice to Proceed ("Time for Completion").

4. REMEDIES FOR FAILURE TO TIMELY COMPLETE THE WORK. If the Contractor fails to fully perform the Work in accordance with the Contract Documents by the Time for Completion, as such time may be amended by change order or other modification to this agreement in accordance with its terms, and/or if the Contractor fails, by the Time for Completion, to fully perform all of the Contractor's obligations under this agreement that have accrued by the Time for Completion, the Contractor will become liable to the District for all resulting loss and damage in accordance with the Contract Documents and applicable law. The District's remedies for the Contractor's failure to perform include, but are not limited to, assessment of liquidated damages of **\$1,000 per day** in accordance with California Government Code Section 53069.85 and the Contract Documents, and/or obtaining or providing for substitute performance in accordance with the Contract Documents.
  
5. CONTRACT PRICE AND PAYMENT. As full compensation in consideration of completion of the Work in accordance with the Contract Documents and in consideration of the fulfillment of all of the Contractor's obligations under the Contract Documents, the District will pay the Contractor in lawful money of the United States the total price of \_\_\_\_\_ (the "Contract Price") as specified in the Contractor's completed Bid Schedule dated \_\_\_\_\_, and attached to and incorporated in this agreement. Payment to the Contractor under this agreement will be for Work actually performed in accordance with the Contract Documents and will be made in accordance with the requirements of the Contract Documents and applicable law. The District will have no obligation to pay the Contractor any amount in excess of the Contract Price unless this agreement is first modified in accordance with its terms. The District's obligation to pay the Contractor under this agreement is subject to and may be offset by charges that may apply to the Contractor under this agreement. Such charges include but are not limited to, charges for liquidated damages and/or substitute performance in accordance with the Contract Documents.
  
6. PREVAILING WAGES. In accordance with California Labor Code Section 1771, not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the Work is to be performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work fixed as provided in the California Labor Code must be paid to all workers engaged in performing the Work. In accordance with California Labor Code Section 1770 and following, the Director of Industrial Relations has determined the general prevailing wage per diem rates for the locality in which the Work is to be performed. In accordance with California Labor Code Section 1773, the District has obtained the general prevailing rate of per diem wages and the general rate for holiday and overtime work in the locality in which the Work is to be performed for each craft, classification or type of worker needed to perform the project. In accordance with California Labor Code Section 1773.2, copies of the prevailing rate of per diem wages are on file at the District Engineer's Office and will be made available on request. Throughout the performance of the Work the Contractor must comply with all provisions of the Contract Documents and all applicable laws and regulations that apply to wages earned in performance of the Work.
  
7. THE CONTRACT DOCUMENTS. This agreement consists of the following documents ("Contract Documents"), all of which are incorporated into and made a part of this agreement as if set forth in full. In the event of a conflict between or among the Contract Documents, precedence will be in the following order:
  - a. Permits

- b. Typical Details
- c. Reference Standard Specs
- d. Reference Standard Plans

- 7.1 This agreement and change orders and other amendments to this agreement signed by authorized representatives of the District and the Contractor.
- 7.2 The General Conditions and change orders and other amendments to the General Conditions signed by authorized representatives of the District and the Contractor.
- 7.3 The Technical Specifications, addenda to the Technical Specifications signed by authorized representatives of the District and issued prior to bid opening, Equal Product Proposals accepted by the District and signed by authorized District representatives prior to bid opening, and change orders and other amendments to the Technical Specifications signed by authorized representatives of the District and the Contractor.
- 7.4 The Drawings, addenda to the Drawings signed by authorized representatives of the District and issued prior to bid opening, Equal Product Proposals accepted by the District and signed by authorized District representatives prior to bid opening, and change orders and other amendments to the Drawings signed by authorized representatives of the District and the Contractor.
- 7.5 Notice Inviting Sealed Bids
- 7.6 Instructions to Bidders
- 7.7 The successful bidder's completed Proposal Cover Page and Bid Schedule
- 7.8 The successful bidder's completed Contractor License Information
- 7.9 The successful bidder's completed Notice to Proceed
- 7.10 The successful bidder's completed List of Proposed Subcontractors
- 7.11 The successful bidder's Workers Compensation Insurance Certification
- 7.12 The successful bidder's completed Non-Collusion Affidavit
- 7.13 The successful bidder's Drug-Free Workplace Certification
- 7.14 The successful bidder's Debarment Certification
- 7.15 The successful bidder's completed Certificates of Insurance and Endorsements
- 7.16 The successful bidder's executed Performance Bond
- 7.17 The successful bidder's executed Payment Bond
- 7.18 The Maintenance Bond form included in the bid package that the Contractor must execute prior to release of final payment under the Contract
- 7.19 The successful bidder's Statement of Experience
- 7.20 The successful bidder's signed Bidder's Signature Page
- 7.21 The successful bidder's Financial Qualifications

- 8. INTERPRETATION OF CONTRACT DOCUMENTS. Any question concerning the intent or meaning of any provision of the Contract Documents, including, but not limited to, the Technical Specifications or Drawings, must be submitted to the District Engineer, or his/her designee, for issuance of an interpretation and/or decision by the authorized District representative in accordance with the requirements of the Contract Documents. Interpretations or decisions by any other person concerning the Contract Documents will not

be binding on the District. The decision of the District Engineer, or his/her designee, shall be final.

- 9. ASSIGNMENT PROHIBITED. The Contractor may not assign part or all of this agreement, or any moneys due or to become under this agreement, or any other right or interest of the Contractor under this agreement, or delegate any obligation or duty of the Contractor under this agreement without the prior written approval of an official authorized to bind the District and an authorized representative of Contractor's surety or sureties. Any such purported assignment or delegation without such written approval on behalf of the District and the Contractor's sureties will be void and a material breach of this agreement subject to all available remedies under this agreement and at law and equity.
- 10. CERTIFICATION RE: CONTRACTOR'S LICENSE. By signing this Agreement the Contractor certifies that the Contractor holds a valid **Class A** license issued by the California State Contractors Licensing Board, and that the Contractor understands that failure to maintain its license in good standing throughout the performance of the Work may result in discipline and/or other penalties pursuant to the California Business and Professions Code, and may constitute a material breach of this agreement subject to all available remedies under this agreement and at law and equity.
- 11. SEVERABILITY. If any term or provision or portion of a term or provision of this Agreement is declared invalid or unenforceable by any court of lawful jurisdiction, then the remaining terms and provisions or portions of terms or provisions will not be affected thereby and will remain in full force and effect.
- 12. VENUE. This Agreement shall be governed and construed by the laws of the State of California. The parties agree that jurisdiction and venue of any dispute shall be in the Superior Court of the State of California in the County of Marin, exclusively.
- 13. ENTIRE AGREEMENT. This Agreement supersedes any and all other agreements, either oral or in writing, between the parties with respect to the subject of this agreement. This agreement contains all of the covenants and agreements between the parties with respect to the subject of this agreement, and each party acknowledges that no representations, inducements, promises, or agreements have been made by or on behalf of any party except the covenants and agreements embodied in this Agreement. No agreements, statement, or promise not contained in this Agreement shall be valid or binding between the parties with respect to the subject of this Agreement. Any modifications shall be in writing.

Executed on \_\_\_\_\_ by

CONTRACTOR

DISTRICT

By: \_\_\_\_\_

By: \_\_\_\_\_  
Curtis Paxton, General Manager

Las Gallinas Valley Sanitary District

Title: .

Attest:

[Attach Notary Page]

By: \_\_\_\_\_

LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**GENERAL CONDITIONS**

1. DEFINITIONS:

The following terms as used in any agreement of which these General Conditions are a part are defined as follows:

- 1.1 Agreement: The agreement between the District and Contractor concerning the Project, as evidenced by and comprised of the Contract Documents.
- 1.2 Architect or Engineer: The person or persons so specified on the title sheet of the Technical Specifications and/or Drawings.
- 1.3 Bid Package: All of the documents listed as comprising the entire Bid Package as specified in the Instructions to Bidders and representing the full set of documents made available to bidders on the Project.
- 1.4 District: Las Gallinas Valley Sanitary District
- 1.5 Documents: All those documents listed in the Project agreement as comprising the entire agreement between the District and the Contractor.
- 1.6 Construction Manager – The person, firm, designated in writing by the District to act as its representative at the construction site and to perform construction observation services and administrative functions relating to this Contract. All contact by the Contractor with the District shall be through the Construction Manager.
- 1.7 Contractor: The successful bidder for the Project and party to the Project agreement with the District as specified in the Project agreement.
- 1.8 Days: Unless otherwise specified in the Contract Documents, days mean working days. Where necessary for clarity, calendar days and working days are appropriately specified as such in the Contract Documents.
- 1.9 Project: The SECONDARY EFFLUENT LINE MODIFICATIONS project as described in the Technical Specifications and Drawings.
- 1.10 District Engineer: The District's authorized representative for administration and overall management of the Project agreement and Work. The District Engineer is the official point of contact between the District, the Architect and/or Engineer, and the Contractor.
- 1.11 Owner: Las Gallinas Valley Sanitary District
- 1.12 Drawings: The primarily graphic detailed requirements concerning the Project contained in Volume 4 of the Bid Package and any addenda to the Drawings signed by authorized District representatives and issued prior to bid opening, Equal Product

Proposals accepted by the District and signed by authorized District representatives prior to bid opening, and change orders and other amendments to the Drawings signed by authorized representatives of the District and the Contractor in accordance with the requirements of the Contract Documents.

- 1.13 Project Inspector: The party or parties charged by the District with inspecting the Work for compliance with the requirements of the Contract Documents and applicable laws and regulations. The Project Inspector acts under the direction of the District and shall coordinate with the District Engineer and Architect as directed by the District in accordance with the Contract Documents.
- 1.14 Subcontractor: A person, firm or corporation that is obligated as a party to a contract with the Contractor to perform part of the Project work. For purposes of these General Conditions Subcontractors include, but are not limited to, those that are obligated as parties to a contract with the Contractor to specially fabricate and install a portion of the Project Work according to the Technical Specifications and/or Drawings.
- 1.15 Technical Specifications: The detailed Project requirements contained in Volume 3 of the Bid Package and any addenda to the Technical Specifications signed by authorized District representatives and issued prior to bid opening, Equal Product Proposals accepted by the District and signed by authorized District representatives prior to bid opening, and change orders and other amendments to the Technical Specifications signed by authorized representatives of the District and the Contractor in accordance with the requirements of the Contract Documents.
- 1.16 Work: The furnishing of all equipment, tools, apparatus, facilities, material, labor and skill necessary to perform and complete in a good and workmanlike manner the Project as shown in the Technical Specifications and Drawings in accordance with the Contract Documents and applicable law.
- 1.16 Written Notice: Will be deemed to have been duly served for purposes of these General Conditions and any agreement of which they are a part if delivered in person to the individual or to a member of the firm or to any office of the corporation for whom the notice is intended, or if sent by registered or certified mail to the last known business address known to the party giving notice. Unless otherwise specified in the Contract Documents, the last known address of the Contractor shall be that listed in the Contractor's completed Proposal Cover Page and Bid Schedule.

## 2. SCOPE OF WORK

- 2.1 Documents Furnished by District. The District will furnish to the Contractor, free of charge, five (5) sets of half-size prints of the Drawings and Technical Specifications for execution of the Work. Throughout the performance of the Work the Contractor must keep one copy of the Drawings and Technical Specifications in good order and available for review by the District Engineer, the Engineer, the Architect, and any other District contractors or representatives.
- 2.2 Ownership of Documents Furnished by District. All documents furnished by the District, including, but not limited to, the Technical Specifications, Drawings, and any copies, are the property of the District. Documents furnished by the District may not to

be used on any other work. All documents furnished by the District must be returned to District upon completion of the Work.

### 2.3 Technical Specifications and Drawings.

2.3.1 The Technical Specifications and Drawings are complementary and intended to mutually describe the Work necessary to complete the Project in accordance with the Contract Documents.

2.3.2 In general, the Drawings indicate dimensions, position and kind of construction, and the Technical Specifications indicate qualities and methods. Any Work indicated on the Drawings and not mentioned in the Technical Specifications or vice versa must be furnished as though fully set forth in both. Work that is not particularly detailed, marked or specified shall be the same as similar Work that is detailed, marked or specified. The Contractor must furnish items necessary for the operation of equipment depicted in the Drawings or specified in the Technical Specifications that are suitable to allow such equipment to function properly at no extra charge.

2.3.3 The Contractor must notify the District Engineer and the Architect as soon as possible of any apparent errors or inconsistencies, including, but not limited to, typographical or notational errors in the Drawings, Technical Specifications, and/or in work done by others affecting the Work. The District Engineer will issue instructions concerning any such apparent errors or inconsistencies. If the Contractor proceeds with Work impacted by apparent errors or inconsistencies without instructions from the District Engineer, the Contractor shall do so at its sole risk and shall have all of the obligations and the District shall have all of the rights and remedies specified in Section 11 concerning any resulting damage or defect.

2.3.4 The General Conditions apply with equal force to all of the Work, including extra work authorized by the District Engineer in accordance with the Contract Documents. The Contractor must submit any required shop diagrams and/or drawings by the times and in the quantities indicated in the Technical Specifications. Any such shop diagrams and/or drawings must show completely the Work to be done, expanding on the Drawings concerning details not previously shown, field conditions and the condition of the Work. Architect or Engineer review of such shop diagrams and/or drawings will concern conformance with the requirements of the Contract Documents only. The Architect or Engineer assumes no responsibility for the correctness or accuracy of the dimensions, or any other contents of any shop diagrams and/or drawings submitted by the Contractor. The Contractor must check all dimensions at the Work site. Shop diagrams and/or drawings must be clearly marked with the name of the Project and the name of the Contractor, subcontractor or supplier making the submittal, and must be stamped and signed by the Contractor and submitted under a signed transmittal letter from the Contractor certifying that all dimensions have been checked at the Work site. These requirements are mandatory. The Architect or Engineer will not review shop diagrams and/or drawings that do not satisfy these requirements. The Contractor will be responsible for any and all discrepancies between dimensions of the actual Project site and/or Work and those shown on shop diagram and/or drawings

submitted by the Contractor, and for any other errors contained in or resulting from such shop diagrams and/or drawings, including, but not limited to, errors in material and/or equipment quantities and any resulting errors, delays or additional cost in the performance of the Work. The Contractor will have all of the obligations and the District will have all of the rights and remedies that are specified in Section 11 concerning any discrepancies or errors in shop diagrams and/or drawings submitted by the Contractor, and concerning any resulting errors, delays or additional costs in the performance of the Work.

### 3. CONTROL OF WORK AND MATERIAL

- 3.1 District Engineer's Status. The District Engineer will administer the Project in accordance with the Contract Documents. After execution of the agreement and issuance of the Notice to Proceed, all correspondence and/or instructions concerning the Project between the Contractor and/or District shall be forwarded through the District Engineer. Except as otherwise provided in the Contract Documents, the District Engineer will not be responsible for and will not have control or charge of construction means, methods, techniques, or procedures or for safety precautions in connection with the Work. The District Engineer, however, will have authority to reject materials and/or workmanship that do not conform to the requirements of the Contract Documents. The District Engineer will also have the authority to require inspection or testing of the Work.
- 3.2 Architect or Engineer's Status. The Architect or Engineer will advise the District Engineer concerning decisions on all claims of the Contractor and all other matters relating to the execution and progress of the Work or the interpretation of the Contract Documents. The Architect or Engineer will also advise the Construction Manger concerning Work that does not conform to the Contract Documents. Whenever, in the Architect's or Engineer's opinion, it is necessary or advisable in accordance with the Contract Documents, the Architect or Engineer may recommend to the District Engineer inspection or testing of the Work, whether or not such Work is then fabricated, installed or completed.
- 3.3 Inspection and Testing of Work and Material.
  - 3.3.1 The District, the District Engineer, the Architect or Engineer and their representatives will have access to the Work at all times wherever it is in preparation or progress. The Contractor must provide proper facilities for such access and for inspection.
  - 3.3.2 The Contractor must inspect all materials as delivered and promptly return all defective materials without waiting for their rejection by the District Engineer or Architect or Engineer.
  - 3.3.3 If the District Engineer, the Technical Specifications, or any laws, ordinances, or any public authority require any Work to be tested or approved, the Contractor must give the District Engineer timely notice of the Contractor's readiness for inspection. Inspections will be promptly made, and where practicable, at the source of supply. Any work subject to such testing that is covered up without timely notice to the District Engineer or without the approval or consent of the District Engineer must, if required by the District Engineer, be uncovered for examination at the Contractor's expense. The Contractor will have all of the

obligations and the District will have all of the rights and remedies that are specified in Section 11 concerning any work subject to testing that is covered up without timely notice to the District Engineer and that is not uncovered for examination at the Contractor's Expense if required by the District Engineer.

- 3.3.4 Tests of materials or qualification tests required by the Contract Documents must be made in accordance with the Technical Specifications and the requirements of the California Building Standards Code as adopted by the District and other applicable law. Copies of all testing reports shall be distributed as required in the Technical Specifications.
- 3.3.5 The District or its representatives may order re-examination of questioned Work. If ordered to do so, the Contractor must uncover such Work. If such Work is found to be according to the Contract Documents, the District shall pay the cost of uncovering and restoring the Work, unless such Work was subject to testing and covered up without timely notice to or approval of the District Engineer. If re-examined Work is found not in accordance with the Contract Documents, the Contractor must pay the cost of uncovering and restoring the Work. The Contractor will have all of the obligations and the District will have all of the rights and remedies that are specified in Section 11 concerning any re-examined Work not in accordance with the Contract Documents that the Contractor fails to uncover and restore at the Contractor's expense.
- 3.3.6 The Contractor must replace or correct without charge any material or workmanship found not to conform to the requirements of the Contract Documents, unless the District consents to accept such material or workmanship with an appropriate adjustment in the Contract Price. The Contractor must promptly segregate and remove non-conforming material from the Work site. The Contractor will have all of the obligations and the District will have all of the rights and remedies that are specified in Section 11 concerning any failure by the Contractor to replace or correct without charge any material or workmanship that does not conform to the requirements of the Contract Documents and that the District has not consented to accept.
- 3.4 Samples Furnished by the Contractor. The Contractor must furnish all samples for approval as directed in sufficient time to permit the Architect or Engineer to examine, approve and select samples before they are required by the progress of the Work. Portions of the Work for which samples are required and for which the Architect or Engineer has selected samples must be in accordance with such approved samples. Samples must be sent prepaid to the office of the District Engineer or to such place as the District Engineer may direct.
- 3.5 Materials and Substitutions.
  - 3.5.1 Materials used for the Work must be new and of the quality specified. When not particularly specified, materials must be the best of their class or kind. The Contractor must, if required, submit satisfactory evidence as to the kind and quality of materials.
  - 3.5.2 If the Contractor submitted complete information to the District Engineer for products proposed as equals in accordance with the Bid Package, and the District approved such products proposed as equals in writing, the Contractor

may either furnish such products approved as equals, or furnish the products listed by manufacturer name, brand or model number in the Technical Specifications or Drawings. The District retains the right, in its sole discretion, to accept or reject any other proposed substitution. To be considered, proposals concerning products proposed as equals must include sufficient information to permit the District to determine whether the products proposed as equals will satisfy the same performance requirements as products listed by manufacturer's name, brand or model number. Such performance requirements may include, but are not limited to, size, strength, function, appearance, ease of maintenance and repair, and useful life requirements. If the District does not accept a proposed substitution, the Contractor must furnish the product specified in the Technical Specifications or Drawings for the Contract Price, regardless of whether the product is specified by manufacturer's name, brand or model number, or otherwise.

3.5.3. During the performance of the Work, all materials must be neatly stacked, properly protected from the weather and other adverse impacts, and placed so as to avoid interference with efficient progress of the Work, with other activities of the District, or with the use of existing District facilities by the public. All materials must be delivered so as to ensure efficient and uninterrupted progress of the Work. Materials must be stored so as to cause no obstruction and so as to prevent overloading of any portion of the Work. The Contractor will be responsible for damage or loss of materials delivered to and/or stored at the Work site due to weather or other causes. The Contractor must promptly remove from the Work site all materials rejected by the District or its representatives as failing to conform to the requirements of the Contract Documents, whether such non-conforming materials have been incorporated in the Work or not. If the District or its representatives so direct, the Contractor must promptly replace and re-execute Work performed by the Contractor and order the replacement and re-execution of Work performed by subcontractors using non-conforming materials with materials that satisfy the requirements of the Contract Documents without expense to the District. The Contractor will bear the expense of making good all Work destroyed or damaged by such removal. The Contractor will have all of the obligations and the District will have all of the rights and remedies that are specified in Section 11 concerning any failure by the Contractor to replace or re-execute Work using non-conforming materials, and/or to make good all work destroyed or damaged by such removal and/or execution.

3.6 Audits and Examination of Records. The District may examine and audit at no additional cost to the District all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports and other Project related data of the Contractor, subcontractors engaged in performance of the Work, and suppliers providing supplies, equipment and other materials required for the Work, including computations and projections related to bidding, negotiating, pricing or performing the Work or contract modifications and other materials concerning the Work, including, but not limited to, Contractor daily logs, in order to evaluate the accuracy, completeness, and currency of cost, pricing, scheduling and any other project related data. The Contractor will make available all such Project related data at all reasonable times for examination, audit, or reproduction at the Contractor's business office at or near the Work site, and at any other location where such Project related data may be kept until

three years after final payment under the Agreement. Pursuant to California Government Code Section 8546.7, if the amount of public funds to be expended is in excess of \$10,000, this Agreement shall be subject to the examination and audit of the State Auditor, at the request of the District, or as part of any audit of the District, for a period of three (3) years after final payment under the Agreement.

- 3.7 Advertising. No advertising signs of any kind may be displayed on the Work site, or on fences, offices or elsewhere adjacent to the Work site.
- 3.8 Project Schedule. Within seven (7) calendar days of the Notice to Proceed, the Contractor shall submit a schedule showing each task of Work, the sequence of each task, the number of days required to complete each task, and the critical path controlling the completion of the entire Work. The schedule shall allow for the completion of the entire Work within the Time for Completion.
  - 3.8.1 District Review of Schedule. The District may review the Contractor's submitted schedule and may note any exceptions. The Contractor shall correct any exceptions noted by the District within five (5) working days of being notified of the exceptions.
  - 3.8.2 Update of Schedule. After submission of a schedule to which the District has taken no exceptions, the Contractor shall submit an updated schedule on a biweekly basis until completion of the Work. The updated schedule shall show the progress of Work as of the date specified in the updated schedule.
  - 3.8.3 Float. The schedule shall show early and late completion dates for each task. The number of working days between these dates shall be designated as "float". The Float shall be designated to the Project and shall be available to both the District and the Contractor as needed.
  - 3.8.4 Failure to Submit Schedule. If the Contractor fails to submit the schedule within the time period specified in Section 3.8, or the updated schedule as specified in Section 3.8.2, or submit a schedule to which the District has taken uncorrected exceptions, **the District shall be entitled to withhold payment for the next application for payment submitted after the schedule or updated schedule becomes late.**
  - 3.8.5 Responsibility for Schedule. The Contractor shall have sole and exclusive responsibility for creating the schedule and properly updating it. The District has no authority to approve the schedule. The District may note exceptions to any schedule submitted by the Contractor. However, it shall be the Contractor's sole responsibility to determine the proper method to address exceptions and the District's review of the schedule shall not serve to place any such obligation on the District.

#### 4. CHANGES IN WORK

- 4.1 District Directed Change Orders. The District may at any time during the progress of the Work direct any amendments to the Work or any of the Contract Documents, including, but not limited to the Technical Specifications, or Drawings. Such amendments will in no way void the agreement, but will be applied to amend the

Contract Price, if such amendments affect the Contract Price, the Project schedule, if such amendments affect the Project schedule, or any other provision of the Contract Documents based on a fair and reasonable valuation of the amendment in accordance with this Section 4.

- 4.2 Writing Requirement. Change orders and other amendments to the Technical Specifications, the Drawings, or other Contract Documents may be made only by a writing executed by authorized representatives of the District and the Contractor.
- 4.3 Contractor Proposed Change Orders. Unless the District Engineer otherwise authorizes or the District and the Contractor otherwise agree, change order proposals submitted by the Contractor must be submitted to the District Engineer no later than the time of the proposed change.
- 4.4 All Change Orders. All change order proposals must be submitted on completed Change Order forms provided in the Contract Documents. All such change order proposals must itemize all cost impacts of the proposed change order and include a total price for that change order and the amended Contract Price that would become effective upon execution of the change order. All change order proposals must specify any change in the Project schedule, or in any project milestone including, but not limited to, the Time for Completion, under the change order. It is understood that change orders that do not specify a change in any milestone, including, but not limited to, the Time for Completion, may be accomplished by the Time for Completion then in effect.
- 4.5 Change Order Pricing. Change order pricing will be governed by the following:
  - 4.5.1 Unit prices specified in the Contract Documents will apply to cost impacts involving items for which the Contract Documents specify unit prices.
  - 4.5.2 Cost impacts involving items for which no unit prices are specified will be calculated by adding the itemized actual direct cost that would be added or reduced under the change order and an allowance for indirect costs in accordance with this Section. Itemization for direct costs for required labor must include the classifications of labor required, the total hours required for each classification, the hourly rate for each classification and other labor related costs such as liability and workers compensation insurance, social security, retirement and unemployment insurance. All other cost impacts for which no unit prices are specified must be itemized as appropriate, including the cost of tools, vehicles, phones and other equipment, and the cost of all required materials or supplies. Indirect costs added under a change order may not exceed an allowance of fifteen (15) percent of the total of combined Contractor and subcontractor direct costs added under the change order. Such allowance covers Contractor overhead and profit under the change order and includes the cost of insurance in addition to that required pursuant to Section 8.8, bond premiums, superintendent labor, clerical labor, home office expenses, worksite office expenses, and utility costs under the change order. Such costs may not be itemized as direct costs under a change order. Indirect costs deducted under a change order will be calculated in exactly the same way as indirect costs added under a change order, except indirect costs deducted under a change order may not exceed an allowance of seven and a half (7.5) percent of the

total of combined Contractor and subcontractor direct costs deducted under the change order.

- 4.6 Liability Under Unapproved Change Orders. The Contractor shall be solely responsible for any and all losses, costs, or liabilities of any kind incurred by the Contractor, any subcontractor engaged in the performance of the Work, any party supplying material or equipment for the Work or any third party that are incurred pursuant to Contractor-proposed change orders prior to issuance of an approved change order executed in accordance with this Section 4. The Contractor will have all of the obligations and the District will have all of the rights and remedies that are specified in Section 11 concerning any work or resulting losses, costs, or liabilities pursuant to a Contractor proposed change order before issuance of an approved change order executed in accordance with this Section 4.
- 4.7 Changes Subject to Contract Documents. Any changes in the Work and/or the Contract Documents pursuant to change orders and any other amendments issued in accordance with the Contract Documents, including this Section 4, will in all respects be subject to all provisions of the Contract Documents, including, but not limited to, the Technical Specifications and the Drawings, except as modified by such change orders or amendments.
- 4.8 Change Order Disputes.
- 4.8.1 Disputed District Directed Change Orders. If the Contractor disputes a District directed change order following a reasonable effort by the District and the Contractor to resolve the dispute including, at a minimum, a meeting between appropriate representatives of the Contractor and the District, the Contractor must commence performing the Work consistent with the disputed change order within five (5) working days of the last meeting between representatives of the Contractor and the District to resolve the dispute, or within the time specified in the disputed District directed change order, whichever is later. In performing Work consistent with a disputed District-directed change order pursuant to this provision the Contractor will have all of the Contractor's rights concerning claims pursuant to the Contract Documents and applicable law.
- 4.8.2 Disputed Contractor Proposed Change Orders. If the District disputes a Contractor proposed change order, the District and the Contractor will use reasonable efforts to resolve the dispute including, at a minimum, holding a meeting between appropriate representatives of the Contractor and the District. Regardless of and throughout any such efforts to resolve the dispute the Contractor must continue performing the Work irrespective of and unmodified by the disputed change order. In continuing to perform the Work, the Contractor will retain all of the Contractor's rights under contract or law pertaining to resolution of disputes and protests between contracting parties. Disputes between the District and the Contractor concerning any Contractor-proposed change order or other amendment do not excuse the Contractor's obligation to perform the Work in accordance with the Contract Documents excluding such Contractor-proposed change order or other amendment by the Time for Completion or waive any other Project milestone or other requirement of the Contract Documents.

## 5. TRENCHING AND UTILITIES

5.1 Excavation More Than Four Feet Deep. In accordance with California Public Contract Code Section 7104, if the Work involves excavation more than four feet deep the Contractor must promptly notify the District in writing before disturbing: any material that the Contractor believes may be hazardous waste, as defined in Section 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 provisions of existing law; any subsurface or latent physical conditions at the Work site differing from those indicated; or any unknown physical conditions at the Work site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents. The District will promptly investigate any such conditions for which notice is given. If the District finds that the conditions do materially differ, or involve hazardous waste, and would cause a decrease or increase in the cost or time of performance of the Work, the District will issue a change order pursuant to Section 4 of these General Conditions. If a dispute arises between the District and the Contractor concerning whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the cost or time of performance, the Contractor will not be excused from any completion date provided in the Contract Documents, but shall proceed with all Work to be performed. The Contractor will retain all rights under contract or law pertaining to resolution of disputes and protests between contracting parties.

5.2 Excavation of Five Feet or More. In accordance with California Labor Code Section 6705, contractors performing contracts exceeding \$25,000 in cost and involving excavation five or more feet deep must submit for the District's acceptance, prior to excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during excavation. If the plan varies from the shoring system standards, it must be prepared by a registered civil or structural engineer.

### 5.3 Existing Utilities.

5.3.1 General – The location of known existing utilities and pipelines are shown on the Plans in their approximate locations. However, nothing herein shall be deemed to require the District to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the site of the project can be inferred from the presence of other visible facilities, such as buildings, cleanouts, meter and junction boxes, on or adjacent to the site of the Project.

The District will assume the responsibility for the timely removal, relocation, or protection of existing main or trunk line utility facilities located on the Project site if such utilities are not identified by the District in the Contract Documents or which cannot reasonably be inferred from the presence of other visible facilities.

5.3.2 Utility Location – It shall be the Contractor's responsibility to determine the exact location and depth of all utilities, including service connections, which have been marked by the respective utility owners and which the Contractor believes may affect or be affected by the Contractor's operations. The Contractor shall not be entitled to additional compensation nor time extensions

for work necessary to avoid interferences nor for repair to damaged utilities if the Contractor does not expose all such existing utilities as required by this section.

The locating of utilities shall be in conformance with Government Code Section 4216 et seq. except for the District's utilities located on the District's property and not on public right-of-way.

A "High Priority Subsurface Installation" is defined in Section 4216 (e) as "high-pressure natural gas pipelines with normal operating pressures greater than 415kPA gauge (60psig) or greater than six inches nominal pipe diameter, petroleum pipelines, pressurized sewage pipelines, high-voltage electric supply lines, conductors, or cables that have a potential to ground of greater than or equal to 60kv, or hazardous materials pipelines that are potentially hazardous to workers or the public if damaged."

A "Subsurface Installation" is defined in Section 4216 (l) as "any underground pipeline, conduit, duct, wire, or other structure, except non-pressurized sewer lines, non-pressurized storm drains, or other non-pressurized drain lines."

Pursuant to Government Code Section 4216.2 the Contractor shall contact the appropriate regional notification center at least two (2) working days but not more than fourteen (14) calendar days before performing any excavation. The Contractor shall request that the utility owners conduct a utility survey and mark or otherwise indicate the location of their service. The Contractor shall furnish to the Construction Manager written documentation of its contact(s) with the regional notification center prior to commencing excavation at such locations.

After the utility survey is completed, the Contractor shall commence "potholing" or hand digging to determine the actual location of the pipe, duct, or conduit. The Construction Manager and District Engineer shall be given notice prior to commencing potholing operations. The Contractor shall uncover all piping and conduits, to a point one (1) foot below the pipe, where crossings, interferences, or connections are shown on the Drawings, prior to trenching or excavating for any pipe or structures, to determine actual elevations. New pipelines shall be laid to such grade as to clear all existing facilities, which are to remain in service for any period subsequent to the construction of the run of pipe involved.

The Contractor's attention is directed to the requirements of Government Code Section 4216.2 (a)(2) which provides: "When the excavation is proposed within 10 feet of a high priority subsurface installation, the operator of the high priority subsurface installation shall notify the excavator of the existence of the high priority subsurface installation prior to the legal excavation start date and time, as such date and time are authorized pursuant to paragraph (1) of subdivision (a) of 4216.2. The excavator and the operator or its representative shall conduct an onsite meeting at a mutually-agreed-on time to determine actions or activities required to verify the location of the high priority subsurface installation prior to start time." The Contractor shall notify the Construction Manager and District Engineer in advance of this meeting.

- 5.3.4. Utility Relocation and Repair – If interferences occur at locations other than those indicated in the Contract Documents with reasonable accuracy, the Contractor shall notify the Construction Manager and District Engineer in writing. The Construction Manager will supply a method for correcting said interferences in accordance with the responsibilities of this section and Government Code Section 4215.

Care shall be exercised by the Contractor to prevent damage to adjacent existing facilities and public or private works; where equipment will pass over these obstructions, suitable planking shall be placed. If high priority subsurface installations are damaged and the operator cannot be contacted, the Contractor shall call 911 emergency services.

The District will compensate the Contractor for the costs of locating and repairing damage not due to the failure of the Contractor to exercise reasonable care, and for removing or relocating such main or trunk line utility facilities not indicated in the Contract Documents with reasonable accuracy, and for the cost of equipment on the Project necessarily idled during such work. The payment for such costs will be made as provided in Section 4, Change Orders. The Contractor shall not be assessed liquidated damages for delay in completion of the Project, when such delay is caused by the failure of the District or utility company to provide for removal or relocation of such utility facilities.

The public utility, where they are the owner of the effected utility, shall have the sole discretion to perform repairs or relocation work or permit the Contractor to do such repairs or relocation work at a reasonable price. The right is reserved to the District and the owners of utilities or their authorized agents to enter upon the Work area for the purpose of making such changes as are necessary for the rearrangement of their facilities or for making necessary connections or repairs to their properties. The Contractor shall cooperate with forces engaged in such work and shall conduct its operations in such a manner as to avoid any unnecessary delay or hindrance to the work being performed by such forces and shall allow the respective utilities time to relocate their facility.

When the Contract Documents indicate that a utility is to be relocated, altered or constructed by others, the District will conduct all negotiations with the utility company and the work will be done at no cost to the Contractor, unless otherwise stipulated in the Agreement.

Temporary or permanent relocation or alteration of utilities desired by the Contractor for its own convenience shall be the Contractor's responsibility and it shall make arrangements and bear all costs for such work.

## 6. PROJECT FACILITIES

- 6.1 Work Site Offices. Any Work site office facilities used by the Contractor and/or its privities must conform to all applicable codes, ordinances, and regulations. The cost of such Work site office facilities shall be paid from the included in the Contract Price.

6.2 District Rights of Access and Ownership. The District and its authorized representatives will at all reasonable times while such office facilities are located at the Work site (including, at a minimum, all times during which the Work is performed), have access to any such Work site office facilities used by the Contractor and/or its privities. With respect to the right of access of the District and its authorized representatives, neither the Contractor nor its privities shall have a reasonable expectation of privacy pursuant to the Fourth Amendment to the Unites States Constitution or other applicable law concerning such Work site office facilities used by the Contractor and/or its privities. Without exception, any and all Project related materials located at such Work site facilities will be deemed at all times to be District property subject to inspection and copying by the District and its authorized representatives at all reasonable times while such facilities are located at the Work site (including, at a minimum, all times during which the Work is performed). Any interference by the Contractor or its privities with the District's rights of access and/or ownership pursuant to this Section 6 will constitute a material breach of the Agreement subject to any and all remedies available pursuant to the Contract Documents and at law and equity.

## 7. PROSECUTION AND PROGRESS OF THE WORK

7.1 Liquidated Damages. Time is of the essence in the Agreement. The District and the Contractor agree that it will be difficult and/or impossible to determine the actual damage which the District will sustain in the event of the Contractor's failure to fully perform the Work or to fully perform all of the Contractor's obligations that have accrued pursuant to the Agreement by the Time for Completion. Accordingly, the District and the Contractor agree in accordance with California Government Code Section 53069.85 that the Contractor will forfeit and pay to the District liquidated damages in the sum of \$1,000 per day for each and every calendar day completion of the Work and/or performance of all of the Contractor's obligations that have accrued pursuant to the Agreement is delayed beyond the Time for Completion. The District and the Contractor further agree in accordance with California Government Code Section 53069.85 that the liquidated damages sum specified in this provision is not manifestly unreasonable under the circumstances existing at the time the Agreement was made, and that the District may deduct liquidated damages sums in accordance with this provision from any payments due or that may become due the Contractor under the Agreement.

7.2 No Damage for Delay Beyond District and Contractor Control. The Contractor will not be held responsible for delays in performance of the Work caused by delay beyond the control of both District and Contractor, such as by strikes, lockouts, or labor disturbances that are not within the control of the contractor to resolve, lack or failure of transportation, or acts of other government entities. This provision will not apply where the delay would not have occurred but for a previous contractor caused delay in the prosecution of the Work. The District will not be liable to the Contractor, any subcontractor or other entity engaged in the performance of the Work, any supplier, or any other person or organization, or to any surety or employee or agent of any of them, for damages arising out of or resulting from (i) delays beyond the control of the District and the Contractor including but not limited to fires, floods, epidemics, abnormal weather conditions, earthquakes and acts of God or acts or neglect by utility owners or other contractors performing other work, or (ii) delays caused by the District,

its officials, officers, employees, agents, or volunteers, or delays caused by the District Engineer or the Architect or Engineer, which delays are reasonable under the circumstances involved and/or are within the contemplation of the District and the Contractor. An extension of the Time for Performance in an amount equal to the time loss due to such delay(s) will be the Contractor's sole and exclusive remedy for such delay(s).

- 7.3 No Damage for Contractor Caused Delay. Contractor shall not be entitled to additional compensation for extended field or home office overhead, field supervision, costs of capital, interest, escalation charges, acceleration costs or other impacts for any delays to the extent such delays are caused by the failure of the Contractor or any subcontractor or other entity engaged in performance of the Work to perform the Work in accordance with the Contract Documents. Contractor may be eligible for additional compensation in excess of the Contract Price for delays caused by the District and/or its privities.
- 7.4 No Damage for Other Delay. Contractor will not be entitled to damages for delay to the Work caused by the following, which the District and Contractor agree will be deemed for purposes of California Public Contract Code Section 7102 either not caused by the District, and/or within the contemplation of the District and the Contractor, and/or reasonable under the circumstances:
- 7.4.1 Exercise of the District's right to sequence the Work in a manner that would avoid disruption to the District and other contractors based on: the failure of the Contractor or any subcontractor or other entity engaged in the performance of the Work to perform the Work in accordance with the Contract Documents, enforcement by the District or any other governmental agency of competent jurisdiction of any government act or regulation, or enforcement by the District of any provisions of the Agreement.
- 7.4.2 Requests for clarification or information concerning the Contract Documents or proposed change orders or modifications to the Contract Documents, including extensive and/or numerous such requests for clarification or information or proposed change orders or modifications, provided such clarifications or information or proposed change orders or modifications are processed by the District or its representatives in a reasonable time in accordance with the Contract Documents.
- 7.5 Delays Caused by the District and/or Its Privities. Either the District or the Contractor may propose a change in the Time for Completion for delays that are purported to be caused by the District and/or its privities and that are not reasonable under the circumstances involved and/or that are not within the contemplation of the District and the Contractor. Such proposed changes in the Time for Completion will constitute change order proposals subject to Section 4. In accordance with Section 4, the District and the Contractor may agree upon pricing for the cost impacts, if any, resulting from such delays. If such pricing is in anticipation of cost impacts that may, but have not yet occurred, the District will be obligated to pay the Contractor for such anticipated impacts in accordance with the Agreement and any applicable, approved change orders only to the extent the Contractor actually incurs the anticipated cost impacts. Notwithstanding anything to the contrary in Section 4.5.2, the District and the Contractor may agree to a daily rate or cap or lump sum that will apply to the cost

impacts, if any, resulting from delay purportedly caused by the District and/or its privities subject to this provision. However, if such daily rate or cap or lump sum is in anticipation of cost impacts that have not yet occurred, the District will be obligated to pay such daily rate or cap or lump sum only to the extent the Contractor actually incurs such cost impacts.

7.5.1 Weather Delays. Extensions of the Time for Completion will not be allowed for weather conditions that are consistent with the following list of anticipated rain days based on historical weather data of the National Oceanographic and Atmospheric Administration of the U.S. Department of Commerce for the record station that is nearest or most applicable to the Work site. Extensions of the Time for Completion for delays due to adverse weather will be allowed only if the number of rain days exceeds those listed in the following table and the Contractor can verify to the District's reasonable satisfaction that such adverse weather caused actual delay in the timely completion of the Work. No extensions of the Time for Completion will be granted for rain days in addition to those listed in the following table that merely result in delays that do not or would not, themselves, result in failure to complete the Work by the Time for Completion. Anticipated weather delays, which may include rain, strong wind, or other types of inclement weather conditions, are as follows:

|                         |         |
|-------------------------|---------|
| August through October: | 4 days  |
| November through April: | 40 days |
| May through July        | 4 days  |

7.6 Delay Claims. Whenever the Contractor claims a delay for which the Time for Completion may be extended, the Contractor must request an extension of time within five (5) working days of the start of the delay. The request must be in writing and describe in detail the cause for the delay, and, if possible, the foreseeable extent of the delay.

#### 7.7 Contractor Coordination of the Work.

7.7.1 The District reserves the right to do other work in connection with or in the vicinity of the Project by contract or otherwise, and Contractor shall at all times conduct the Work so as to impose no hardship on the District, others engaged in the Work or other contractors working at the Work site. The Contractor will adjust, correct and coordinate the Work with the work of others so that no delays result in the Work or other work at or near the Work site.

7.7.2 If any part of the Work depends for proper execution or results upon the work of the District or any other contractor, the Contractor will, before proceeding with such Work, promptly report to the District any apparent discrepancies or defects in such other Work. Failure of the Contractor to promptly report any apparent discrepancy or defect will be deemed an acceptance of the District's or other contractor's Work as fit and proper.

7.7.3 The Contractor will anticipate the relations of the various trades to the progress of the Work and will ensure that required anchorage or blocking is furnished and set at proper times. Anchorage and blocking necessary for each trade shall be part of the Work except where stated otherwise.

7.7.4 The Contractor will provide proper facilities at all times for access of the District, the District Engineer, Architect or Engineer, and other authorized District representatives to conveniently examine and inspect the Work.

#### 7.8 Suspension of Work

7.8.1 If the Contractor fails to correct defective work, or fails to carry out the Work in accordance with the Contract Documents or any other applicable rules and regulations, the District, by a written order of the District's representative or signed personally by an agent specifically so empowered by the District, in writing, may order the Contractor to stop the work, in its entirety or any portion thereof. In the event of a suspension of only a portion of the work, the Contractor is obligated to perform the portion of the work not suspended. The Suspension of Work shall remain in effect until the condition or cause for such order has been eliminated. The District's concurrence that the condition or cause has been eliminated will be provided to the Contractor in writing. This right of the District to stop and suspend the Work shall not give rise to any duty on the part of the District to exercise this right for the benefit of the Contractor or any other person or entity. All delays in the Work occasioned by such stoppage shall not relieve the Contractor of any duty to perform the Work or serve to extend the time for its completion. Any and all necessary corrective work done in order to comply with the Contract Documents shall be performed at no cost to the District.

7.8.2 In the event that a suspension of Work is ordered, as provided in this paragraph, the Contractor, at its expense, shall perform all work necessary to provide a safe, smooth, and unobstructed passageway through construction for use by public, pedestrian, and vehicular traffic, during the period of such use by suspension. Should the Contractor fail to perform the Work as specified, the District may perform such work and the cost thereof may be deducted from partial payments and/or final payment due the Contractor under the Contract.

7.8.3 The District shall also have authority to suspend the Work wholly or in part, for such period as the District may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the Work. Such temporary suspension of the Work will be considered justification for time extensions to the Contract in an amount equal to the period of such suspension if such suspended work includes the current critical activity on the latest favorably reviewed progress schedule. The Contractor as directed by the District shall comply with the provisions in Section 7.8.2 above. Such additional work shall be compensated as provided for in Section 4, Changes in Work.

### 8. CONTRACTOR RESPONSIBILITIES

8.1. Eligibility. By executing the Agreement, the Contractor certifies that the Contractor is not ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7. In accordance with California Public Contract Code Section 6109(a), contractors who are ineligible to perform work on public works

projects pursuant to California Labor Code Sections 1777.1 or 1777.7 may neither bid on, be awarded or perform the Work. The Contractor shall hold harmless and indemnify the District from and against any and all damages, costs, and liability arising from or as a consequence of any violation of Public Contract Code Section 6109.

- 8.2 Supervision of the Work. The Contractor will be solely responsible for the performance of the Work, including portions of the Work to be performed by subcontractors. The Contractor is charged with ensuring that all orders or instructions from the District, District Engineer or Architect are disseminated to and followed by all subcontractors engaged in performance of the Work. The Contractor will supervise the Work using the Contractor's best skill and attention. At any time during the progress of the Work, the District, the District Engineer, or the Architect may require the Contractor and/or subcontractors engaged in performance of the Work to attend a project meeting and the Contractor will attend, and ensure the attendance of any subcontractors whose attendance is required by the District and/or advisable in light of the matters to be addressed at the meeting.
- 8.3 Contractor's Superintendent. The Contractor will keep on the Work, throughout its progress, a competent superintendent and any necessary assistants, all satisfactory to the District. The superintendent may not be changed without the consent of the District. The superintendent will represent the Contractor and all directions given by the District to the superintendent will bind the Contractor in accordance with the Agreement. Superintendent time included in Contractor's completed Bid Schedule and/or in approved change orders, if any, must be included in Contractor's approved overhead rate and may not be charged as a direct cost.
- 8.4 Competent Employees. The Contractor must at all times enforce strict discipline and good order among the Contractor's employees and may not employ on the Work any unfit person or anyone not skilled in the Work assigned, or anyone incompetent or unfit for the duties of that person. When the District determines that a Contractor employee does not satisfy the requirements of this provision, upon notice from the District, the Contractor must ensure that employee performs no further Work and is no longer present at the Work site. Any such Contractor employee may not again be employed on the Work without District approval.
- 8.5 Items Necessary for Proper Completion of the Work. Except as otherwise noted in the Contract Documents, the Contractor will provide and pay for all labor, materials, equipment, permits, fees, licenses, facilities and services necessary for the proper execution and timely completion of the Work in accordance with the Contract Documents.
- 8.6 Construction Reports. The Contractor must submit daily construction reports detailing the daily progress of the Work to the District Engineer on a weekly basis.
- 8.7 Subcontracting.
  - 8.7.1 By executing the Agreement, the Contractor certifies that no subcontractor included on the list of proposed subcontractors submitted with the Contractor's bid is ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7. In accordance with California Public Contract Code Section 6109(a), subcontractors who are ineligible to perform

work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7 may neither bid on, be awarded or perform as a subcontractor on the Work. In accordance with California Public Contract Code Section 6109(b), any contract on a public works project entered into between a contractor and a debarred subcontractor is void as a matter of law. The Contractor will ensure that no debarred subcontractor receives any public money for performing the Work, and any public money that may have been paid to a debarred subcontractor for the Work is returned to the District. The Contractor will be responsible for payment of wages to workers of a debarred subcontractor who has been allowed to perform the Work.

- 8.7.2 The Agreement and the performance of the Work are subject to the requirements of the Subletting and Subcontracting Fair Practices Act codified at California Public Contract Code Section 4100 and following. If the Contractor fails to specify a subcontractor or specifies more than one subcontractor for the same portion of the Work in excess of one-half of 1 percent of the Contractor's total bid, the Contractor agrees that the Contractor is fully qualified to perform that portion of the Work with the Contractor's own forces, and that the Contractor will perform that portion of the Work with the Contractor's own forces. If after award of the Agreement the Contractor subcontracts, except as provided for in California Public Contract Code Sections 4107 or 4109, any such portion of the Work, the Contractor will be subject to the penalties set forth in California Public Contract Code Sections 4110 and 4111, including cancellation of the Agreement, assessment of a penalty of up to 10 percent of the amount of the subcontract, and disciplinary action by the Contractors State License Board.
- 8.7.3. No contractual relationship exists between the District and any subcontractor engaged in performance of the Work.
- 8.7.4 Incorporation of Contract Documents. The Contractor must incorporate the Contract Documents in each contract with a subcontractor engaged in the performance of the Work. The Contractor shall be solely responsible for any delay or additional costs incurred as a result of its failure to provide adequate or accurate project information to a subcontractor that results in improper submittals and/or work, or time or other impacts is the sole responsibility of the Contractor. The Contractor will have all of the obligations and the District will have all of the remedies that are specified in Section 11.
- 8.7.5 Coordination of Subcontract Work: The Contractor is responsible for scheduling the Work of subcontractors so as to avoid delay or injury to either Work or materials.

## 8.8 Insurance.

- 8.8.1 All required insurance shall be provided in the form of "occurrence"-type policies underwritten by admitted insurers in the State of California with a current A.M. Best rating of no less than A: VII, unless otherwise acceptable to the District. All policies must be issued at the expense of the Contractor and must be maintained at the Contractor's expense throughout the performance of the Work. Coverage should be maintained for a minimum of five (5) years after contract completion.

- 8.8.2 The Contractor and any subcontractors engaged in performance of the Work must secure payment of workers compensation in accordance with California Labor Code Section 3700 and other applicable law. The Contractor must verify that all Subcontractors comply with this requirement.
- 8.8.3 Within seven (7) calendar days following Notice of Award the Contractor must submit to the District along with executed copies of all other documents specified in the Contract Check List certificates of insurance and endorsements evidencing that the Contractor has in effect and will maintain throughout the performance of the Work the following kinds and amounts of insurance:
- 8.8.3.1 Worker's Compensation Insurance. In accordance with the provisions of Article 5, Chapter 1, Part 7, Division 2 (commencing with Section 1860) and Chapter 4, Part 1, Division 4 (commencing with Section 3700) of the Labor Code of the State of California, the Contractor is required to secure the payment of compensation to its employees and for that purpose obtain and keep in effect adequate Workers' Compensation Insurance. If the Contractor, in the sole discretion of the District, satisfies the District of the responsibility and capacity under the applicable Workers' Compensation Laws, if any, to act as self-insurer, the Contractor may so act, and in such case, the insurance required by this paragraph need not be provided. The Contractor is advised of the provisions of Section 3700 of the Labor Code, 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 shall comply with such provisions and have Employers' Liability limits of **\$1,000,000** per accident and per employee, and in the aggregate for injury by disease, before commencing the performance of the work of this Contract. Before the Notice to Proceed with the Work under this Contract is issued, the Contractor shall submit written evidence that the Contractor has obtained for the period of the Contract Workers' Compensation and Employer's Liability Insurance as required for all persons whom it employs or may employ in carrying out the work under this Contract. Such evidence of coverage shall be accompanied by an endorsement from the insurer agreeing to waive all rights of subrogation against the District, its officers, officials, employees, agents and volunteers, the Design Consultants, the Construction Manager and their agents, consultants and employees which might arise by reason of any payment under the policy. This insurance shall be in accordance with the requirements of the most current and applicable State Workers' Compensation Insurance Laws.
- 8.8.3.2 Commercial General Liability and Automobile Liability Insurance - This insurance shall protect the Contractor from claims for bodily injury, personal injury and property damage which may arise because of the nature of the work or from operations under this Contract. The Commercial General Liability Insurance shall be maintained for five (5) years after final completion and shall provide coverage on an occurrence basis.

a. Additional Insureds - The Commercial General Liability and Automobile Policies of insurance shall include as additional insureds or be endorsed to contain the following provisions the "entities" listed below and each of their partners, officers, officials, employees, agents and volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor and or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitation on the scope of protection afforded to the "entities" and each of their partners, officers, officials, employees, agents and volunteers and coverage provided to such additional insured. This policy shall provide coverage to each of the said insureds with respect to said work. Said policy shall provide primary coverage to the full limit of liability stated in the declarations.

Las Gallinas Valley Sanitary District  
300 Smith Ranch Road  
San Rafael, CA 94903

Construction Manager: (To be selected by the District later.)

District Consultants: (To be selected by the District later.)

Other Public Agencies Having Jurisdiction

b. (1) Amount of Coverage (General Contractor) - The bodily injury, personal injury and property damage liability of the Commercial General Liability insurance shall provide coverage in the following limits of liability: **\$5,000,000** on account of anyone occurrence for bodily injury and property damage, **\$5,000,000** personal and advertising injury limit with an annual general aggregate limit of not less than **\$5,000,000**, and **\$5,000,000** products and completed operations aggregate, combined single limit. The Automobile Liability insurance policy shall provide minimum limits of **\$5,000,000** per accident for bodily injury and property damage and **\$5,000,000** policy aggregate arising out of the ownership, maintenance, or use of any owned or non-owned vehicles.

(2) Amount of Coverage for Subcontractors - The bodily injury, personal injury and property damage liability of the Commercial General Liability insurance shall provide coverage in the following limits of liability: **\$3,000,000** on account of anyone occurrence for bodily injury and property damage **\$3,000,000** personal and advertising injury limit with an annual general aggregate limit of not less than **\$3,000,000**, and **\$3,000,000** products and completed operations aggregate, combined single limit. The Automobile Liability insurance policy shall provide minimum limits of **\$3,000,000** per accident and **\$3,000,000** policy aggregate arising out of the ownership, maintenance, or use of any owned or non-owned vehicles.

c. Subcontractors - The bodily injury and property damage liability insurance shall not be deemed to require the Contractor to have its

subcontractors named as insureds in the Contractor's policy, but the policy shall protect the Contractor from contingent liability which may arise from operations of its subcontractors.

d. Included Coverage - The above Commercial General Liability insurance shall also include the following coverage:

- Premises – Operations
- Independent Contractors
- Products - Completed Operations
- Personal Injury - (False Arrest, Libel, Wrongful Eviction, etc.)
- Advertising Injury
- Broad Form Property Damage, Including, Completed Operations
- Separation of Insureds/Cross-Liability Provision
- Duty to Defend all Insureds
- Deletion of any Limitation on Coverage for Bodily Injury or Property Damage Arising out of Subsidence or Soil or Earth Movement
- Separate Aggregate - A provision that the annual general aggregate and the products and completed operations annual aggregate shall apply separately to each project for which Contractor provides services away from premises owned by or rented to Contractor.
- XCU - (Explosion, Collapse, and Underground Damage) is applicable to operations performed by the Contractor or its subcontractors.
- Blanket Contractual Liability

8.8.3.3 Commercial Umbrella Policy. The Commercial policy is to insure losses above General liability, Employers liability, Auto liability, and Contractor's Pollution Legal liability limits. The Contractor may use an umbrella policy to meet the limit requirements of Section 8.8.3.2.b(1). However, any such umbrella/excess policy must be approved by the District and maintain an A.M. Best Rating of no less than A:VII.

8.8.3.4 Builders Risk. (Not Required)

8.8.3.5 Contractor's Pollution Legal Liability. Coverage for liability because of third-party claims for bodily injury and/or property damage, including insurance for remediation costs stemming from pollution incidents resulting from the contractor's operations. The Contractor's Pollution Legal Liability insurance policy shall provide coverage with limits no less than \$1,000,000 per occurrence or claim, and \$2,000,000 policy aggregate.

8.8.4 For any claims related to this project, the Contractor's insurance coverage shall be primary and non-contributory insurance coverage as respects the District, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the District, its officers, officials, employees, or volunteers shall

be excess of the Contractor's insurance and shall not contribute with it. This requirement shall also apply to any Excess or Umbrella liability policies.

- 8.8.5 Any deductibles or self-insured retentions must be declared to and approved by the District.
- 8.8.6 See Appendix section for the required insurance endorsement forms and other requirements.
- 8.8.7 For each insurance policy required under the Agreement except for the required workers compensation insurance policy, the Contractor must provide endorsements that add the District, its officers, officials, employees, and volunteers, as an additional insured. Such endorsements must: provide that the insurance required to be furnished by the Contractor will be primary as regards the District, its officers, officials, employees, and volunteers, and that the District's insurance will be excess of and not contribute to the insurance required to be furnished by the Contractor; that the District will receive 30-calendar day written notice of any reduction or cancellation of such insurance required to be furnished by the Contractor; and include a severability of interest clause acceptable to the District. Said endorsement shall be at least as broad as Insurance Services Office form number CG20 10 11 85 (Modified).
- 8.8.8 Contractor hereby grants to District a waiver of subrogation which any insurer may acquire against District, its officers, officials, employees, and volunteers, from Contractor by virtue of the payment of any loss. Contractor agrees to obtain any endorsement that may be necessary to affect this waiver of subrogation, but this provision applies regardless of whether or not the District has received a waiver of subrogation endorsement from the insurer.
- 8.8.9 The Contractor shall not allow any subcontractor to commence work on its subcontract until all similar insurance required of the subcontractor, except Builder's Risk Insurance, has been obtained and verified by the Contractor and submitted to the Construction Manager for the District's review and records. Subcontractors shall furnish original certificates and required endorsements as verification of insurance coverage. The insurance liability limits specified in Sections 8.8.3.2.a(2), shall also apply for all subcontractors listed in Section LIST OF PROPOSED SUBCONTRACTORS. The Contractor shall designate the required insurance liability limits for all other subcontractors.
- 8.8.10 Proof of Coverage - Before the Notice to Proceed with the Work under this Contract is issued, the Contractor shall furnish the District with certificate(s) evidencing issuance of all insurance mentioned herein, copies of the policy declaration or information page(s) and additional insured endorsements. The certificate(s) and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The endorsements are to be on forms as included in the appendix section or equivalent endorsement forms acceptable to the District. The certificate(s), policy declaration or information page(s), and endorsements are to be received and approved by the District before work commences. Except for the waiver of subrogation rights endorsements, no other endorsements are required for Workers Compensation or Builder's Risk Insurance. Such certificates of

Insurance shall provide that the insurance policy shall be endorsed to state that coverage shall not be suspended, voided, cancelled by either party, reduced in coverage or limits except after thirty (30) calendar days prior written notice by certified mail, return receipt requested, has been given to the District. Contractor shall also provide certificate(s) evidencing renewals of all insurance required herein, at least thirty (30) calendar days prior to the expiration date of any such insurance.

Any deductibles or self-insured retentions must be declared to and approved by the District. At the option of the District, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the District, the Design Consultants and the Construction Manager and their officers, officials, employees, agents and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses. In the event of the breach of any provision of this paragraph, or in the event of any notices received which indicates any required insurance coverage will be diminished or canceled, District, at its option, may, notwithstanding any other provisions of this Agreement to the contrary, immediately declare a material breach of this Agreement and suspend all further work pursuant to this Agreement.

#### 8.8.11 Insurance During Guarantee Period

For any construction related work, including, but not limited to, maintenance, service, or repair work performed by the Contractor or its subcontractors during the guarantee period, workers compensation, and commercial general liability insurance in the amounts and format required herein, shall remain in force and shall be maintained for five (5) years after final completion of the contract of work.

### 8.9 Indemnities.

8.9.1 The Contractor will take all responsibility for the Work, and will bear all losses and damages directly or indirectly resulting to the Contractor, any subcontractors engaged in performance of the Work, the District, its officials, officers, employees, agents, volunteers and consultants, and to third parties on account of the performance or character of the Work, unforeseen difficulties, accidents, or occurrences of other causes predicated on active or passive negligence of the Contractor or of any subcontractor engaged in performance of the Work. To the fullest extent permitted by law the Contractor will indemnify, defend and hold harmless the District, its officials, officers, employees, agents, volunteers and consultants from and against any or all loss, liability, expense, claims, costs (including costs of defense), suits, and damages of every kind, nature and description (including, but not limited to, penalties resulting from exposure to hazards in violation of the California Labor Code) directly or indirectly arising from the performance of the Work ("Claims").

8.9.2 The Contractor will indemnify, defend and hold harmless the District, the District's officials, officers, employees, volunteers, agents and the District Engineer and Architect for all liability on account of any patent rights, copyrights, trade names or other intellectual property rights that may apply to the Contractor's performance of the Work. The Contractor will pay all royalties

or other charges as a result of intellectual property rights that may apply to methods, types of construction, processes, materials, or equipment used in the performance of the Work, and will furnish written assurance satisfactory to the District that any such charges have been paid.

- 8.9.3 The Contractor assumes all liability for any accident or accidents resulting to any person or property as a result of inadequate protective devices for the prevention of accidents in connection with the performance of the Work. The Contractor will indemnify, defend, and hold harmless the District and its officials, officers, employees, agents, volunteers and consultants from such liability.
- 8.9.4 Approval of the Contractor's certificates of insurance and/or endorsements does not relieve the Contractor of liability under this Section 8.9. The Contractor will defend, with legal counsel reasonably acceptable to the District, any action or actions filed in connection with any Claims and will pay all related costs and expenses, including attorney's fees incurred. The Contractor will promptly pay any judgment rendered against the District, its officials, officers, employees, agents, volunteers, or consultants for any Claims. In the event the District, its officials, officers, employees, agents, volunteers or consultants is made a party to any action or proceeding filed or prosecuted against Contractor for any Claims, Contractor agrees to pay the District, its officials, officers, employees, agents, volunteers and consultants any and all costs and expenses incurred in such action or proceeding, including but not limited to, reasonable attorneys' fees.
- 8.9.5 In accordance with California Civil Code Section 2782(a), nothing in the Agreement will be construed to indemnify the District for its sole negligence, willful misconduct, or for defects in design furnished by District. In accordance with California Civil Code Section 2782(b), nothing in the Agreement will be construed to impose on the Contractor or to relieve the District from liability for the District's active negligence. By execution of the Contract Documents the Contractor acknowledges and agrees that the Contractor has read and understands the insurance and other requirements of Agreement, and this Section 8.9, which is a material element of consideration.
- 8.10 Licenses/Permits. The Contractor must, without additional expense to the District, obtain all licenses, permits and other approvals required for the performance of the Work.
- 8.11 California Labor Code Requirements.
  - 8.11.1 In accordance with California Labor Code Section 1810, eight (8) hours of labor in performance of the Work shall constitute a legal day's work under the Agreement.
  - 8.11.2 In accordance with California Labor Code Section 1811, the time of service of any worker employed in performance of the Work is limited to eight hours during any one calendar day, and forty hours during any one calendar week, except in accordance with California Labor Code Section 1815, which provides that work in excess of eight hours during any one calendar day and forty hours during any one calendar week is permitted upon compensation for all hours

worked in excess of eight hours during any one calendar day and forty hours during any one calendar week at not less than one-and-one-half times the basic rate of pay. However, if the prevailing wage determination requires a higher rate of pay for overtime than is required under Section 1815, then the overtime rate must be paid, as specified in California Code of Regulation Title 8, Group 3, Section 16200(a)(3)(F).

- 8.11.3 In accordance with California Labor Code Section 1813, the Contractor and its subcontractors will forfeit as a penalty to the District \$25 for each worker employed in the performance of the Work for each calendar day during which the worker is required or permitted to work more than eight (8) hours in any one calendar day, or more than forty (40) hours in any one calendar week, in violation of the provisions of California Labor Code Section 1810 et seq.
- 8.11.4 In accordance with California Labor Code Section 1773.2, the District has determined the general prevailing wages in the locality in which the Work is to be performed for each craft or type of work needed to be as published by the State of California Department of Industrial Relations, Division of Labor Statistics and Research, a copy of which is on file in the office of the District Engineer and shall be made available on request. The Contractor and subcontractors engaged in the performance of the Work shall pay no less than these rates to all persons engaged in performance of the Work.
- 8.11.5 In accordance with California Labor Code Section 1775, the Contractor and any subcontractors engaged in performance of the Work must comply with Labor Code Section 1775 which establishes a penalty of up to \$200 per day for each worker engaged in the performance of the Work that the Contractor or any subcontractor pays less than the specified prevailing wage. The amount of such penalty shall be determined by the Labor Commissioner. The Contractor or subcontractor shall pay the difference between the prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate. If a subcontractor worker engaged in performance of the Work is not paid the general prevailing per diem wages by the subcontractor, the Contractor is not liable for any penalties therefore unless the Contractor had knowledge of that failure or unless the Contractor fails to comply with all of the following requirements:
  - 8.11.5.1 The contract executed between the Contractor and the subcontractor for the performance of part of the Work must include a copy of the provisions of California Labor Code Sections 1771, 1775, 1776, 1777.5, 1813, and 1815.
  - 8.11.5.2 The Contractor must monitor payment of the specified general prevailing rate of per diem wages by the subcontractor by periodic review of the subcontractor's certified payroll records.
  - 8.11.5.3 Upon becoming aware of a subcontractor's failure to pay the specified prevailing rate of wages, the Contractor must diligently take corrective action to halt or rectify the failure, including, but not limited to, retaining sufficient funds due the subcontractor for performance of the Work.

8.11.5.4 Prior to making final payment to the subcontractor, the Contractor must obtain an affidavit signed under penalty of perjury from the subcontractor that the subcontractor has paid the specified general prevailing rate of per diem wages employees engaged in the performance of the Work and any amounts due pursuant to California Labor Code Section 1813.

8.11.6 In accordance with California Labor Code Section 1776, the Contractor and each subcontractor engaged in performance of the Work, 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 performance of the Work. Each payroll record must contain or be verified by a written declaration that it is made under penalty of perjury, stating that the information contained in the payroll record is true and correct and that the employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by the employer's employees on the public works project. The payroll records required pursuant to California Labor Code Section 1776 must be certified and must be available for inspection by the District and its authorized representatives, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations and must otherwise be available for inspection in accordance with California Labor Code Section 1776.

8.11.7 In accordance with California Labor Code Section 1777.5, the Contractor, on behalf of the Contractor and any subcontractors engaged in performance of the Work, will be responsible for ensuring compliance with California Labor Code Section 1777.5 governing employment and payment of apprentices on public works contracts.

Apprentices - Prior to commencing the Work, Contractor shall comply with the provisions of Labor Code 1777.5, including but not limited to the submission of contract award information to an applicable apprenticeship program that can supply apprentices to the site of the Work. Such information shall include an estimate of journeyman hours to be performed under this Contract, the number of apprentices proposed to be employed, and the approximate dates the apprentices would be employed. A copy of this information shall be submitted to the District if requested by the District.

A determination by the Chief of the Division of Apprenticeship Standards that Contractor or its subcontractors have knowingly violated Labor Code 1777.5 shall forfeit as a civil penalty an amount not exceeding one hundred dollars (\$100) for each full calendar day of noncompliance. Contractor or its subcontractor, who knowingly commits a second or subsequent violation of Labor Code 1777.5 within a three-year period, where the noncompliance results in apprenticeship training not being provided as required, shall forfeit as a civil penalty the sum of not more than three hundred dollars (\$300) for each full calendar day of noncompliance. Upon the receipt of a determination that a civil penalty has been imposed by the Chief of the Division of Apprenticeship

Standards, the District shall withhold the amount of the civil penalty from the next progress payment then due or to become due Contractor.

8.11.8 In case it becomes necessary for the Contractor or any subcontractor engaged in performance of the Work to employ on the Work any person in a trade or occupation (except executive, supervisory, administrative, clerical, or other non-manual workers as such) for which no minimum wage rate has been determined by the Director of the Department of Industrial Relations, the Contractor must pay the minimum rate of wages specified therein for the classification which most nearly corresponds to Work to be performed by that person. The minimum rate thus furnished will be applicable as a minimum for such trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment.

8.11.9 Labor Discrimination. Attention is directed to Section 1735 of the Labor Code, which reads as follows:

"No discrimination shall be made in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, sex, age or sexual orientation of such persons, except as provided in Section 12940 of the Government Code, and every contractor for public works violating this section is subject to all the penalties imposed for violation of this chapter."

8.11.10 Receipt of Workers' Wages, Fee for Registering or Placing Persons In Public Works - Attention is directed to the provisions of sections 1778 and 1779 of the California Labor Code, which read as follows:

"Section 1778. Every person, who individually or as a representative of an awarding or public body or officer, or as a contractor or subcontractor doing public work, or agent or officer thereof, who takes, receives or conspires with another to take or receive, for its own use or the use of any other person any portion of the wages of any workman or working subcontractor, in connection with services rendered upon any public work is guilty of a felony."

"Section 1779. Any person or agent or officer thereof who charges, collects, or attempts to charge or collect, directly or indirectly, a fee or valuable consideration for registering any person for public work, or for giving information as to where such employment may be procured, or for placing, assisting in placing, or attempting to place, any person in public work, whether the person is to work directly for the state, or any political subdivision or for a contractor or subcontractor doing public work is guilty of a misdemeanor."

8.12 Laws and Ordinances. The Contractor and all subcontractors engaged in the performance of the Work must conform to the following specific rules and regulations as well as all other laws, ordinances, rules and regulations that apply to the Work. Nothing in the Technical Specifications or Drawings is to be construed to permit Work not conforming to these codes:

National Electrical Safety Code, U. S. Department of Commerce  
National Board of Fire Underwriters' Regulations

California Building Standards Code as adopted by the District  
Manual of Accident Prevention in Construction, latest edition, published by  
A.G.C. of America  
Industrial Accident Commission's Safety Orders, State of California  
Regulations of the State Fire Marshall (Title 19, California Code of Regulation) and  
Applicable Local Fire Safety Codes  
Labor Code of the State of California - Division 2, Part 7, Public Works and Public  
Agencies.

8.13 Guaranty. The Contractor guarantees all of the Work for one year from the date the District accepts the Work. Upon receiving written notice of a need for repairs which are directly attributable to defective materials or workmanship the Contractor must make good any defects arising or discovered in any part of the Work by diligently commencing the necessary repairs within seven (7) calendar days from the date of notice from the District. If the Contractor fails to make good any defects in the Work in accordance with this provision, in addition to any other available remedy under the contract or at law or equity, the District may make good or have made good such defects in the Work and deduct the cost from amounts that may be due or become due the Contractor, and/or call on the Contractor's maintenance bond for the cost of making good such defects and for the District's reasonable legal costs, if any, of recovering against the bond. The Contractor shall remain responsible for repairing any Work found to be defective regardless of when such defect is discovered by the District. See Drawings for other Guaranty/Warranty requirements for the project.

#### 8.14 Safety

8.14.1 Contractor's Safety Responsibility - The Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA), the California Occupational Safety and Health Act (CalOSHA), and all other applicable Federal, State, County, and local laws, ordinances, codes, including but not limited to the requirements set forth below, and any regulations that may be detailed in other parts of these Contract Documents. In the event of conflicting requirements, the most stringent requirement as it pertains to the Contractor's safety responsibility shall be followed by the Contractor.

No provision of the Contract Documents shall act to make the District, the Construction Manager, Design Consultant or any other party than the Contractor responsible for safety. The Contractor agrees that for purposes of California Labor Code Section 6400 and related provisions of law the Contractor, the Contractor's privities and any other entities acting pursuant to this contract will be "employers" responsible for furnishing employment and a place of employment that is safe and healthful for the employees, if any, of such entities acting pursuant to this contract and that neither the District nor the Construction Manager, Design Consultant or their respective officers, officials, employees, agents or volunteers or other authorized representatives will be responsible for having hazards corrected and /or removed at the location(s) where the work is to be performed. The Contractor agrees that neither the District nor the Construction Manager, Design Consultant or their respective

officers, officials, employees, agents or volunteers or other authorized representatives will be responsible for taking steps to protect the Contractor's employees from such hazards, or for instructing the Contractor's employees to recognize such hazards or to avoid the associated dangers. The Contractor agrees that with respect to the work to be performed under this contract and the location(s) where such work is to be performed, the Contractor will be responsible for not creating hazards, and for having hazards corrected and/or removed. The Contractor agrees that through the safety obligations contained in this contract and the Contractor's own inspection of the site(s) where the contract work is to be performed, the Contractor is aware and has been notified of the hazards to which the Contractor's employees may be exposed in the performance of contract work. The Contractor has taken and/or will take appropriate, feasible steps to protect the Contractor's employees from such hazards, and has instructed and/or will instruct its employees to recognize such hazards and how to avoid the associated dangers. The Contractor agrees that neither the District nor the Construction Manager, Design Consultant or their respective officers, officials, employees, agents or volunteers or other authorized representatives will be "employers" pursuant to California Labor Code Section 6400 and related provisions of law with respect to the Contractor, the Contractor's privities or other entities acting pursuant to this contract.

- 8.14.2 Review and inspection by the District, the District Engineer, the Architect or Engineer, and/or other representatives of the District of the Contractor's performance of the Work will not constitute review of the adequacy of the Contractor's safety measures in, on, or near the Work site. Such reviews and inspections do not relieve the Contractor of any of the Contractor's obligations under the Contract Documents and applicable law to ensure that the Work site is maintained, and the Work is performed in a safe manner.
- 8.14.3 The Contractor will be solely responsible for the implementation and maintenance of safety programs to ensure that the Work site is maintained, and the Work is performed in a safe manner in accordance with the Contract Documents and applicable law.
- 8.14.4 Safety Plan - Within seven (7) calendar days following Notice of Award the Contractor must submit to the District a copy of the Contractor's Safety Plan.

The Contractor shall establish, implement, and maintain a written injury prevention program as required by Labor Code Section 6401.7. Before beginning the Work, the Contractor shall prepare and file with the Construction Manager a written Contractor Safety Plan that provides for the implementation of all of the Contractor's safety responsibilities in connection with the Work at the Project site. The coordination of that program and its associated procedures and precautions with safety plans, precautions and procedures of each of its subcontractors and other Contractors performing work at the Project site. The Contractor shall be solely responsible for initiating, maintaining, monitoring, coordinating, and supervising all safety plans, precautions, and procedures in connection with the Work and for coordinating its programs, precautions, and procedures of the other contractors and subcontractors performing the Work at the Project site. The Safety Plan should contain all the necessary elements for the Contractor to administer its program on the Project site. At a minimum, this

written Safety Plan shall address the elements required by Labor Code Section 6401.7.

The Contractor's compliance with requirements for safety and/or the Construction Manager's review of the Contractor's Safety Plan shall not relieve or decrease the liability of the Contractor for safety. The Construction Manager's review of the Contractor's Safety Plan is only to determine if the above listed elements are included in the program.

- 8.14.5 The Contractor must furnish and place proper guards and systems for the prevention of accidents, including, but not limited to, those systems required pursuant to Title 8, Section 1670 and following of the California Code of Regulations concerning safety belts and nets. The Contractor must provide and maintain any other necessary systems or devices required to secure safety of life or property at the Work site in accordance with accepted standards of the industry and applicable law. The Contractor must maintain during all night hours sufficient lights to prevent accident or damage to life or property.
- 8.14.6 The Contractor must comply with the District's Confined Space Entry Program shown in the Appendix section of the Contract Documents.
- 8.14.7 The Contractor shall indemnify, defend and hold District and Construction Manager, Design Consultant and their respective officers, officials, employees, agents and volunteers or other authorized representatives harmless to the full extent permitted by law concerning liability related to the Contractor's safety obligations in accordance with the indemnification section of the Contract Documents.

If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Construction Manager and the District. In addition, the Contractor shall furnish the Construction Manager with a copy of the Employer's Report of Injury immediately following any incident requiring the filing of said report during the prosecution of the Work under this Contract. The Contractor shall also furnish the Construction Manager with a copy of the Employer's Report of Injury involving any subcontractors on this Project. The Contractor shall make all reports as are, or may be, required by any authority having jurisdiction, and permit all safety inspections of the Work being performed under this Contract.

If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Construction Manager, giving full details of the claim.

- 8.14.8 Safety Supervisor - The Contractor shall appoint an employee as safety supervisor who is qualified and authorized to supervise and enforce compliance with the Safety Program. The Contractor shall notify the Construction Manager in writing prior to the commencement of work of the name of the person who will act as the Contractor's Safety Supervisor and furnish the safety supervisor's resume to the Construction Manager.

Contractor will, through and with its Safety Supervisor, ensure that all of its employees, and its subcontractors of any tier, fully comply with the Project Safety Policies. The Safety Supervisor shall be a full-time employee of the Contractor whose responsibility shall be for supervising compliance with applicable safety requirements on the Project site and for developing and implementing safety training classes for all job personnel. The District shall have the authority to require removal of the Contractor's Safety Supervisor if the representative is judged to be improperly or inadequately performing the duties; however, this authority shall not in any way affect the Contractor's sole responsibility for performing this work safely, nor shall it impose any obligation upon the District to ensure the Contractor performs its work safely.

8.14.9 Safety and Protection - The Contractor shall take all necessary precautions to prevent damage, injury, and loss to:

- All employees on the Project, employees of all subcontractors, and other persons and organizations who may be affected thereby;
- All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and
- Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, wetlands, pavements, roadways, structures, utilities, and underground facilities not designated for removal, relocation, or replacement in the course of construction, even if not shown on the Contract Drawings.

The Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and of underground facilities and utility districts when prosecution of the Work may affect them and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor, supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by the Contractor, and the Contractor shall be responsible for any direct or indirect costs resulting from such damage, injury or loss.

8.14.10 Excavation Safety - In accordance with the provisions of Section 6705 of the Labor Code, the Contractor shall submit, in advance of excavation of any trench or trenches five feet or more in depth, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plans vary from the shoring system standards set forth in the Construction Safety Orders of the Division of Industrial Safety in Title 8, Subchapter 4, Article 6, California Code of Regulations, the plans shall be prepared and signed by a registered civil or structural engineer employed by the Contractor, and all costs therefor shall be included in the price named in the Contract for completion of the work as set forth in the Contract Documents. Nothing in this section shall be deemed to allow the use of a shoring, bracing,

sloping, or other protective system less effective than that required by the Construction Safety Orders. Nothing in this section shall be construed to impose a tort liability on the District, the Design Consultant, the Construction Manager, nor any of their officers, officials, employees, agents, consultants or volunteers. The District's review of the Contractor's excavation plan is only for general conformance to the Construction Safety Orders.

Prior to commencing any excavation, the Contractor shall designate in writing to the Construction Manager the "competent person(s)" with the authority and responsibilities designated in the Construction Safety Orders.

8.14.11 Safety Emergencies - In emergencies affecting the safety or protection of persons or the Work or property at the Project site or adjacent thereto, the Contractor, without special instruction or authorization from the Construction Manager, is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the Construction Manager prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby.

8.14.12 Safety Violations - Should the Contractor fail to correct an unsafe condition, the District shall have the right to notify the Contractor through the Construction Manager that an unsafe condition may exist and must be corrected or the work in question can be stopped in accordance with Section 7.8, Suspension of Work until the condition is corrected to the satisfaction of the District. No extension of time or additional compensation will be granted as a result of any stop order so issued. The notification and suspension of such work or the failure to provide such notification and suspension by the District shall not relieve the Contractor of its sole responsibility and liability for safety and the correction of any unsafe conditions.

The District shall have the authority to require the removal from the project of any worker and the foreman and/or superintendent in responsible charge of the work where safety violations occur.

8.14.13 Equipment Safety Provisions - The completed Work shall include all necessary permanent safety devices, such as machinery guards and similar safety items, required by the State and Federal (OSHA) industrial authorities and applicable local and national codes. Further, any features of the Work, including District -selected equipment, subject to such safety regulations shall be fabricated, furnished, and installed in compliance with these requirements. All equipment furnished shall be grounded and provided guards and protection as required by safety codes. Where vapor-tight or explosion-proof electrical installation is required by safety codes, this shall be provided. Contractors and manufacturers of equipment shall be held responsible for compliance with the requirements included herein. The Contractor shall notify all equipment suppliers and subcontractors of the provisions of this paragraph.

8.14.14 Confined Spaces – The Project requires work in confined spaces and requires compliance with CAL/OSHA and Federal OSHA requirements. Confined spaces for the purposes of this section shall be as defined by the Division of Industrial Safety. Notwithstanding any classifications relative to the

Tunnel Safety Orders, work within confined spaces of this project is subject to the definitions and applicable provisions of Section 5156 et. seq., Title 8, Division 1, Chapter 4, Subchapter 7, Group 16, Article 108 of California Code of Regulations.

Entry into existing "permit" confined spaces as defined by OSHA shall be allowed only in compliance with a confined space entry permit program by the Contractor that meets the requirements of CAL/OSHA Section 5157. While the District has identified certain existing facilities as confined spaces other confined spaces may exist on the Project. It shall be the responsibility of the Contractor to identify and classify these confined spaces.

Sources of ignition, including smoking, shall be prohibited in any confined space.

It is anticipated that the Contractor may encounter hazardous conditions within these confined spaces which include, but are not limited to the following:

- A. Exposure to hydrogen sulfide, methane, carbon dioxide and other gases and vapors commonly found in municipal sewers which could have or has the potential of having Immediate Danger to Life or Health Conditions (IDLH).
- B. Exposure to atmosphere containing insufficient oxygen to support human life.
- C. Exposure to combustible, flammable and/or explosive atmosphere.
- D. Exposure to sewage which may contain bacteriological, chemical, and other constituents harmful to humans.
- E. Work in conditions where engulfment or entrapment may occur.
- F. Work in environments which may be slippery and/or have uneven work surfaces.
- G. Work in structures which have limited and/or restricted access and egress.
- H. Work in structures where workers may trip, slip and/or fall several feet.
- I. See Appendices "Contractor Safe Work Requirements" and "Confined Space Entry Program" for additional requirements. Copies of confined space permits shall be submitted to the District weekly.

8.14.15 Construction Activity Permits - The Contractor must submit a copy of its respective current DOSH permit before beginning work on any the following construction activities:

- A. Construction of trenches or excavations which are five feet or deeper and into which a person is required to descend.

- B. Construction of any building, structure, scaffolding or falsework more than three stories high or the equivalent height (36 feet).
- C. Demolition of any building or structure, or dismantling of scaffolding or falsework more than three stories high or the equivalent height (36 feet).
- D. Erection or dismantling of vertical shoring systems more than three stories high, or the equivalent height (36 feet).

8.14.16 Public Safety and Convenience – In accordance with the provisions of Section 6500 of the Labor Code the Contractor shall conduct his work so as to ensure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the Work and to ensure the protection of persons and property. No road or street shall be closed to the public except with the permission of the Construction Manager and the proper governmental authority. Fire hydrants on or adjacent to the Work shall be accessible to firefighting equipment. Temporary provisions shall be made by the Contractor to ensure the use of sidewalks, private and public driveways and proper functioning of gutters, sewer inlets, drainage ditches and culverts, irrigation ditches and natural water courses. To the maximum extent permitted by law, Contractor shall indemnify, hold harmless and defend District from any and all liability, including attorneys' fees and costs of litigation, arising from any failure to comply with this section by Contractor or its privities.

8.15 Assignment of Unfair Business Practice Claims. In accordance with California Public Contract Code Section 7103.5, the Contractor and any subcontractors offer and agree to assign to the District all rights, title, and interest in and to all causes of action the Contractor or any subcontractors 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 this contract. This assignment shall be made and become effective at the time the District tenders final payment to the Contractor, without further acknowledgement by the parties.

## 9. MEASUREMENT AND PAYMENT

9.1 F.O.B. All shipments must be F.O.B. destination to the Work site and/or other sites indicated in the Contract Documents. The Contract Price is all-inclusive (including sales tax). There shall be no additional compensation paid for containers, packing, unpacking, drayage or insurance.

### 9.2 Payment

9.2.1 On or about the first day of each calendar month the Contractor will submit to the District Engineer a verified application for payment and schedule of values supported by a statement showing all materials actually installed during the preceding month and the cost of labor actually expended in the performance of the Work. Unless otherwise provided in the Contract Documents, no allowances or payments will be made for material or equipment not placed at the Work site.

- 9.2.2 To be eligible for payment the Contractor's applications for payment must include certified payroll reports prepared in accordance with California Labor Code Section 1776 and the Agreement for each employee of the Contractor and any subcontractors engaged in the performance of the Work during the preceding months, applications for payment will not be processed without certified payroll reports.
- 9.2.3 In accordance with California Public Contract Code Section 20104.50, the District will review applications for payment as soon as practicable after receipt. Any application or part of an application that is determined to be improper will be returned to the Contractor as soon as practicable, but no later than seven (7) calendar days after receipt by the District, along with a written description of the reasons why the application is improper. The Contractor's failure to submit a schedule in the time specified in Section 3.8, or its submission of a schedule to which the District has taken any uncorrected exception, shall serve as a basis for returning an application for payment in its entirety.
- 9.2.4 Unless the Contractor has elected to post securities in lieu of retention in accordance with California Public Contract Code Section 22300 and the Agreement, and the Contractor and the District have executed an escrow agreement in accordance with the Public Contract Code and the Agreement, the District will make progress payments to the Contractor in accordance with applicable law in the amount of 95 percent of the value of the labor actually performed and the material incorporated in the Work as specified in Contractor's verified application for payment upon approval by the District's authorized representative(s). Payment of progress payments will not be construed as acceptance of the Work performed. If the Contractor has elected to post securities in lieu of retention in accordance with Public Contract Code Section 22300 and the Agreement and the Contractor and the District have executed an escrow agreement in accordance with the Public Contract Code and the Agreement, the District will make payments to the Contractor or the Contractor's escrow agent in accordance with such escrow agreement.
- 9.2.5 The District will pay the Contractor's final invoice in accordance with applicable law and this Section 9 following acceptance of the Work provided that:
- 9.2.5.1 The Contractor has furnished evidence satisfactory to the District that all claims for labor and material have been paid, or the time for filing valid stop notices has passed and no stop notices have been filed, or all stop notices filed have been released by valid release or release bond acceptable to the District.
- 9.2.5.2 No claim has been presented to the District by any person based upon any acts or omissions of the Contractor or any subcontractor engaged in the performance of the Work.
- 9.2.5.3 No other claim or dispute exists under the Agreement or applicable law concerning payment of the Contractor's final invoice and/or release of the Agreement retention.

- 9.2.5.4 The Contractor has filed with the District the Maintenance Bond provided in the Contract Documents with duly notarized signatures of an authorized representative of the Contractor and an attorney-in-fact of an admitted surety insurer acceptable to the District and such Maintenance Bond binds the Contractor as Principal and the Surety in accordance with its terms in the amount of 10% of the final Contract Price.
- 9.2.5.5 The Contractor's application for final payment contains a written waiver of all claims against the District of which the Contractor may not yet asserted at the time of the submission of the application for final payment.
- 9.2.5.6 In accordance with California Public Contract Code Section 7107, the final payment or release of retention shall not be due and payable until the expiration of 60 days from the date of recording the Notice of Completion by the District.
- 9.2.6 In accordance with California Public Contract Code Section 20104.50, if the District fails to make a progress payment within 30 calendar days of receipt of an undisputed, properly submitted application for payment, the District will pay the Contractor interest equivalent to the legal rate set forth in subdivision (a) of California Code of Civil Procedure Section 685.010. The number of calendar days available to the District to make a payment without incurring an interest obligation pursuant to this provision and California Public Contract Code Section 20104.50 will be reduced by the number of calendar days, if any, by which the District has delayed return of an application for payment beyond the seven day return requirement set forth in Section 9.2.5.
- 9.3 Non-Allowable Direct Charges. The following costs are not allowable direct charges under the Agreement. The following costs may only be paid under the Agreement, if at all, as part of any allowance for contractor overhead and/or profit established under the Agreement.
  - 9.3.1 Labor costs in excess of applicable prevailing wages pursuant to the Agreement and applicable law, liability and workers compensation insurance, social security, retirement and unemployment insurance and other employee compensation and benefits pursuant to bona fide compensation plans in effect at the time specified for the opening of Project bids for contractor and subcontractor employees engaged in the performance of the Work. However, in no event will allowable direct labor charges under the agreement include employee bonuses, employee vehicles or vehicle allowances, employee telephones or telephone allowances, or employee housing or housing allowances, whether or not such benefits are part of a bona fide compensation plan in effect at the time specified for the opening of Project bids.
  - 9.3.2 Superintendent labor and clerical labor.
  - 9.3.3 Bond premiums
  - 9.3.4 Insurance in excess of that required under Section 8.8

- 9.3.5 Utility costs
- 9.3.6 Work Site office expenses
- 9.3.7 Home office expenses.
- 9.4 Withhold. The District or its agent may, in accordance with the Contract Documents and applicable law, withhold any payment of monies due or that may become due the Contractor because of:
  - 9.4.1 Defective work not remedied or uncompleted work.
  - 9.4.2 Claims filed or reasonable evidence indicating probable filing of claims.
  - 9.4.3 Failure to properly pay subcontractors or to pay for material or labor.
  - 9.4.4 Reasonable doubt that the Work can be completed for the balance then unpaid.
  - 9.4.5 Damage to another contractor.
  - 9.4.6 Damage to the District.
  - 9.4.7 Damage to a third party.
  - 9.4.8 Delay in the progress of the Work, which, in the District's judgment, is due to the failure of the Contractor to properly expedite the Work.
  - 9.4.9 Liquidated damages or other charges that apply to the Contractor under the Agreement.
  - 9.4.10 Any other lawful basis for withholding payment under the contract.
  - 9.4.11 Failure of the Contractor to maintain record documents and as-built drawings.
  - 9.4.12 Cost of insurance arranged by the District due to cancellation or reduction of the Contractor's insurance.
  - 9.4.13 Failure to submit, revise, resubmit or otherwise conform to the requirements herein for preparing and maintaining a construction schedule.
  - 9.4.14 Failure to make proper submissions, as specified herein.
  - 9.4.15 Stop Notice claims filed by Contractor's subcontractors, of any tier, or its material suppliers.
  - 9.4.16 Provisions of law that enable or require the District to withhold such payments in whole or in part.
  - 9.4.17 Failure to comply with environmental or other regulatory requirements.
  - 9.4.18 Failure of Contractor to submit Operation and Maintenance Manuals.

## 9.5 Securities in Lieu of Retention.

- 9.5.1 In accordance with Public Contract Code Section 22300, except where federal regulations or polices do not permit substitution of securities, the Contractor may substitute securities for any moneys withheld by the District to ensure performance of the Work. At the Contractor's request and expense, securities equivalent to the amount withheld will be deposited with the District, or with a state or federally chartered bank in California as the escrow agent, who will then pay those moneys to the Contractor under the terms of an Escrow for Security Deposit agreement. The Escrow for Security Deposit agreement is provided in the Contract Documents. Upon satisfactory completion of the Work, the securities will be returned to the Contractor.
- 9.5.2 Alternatively, at the Contractor's request and expense, the District will pay retentions earned directly to the escrow agent. At the Contractor's expense, the Contractor may direct investment of the payments into securities. Upon satisfactory completion of the Work, the Contractor will receive from the escrow agent all securities, interest, and payments received by the escrow agent from the District pursuant to this provision and the terms of the Escrow for Security Deposit agreement. The Contractor will, within twenty (20) working days of receipt of payment, pay to each subcontractor the respective amount of interest earned, less costs of retention withheld from each Subcontractor, on monies withheld to ensure the Contractor's performance of the Work.
- 9.5.3 Securities eligible for investment in accordance with this provision include those listed in Government Code Section 16430, bank or savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the District.
- 9.5.4 The Contractor will be the beneficial owner of any securities substituted for moneys withheld and will receive any interest thereon.

## 10. PROJECT ACCEPTANCE AND CLOSEOUT

- 10.1 Occupancy. The District reserves the right to occupy or use any part or parts or the entire of the Work before the Work is fully performed. Subject to applicable law, exercising this right will in no way constitute acceptance of any part of the Work so occupied or used or acceptance of the entire Work, nor will such occupancy or use in any way affect the times when payments will become due the Contractor, nor will such occupancy or use in any way prejudice the District's rights under the Agreement, any Agreement bonds, or at law or equity. Occupancy or use shall not waive the District's rights to assess liquidated damages in accordance with Section 7 after the date of such occupancy or use.
- 10.2 Work Completion and Final Inspection.
  - 10.2.1 Certificate of Completion. When the Contractor considers the Work is completed, the Contractor will submit written certification to the District Engineer specifying that: the Contract Documents have been reviewed; the Work has been inspected for compliance with the Contract Documents; the Work has been completed in accordance with the Contract Documents; and that equipment and systems have been tested in the presence of the District's

representative and are operational. The District and/or the District's authorized representatives will make an inspection to verify that the Work is complete and will notify the Contractor in writing of any incomplete or deficient Work. The Contractor will take immediate steps to remedy the stated deficiencies and give notice of correction to the District Engineer. Upon receiving a notice of correction, the District or the District's authorized representatives will re-inspect the Work. The Contractor must correct all punch list items within 15 working days after the issuance of the punch list.

10.2.2 Project Record Drawings (As-Builts). Before acceptance of the Work the Contractor must submit:

1. One set of Project Record Drawings, based on the Conformed Set, in 24 x 36 and 11 x 17 sheets.
2. Project Record Drawings, based on the Conformed Set, in AutoCad (.DWG) and portable document file (.PDF) formats.
3. Equipment operating and maintenance instructions and data: one set of hard copy, and one scanned set in portable document file (.PDF) format.
4. Miscellaneous construction-related documents, studies, reports, etc., obtained or developed by the contractor during construction of the project in portable document file (.PDF) format.
5. Maintenance Bond, warranties, etc.

10.3 Work Acceptance.

- 10.3.1 All finished Work will be subject to inspection and acceptance or rejection by the District, the District Engineer, and the Architect or Engineer and other government agencies having jurisdiction over the Work. Final acceptance of the Work will be at the discretion of the District.
- 10.3.2 The District will accept the Work in writing only when the Work has been completed to the District's reasonable satisfaction. Progress payments will in no way be construed as acceptance of any part of the Work.
- 10.3.3 In evaluating the Work, no allowance will be made for deviations from the Technical Specifications, Drawings or other Contract Documents unless already approved in writing in accordance with the requirements of Section 4, above.
- 10.3.4 The fact that the Work and materials have been inspected from time to time and that progress payments have been made does not relieve the Contractor of the responsibility of replacing and making good any defective or omitted work or materials in accordance with the requirements of the Contract Documents.

## 11. REMEDIES AND DISPUTES

- 11.1 Failure to Correct Work. Within ten (10) working days of receiving written notice from the District describing Work that is defective or that is otherwise not in accordance with the requirements of the Agreement and/or applicable law and directing that such Work be corrected, the Contractor and/or the Contractor's sureties must give the District written notice of the intent of the Contractor and/or the Contractor's sureties to correct such Work and commence correction of such Work in accordance with the District's notice and the Agreement. If the Contractor and/or the Contractor's sureties do not give the District written notice of intent to correct such Work and commence correction of such Work within ten (10) working days of receipt of the District's notice, then the District may correct such work and/or have such work corrected for the account and at

the expense of the Contractor and/or its sureties, and the Contractor and/or its sureties will be liable to the District for any resulting excess cost. The District may, in addition to all other remedies that the District may have under the Agreement and at law or equity, deduct any such excess cost of completing the Work from amounts that are due or that may become due the contractor.

## 11.2 Termination.

11.2.1 In accordance with California Public Contract Code Section 7105, in addition to all other available remedies that the District may have under the Agreement, and at law or equity, the District may terminate the Contractor's control of the Work:

11.2.1.1 If the Contractor or any of its subcontractors engaged in the performance of the Work fails to timely perform the Work and/or any of the Contractor's material obligations under the Contract Documents, including but not limited to submission of an acceptable schedule, that have accrued except for due to reasons beyond the control of the Contractor pursuant to the Contract Documents.

11.2.1.2 If the Contractor is adjudged bankrupt, or if it should make a general assignment for the benefit of creditors, or if a receiver should be appointed on account of its creditors.

11.2.1.3 If the Contractor or any of the subcontractors engaged in the performance of the Work persistently or repeatedly refuses or fails to supply enough properly skilled workmen or proper materials for the timely completion of the Work.

11.2.1.4 If the Contractor fails to make prompt payment to subcontractors engaged in the performance of the Work or for material or labor used in the performance of the Work in accordance with the Contract Documents and applicable law.

11.2.1.5 If the Contractor or any subcontractors engaged in the performance of the Work persistently disregards laws or ordinances applicable to the performance of the Work, or the instructions of the District, the District Engineer, the Architect, or other authorized representatives of the District.

11.2.1.6 For any reason or for no reason, at the District's sole discretion.

11.2.2 If the District intends to terminate the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, above, the District will immediately serve written notice to the Contractor and its sureties in accordance with the Contract Documents. Notice of the District's intent to terminate the Contractor's control of the Work will be given by registered or certified mail and specify the grounds for termination, the required cure and the time by which the cure must be effected. Upon receipt of notice of the District's intent to terminate the Contractor's control of the Work for any of the reasons specified in provisions 11.2.1.1 through 11.2.1.5, above, the Contractor will have ten (10) working days from receipt of the notice or a longer time specified

in the notice to cure its default. If the Contractor does not effect the required cure by the time specified in the notice, the District will issue a written notice of termination to the Contractor and its sureties by registered or certified mail. The notice of termination will specify: that upon receipt of the notice the Contractor's right to perform or complete the Work, including on behalf of the Contractor's sureties, is terminated; that the Contractor's sureties will have the right to take over and complete the Work and perform all of the Contractor's remaining obligations that have accrued under the Agreement; and that if the Contractor's sureties do not both give the District written notice of their intention to take over and perform the Agreement and commence completion of the Work and performance of all of the Contractor's remaining obligations that have accrued under the Agreement within ten (10) working days after receipt of notice of termination that the District may declare the Contractor's sureties in default and take over the completion of the Work or have the Work completed for the account and at the expense of the Contractor and its sureties, and the Contractor and its sureties will be liable to the District for any resulting excess cost. The District may, in addition to all other available remedies that the District may have under the Contract Documents and at law or equity, deduct any such excess cost of completing the Work from amounts that are due or that may become due the Contractor.

- 11.2.3 Upon termination of the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 - 11.2.1.5, the Contractor will, if so directed by the District, immediately remove from the Work site any and all materials and personal property belonging to the Contractor which have not been incorporated in the Work and the Contractor and its sureties will be liable upon their bond for all damages caused the District by reason of the Contractor's failure to complete the Work.
- 11.2.4 Upon termination of the Contractor's control of the Work for any of the reasons specified in provisions 11.2.1.1 through 11.2.1.5, above, the District reserves the right to refuse tender of the Contractor by any surety to complete the Work.
- 11.2.5 If the District completes or has completed any portion of, or the whole of the Work, following termination of the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, above, the District will neither be liable for nor account to the Contractor or the Contractor's sureties in any way for the time within which, or the manner in which such Work is performed, or for any changes made in such Work or for the money expended in satisfying claims and/or suits and/or other obligations in connection with completing the Work. If, following termination of the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, above, the unpaid balance of the Contract Price exceeds the expense of completing the Work, including compensation for additional legal, managerial and administrative services and all other amounts due for the completion of the Work and/or satisfaction of claims of the District and/or others arising out of the Agreement and any other charges that apply to the Contractor under the Agreement, the difference will be paid to the Contractor. If such expenses of completing the Work exceed the unpaid balance of the Contract Price, the Contractor or its sureties will pay the difference to the District.

- 11.2.6 If the Agreement or Contractor's control of the Work is terminated for any reason, no allowances or compensation will be granted for the loss of any anticipated profit by the Contractor.
- 11.2.7 In accordance with California Government Code Section 4410, in the event a national emergency occurs, and public work being performed by contract is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the work, then the District and the Contractor may, by written agreement, terminate the Agreement. In accordance with California Government Code Section 4411, such an agreement will include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party will pay to the other or any other person, under the facts and circumstances in the case. Compensation to the Contractor will be determined on the basis of the reasonable value of the work done, including preparatory work. As an exception to the foregoing, in the case of any fully completed separate item or portion of the Work for which there is a separate contract price, the contract price shall control. The parties may in any other case adopt the contract price as the reasonable value of the work or any portion of the work done.

### 11.3 Disputes.

- 11.3.1 In accordance with California Public Contract Code Section 20104.2, the following procedures apply to claims of \$375,000 or less between the Contractor and the District:
- 11.3.1.1 The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.
- 11.3.1.2 For claims of less than fifty thousand dollars (\$50,000), the District shall respond in writing to any written claim within forty five (45) calendar days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the District may have against the Contractor.
- 11.3.1.2.1 If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the District and the Contractor.
- 11.3.1.2.2 The District's written response to the claim, as further documented, shall be submitted to the Contractor within fifteen (15) calendar days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor in producing the additional information, whichever is greater.

11.3.1.3 For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the District shall respond in writing to all written claims within sixty (60) calendar days of receipt of the claim, or may request, in writing, within thirty (30) calendar days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the District may have against the Contractor.

11.3.1.3.1 If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the District and the Contractor.

11.3.1.3.2 The District's written response to the claim, as further documented, shall be submitted to the Contractor within thirty (30) calendar days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation, whichever is greater.

11.3.1.4 If the Contractor disputes the District's written response, or the District fails to respond within the time prescribed, the Contractor may so notify the District, in writing, either within fifteen (15) calendar days of receipt of the District's response or within fifteen (15) calendar days of the District's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the District shall schedule a meet and confer conference within thirty (30) calendar days for settlement of the dispute.

11.3.1.5 Following the meet and confer conference, if the claim or any portion remains in dispute, the Contractor may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the Contractor submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

11.3.1.6 This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.

11.3.2 In accordance with California Public Contract Code Section 20104.4, the following procedures apply to civil actions to resolve claims greater than \$375,000 between the District and the Contractor:

11.3.2.1 Within sixty (60) calendar days, but no earlier than thirty (30) calendar days, following the filing or responsive pleadings, the court shall submit the matter to non-binding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within fifteen (15) calendar days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) calendar days of the submittal, and shall be concluded within fifteen (15) calendar days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

11.3.2.2 If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

11.3.2.2.1 Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

11.3.2.2.2 In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees of the other party arising out of the trial de novo.

11.3.2.3 The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process.

11.3.3 In accordance with California Public Contract Code Section 20104.6:

11.3.4.1 The District shall not fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.

11.3.4.2 In any suit filed under Public Contract Code Section 20104.4 concerning this contract, the District shall pay interest at the legal rate

on any arbitration award or judgment. Such interest shall accrue from date the suit was filed.

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**PERFORMANCE BOND**

BOND NO. \_\_\_\_\_

PREMIUM: \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, LAS GALLINAS VALLEY SANITARY DISTRICT, (hereinafter designated as "Obligee") and \_\_\_\_\_ (hereinafter designated as "Principal") have entered into an agreement whereby principal agrees to install and complete certain designated public improvements, which said agreement, dated \_\_\_\_\_, and identified as project SECONDARY EFFLUENT LINE MODIFICATIONS, JOB NO. 12600-07, is hereby referred to and made a part hereof; and

WHEREAS, Said principal is required under the terms of said agreement to furnish a bond for the faithful performance of said agreement;

NOW, THEREFORE, We, the principal and \_\_\_\_\_ as surety, are held and firmly bound unto the hereinafter called "The Obligee," in the penal sum of \_\_\_\_\_ dollars (\$ \_\_\_\_\_) lawful money of the United States for the payment of which sum well and truly to be made, we bind ourselves, our heirs, successors, executors and administrators, jointly and severally firmly by these presents.

The condition of this obligation is such that if the above bound principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the said agreement and any alteration thereof made as therein provided, on his or their part, to be kept and perform and at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the Obligee, its officers, agents and employees, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As part of the obligation secured hereby and in addition to the face amount specified therefore, there shall be included costs and reasonable expenses and fees, including reasonable attorney's fees, incurred by county in successfully enforcing such obligation, all to be taxed as costs and included in any judgment rendered.

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

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SECONDARY EFFLUENT LINE MODIFICATIONS  
PERFORMANCE BOND

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals this \_\_\_\_\_ day of \_\_\_\_\_, the name and corporate seals of each corporate party being hereto affixed and these presents duly signed by their undersigned representatives, pursuant to authority of their governing bodies.

(Corporate Seal)

PRINCIPAL

(Acknowledgement)

By: \_\_\_\_\_  
Title: \_\_\_\_\_

(Corporate Seal)

SURETY

By: \_\_\_\_\_

(Attorney-in-fact)

(Acknowledgement)

Title: \_\_\_\_\_

*(NOTE TO SURETY COMPANY: A certified copy of unrevoked resolution of authority for the attorney-in-fact must be submitted with and attached to the executed bid bond.)*

LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**PAYMENT/LABOR AND MATERIALS BOND**

BOND NO.: \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS:

That we, \_\_\_\_\_ Principal, and \_\_\_\_\_, incorporated under the laws of the State of \_\_\_\_\_ and authorized to execute bonds and undertakings as sole surety, as Surety, are held and firmly bound unto any and all persons named in California Civil Code Section 1181 whose claim has not been paid by the contractor, company or corporation, in the aggregate total of \_\_\_\_\_ dollars (\$ \_\_\_\_\_ ), for the payment whereof, well and truly to be made, said Principal and Surety bind themselves, their heirs, administrators, successors and assigns, jointly and severally, firmly by these present.

The Condition of the foregoing obligation is such that; whereas the above bounden Principal has entered into a contract, dated \_\_\_\_\_, with the LAS GALLINAS VALLEY SANITARY DISTRICT to do the following work, to-wit: SECONDARY EFFLUENT LINE MODIFICATIONS, JOB NO. 12600-07.

NOW, THEREFORE, if the above bounden Principal contractor, person, company or corporation, or his or its subcontractor, fails to pay any claimant named in Section 3181 of the Civil Code of the State of California, or amounts due under the Unemployment Insurance Code, with respect to work or labor performed by any such claimant, that, the Surety on this bond will pay the same, in an amount not exceeding the aggregate sum specified in this bond, and also in case suit is brought upon this bond, a reasonable attorney's fee, which shall be awarded by the court to the prevailing party in said suit, said attorney's fee to be taxes as costs in said suit. This bond shall inure to the benefit of any person named in Section 3181 of the Civil Code of the State of California so as to vie a right of action to them or their assignees in any suit brought upon this bond.

This bond is executed and filed to comply with the provisions of the act of Legislature of the State of California as designated in Civil Code Sections 3247-3252 inclusive, and all amendments thereto.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_ the name and corporate seals of each corporate party being hereto affixed and these presents duly signed by their undersigned representatives, pursuant to authority of their governing bodies.

(Corporate Seal)

PRINCIPAL

(Acknowledgement)

By:  
Title: \_\_\_\_\_

(Corporate Seal)

SURETY

By: \_\_\_\_\_

(Attorney-in-fact)

(Acknowledgement)

Title: \_\_\_\_\_

*(NOTE TO SURETY COMPANY: A certified copy of unrevoked resolution of authority for the attorney-in-fact must be submitted with and attached to the executed bid bond.)*

LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**MAINTENANCE BOND**

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS the Board of the Las Gallinas Valley Sanitary District (designated as the "OBLIGEE"), has awarded to \_\_\_\_\_, (designated as the "PRINCIPAL") a contract for the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, which contract and all of the Contract Documents as defined therein (designated as the "Contract") are hereby made a part hereof;

WHEREAS, the PRINCIPAL is required under the terms of the Contract to furnish a bond for the correction of any defects due to defective materials or workmanship in the work performed under the Contract, for a period of ONE (1) YEAR from the date of acceptance by the OBLIGEE of the contracted work.

NOW, THEREFORE, we the PRINCIPAL and the undersigned \_\_\_\_\_, as surety (designated as "SURETY"), an admitted surety insurer authorized to do business in the State of California, are held and firmly bound unto the Las Gallinas Valley Sanitary District, in the penal sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_), lawful money of the United States, being a sum not less than ten percent (10%) of the final Contract price, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH that if, during a maintenance period of ONE (1) YEAR from the date of acceptance by the OBLIGEE of the contracted work, the PRINCIPAL upon receiving written notice of a need for repairs which are directly attributable to defective materials or workmanship, shall diligently take the necessary steps to correct said defects within seven (7) calendar days from the date of said notice, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

If any action shall be brought by the OBLIGEE upon this bond, a reasonable attorney's fee, to be fixed by the Court, shall be and become a part of OBLIGEE's judgment in any such action. No right of action shall accrue on this bond to, or for the use of, any person or corporation other than the OBLIGEE named herein or the heirs, executors, administrator or successor of the OBLIGEE.

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their seals this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, the name and corporate seals of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(Corporate Seal)

PRINCIPAL

(Acknowledgement)

By: \_\_\_\_\_  
Title: \_\_\_\_\_

(Corporate Seal)

SURETY

(Acknowledgement)

By: \_\_\_\_\_

(Attorney-in-fact)  
Title: \_\_\_\_\_

*(NOTE TO SURETY COMPANY: A certified copy of unrevoked resolution of authority for the attorney-in-fact must be submitted with and attached to the executed bid bond)*

LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**ESCROW AGREEMENT FOR  
SECURITY DEPOSITS IN LIEU OF RETENTION**

This Escrow Agreement is made and entered into by and between the Board of the LAS GALLINAS VALLEY SANITARY DISTRICT, whose address is 101 Lucas Valley Road Suite 300, San Rafael, California, 94903, hereinafter called "District", \_\_\_\_\_, whose address is \_\_\_\_\_, hereinafter called "Contractor", and \_\_\_\_\_, whose address is \_\_\_\_\_, hereinafter called "Escrow Agent"

For consideration hereinafter set forth, the District, Contractor, and Escrow Agent agree as follows:

1. Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by District pursuant to the Construction Contract entered into between the District and Contractor for the project entitled SECONDARY EFFLUENT LINE MODIFICATIONS in the amount of \_\_\_\_\_ dated \_\_\_\_\_ (hereinafter referred to as the "Contract"). Alternatively, on written request of the Contractor, the District shall make payments of the retention earnings directly to the Escrow Agent. When Contractor deposits the securities as substitute for Contract earnings, the Escrow Agent shall notify the District within ten (10) working days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between the District and Contractor. Securities shall be held in the name of \_\_\_\_\_ and shall designate the Contractor as the beneficial owner.

2. The District shall make progress payments to the Contractor for such funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above.

3. When the District makes payment of retentions earned directly to the Escrow Agent, the Escrow Agent shall hold them for the benefit of the Contractor until such time as the escrow created under this contract is terminated. The Contractor may direct the investments of the payments into securities. All terms and conditions of this agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the District pays the escrow agent directly.

4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of the District. These expenses and payment terms shall be determined by the District, Contractor and Escrow Agent.

5. The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of the Contractor and shall be subject to withdrawal by contractor at any time and from time to time without notice to the District.

6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from District to the Escrow Agent that District consents to the withdrawal of the amount sought to be withdrawn by Contractor.

7. The District shall have a right to draw upon the securities in the event of default by the Contractor. Upon seven day's written notice to the Escrow Agent from the District of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by the District.

8. Upon receipt of written notification from the District certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all monies and securities on deposit and payments of fees and charges.

9. Escrow Agent shall rely on the written notifications from the District and the Contractor pursuant to Sections (4) to (6) inclusive, of this agreement and the District and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

10. The names of the persons who are authorized to give written notice or to receive written notice on behalf of the District and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures, are as follows:

On behalf of District:

On Behalf of Contractor

\_\_\_\_\_  
Title

\_\_\_\_\_  
Curtis Paxton, General Manager

\_\_\_\_\_  
Name

On behalf of Escrow Agent:

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

At the time the Escrow Account is opened, the District and Contractor shall deliver to the Escrow Agent a fully executed counterpart of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

District:

Contractor:

\_\_\_\_\_  
Curtis Paxton, General Manager  
Las Gallinas Valley Sanitary District  
101 Lucas Valley Road, Suite 300  
San Rafael, CA 94903

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

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**VOLUME 2  
BID FORMS**

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**BIDDER'S CHECK LIST**

Name of Bidder: \_\_\_\_\_  
(Contractor's Legal Name)

Did You:

- \_\_\_\_\_ Send a properly completed Acknowledgement form immediately after receiving the Contract Documents and before bid opening.
- \_\_\_\_\_ Submit equal product proposals, if any, in accordance with the Instruction to Bidders included in the bid package at least seven (7) calendar days before the time specified for bid opening.
- \_\_\_\_\_ Include with your bid properly completed, accurate copies of the following documents in the following order using the forms included in the bid package:
  - \_\_\_\_\_ Bidder's Check List and Bid Label
  - \_\_\_\_\_ Proposal Cover Page and Bid Schedule
  - \_\_\_\_\_ Acknowledgement of each addendum issued by the District, if any, with signed and dated acknowledgement page.
  - \_\_\_\_\_ Executed Bid Bond
  - \_\_\_\_\_ Contractor License Information
  - \_\_\_\_\_ List of Proposed Subcontractors with License Information and References
  - \_\_\_\_\_ List of Major Materials
  - \_\_\_\_\_ Workers Compensation Insurance Certification
  - \_\_\_\_\_ Signed and notarized Non-Collusion Affidavit
  - \_\_\_\_\_ Drug-Free Workplace Certification
  - \_\_\_\_\_ Debarment Certification
  - \_\_\_\_\_ Statement of Experience of Bidder
  - \_\_\_\_\_ Financial Qualifications
  - \_\_\_\_\_ Signed and Notarized Site Visit Affidavit
  - \_\_\_\_\_ Executed Bidder's Signature Page

**(CONTINUED ON NEXT PAGE)**

- \_\_\_\_\_ Affix a properly completed, signed and accurate Bid Label using the form included in the bid package to the sealed cover of your bid.
  
- \_\_\_\_\_ Arrange to have the sealed bid delivered to the **Engineering Department, Las Gallinas Valley Sanitary District, 101 Lucas Valley Road, Suite 300, San Rafael, CA 94903** before the time and day specified on the Notice Inviting Sealed Bids.

LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**BID LABEL**

Sealed bid for the SECONDARY EFFLUENT LINE MODIFICATIONS, JOB NO. 12600-07.

Bidder: \_\_\_\_\_

Bidder Business Address (Street, City, State and Zip Code)

\_\_\_\_\_  
\_\_\_\_\_

Bidder Business Phone No.: \_\_\_\_\_

Bidder Business Fax No.: \_\_\_\_\_

Bidder Email Address: \_\_\_\_\_

By my signature below I certify under penalty of perjury under the laws of the State of California that a representative of the above bidder visited the project sites listed in the Contract Documents, and I am the person authorized to bind bidder as required by the attached Site Visit Affidavit.

By: \_\_\_\_\_  
(Official authorized to bind bidder)

Print Name and Title: \_\_\_\_\_

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**PROPOSAL COVER PAGE AND BID SCHEDULE**

TO THE BOARD OF DIRECTORS OF THE LAS GALLINAS VALLEY SANITARY DISTRICT:

Pursuant to the Notice Inviting Sealed Bids for the SECONDARY EFFLUENT LINE MODIFICATIONS PROJECT, JOB NO. 12600-07, the person signing the bidder's signature page contained in this proposal binds the entity listed on the bidder's signature page to submit complete, executed copies of all documents specified in the contract checklist included in Volume 1 of the bid package within seven (7) calendar days of receiving written Notice of Award of the project, and to fully perform the project by the time for completion specified in the Contract Documents for the price specified in the bid schedule below in accordance with the terms of the Contract Documents and applicable law. This proposal cover page and bid schedule will be included as part of the Contract Documents in accordance with the bid package.

This bid includes properly completed, accurate copies of all of the documents listed in the Bidder's Check List included in the bid package in the order listed in the Bidder's Check List and using the forms included in the bid package. This bid includes copies of each of the following addenda issued by the District. Each addendum has been signed and dated to confirm receipt on behalf of the entity listed on the bidder's signature page.

Addendum No. 1 dated \_\_\_\_\_

Addendum No. 2 dated \_\_\_\_\_

Addendum No. 3 dated \_\_\_\_\_

Addendum No. 4 dated \_\_\_\_\_

Addendum No. 5 dated \_\_\_\_\_

## BID SCHEDULE – BID ITEM DESCRIPTIONS

The following paragraphs provide a summary of the work to be included for each base bid item listed in the Bid Schedule.

### BASE BID ITEMS

#### **Item 1 – Phase 1 Work as described in Section 011000 Summary of Work.**

Includes installation of new 36" piping and 8-foot diameter manhole #1 along with 24" buried gate valve to connect existing 24" HDPE piping to existing 36" HDPE CCC piping. All associated site/civil, grading, and paving work to complete Phase 1 work.

#### **Item 2 – Phase 2 and Phase 3 Work as described in Section 011000 Summary of Work.**

Includes concrete encasing existing 30" HDPE piping, installation of manhole #2, disconnection of 24" HDPE from existing tee, removal of concrete 24" concreted encased HDPE piping from CCC Weir Box, installation of new 42" HDPE piping from manhole #2 to CCC Weir Box, installation of temporary bypass pumping as described in Section 020960, installation of new doppler radar flow meter, installation of new 3"x1" containment PVC piping to new manhole #2, installation of and removal of 42"/24" piping (and reducers) to complete installation of manhole #2, and removal/salvage of existing 20" flow meter from vault work.

#### **Note: The District may award only Phase 1 or both Phase 1 and Phase 2 work.**

Accordingly, costs for mobilization, project management/overhead, etc. for each bid item should be separated accordingly.

**BID SCHEDULE – BASE BID**

LUMP SUM BID ITEMS

| Item No. | Description                    | Units | Cost     |
|----------|--------------------------------|-------|----------|
| 1        | Phase 1 Work                   | LS    | \$ _____ |
|          | _____ Item #1, in Written Form |       |          |
| 2        | Phase 2 and Phase 3 Work       | LS    | \$ _____ |
|          | _____ Item #2, in Written Form |       |          |

**TOTAL BASE BID, BASIS OF AWARD (SUM OF BID ITEMS 1 AND 2)**

\$ \_\_\_\_\_

**(In figures)**

\_\_\_\_\_ **Dollars**

**(In Written Form)**

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**BID BOND**

(NOTE: Bidders must use this form, or use of any other bid bond form may render a bid non-responsive)

KNOW ALL MEN BY THESE PRESENTS:

That we, as PRINCIPAL, and \_\_\_\_\_, a (sole proprietorship /corporation/partnership/joint venture) organized and existing under and by virtue of the laws of the State of \_\_\_\_\_ and an admitted surety insurer authorized to do business in the State of California, as SURETY, are held and firmly bound unto the Las Gallinas Valley Sanitary District, as OBLIGEE, in a penal sum equal to ten-percent (10%) the total bid price including the base bid and alternates specified in the proposal of the PRINCIPAL, to the OBLIGEE for the work described below, which penal sum is \_\_\_\_\_ (\$ \_\_\_\_\_) lawful money of the United States of America, for the payment of which sum well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the PRINCIPAL has submitted the accompanying proposal dated \_\_\_\_\_, \_\_\_\_\_ to the OBLIGEE, for the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07.

NOW THEREFORE, if the PRINCIPAL shall not withdraw said proposal within the ninety (90) day period following the opening of bids, and if the PRINCIPAL receives written notice that the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, is awarded to the PRINCIPAL and shall, within seven (7) calendar days of receiving such notice: enter into a written contract with the OBLIGEE in the form prescribed in the bid package issued by the OBLIGEE concerning the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07; and give insurance and bond with good and sufficient sureties guaranteeing the faithful performance and proper fulfillment of such contract and guaranteeing payment for labor and materials used for performance of the contract as required by law; and file with the OBLIGEE all required documents and do all other thing required in accordance with the bid package issued by the OBLIGEE concerning the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, for the contract between the PRINCIPAL and the OBLIGEE to become effective and for work to commence in accordance with the bid package issued by the OBLIGEE concerning the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, or, in the event of withdrawal of the accompanying proposal within the ninety (90) day period following the opening of bids; or failure by the PRINCIPAL to enter into such contract with the OBLIGEE or to give the OBLIGEE such bonds or to file any other documents or to do any other things required in the bid package issued by the OBLIGEE for the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, if the PRINCIPAL shall pay the OBLIGEE the difference between the total bid price in the accompanying proposal and the amount for which the OBLIGEE may procure the required performance, if the latter amount be in excess of the former, together with all costs incurred by

the OBLIGEE in again attempting to let the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07 and if the said PRINCIPAL shall fully reimburse and save harmless the OBLIGEE from any damage sustained by the OBLIGEE through failure of the PRINCIPAL to enter into the written contract or to file the required performance or labor and material bonds, or to file any other required documents or to do any other things required for the contract between the PRINCIPAL and the OBLIGEE to become effective and the work to commence in accordance with the bid package issued by the OBLIGEE concerning the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, then this obligation shall be null and void; otherwise, it shall be and remain in full force and effect.

SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the bid or Contract Documents for the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, or to the specifications included in the same, or to the work to be performed there under, or to the notice to bidders, or to any other documents concerning the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, shall in anywise affect SURETY's obligation under this bond, and SURETY hereby waives notice of any such change, extension of time, alteration or addition to such bid or Contract Documents.

In the event suit is brought upon this bond by the OBLIGEE and judgment is recovered, the SURETY shall pay all costs incurred by the OBLIGEE in such suit, including a reasonable attorney's fee to be fixed by the Court.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, the name and corporate seals of each corporate party being hereto affixed and these presents duly signed by their undersigned representatives, pursuant to authority of their governing bodies.

(Corporate Seal)

PRINCIPAL \_\_\_\_\_

By \_\_\_\_\_

(Acknowledgement)

Title \_\_\_\_\_

(Corporate Seal)

SURETY \_\_\_\_\_

By \_\_\_\_\_  
(Attorney-in-fact)

(Acknowledgement)

Title \_\_\_\_\_

*(NOTE TO SURETY COMPANY: A certified copy of unrevoked resolution of authority for the attorney-in-fact must be submitted with and attached to the executed bid bond.)*

LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**CONTRACTOR LICENSE INFORMATION**

The bidder acknowledges that the license(s) required for performance of the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, is a **Class A** license.

The bidder holds the following California Contractors License(s):

- 1. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_
- 2. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_
- 3. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_
- 4. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_
- 5. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_
- 6. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_
- 7. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_
- 8. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_
- 9. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_
- 10. License No. \_\_\_\_\_, Class \_\_\_\_\_, Expiration Date \_\_\_\_\_

Bidder's Taxpayer Identification No. \_\_\_\_\_

Bidder's DIR Registration No. \_\_\_\_\_

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

### LIST OF PROPOSED SUBCONTRACTORS

In accordance with the requirements of the Subletting and Subcontracting Fair Practices, Act, California Public Contract Code Section 4100 and following, listed below are the name, business location, and the portion (type or trade) of the Project work to be subcontracted to each subcontractor that will perform a portion of the Project work (including special fabrication and installation of a portion of the work) valued in excess of one half ( $\frac{1}{2}$ ) of one (1) percent of the total bid price. If the Project work includes construction of streets or highways, listed below are the name, business location, and the portion (type or trade) of the Project Work to be subcontracted to each subcontractor that will perform a portion of the Project work (including special fabrication and installation of a portion of the work) valued in excess of one half ( $\frac{1}{2}$ ) of one (1) percent of the total Project bid price, or ten thousand dollars (\$10,000), whichever is greater. Also listed below are the proposed subcontract dollar amount and current California Contractor's License Number(s) for each proposed subcontractor. Bids that fail to include complete proposed subcontractor information in accordance with this form and Public Contract Code Section 4100 and following may be deemed non-responsive.

In accordance with California Public Contract Code Section 4106, for any portion of the Project work with a value of more than one half ( $\frac{1}{2}$ ) of one (1) percent of the total bid price for which no subcontractor is listed, or for which more than one subcontractor is listed, the bidder certifies by submission of its bid that the bidder is qualified to perform that portion of the Project work and that the bidder will perform that portion of the Project work with its own forces. The penalties listed in California Public Contract Code Section 4111 will apply to any substitution of another subcontractor for a subcontractor listed below except as permitted by the District in accordance with Section 4107 and following of the California Public Contract Code.

1. Subcontractor Name \_\_\_\_\_  
Contact: \_\_\_\_\_  
Phone No. \_\_\_\_\_ Email: \_\_\_\_\_  
Business Location \_\_\_\_\_  
Trade \_\_\_\_\_  
Subcontract Amount \_\_\_\_\_  
Current Contractor's License No(s). \_\_\_\_\_  
DIR Registration No. \_\_\_\_\_

2. Subcontractor Name \_\_\_\_\_  
Contact: \_\_\_\_\_  
Phone No. \_\_\_\_\_ Email: \_\_\_\_\_  
Business Location \_\_\_\_\_  
Trade \_\_\_\_\_  
Subcontract Amount \_\_\_\_\_  
Current Contractor's License No(s). \_\_\_\_\_  
DIR Registration No. \_\_\_\_\_
3. Subcontractor Name \_\_\_\_\_  
Contact: \_\_\_\_\_  
Phone No. \_\_\_\_\_ Email: \_\_\_\_\_  
Business Location \_\_\_\_\_  
Trade \_\_\_\_\_  
Subcontract Amount \_\_\_\_\_  
Current Contractor's License No(s). \_\_\_\_\_  
DIR Registration No. \_\_\_\_\_
4. Subcontractor Name \_\_\_\_\_  
Contact: \_\_\_\_\_  
Phone No. \_\_\_\_\_ Email: \_\_\_\_\_  
Business Location \_\_\_\_\_  
Trade \_\_\_\_\_  
Subcontract Amount \_\_\_\_\_  
Current Contractor's License No(s). \_\_\_\_\_  
DIR Registration No. \_\_\_\_\_

(Attach additional list as necessary.)





LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**WORKERS COMPENSATION INSURANCE CERTIFICATION**

By submitting its bid the bidder certifies as follows:

I am aware of the provisions of California Labor Code Section 3700 which require every employer to be insured against liability for workmen's compensation or to undertake self-insurance in accordance with the provisions of the Labor Code, and I will comply with such provisions before commencing performance of the work of this Contract.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
Bidder's Name

\_\_\_\_\_  
Authorized Signature Date

\_\_\_\_\_  
Title of Signatory

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**NON-COLLUSION AFFIDAVIT**

TO BE EXECUTED BY BIDDER  
AND SUBMITTED WITH BID

STATE OF CALIFORNIA    )  
  )  
COUNTY OF \_\_\_\_\_ )

\_\_\_\_\_, being first duly sworn, deposes and says that he or she is \_\_\_\_\_ of \_\_\_\_\_, the party making the foregoing bid, that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that 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, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that 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, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

\_\_\_\_\_  
Signature of Bidder

(Acknowledgement)  
Subscribed and sworn before me by \_\_\_\_\_, this \_\_\_\_\_  
day of \_\_\_\_\_, \_\_\_\_\_.

(SEAL) \_\_\_\_\_  
Notary Public

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**DRUG-FREE WORKPLACE CERTIFICATION**

By submitting its bid the bidder certifies compliance with Government Code Section 8355 in matters relating to providing a drug-free workplace. The above-named contractor or applicant will:

1. Publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees for violations, as required by Government Code Section 8355(a).
2. Establish a Drug-Free Awareness Program as required by Government Code Section 8355(b), to inform employees about all of the following:
  - (a) The dangers of drug abuse in the workplace,
  - (b) The person's or organization's policy of maintaining a drug-free workplace,
  - (c) Any available counseling, rehabilitation and employee assistance programs, and
  - (d) Penalties that may be imposed upon employees for drug abuse violations.
3. Provide as required by Government Code Section 8355(c), that every employee who works on the proposed contract:
  - (a) Will receive a copy of the company's drug-free policy statement, and
  - (b) Will agree to abide by the terms of the company's statement as a condition of employment on the contract.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Bidder's Name

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title of Signatory

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**DEBARMENT CERTIFICATION**

By submitting its bid the bidder certifies in accordance with California Public Contract Code Section 6109 that neither the bidder nor any subcontractor included on the list of proposed subcontractors submitted with the bid is ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7. In accordance with California Public Contract Code Section 6109, contractors and subcontractors who are ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7 may neither bid on, be awarded or perform as a subcontractor on public works projects.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Bidder's Name

\_\_\_\_\_  
Authorized Signature Date

\_\_\_\_\_  
Title of Signatory

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

## STATEMENT OF EXPERIENCE OF BIDDER

(To Accompany Bid)

The undersigned Bidder certifies that it is, at the time of bidding, and shall be, throughout the period of the contract, licensed under the provisions of Chapter 9, Division 3, of the Business and Professions Code of the State of California, to do the type of work contemplated in the Contract Documents. Bidder further certifies that it is skilled and regularly engaged in the general class and type of work called for in the Contract Documents.

The Bidder represents that it is competent, knowledgeable, and has special skills concerning the nature, extent, and inherent conditions concerning the work to be performed. Bidder further acknowledges that there are certain inherent conditions existent in the construction of the particular facilities which may create, during the construction program, unsafe conditions hazardous to persons and property. Bidder expressly acknowledges that it is aware of such risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the construction work with respect to such hazards.

### A. ESSENTIAL REQUIREMENTS FOR QUALIFICATION

If the answer to any of questions 1 through 3 is "no", or if the answer to any of questions 4 through 7 is "yes", the Bidder will be deemed ineligible or not responsible for purposes of the Contract.

1. Bidder possesses a valid and current California Contractor's license as required for the project for which it intends to submit a bid.  
 Yes                       No
2. Bidder will comply with and provide all insurance as defined in Section 8.8, Insurance, of then General Conditions.  
 Yes                       No
3. Bidder has current Workers' Compensation insurance coverage as required by the Labor Code or is legally self-insured pursuant to Labor Code section 3700 et. seq.  
 Yes                       No
4. Has your contractor's license been revoked at any time in the last five (5) years?  
 Yes                       No
5. Has a surety firm completed a contract on your behalf, or paid for completion because your firm was default terminated by the project owner within the last five (5) years?  
 Yes                       No

6. At the time of submitting this qualification form, is your firm ineligible to bid on or be awarded a public works contract, or perform as a subcontractor on a public works contract, pursuant to either Labor Code section 1777.1 or Labor Code section 1777.7?  
 Yes                       No
7. At any time during the last five (5) years, has your firm, or any of its owners or officers been convicted of a crime involving the awarding of a contract of a government construction project, or the bidding or performance of a government contract?  
 Yes                       No

**B. COMPANY EXPERIENCE**

The Bidder has been engaged in the contracting business, under the present business name for \_\_\_\_\_ years and has experience in work of a nature similar to this project which extends over a period of \_\_\_\_\_ years (Bidder must show **at least five (5) years** of related experience).

The Bidder, as a Contractor, has never failed to satisfactorily complete a contract awarded to it, except as follows:

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For the District to consider the Bidder properly experienced in work of similar nature to this project, the Bidder must list at least **\$5,000,000** in construction volume on **no more than five (5)** projects completed **within the last five (5) years** of the following types of projects:

**1. Wastewater treatment plant projects.**

The Bidder can include project(s) currently under construction, but only the total amount paid by the District(s) as of three (3) months prior to the bid date on uncompleted project(s) can be included in the construction volume for purposes of this certification. The Bidder is allowed to list up to a maximum of five (5) projects of the types listed above, that combined, will add up to at least the cost in completed volume of work listed above. Any projects listed below which are not as defined above will not be considered by the District in meeting this experience requirement. For example, pump stations are not considered a treatment plant.

Bidder also certifies that Bidder self-performed at least forty percent (40%) of the Work on each of the projects listed below. The District considers this level of past self-performance demonstrates a benefit to a Project in terms of better control of cost, schedule and safety.

If the Bidder is a Joint Venture of two or more companies, each participant in the Joint Venture shall meet this prior project experience requirement and provide project information for each Joint Venture participant in the format below.

1. **Project Name:** \_\_\_\_\_  
**Owner:** \_\_\_\_\_  
**Construction Cost: \$** \_\_\_\_\_  
**Construction Time:** \_\_\_\_\_ **Calendar Days**  
**Owner's Representative:** \_\_\_\_\_  
**Owner's Telephone No.:** \_\_\_\_\_  
**Date of Substantial Completion:** \_\_\_\_\_

2. **Project Name:** \_\_\_\_\_  
**Owner:** \_\_\_\_\_  
**Construction Cost: \$** \_\_\_\_\_  
**Construction Time:** \_\_\_\_\_ **Calendar Days**  
**Owner's Representative:** \_\_\_\_\_  
**Owner's Telephone No.:** \_\_\_\_\_  
**Date of Substantial Completion:** \_\_\_\_\_

3. **Project Name:** \_\_\_\_\_  
**Owner:** \_\_\_\_\_  
**Construction Cost: \$** \_\_\_\_\_  
**Construction Time:** \_\_\_\_\_ **Calendar Days**  
**Owner's Representative:** \_\_\_\_\_  
**Owner's Telephone No.:** \_\_\_\_\_  
**Date of Substantial Completion:** \_\_\_\_\_

4. **Project Name:** \_\_\_\_\_  
**Owner:** \_\_\_\_\_  
**Construction Cost: \$** \_\_\_\_\_  
**Construction Time:** \_\_\_\_\_ **Calendar Days**  
**Owner's Representative:** \_\_\_\_\_  
**Owner's Telephone No.:** \_\_\_\_\_  
**Date of Substantial Completion:** \_\_\_\_\_

5. **Project Name:** \_\_\_\_\_  
**Owner:** \_\_\_\_\_  
**Construction Cost: \$** \_\_\_\_\_  
**Construction Time:** \_\_\_\_\_ **Calendar Days**  
**Owner's Representative:** \_\_\_\_\_  
**Owner's Telephone No.:** \_\_\_\_\_  
**Date of Substantial Completion:** \_\_\_\_\_

**C. SAFETY QUALIFICATION CRITERIA**

The following information will be used to determine if you meet the minimum safety requirements for this project. To qualify to bid and be awarded the project, the contractor shall have a safety record that meets or exceeds the one of the three following safety criteria:

1. If the Contractor's three-year average Workers' Compensation Experience Modification (EMR) is equal to or less than 100%, the contractor meets the minimum safety requirements for this project;
2. If the Contractor's three-year average EMR is greater than 100%, the Contractor's three-year average Recordable Incident Rate (RIR) must not be greater than 3.8 and three-year average Lost Time Incident Rate (LTIR) must not be greater than 1.7 to meet the minimum safety requirements for this project;
3. If the Contractor only meets either the three-year average RIR or LTIR value, the Contractor shall be required to hire at no additional cost to the District a mutually acceptable safety consultant who will prepare a project specific safety plan, conduct random weekly inspections of the Contractor's activities to ensure conformance with the safety plan and prepare and submit a weekly report to the District summarizing the results of each inspection. The contractor's shall adhere to the safety plan. The contractor's activities shall be adjusted immediately to address any issues resulting from the weekly safety inspection.

Contractors that cannot meet any of the three safety criteria above are not eligible to work for the District.

The Bidder shall list its Experience Modification Rate, Lost time Incident Rate, and Recordable Incident Rate for the last three complete years (available from your insurance carrier).

| <u>Year</u> | <u>EMR</u> | <u>RIR</u> | <u>LTIR</u> |
|-------------|------------|------------|-------------|
| _____       | _____      | _____      | _____       |
| _____       | _____      | _____      | _____       |
| _____       | _____      | _____      | _____       |
|             | _____AVG   | _____AVG   | _____AVG    |

To verify the above information, the District will contact the Bidder's Workers' Compensation Insurance carrier. The Bidder shall authorize its carrier to release this information. Failure to release this information will result in the bid being non-responsive and result in automatic disqualification of the bid.

Workers' Compensation Insurance Company: \_\_\_\_\_  
Contact Person for Insurance Company: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

\_\_\_\_\_  
Name of Bidder

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

\_\_\_\_\_  
Name of Bidder

\_\_\_\_\_  
Contractor's License No.

\_\_\_\_\_  
Expiration Date

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Title of Signatory

**D. FINANCIAL QUALIFICATIONS**

**(TO BE SUBMITTED WITH BID)**

Provide evidence that the Bidder has sufficient financial resources to provide all work necessary to complete the project including construction, start-up, and warranty services.

A. Bidder must provide Section FINANCIAL QUALIFICATIONS to assist the District in determining the Bidder's financial condition.

B. Bidder must provide a letter from its Surety or Surety Broker which certifies that Bidder's current bonding capacity is sufficient for the bonding requirements for this Project.

C. Bidder shall identify any claims filed in court or arbitration against Bidder in the past five years which concerned Bidder's work on a construction project. For each claim, if any, the Bidder shall provide the project name, date of the claim, name of the claimant, a brief description of the nature of the claim, the court in which the case was filed and a brief description of the status of the claim (pending or, if resolved, a brief description of the resolution). Are there any pending claims against your company that should you lose the claim(s), would adversely affect your financial position or your ability to meet your obligations if awarded the contract for this project? If so, please explain.

**Claims Filed Against Bidder**

Project Name: \_\_\_\_\_

Date of Claim: \_\_\_\_\_

Claimant Name: \_\_\_\_\_

Court: \_\_\_\_\_

Status of Claim: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Bidder shall also identify any claims filed in court or arbitration by Bidder against a project owner in the past five years concerning work on a project or payment for a contract. For each claim, if any, the Bidder shall provide the project name, date of the claim, a brief description of the nature of the claim, the court in which the case was filed and a brief description of the status of the claim (pending or, if resolved, a brief description of the resolution). Are there any pending claims filed by your company against a project owner that should you lose the claim(s), would adversely affect your financial position or your ability to meet your obligations if awarded the contract for this project? If so, please explain.

**Claims Filed By Bidder**

Project Name: \_\_\_\_\_

Date of Claim: \_\_\_\_\_

Claimant Name: \_\_\_\_\_

Court: \_\_\_\_\_

Status of Claim: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

All financial information provided by Bidder that is marked "Confidential" or "Proprietary" shall be handled by the District in accordance with Public Records Act.

**The undersigned hereby states that all representations regarding the Bidder's Company Experience, and Safety Qualification Information are correct and true.**

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Bidder's Name

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title of Signatory

LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**FINANCIAL QUALIFICATIONS  
BIDDER'S REFERENCES AND CREDIT REPORT**

The Contractor shall submit with his/her bid a credit report, current within five (5) working days of the bid opening date for this project. For privacy purposes, the report may be submitted in an envelope marked "CONFIDENTIAL". To be considered a responsible bidder on this project, either the Contractor's credit report shall indicate a Dun & Bradstreet credit risk rating specified below or the Contractor's bank shall issue a financial statement on the following page. If the Contractor is a Dun & Bradstreet member, a copy of the current Dun & Bradstreet rating form showing a rating not less than the specified rating.

**The specified Dun and Bradstreet credit risk rating for this project is 3A2 or better.**

If the Contractor is not a Dun & Bradstreet member, an acceptable credit report shall consist of the submittal of the District's Financial Statement Form (which follows) executed by the Contractor's bank. Failure to submit the required report with the bid for this project shall cause the bid to be rejected. Failure to possess the required financial strength and credit risk rating may cause the bid to be rejected. The District shall request confirmation of the Contractor's rating from Dun & Bradstreet Information Services. The sufficiency of the Bidder's financial qualifications will be determined solely by the District and its decision shall be final.

Reference is hereby made to the following bank or banks as to the financial responsibility of the Bidder:

| Name of Bank | Address |
|--------------|---------|
| _____        | _____   |
| _____        | _____   |
| _____        | _____   |

Reference is hereby made to the following surety companies as to the financial responsibility and general reliability of the Bidder:

Name of Surety Company \_\_\_\_\_  
\_\_\_\_\_  
Signature of Bidder \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_

### FINANCIAL STATEMENT FORM

\_\_\_\_\_ has an established deposit  
and borrowing relationship with \_\_\_\_\_ since  
(Bank)  
\_\_\_\_\_. Both business account and credit accommodations are maintained in  
(Date)  
a highly satisfactory manner. Based on my knowledge of \_\_\_\_\_ 's  
(Contractor)

Average monthly business account balances and its credit worthiness, I believe its general financial strength and credit rating meet or exceed the Dun & Bradstreet alphanumeric rating of not less than **3A2**.

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

\_\_\_\_\_  
Contractor Representative, Printed Name

\_\_\_\_\_  
Contractor Representative, Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Bank Name

\_\_\_\_\_  
Business Address

\_\_\_\_\_  
City/State/Zip Code

\_\_\_\_\_  
Bank Representative, Printed Name

\_\_\_\_\_  
Bank Representative, Signature

\_\_\_\_\_  
Date

Following are two Dun & Bradstreet rating component sheets to assist in the evaluation of the responsible bidder's tangible net worth and credit worthiness.

**D & B RATING KEY**

Quickly assesses a company's size and composite credit appraisal, e.g., a company rated 3A3 has a worth of \$1,000,000 - \$9,999,000 based on an interim or fiscal balance sheet and a composite credit appraisal of 'Fair'.

Key to Employee Range

|     |               |
|-----|---------------|
| ER1 | 1,000 or more |
| ER2 | 500-999       |
| ER3 | 100-499       |
| ER4 | 50-99         |
| ER5 | 20-49         |
| ER6 | 10-19         |
| ER7 | 5-9           |
| ER8 | 1-4           |
| ERN | Not Available |

| <u>Rating Classification</u>                               |              |                 | <u>Composite Credit Appraisal</u> |             |             |                |
|--|--------------|-----------------|-----------------------------------|-------------|-------------|----------------|
| <u>Based on Worth from Interim or Fiscal Balance Sheet</u> |              |                 | <u>HIGH</u>                       | <u>GOOD</u> | <u>FAIR</u> | <u>LIMITED</u> |
| 5A   | \$50,000,000 | and Over        | 1                                 | 2           | 3           | 4              |
| 4A   | 10,000,000   | to \$49,999,999 | 1                                 | 2           | 3           | 4              |
| 3A   | 1,000,000    | to 9,999,999    | 1                                 | 2           | 3           | 4              |
| 2A   | 750,000      | to 999,999      | 1                                 | 2           | 3           | 4              |
| 1A   | 500,000      | to 749,999      | 1                                 | 2           | 3           | 4              |
| BA   | 300,000      | to 499,999      | 1                                 | 2           | 3           | 4              |
| BB   | 200,000      | to 299,999      | 1                                 | 2           | 3           | 4              |
| CB   | 125,000      | to 199,999      | 1                                 | 2           | 3           | 4              |
| CC   | 75,000       | to 124,999      | 1                                 | 2           | 3           | 4              |
| DC   | 50,000       | to 74,999       | 1                                 | 2           | 3           | 4              |
| DD   | 35,000       | to 49,999       | 1                                 | 2           | 3           | 4              |
| EE   | 20,000       | to 34,999       | 1                                 | 2           | 3           | 4              |
| FF   | 10,000       | to 19,999       | 1                                 | 2           | 3           | 4              |
| GG   | 5,000        | to 9,999        | 1                                 | 2           | 3           | 4              |
| HH   |              | up to 4,999     | 1                                 | 2           | 3           | 4              |

| <u>Rating Classification</u>        |              |          | <u>Composite Credit Appraisal</u> |             |                |
|-------------------------------------|--------------|----------|-----------------------------------|-------------|----------------|
| <u>Based on Number of Employees</u> |              |          | <u>GOOD</u>                       | <u>FAIR</u> | <u>LIMITED</u> |
| 1R                                  | 10 employees | and Over | 2                                 | 3           | 4              |
| 2R                                  | 1            | to 9     | 2                                 | 3           | 4              |

## WHAT THE RATINGS MEAN

5A to HH – ‘5A’ to ‘HH’ Ratings reflect company size based on worth or equity as computed by D&B. Company size can be an effective indicator of credit capacity. These Ratings are assigned to businesses that have supplied D&B with a current financial statement.

1R and 2R – the ‘1R’ and ‘2R’ Rating categories reflect company size based on the total number of employees for the business. They are assigned to business files that do not contain a current financial statement.

Composite Credit Appraisal: The Composite Credit Appraisal is a number, one through four, that makes up the second half of the company’s rating and reflects D&B’s overall assessment of that firm’s credit worthiness. The Composite Credit Appraisal is based on analysis by D&B of company payments, financial information, public records, business age and other important factors (where available).

A ‘2’ is the highest Composite Credit Appraisal a company not supplying D&B with current financial information can receive.

Rating: May also include the ‘-’ symbol, or absence of a D&B Rating. This symbol should not be interpreted as indicating that credit should be denied. It means that the information available to D&B does not permit us to classify the company within our Rating key and that further inquiry should be made before reaching a credit decision. Some reasons for using the ‘-’ symbol includes: deficit net worth, bankruptcy proceedings, lack of sufficient payment information or incomplete history indicator.

Date Applied: Allows you to review a company’s rating changes over time (the last 10 Rating changes or any changes since 1991 if less than 10 are provided).

ER (Employee Range): Certain lines of business do not lend themselves to classification under the D&B Rating system. Instead, we assign these types of businesses an Employee Range symbol based on the number of people employed. No other significance should be attached to this symbol. For example, a Rating of ‘ER7’ means there are between five and nine employees in the company. ‘ERN’ should not be interpreted negatively. It simply means we do not have information indicating how many people are employed at this firm.

DS (DUNS) Support: This indicates that the information available to D&B does not permit us to classify the company within our Rating key. When ordering these reports an investigation can be performed and results sent to you within four working days, at no additional charge.

INV (Investigation Being Conducted): When an ‘INV’ appears, it means an investigation is being conducted on this business to get the most current details.

LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**SITE VISIT AFFIDAVIT TO BE EXECUTED  
BY BIDDER, NOTARIZED AND SUBMITTED WITH BID**

(To Accompany Bid)

State of California )  
County of \_\_\_\_\_ ) ss.

\_\_\_\_\_, being first duly sworn, deposes and says that  
(Contractor's Authorized Representative)

he or she is \_\_\_\_\_ of \_\_\_\_\_,  
(Title of Representative) (Contractor's Legal Name)

the party making the foregoing Bid, has visited the Project site(s) as described in the Contract Documents and has examined and familiarized themselves with the existing conditions, as well as all other conditions relating to the construction which will be performed. The submitting of a Bid shall be considered an acknowledgment on the part of the Bidder of familiarity with conditions at the site of the Work and that the site examination has provided adequate and sufficient information related to existing conditions which may affect cost, progress or performance of the Work.

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Type/Print Name of Bidder

\_\_\_\_\_  
Type/Print Representative's Name

\_\_\_\_\_  
Type/Print Title

\_\_\_\_\_  
Date

(Acknowledgement)  
Subscribed and sworn before me by \_\_\_\_\_, this \_\_\_\_\_  
day of \_\_\_\_\_, \_\_\_\_\_.

(SEAL)

\_\_\_\_\_  
Notary Public

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LAS GALLINAS VALLEY SANITARY DISTRICT  
101 Lucas Valley Road, Suite 300  
San Rafael, California 94903

**BIDDER'S SIGNATURE PAGE**

By my signature on this proposal I certify, under penalty of perjury under the laws of the State of California, that the information submitted with this proposal for the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, which information includes, but is not limited to, the Bidder's Check List, Proposal Cover Page and Bid Schedule, Acknowledgement of Bid Addenda, Bid Bond, Contractor License Information, List of Proposed Subcontractors, Workers Compensation Insurance Certification, Non-Collusion Affidavit, Drug-Free Workplace Certification, Debarment Certification, Statement of Experience of Bidder, Financial Qualifications, and Site Visit Affidavit are accurate, true and correct, and are submitted in accordance with the requirements of the bid package issued by the Las Gallinas Valley Sanitary District concerning the SECONDARY EFFLUENT LINE MODIFICATIONS project, JOB NO. 12600-07, and applicable law. By my signature on this proposal I further certify that I am legally authorized to bind the bidder in accordance with the requirements of the bid package.

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

\_\_\_\_\_  
(Typed or printed name)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Bidder)

Bidder Business Address (Street, City, State and Zip Code)

\_\_\_\_\_  
\_\_\_\_\_

Bidder Business Phone No.: \_\_\_\_\_

Bidder Business Fax No.: \_\_\_\_\_

Bidder Email Address: \_\_\_\_\_

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## **APPENDIX A**

### **SAFE WORK REQUIREMENTS**

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# LAS GALLINAS VALLEY SANITARY DISTRICT

## CONTRACTOR SAFE WORK REQUIREMENTS

Revised June 8, 2017

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### SAFETY POLICY

Contractors and their subcontractors working for the Las Gallinas Valley Sanitary District shall comply with all applicable federal, state, and local safety orders in the performance of any work on District projects. In addition, Contractors and their subcontractors shall comply with all safety regulations and procedures listed in this Safe Work Requirements. Contractors shall take any additional precautions necessary to prevent injury or damage to persons, property, or interference with District operations.

Contractors shall be responsible for notifying employees, subcontractors, and invitees of these District Safe Work Requirements. No work within District facilities or on District contract work sites shall begin prior to such notification. Contractor shall not allow a new employee or new subcontractor to begin work on District projects without having conducted a full and proper safety orientation.

Contractors doing work at the Treatment Plant facility, lift stations or sewage conveyance systems shall schedule a safety orientation session for their site Superintendent and other Contractor-designated personnel with the Authorized District Representative prior to commencing work. The orientation session shall include emergency procedures, an explanation of applicable District safety policies, and any unique and inherent hazards of District facilities. It is then the responsibility of the Contractor's Superintendent or designated personnel to orient and so inform all personnel under the Contractor's supervision.

The District may, in its sole discretion, either temporarily or permanently remove a Contractor's employee from District work and/or terminate the Contractor's right to proceed for any violation of applicable Cal/OSHA Construction Safety Orders or these District Safe Work Requirements.

### DEFINITIONS

As used in this Safe Work Requirement, the following definitions are applicable:

A. **PARTS AND MATERIALS:**

All products, materials, devices, systems, or installations installed by Contractor shall have been approved, listed, labeled, or certified as conforming to applicable governmental or other nationally recognized standards, or applicable scientific principles. The listing, labeling, or certification of conformity shall be based upon an evaluation performed by a person, firm, or entity with appropriate registered engineering

competence; or by a person, firm, or entity, independent of the manufacturer or supplier of the product, with demonstrated competence in the field of such evaluation.

- B. CONTRACTOR**  
Designates “Contractor”, “Contractors”, “Sub-Contractors”, “Suppliers”, and all employees of each.
- C. AUTHORIZED DISTRICT REPRESENTATIVE**  
The District’s Authorized Representatives shall be the employee(s) designated by the District to be responsible for communicating with the Contractor.
- D. DISTRICT JURISDICTION**  
For the purposes of these regulations, “District” Shall mean the Las Gallinas Valley Sanitary District.
- E. TREATMENT PLANT AND FACILITIES**  
For the purposes of these regulations, “Treatment Plant & Facilities” shall include the District's Wastewater Treatment Plant, lift stations and sewage conveyance systems located within the boundaries of the District.

## EMERGENCY PROCEDURES

- A. FIRST AID**  
Contractors shall be responsible for providing first aid and medical treatment for their employees and for compliance with the first aid requirements of all applicable Cal/OSHA Construction Safety Orders.
- Contractors shall be responsible for making prior arrangements for emergency medical care and for transportation of injured Contractor personnel.
- B. FIRE**  
When work is being performed which generates sparks or open flames, the Contractor will provide a fire watch, a person trained in the use of appropriate fire fighting equipment, whose only task is to observe and extinguish fires. A District “Hot Works” permit must be filled out and turned into the Collection System / Safety Manager, or General Manager when the Safety Manager is not available, when work is completed. Contractor shall ensure that appropriate fire extinguisher(s) are available at the specific work site for use in case of a fire. All Contractor’s employees shall be properly trained to use them.

In the event of a fire, Contractor shall immediately notify the nearest District employee and if possible, call emergency (911) and give the location of the plant, which is 300 Smith Ranch Rd. San Rafael. A map of the wastewater plant is included in this policy. Refer to Attachment A.

## BASIC SAFETY RESPONSIBILITIES AT DISTRICT FACILITIES

### A. COMMUNICATION

Contractor shall maintain close communication with the Authorized District Representative. Contractors should sign-in at the office at the beginning and end of each day along with a headcount of crew members.

### B. RESPONSIBILITY

Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss, to:

1. All employees on the work site and other persons and organizations who may be affected thereby.
2. All the work, materials, and equipment to be incorporated therein, whether in storage or off the site.
3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation, or replacement in the course of construction.

Contractor shall comply with all applicable laws and regulations (whether referred to herein or not) of any public agency having jurisdiction over the safety of persons or property, or the protection of persons from damage, injury, or loss, and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and facilities when performance of the work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property and facilities.

Contractor shall designate a responsible representative at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's Superintendent unless otherwise designated in writing by the Contractor to the District.

### C. GENERAL SAFETY REGULATIONS

#### Basic Rules:

- Work shall not begin until the Contractor's personnel have been informed of the District's Safe Work Requirements and potential hazards. The District employee responsible for the project is responsible for advising the Contractor of the District's Safe Work Requirements and potential hazards.
- All safety procedures applicable to the job being performed, including use of appropriate protection equipment, shall be followed.
- The Contractor's personnel shall **never** operate, use, adjust, modify or relocate any District equipment, switches, valves, or other controls. The Authorized

District Representative must be contacted should operation, adjustment, modification, or relocation of District equipment be necessary.

- Contractor's use of District instruments, tools, ladders, scaffolding or other equipment is not permitted except in cases of emergency as determined by a District supervisor or by permission from a senior Manager of the District.
- Drinking water shall be supplied by Contractor. **Do Not Drink Water from Hose Connections at any District Facility.**
  1. Hose bib connections are located throughout the treatment plant. Most of these supply treated wastewater and may or may not be posted with signs reading "Do Not Drink." In any case, **never** drink water from hose bibs or hoses.
  2. Water lines throughout the treatment plant are color coded (when not stainless steel) and labeled as follows:

|                                       |        |
|---------------------------------------|--------|
| Recycle Water Piping                  | Purple |
| Domestic Water Piping                 | Blue   |
| Service Water Piping (Plant Effluent) | Gray   |
  3. Hose connections may be used to wash down equipment. Never hose down electrical or heated equipment of any kind. If an employee has used a gray or purple water hose for wash down, he/she should immediately wash their hands in domestic water with soap.
- NEVER make any connection to any water line without first verifying with the Authorized District Representative that contamination of the water lines will not occur.
- Use of alcoholic beverages and/or illegal drugs by Contractor or any employee is strictly prohibited. Smoking within the plant is prohibited. Use of prescription or non-prescription drugs which interfere with the individual's ability to work safely is also prohibited.
- Contractor shall advise the Authorized District Representative of any employee with any medical conditions that could put the employee in danger.

#### **Personal Protection Equipment:**

- Contractor shall be responsible for providing and assuring use by employees of all OSHA required protective equipment.
- Approved respiratory equipment shall be worn when the possibility of exposure to hazardous dusts, vapors, fumes, mists, or gases exists. In addition to all other safety regulations, pipes or conduit should be mechanically BLOCKED off when being worked on. District safety procedures shall be followed when working on, but not limited to, the following systems:
  - 1) Natural gas and sludge gas (Methane)

- 2) Ferrous Chloride
- 3) Polymer
- 4) Hypochlorite
- 5) Compressed Air
- 6) Sodium Bisulfite

- Contractor shall be responsible for determining the existence and location of such systems prior to commencement of work.

**Power Tools and Welding Equipment:**

- Gasoline and electrical powered hand tools shall be protected by approved ground fault circuit interrupters, or shall be double insulated. Cords shall be inspected daily prior to use. Damaged cords shall not be used on District work.
- Pneumatic driven power tools shall be disconnected from air lines when not in use. Hoses shall be inspected daily prior to use. Damaged hoses shall not be used on District work.
- Power tools shall be used only by trained personnel who have a valid license (when applicable, i.e, welding) in their possession. Proper warning signs shall be posted when these tools are in use.
- Electric and gas welding and cutting tools, including cords and gas hoses, shall be inspected daily prior to use. Damaged cords and gas hoses shall not be used on District work.
- Contractor and Contractor employees' tools and equipment used on District work sites shall be in safe operating condition and shall conform to the requirements of Cal/OSHA regulations. All personnel using such tools shall be properly trained.

**D. BARRICADES AND SIGNS FOR TRAFFIC CONTROL**

All Contractors, permittees, or agencies doing work for District which requires traffic control shall:

- 1) Install and maintain required traffic devices.
- 2) Provide appropriately equipped flag persons when required.
- 3) Provide adequate safeguards for workers and District personnel.
- 4) Maintain access for District personnel to all District facilities.

All work on streets, roadways, or similar thoroughfares shall comply with the Federal Highway Administration's "Manual on Uniform Traffic Control Devices for Streets and Highways" and any local ordinances. District Plant speed is *maximum* 10 mph.

## SPECIAL PROCEDURES AND UNIQUE HAZARDS

### A. **CONFINED SPACE ENTRY**

Confined spaces of all types exist throughout the District and throughout the plant and range from open trenches and manholes, to tanks, clarifiers and digesters. Contractors are required to meet Cal/OSHA safety standards for CONFINED SPACE ENTRY OPERATIONS, Title 8 Article 108 (Sections 5156-5159), or the most current CAL/OSHA applicable standards, and to provide a safe working environment for their employees. All Contractors directing or working in confined spaces are required to notify the Authorized District Representative. Contractors are responsible for all operations, testing, equipment calibration, ventilation, and entry per the Cal/OSHA standards. Contractors are responsible for all confined space permits and all appropriate equipment. Completed confined space permits are to be turned in to the District's safety manager.

### B. **ELECTRICAL SUPPLY SYSTEMS**

The treatment plant's Electrical Supply System consists of two 65kW Gas Microturbine Generators, one 1MW diesel oil engine driven standby generator and one 380 KW trailer mounted standby generator, and solar power. All electrical power generated in the plant and PG&E power (beyond their transformer) is 480 volt, 3 phase, 60 Hz electricity and is delivered to one 480 volt switchgear panel. This panel is interconnected by cables and protected by breakers, relays and monitoring devices.

Electricity is dispersed from the switchgear through breakers and cables to motor control centers (MCC's), to power panels, to transformers (voltage reducers), to lighting panels and to motor driven pumps and equipment. Lockable control stations are located at each piece of equipment. 480 volt, 208 volt and 120 volt electricity is used in the plant. Contact the duty operator prior to working on any piece of electrical equipment. Electricity is hazardous and can burn or kill people.

All work on electrical systems shall be done in accordance with the State of California, CAL/OSHA, Article 33, Electrical Requirements for construction work, Low Voltage Electrical Safety Orders.

### C. **FERROUS CHLORIDE SYSTEMS -**

The Ferrous Chloride System consists of a positive displacement pump with feed rate adjustment. Shut-off valves are located before and after the pump. Before working on this system, close all valves and disconnect the pump from electricity.

Ferrous Chloride is a dangerous chemical which will attack the skin, eyes and the mucous membranes of the mouth, throat and lungs. Contact the plant duty operator prior to working on this system.

**D. DIGESTER GAS SYSTEM**

The Digester Gas System consists of one steel tank, associated piping, compressors, flare, etc. Sludge is bacterially reduced in the tanks creating principally methane (CH<sub>4</sub>) and other combustible hazardous gases, including hydrogen sulfide (H<sub>2</sub>S). Hydrogen sulfide is toxic at very low concentrations. These gases are contained by the tank covers and piping which is located on overhead racks, in pipe trenches and buried throughout the plant. The gases are burned in large engines driving generators to make electricity for the plant. Heat from the engines is captured and piped to the digesters to heat the sludge, speeding up the digestion process.

Digesters and the stored gases within them are hazardous. No smoking, cutting, or spark-generating equipment is allowed on or within ten feet of any digester. Contact the duty operator prior to working on digesters.

**E. HYPOCHLORITE SYSTEM**

Hypochlorite, or concentrated chlorine bleach (12.5%), is used to disinfect, or kill bacteria and virus in the final effluent (water) discharged from the plant. Two tanks, each 7,000 gallons are used to store hypochlorite. Piping, valves, pumps, strainers (filters) and flow measuring and control equipment make up the system. Hypochlorite will attack clothing, skin, eyes and mucous membranes of the nose, mouth, throat and lungs. Contact the duty operator prior to working on the hypochlorite system.

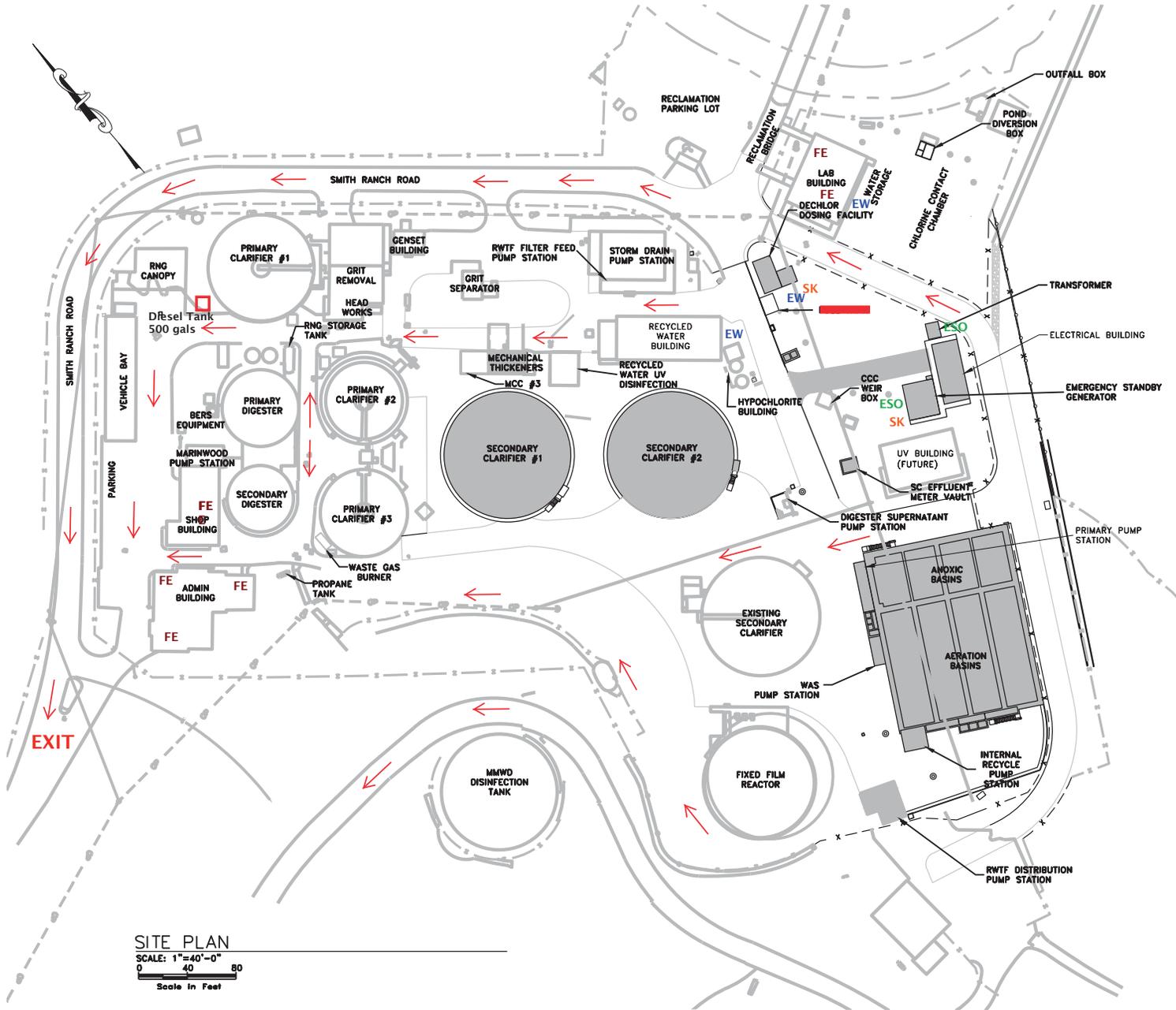
**F. SODIUM BISULFITE**

Sodium bisulfite is used when neutralizing sodium hypochlorite. Two tanks, each 4,000 gallons and one 2,500 gallons are used to store sodium bisulfite. Piping, valves, pumps, strainers (filters) and flow measuring and control equipment make up the system. Sodium bisulfite is an irritant to eyes, skin and mucous membranes. Inhalation of mist may cause irritation to respiratory tract. Contact the duty operator prior to working on the sodium bisulfite system.

**G. GENERAL HAZARDS**

Throughout District's treatment plant and facilities there are a number of extremely hazardous elements that are dangerous. They include, but are not limited, to:

- Flammable gas and petroleum.
- H<sub>2</sub>S (hydrogen sulfite)
- Deep pools of liquid sewage which are rarely patrolled, and for which self-rescue is unlikely.
- Automatic start equipment.
- HBV (Hepatitis B Virus)



Attachment A. Map of Wastewater Plant  
**EMERGENCY EVACUATION ROUTES**

## **APPENDIX B**

### **CONFINED SPACE ENTRY REQUIREMENTS**

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**Las Gallinas Valley  
Sanitary District**

**Confined Space**

**Entry**

**Program**

SAMPLE

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SAMPLE

**LAS GALLINAS VALLEY SANITARY DISTRICT  
Confined Space Entry Program**

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SAMPLE

## LGVS D CONFINED SPACE ENTRY PROGRAM

### INTRODUCTION

The purpose of Las Gallinas Valley Sanitary District's confined space entry program is to protect employees who work in manholes, pump stations, tanks, or any other confined space that could expose employees to hazardous conditions or substances. The program establishes an entry permit system and procedures to ensure that potential hazards of each confined space are identified and evaluated and that appropriate safety precautions are taken before an employee enters the space.

Employees will be given an opportunity to participate in the development and implementation of LGVS D's confined space procedures. The program will be revised or procedures will be modified whenever suggestions or recommendations from employees would improve confined space safety.

The policies and procedures in this program are consistent with the requirements of Cal/OSHA General Industry Safety Orders, Title 8, Sections 5156 and 5157 and supersede previous confined space policies and procedures. The program applies to all employees who work in, or in connection with LGVS D confined spaces.

Confined spaces at LGVS D have been identified based on the definitions in Section 5157 as follows:

**Confined Space** is a space that:

1. Is large enough and so configured that an employee can bodily enter and perform assigned work; and
2. Has limited or restricted means for entry or exit; and
3. Is not designed for continuous employee occupancy.

**Permit-Required Confined Space** is a space that has one or more of the following characteristics:

1. Contains or has a potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfing an entrant;
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section; or
4. Contains any other recognized serious safety or health hazard.

**Non-Permit Confined Space** is a space that does not contain (or with respect to atmospheric hazards, has no potential to contain) any hazard capable of causing death or serious physical harm.

Employees who work in or in connection with confined spaces are required to follow the procedures described in this program and to take all the appropriate precautions to ensure that the work is performed safely. At no time should an employee enter a confined space or perform work in the space unless it can be done safely.

## **PERMIT-REQUIRED CONFINED SPACES**

The tables on pages 4 and 5 list confined spaces at LGVSD that require a permit to enter. Potential hazards associated with these spaces include engulfment, toxic gases, explosive or flammable gases, oxygen deficiency, electrical and mechanical hazards, and may under certain circumstances involve heat stress. Warning signs will be posted at wet wells and similar locations to inform employees that the space requires a permit to enter. To prevent unauthorized entry, each of these spaces will be secured.

Using the entry permit, a non-entry evaluation must be done so that potential hazards can be identified and the appropriate safety precautions taken. The types of hazards that may be encountered, pre-entry safety checks, and the types of safety equipment that will be used are entered on the permit. Only the person designated as the entry supervisor has the authority to authorize the entry permit. At least three employees are required for a permit-required confined space entry which would include an attendant and a standby rescuer.

The tables on pages 4 and 5 that list permit-required confined spaces at LGVSD are not all-inclusive. Other spaces may be determined to be permit-required after evaluating the conditions or circumstances of the entry. The type of work to be performed in the space could introduce hazards to an otherwise safe space. Working with flammable or toxic substances, welding or other hot work, or drifting vapors from outside sources would make a space hazardous or potentially hazardous and therefore require a permit to enter.

## **ALTERNATE ENTRY PROCEDURES**

Alternate procedures are allowed in permit-required spaces where it can be demonstrated and documented that the only hazard or potential hazard is an atmospheric one, and that continuous forced air ventilation alone will maintain the space safe for entry. A trained, qualified employee may enter these confined spaces without an attendant or rescue preparations provided the following conditions are met.

1. All unsafe conditions are eliminated before the confined space cover is removed.
2. The entrance to the space is guarded with a railing or other type of barrier to prevent an accidental fall through the opening and to protect employee in the space.
3. The atmosphere is tested before entry in the following order: O<sub>2</sub>, LEL/LFL, H<sub>2</sub>S.
4. No entrance is made until hazardous atmosphere is eliminated.
5. There is no hazardous atmosphere when employees are in the space.
6. Continuous forced ventilation is used.
7. The air supply is clean and will not increase hazards.
8. The air supply is directed to area where employees are working.
9. The atmosphere is tested every 15 minutes to ensure a hazardous atmosphere is not developing.
10. Records of pre-entry and entry monitoring data and inspection data are maintained.
11. The entrant certifies, in writing, that the required pre-entry measures have been taken.
12. Monitoring and inspection data, and the certification information are made available to each employee entering the space.

If a hazardous atmosphere develops in the space, or other hazards arise, alternate procedures can no longer be used and the space must be reclassified as a fully permitted space.

**SPECIAL ENTRY PROCEDURES**

There are a few confined spaces at LGVSD that are not considered permit-required confined spaces. As far as can be determined, these spaces do not contain any known hazard. However, as a precautionary measure, employees are required to follow certain special procedures before entering these spaces.

1. Test the atmospheric conditions prior to entry.
2. If atmospheric conditions are acceptable, entry can be made.
3. If atmospheric conditions are not acceptable, use alternate procedures.
4. If any other hazardous condition exists, follow permit-required confined space procedures.

**THE ENTRY PERMIT SYSTEM**

Confined space entry permits are to be issued for a specific purpose, a specific work crew, and for a specified period of time. The entry permit is a written authorization of the location and type of work to be done. It also authorizes the personnel assigned to the job, and verifies that potential hazards have been evaluated and controlled or eliminated, that proper safety precautions have been taken, and it is safe for workers to enter. The permit must be kept at the work site (outside the space) for the duration of the work and cancelled after the work is completed.

**HOT WORK PERMIT**

A hot work permit must be issued for any work that produces heat, sparks or flame in a permit-required confined space. This includes but not limited to brazing, cutting, grinding, soldering, and welding.

**Table 1: Main Plant Permit-Required Confined Spaces**

| MAIN PLANT                         | Permit-Required | Alternate or Special Procedure | MAIN PLANT                                   | Permit-Required | Alternate or Special Procedure |
|------------------------------------|-----------------|--------------------------------|--|-----------------|--------------------------------|
| Marinwood Pump Station             |                 |                                | Deep Bed Filter                              |                 |                                |
| Pre Wet Well Structure             | •               |                                | Bypass Channel                               | •               |                                |
| Wet Well                           | •               |                                | Wet Well/Supply Pumps                        | •               |                                |
| Valve Pit                          |                 | SP                             | Valve Pit                                    |                 | SP                             |
| Flow Meter Pit (F1)                |                 | SP                             | Tanks  | •               |                                |
| Primary Clarifier                  |                 |                                | Weir Overflow Pit                            | •               |                                |
| Tank                               | •               |                                | Underdrain                                   | •               |                                |
| Scum Pit                           | •               |                                | Inlet Channel                                | •               |                                |
| Weir Overflow Pit                  | •               |                                | Center Column                                | •               |                                |
| Chemical Tank                      | •               |                                | F8 Flow Meter Manhole                        | •               |                                |
| Sodium Hydroxide Tank              | •               |                                | Effluent Channel                             | •               |                                |
| Methane Tank                       | •               |                                | Backwash Return Wet Well                     | •               |                                |
| Methane Scrubber Tank              | •               |                                | Hypochlorite Storage Tank                    | •               |                                |
| Primary Digester                   |                 |                                | Digester Supernatant Pump Station            |                 |                                |
| Tank                               | •               |                                | Wet Well                                     | •               |                                |
| Valve Pit                          |                 |                                | Valve Pit                                    |                 | SP                             |
| Secondary Digester                 |                 |                                | Secondary Clarifier                          |                 |                                |
| Tank                               | •               |                                | Tank   | •               |                                |
| Valve Pit                          |                 | SP                             | Flow Meter (F4)                              | •               |                                |
| Intermediate Flow Meter Pit (F3)   | •               |                                | Effluent Box                                 | •               |                                |
| Aerated Grit                       |                 |                                | Scum Pit                                     | •               |                                |
| Tank                               | •               |                                | Fixed Film Reactor                           |                 |                                |
| Scum Pit                           | •               |                                | Tank   | •               |                                |
| Outlet Channel                     | •               |                                | Underdrain                                   | •               |                                |
| Inlet Channel                      | •               |                                | Center Column                                | •               |                                |
| Clarifier Return Pit               |                 |                                | F4 Diversion Box                             | •               |                                |
| Wet Well                           | •               |                                | Influent and Effluent Wet well               | •               |                                |
| Influent Flow Meter Pit            |                 | SP                             | Filter Water Storage Tank                    | •               |                                |
| Grease Storage Tank                | •               |                                | Chlorine Sample Pump #2                      |                 |                                |
| Intermediate Clarifier East        |                 |                                | Wet Well                                     | •               |                                |
| Diversion Structure                | •               |                                | Valve Pit                                    | •               |                                |
| Tank                               | •               |                                | Chlorine Contact Chamber/DBF Backwash        |                 |                                |
| Scum Pit                           | •               |                                | Tank   | •               |                                |
| Weir Overflow Pit (2)              | •               |                                |  |                 |                                |
| Intermediate Clarifier West        |                 |                                | Pipe Inspection Manhole                      | •               |                                |
| Tank                               | •               |                                | Plant Effluent Water Pump Wet Well           | •               |                                |
|                                    |                 |                                | Bisulfite                                    |                 |                                |
| Scum Pit                           | •               |                                | Wet Well                                     | •               |                                |
| Weir Overflow Pit                  | •               |                                | Tanks  | •               |                                |
| Sludge Thickener                   |                 |                                | White Shack Effluent Box                     |                 |                                |
| Influent Pit                       | •               |                                | Wet Well                                     | •               |                                |
| Tank                               | •               |                                | Flow Meter Pit (F5)                          |                 | SP                             |
| Scum Pit                           | •               |                                | Effluent Pipe Inspection Manhole             | •               |                                |
| Primary Biofilter                  |                 |                                | Stormwater Pump Station                      |                 |                                |
| Valve Pit                          |                 |                                | Wet Well                                     | •               |                                |
| Pump Pit Dry Well                  |                 | SP                             | Flow Metet Pit (F9)                          |                 | SP                             |
| Underdrain                         | •               |                                | Miller Creek Plant Effluent Box Wet Well     | •               |                                |
| Prim/Sec Biofilter Diversion Vault | •               |                                | Storm Ponds Pump Pit Wet Wells               | •               |                                |
| Secondary Biofilter                |                 |                                | Centrifuge Pit Tank                          | •               |                                |
| Effluent Box                       | •               |                                | Gardener's Building (ventilate before entry) |                 |                                |
| Underdrain                         | •               |                                | F4 - DBF Effluent Box                        | •               |                                |
| Pump Pit                           | •               |                                | DBF Effluent Weir Box/Plant Water Pump       | •               |                                |
|                                    |                 |                                | MMWD Backwash Return Wet Wells (2)           | •               |                                |

**Table 2: Reclamation, Collection System, and Pump Stations Permit-Required Confined Spaces**

| Location  | Permit-Required | Alternate Procedure | Location             | Permit-Required | Alternate Procedure |
|---|-----------------|---------------------|----------------------|-----------------|---------------------|
| <b>RECLAMATION</b>  |                 |                     | <b>PUMP STATIONS</b> |                 |                     |
| Diversion box   |                 |                     | McInnis Park         |                 |                     |
| Wet Well  | •               |                     | Wet Well             | •               |                     |
| Valve Pit   | •               |                     | Valve Pit            |                 | •                   |
| Underdrain  | •               |                     | Smith Ranch          |                 |                     |
| Transfer Box  |                 |                     | Wet Well             | •               |                     |
| Wet Well  | •               |                     | Valve Pit            |                 | •                   |
| Valve Pit   | •               |                     | Flow Meter Pit       |                 | •                   |
| Underdrain  | •               |                     | Industrial Park      |                 |                     |
| Meter Pit (F7)  |                 | •                   | Wet Well             | •               |                     |
| Reclamation Pump Station  |                 |                     | Valve Pit            |                 | •                   |
| Wet Well  | •               |                     | John Duckett         |                 |                     |
| Flow Meter Pit (F6)   |                 |                     | Wet Well             | •               |                     |
| Sludge Supernatant Pump Station   |                 |                     | Valve Pit            |                 | •                   |
| Wet Well  | •               |                     | Flow Meter Pit       |                 | •                   |
| Dry Well  | •               |                     | Comminutor Deck      |                 | •                   |
| Valve Pit   |                 | •                   | Civic Center North   |                 |                     |
| Pond Diversion Gate Boxes   | •               |                     | Wet Well             | •               |                     |
| Pond Inflow/Effluent Boxes  | •               |                     | Valve Pit            |                 | •                   |
| Sludge Ponds (3)  | •               |                     | Marin Lagoon (9)     |                 |                     |
|   |                 |                     | Wet Well             | •               |                     |
|   |                 |                     | Valve Pit            |                 | •                   |
| <b>COLLECTION SYSTEM</b>  |                 |                     | Mulligan             |                 |                     |
| All Manholes  | •               |                     | Wet Well             | •               |                     |
| Air Release Valves  |                 | •                   | Valve Pit            |                 | •                   |
| Valve Boxes   | •               |                     | Venetia Harbor       |                 |                     |
|   |                 |                     | Wet Well             | •               |                     |
|   |                 |                     | Valve Pit            |                 | •                   |
|   |                 |                     | Hawthorne            |                 |                     |
|   |                 |                     | Wet Well             | •               |                     |
|   |                 |                     | Dry Well             |                 | •                   |
|   |                 |                     | Adrian Way           |                 |                     |
|   |                 |                     | Wet Well             | •               |                     |
|   |                 |                     | Valve Pit            |                 | •                   |
|   |                 |                     | Descanso Way         |                 |                     |
|   |                 |                     | Wet Well             | •               |                     |
|   |                 |                     | Valve Pit            |                 | •                   |
|   |                 |                     | McPhail              |                 |                     |
|   |                 |                     | Wet Well             | •               |                     |
|   |                 |                     | Valve Pit            |                 | •                   |
|   |                 |                     | San Rafael Meadows   |                 |                     |
|   |                 |                     | Wet Well             | •               |                     |
|   |                 |                     | Valve Pit            |                 | •                   |
| <b>SPECIAL ENTRY PROCEDURES (SP)</b>  |                 |                     |                      |                 |                     |
| 1. Test atmospheric conditions prior to entry.  |                 |                     |                      |                 |                     |
| 2. If atmospheric conditions are acceptable, entry can be made.                               |                 |                     |                      |                 |                     |
| 3. If atmospheric conditions are not acceptable, use alternate procedures.                    |                 |                     |                      |                 |                     |
| 4. If any other hazardous condition exists, follow permit-required confined space procedures. |                 |                     |                      |                 |                     |

**DUTIES OF ENTRY TEAM**

A permit-required confined space entry team will include an entry supervisor, entrant(s), and at least one attendant. Before an employee begins confined space work, the work must be authorized by the District Manager or Plant Superintendent. In the absence of the District Manager and Plant Superintendent, the designated employee-in-charge may authorize the work.

As long as each individual can fully perform his/her duties, an entry supervisor may be the same person as the entrant or the attendant. The safety precautions that should be taken with a permit-required confined space entry will vary depending on the types of hazards or potential hazards involved. Regardless of the types of hazards, it is the District's policy that in addition to an attendant, a standby rescuer must be part of the entry team.

**Duties of Entry Supervisor**

1. Verifies that acceptable entry conditions exist.
2. Ensures acceptable entry conditions are maintained.
3. Verifies that the information and procedures on the entry permit are accurate and complete.
4. Verifies that the equipment specified on the permit is in place and in good condition.
5. Reviews permit conditions and procedures with entrants and attendants.
6. Ensures unauthorized persons do not enter the space.
7. Signs the permit to authorize entry.
8. Cancels and files permit.

**Duties of Entrant**

1. Properly uses the safety equipment and tools supplied.
2. Promptly notifies the attendant if any prohibited condition exists or any warning signs or symptoms appear.
3. Quickly evacuates space if an order is given by the attendant or entry supervisor, if any prohibited condition is detected, or if an alarm is activated.
4. Maintains communication with the attendant to enable attendant to monitor status of space conditions and the entrants.
5. Adheres to the procedures and precautions indicated on the permit and provided in training.

**Duties of Attendant**

1. Remains outside the permit space until relieved by another attendant.
2. Maintains communication with entrants.
3. Maintains accurate count and identification of entrants.
4. Monitors activities inside and outside the space.
5. Orders entrants to evacuate if a prohibited condition exists, or behavioral effects of hazardous exposure are detected, or activities outside space could endanger entrants, or attendant cannot effectively perform all required duties.
6. Ensures unauthorized persons stay away from the space.
7. Performs non-entry rescue procedures or initiates on-site rescue operations.
8. Summons additional rescue services, when needed.

## ENTRY PROCEDURES

### Pre-Entry

1. Notify other work groups or employees who may be affected by any interruption in service.
2. Determine (by entry supervisor or other qualified person) what hazards or potential hazards are within the confined space.
3. Check that all safety equipment is available and in good working condition.
4. Check that atmosphere monitoring equipment has been calibrated as recommended by manufacturer.
5. Without entering space:
  - a) Test atmosphere and record readings on permit.  
*Acceptable atmospheric conditions: Oxygen not less than 19.5% or more than 23.5%, LEL/LFL not more than 10%, H2S not more than 10 ppm, CO not more than 25 ppm.*
  - b) Ventilate the space or check that ventilation system is operating properly.
6. Ensure that all affected employees observe pre-entry atmospheric testing.
7. Set up barrier around entrance to prevent accidental falls and to protect employees from vehicles, or falling objects.
8. Check for physical hazards such as poor footing, structures and equipment that hinder movement, and extreme temperatures or humidity that could affect worker safety.
9. Secure and lock out all energy sources (electrical, mechanical, hydraulic, pneumatic, chemical) that are potentially hazardous to confined space workers. Follow lockout/tagout procedures.
10. Disconnect, blind, or block lines to prevent development of hazardous conditions.
11. Use continuous forced air ventilation. Ensure that there is no recirculation of exhausted air from blowers or the introduction of contaminants from the outside, such as traffic exhaust, or vapors or toxic substances from other areas. Place blowers at least 10 feet away from opening of space.
12. Entry supervisor reviews and authorizes entry permit if the space is safe to enter, and all preparatory steps required for safe entry have been taken.

### Entry

1. Only employees who have been trained on LGVSD's confined space entry and work procedures are allowed to work in or around confined spaces.
2. Only the work activity specified on the authorized permit is to be performed in the confined space.
3. At least one attendant is required for confined space work.
4. If at any time during the performance of confined space work, dangerous atmospheric conditions develop, work must stop and the space evacuate immediately.
5. An attendant must be stationed outside the space at all times during the confined space operations and remain in constant communication with workers in the space.
6. The attendant must order evacuation of the space whenever:
  - a) a condition not allowed on the permit is observed
  - b) unusual behavior is observed
  - c) an outside situation endangers the confined space workers
  - d) the attendant must leave the work station

7. The permit must be cancelled if the air becomes hazardous after entry.
8. Respiratory equipment must be worn whenever a safe atmosphere cannot be assured after implementing pre-entry procedures.

### **Post-Entry**

The entry supervisor:

1. Cancels the permit by entering date and time of cancellation and signature.
2. On the reverse side of the permit, makes note of any problems encountered during entry operations.
3. Places the cancelled permit in the safety files.
4. Notifies the Plant Superintendent if any equipment, safety gear or tools need to be repaired or replaced.

### **RESCUE PROCEDURES**

It is the District's policy that all employees who work in or in connection with confined spaces must be trained in rescue procedures. Members of a permit space entry team must be knowledgeable of the hazards or potential hazards, be able to recognize the signs and symptoms of exposure, be trained in the selection and use of personal protective equipment, and be certified in first-aid and cardiopulmonary resuscitation. Prior to each entry the team will plan and prepare for non-entry and entry rescues and ensure that at least one standby is immediately available to provide rescue services.

### **Self-Rescue**

If possible, entrants should immediately leave the confined space:

1. When an alarm sounds.
2. At the first sign of any exposure symptoms.
3. When ordered to evacuate by attendant or entry supervisor.

### **Non-Entry Rescue**

If entrants cannot immediately evacuate the space at the first sign of trouble, the attendant should attempt a non-entry rescue by retrieving the entrant using a harness and hoisting equipment. The attendant must not enter the space unless relieved by another attendant. Retrieval systems must be used in vertical permit spaces more than 5 feet deep.

### **Entry Rescue**

Rescuers are to assume that a hazardous atmosphere exists if an entrant has slurred speech, appears dizzy, disoriented, confused, unconscious, or displays any unusual behavior, or if communication with the entrant is lost. A self-contained breathing apparatus must be worn for entry rescues if a hazardous atmosphere is suspected or if there is any chance that it can develop. Call 911 for assistance or if specialized equipment is needed to remove a worker.

### **Outside Rescue Services**

Although outside rescue services may be present at the time of the entry or summoned to give assistance and support in an emergency, members of the entry team must be prepared to give immediate assistance to any of the entrants who may need it.

### **NON-PERMIT CONFINED SPACES**

All confined spaces are considered permit-required until pre-entry procedures demonstrate otherwise. A confined space may be designated a non-permit space, or a permit-required confined space may be reclassified a

non-permit space if all hazards have been eliminated. Because atmospheric hazards are controlled with ventilation and not eliminated in spaces, these spaces cannot be classified as non-permit spaces.

## **CONTRACTORS**

Contractors and subcontractors who plan to work in LGVSD confined spaces will be given all available information on LGVSD confined space hazards, the permit system, and entry procedures. Contractors are required to use a permit system for entry into LGVSD permit-required confined spaces. Contractors are also required to coordinate work and entry activities whenever LGVSD employees and contractor employees will be working in or near the permit spaces.

At the conclusion of the contractor's work, the LGVSD supervisor in charge will debrief the contractor to determine if any hazards were encountered or created during entry.

## **TRAINING**

All employees who work in or around confined spaces must be trained before performing any confined space work. At a minimum, the training will include:

1. Hazards of confined spaces.
2. Signs and symptoms of hazard exposure.
3. Duties of entrant, attendant, and entry supervisor.
4. Pre-entry and entry procedures.
5. LGVSD confined space permit system.
6. Selection and use of personal protective equipment.
7. Atmosphere test equipment.
8. Rescue procedures and equipment.
9. CPR/First Aid.

In addition, employees involved in confined space work will participate in simulated rescue operations at least once per year. Review training will be provided whenever the need is indicated, such as changes in procedures, introduction of new equipment, the hiring of new employees or whenever deficiencies in implementing the program are observed.

Training records will be maintained which will include names and signatures of trainees and trainers, dates and content of training. These records will be made available for inspection to employees or their representatives

## LGVSD CONFINED SPACE ENTRY PERMIT

|   |  |
|---|--|
| Date issued: _____ Permit Expiration Date/Time: _____<br><br>Location/Description of Space: _____<br>Street Address of Entry _____<br>Reason for Entry: _____ | Work Site Permit:<br>Authorized entry permit and monitoring data must remain at the work site until the job is complete. |
|   | <b>Fire Dept. Notified 472-0911</b><br>Before entry _____ initials<br>After exiting _____ initials                       |

Entry Supervisor: \_\_\_\_\_

|                                    |                                  |
|------------------------------------|----------------------------------|
| Authorized Attendants and Initials | Authorized Entrant and Initials: |
| _____                              | _____                            |
| _____                              | _____                            |
| _____                              | _____                            |

Note: Indicate which attendant is assigned standby rescue duties. Initial of attendants and entrants indicate they understand their assignments, responsibilities and duties.

|  |   |   |
|--|---|---|
| <b>Pre-Entry Checks (complete before obtaining work authorization):</b><br><br><input type="checkbox"/> Notified other work groups. N/A _____<br><input type="checkbox"/> Notified office personnel. N/A _____<br><input type="checkbox"/> Checked that entry team training is current. N/A _____<br><input type="checkbox"/> Reviewed entry procedures with team. N/A _____<br><input type="checkbox"/> Set up barrier at entrance to space. N/A _____<br><input type="checkbox"/> Checked that gas detection equipment calibration is current. N/A _____<br><input type="checkbox"/> Performed pre-entry atmosphere tests. N/A _____<br><input type="checkbox"/> Checked ventilation system. N/A _____<br><input type="checkbox"/> Checked for physical hazards. N/A _____<br><input type="checkbox"/> Secured and locked out energy sources. N/A _____<br><input type="checkbox"/> Blocked or disconnected lines. N/A _____<br><input type="checkbox"/> Discussed potential hazards with team. N/A _____<br><input type="checkbox"/> Reviewed emergency response procedures. N/A _____<br><input type="checkbox"/> Checked condition of safety equipment. N/A _____<br><input type="checkbox"/> Obtained work authorization signatures. N/A _____ | <b>Potential Hazards:</b><br><input type="checkbox"/> Oxygen deficiency N/A _____<br><input type="checkbox"/> Oxygen enrichment N/A _____<br><input type="checkbox"/> Flammable gases or vapors N/A _____<br><input type="checkbox"/> Toxic gases or vapors N/A _____<br><input type="checkbox"/> Mechanical hazards N/A _____<br><input type="checkbox"/> Electrical hazards N/A _____<br><input type="checkbox"/> Engulfment/entrapment N/A _____<br><input type="checkbox"/> Noise N/A _____<br><input type="checkbox"/> Heat/Cold N/A _____<br><input type="checkbox"/> Falls N/A _____<br><input type="checkbox"/> Falling objects N/A _____<br><input type="checkbox"/> Other N/A _____<br><br><b>Safety Equipment:</b><br><input type="checkbox"/> Gas detection equipment N/A _____<br><input type="checkbox"/> Safety harness N/A _____<br><input type="checkbox"/> Safety line N/A _____<br><input type="checkbox"/> Wristlets N/A _____<br><input type="checkbox"/> Hoisting equipment N/A _____ | <input type="checkbox"/> Manhole hook N/A _____<br><input type="checkbox"/> Barricades, cones, tape N/A _____<br><input type="checkbox"/> Portable blower and hose N/A _____<br><input type="checkbox"/> Explosion-proof lighting N/A _____<br><input type="checkbox"/> Non-sparking tools N/A _____<br><input type="checkbox"/> Tool bucket and line N/A _____<br><input type="checkbox"/> Ladder N/A _____<br><input type="checkbox"/> First aid kit N/A _____<br><input type="checkbox"/> Fire extinguisher N/A _____<br><input type="checkbox"/> Radio communication equipment N/A _____<br><input type="checkbox"/> Cell phone N/A _____<br><input type="checkbox"/> SCBA N/A _____<br><input type="checkbox"/> Hard hat N/A _____<br><input type="checkbox"/> Goggles, face shield N/A _____<br><input type="checkbox"/> Gloves N/A _____<br><input type="checkbox"/> Rain suit N/A _____<br><input type="checkbox"/> Rubber boots N/A _____<br><input type="checkbox"/> Other _____<br>_____ |
|--|---|---|

**Hot Work:**  
 Does the entry involve hot work?  Yes  No If Yes, complete and attach a hot work permit.

**Special Instructions:**  
 \_\_\_\_\_  
 \_\_\_\_\_

**Monitoring Data:** Record monitoring data at 15-minute intervals on the reverse side of this permit.  
**Acceptable Atmospheric Conditions:** Oxygen not less than 19.5% or more than 23.5%, LEL/LFL/not more than 10%, H<sub>2</sub>S not more than 10 ppm.

|   |   |  |
|---|---|--|
| <b>Work Authorization Signatures</b><br>All confined space work must be authorized by the General Manager, Plant Manager or Collection Crew Manager<br><br>Work authorized by:<br>_____<br><br>Date/Time: _____ | <b>Entry Authorization</b><br>I certify that the confined space work authorized by this permit has been reviewed with the entry team and that acceptable entry conditions exist and the necessary equipment for safe entry has been provided.<br>Entry supervisor signature:<br>_____ | <b>Permit Cancellation</b><br><br>Date: _____<br><br>Time: _____<br>Entry supervisor signature:<br>_____ |
|---|---|--|





**LGVSD HOT WORK PERMIT**

This form is to be filled out by employee before performing hot work.

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Location of job: \_\_\_\_\_

Detailed description of job: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

|   | YES                      | NO                       |
|---|--------------------------|--------------------------|
| 1. If the job is planned to be done indoors, can it be done outdoors or in the welding shop?<br>If yes, move to one of these locations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. have all combustible materials (solids, liquids, gases) been removed from the work area?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Are there any gas lines or other lines carrying combustible/flammable materials?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. If yes, have all lines be disconnected, blanked or otherwise protected?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Has atmospheric test data been collected in the work area?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Is a fire watch needed for this job?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Is a fire extinguisher or water hose available and ready to use at the job site?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Can flame or sparks ignite materials in work area or on lower floors or levels?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Are non-flammable tarps used to cover combustibles in the work area?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Have affected employees reviewed or given specific safety instructions?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Have screens been set up in the work area?  | <input type="checkbox"/> | <input type="checkbox"/> |

Special precautions to be taken: \_\_\_\_\_

\_\_\_\_\_

|   |  |
|---|--|
| <p>I have reviewed and approved this permit:</p> <p>Date: _____ Time: _____</p> <p>_____</p> <p style="text-align: center;">Signature of District Manager</p> | <p>Please make note of any actions taken based on the above responses.</p> |
|---|--|

Revision: February 2006  
P:\Safety\Hot Work Permit

## LGVSD CONFINED SPACE ENTRY PROCEDURES SUMMARY

### Pre-Entry

1. Obtain work authorization from the District Manager or District Superintendent.
1. Perform non-entry evaluation of the space to identify potential hazards.
2. Test atmosphere, check ventilation system and check for physical hazards in and around work area.
3. Ensure affected employees observe pre-entry testing.
4. Gather appropriate safety equipment and check that all of it is in good working condition.
5. Without entering the space, secure and lockout energy sources and disconnect or block lines.
6. Place barricade or railing around opening to space.
7. Make sure there are no ignition sources near the confined space.
8. Complete pre-entry checks.
9. Have the Entry Supervisor authorize the entry permit.
10. Test atmosphere of space again. If there is no air contamination or O<sub>2</sub> deficiency, entry may proceed provided permit conditions and appropriate safety procedures are in effect.
11. If there is contamination or O<sub>2</sub> deficiency, ventilate 10 minutes and test again. If contamination persists, do not enter. Notify the Entry Supervisor.
12. Prior to entry, ventilate manholes and other confined spaces known or suspected to be hazardous.
13. Maintain continuous ventilation. Existing ventilation must be augmented whenever there is a potential for hazardous atmosphere or initial tests indicate contamination.
14. Keep the entry permit and monitoring data at the work site until the job is complete. Entry permits are valid only for the duration indicated on the permit.

### Entry

1. Do not work in or around confined spaces if you are not properly trained or experienced in safe entry and rescue procedures.
2. Wear respiratory equipment whenever a safe atmosphere cannot be ensured.
3. Attendant must be in constant communication and visual contact with entrant and must monitor activities inside and outside of space.
4. Attendant must order evacuation if he/she observes any activity not on the permit, unusual behavior, or an outside situation that endangers the entrant.
5. Perform only the work authorized on the permit.

### Rescue

1. Attendant never performs entry rescue unless relieved by another attendant.
2. Perform rescue from outside the space whenever possible.
3. Use respiratory equipment if entry rescue is performed.
4. Call 911 for rescue assistance.

### Post-Entry

1. Note on back of permit and notify the District Superintendent of any unsafe or unusual conditions encountered during the confined space work.
2. Have Entry Supervisor cancel and file the permit.
3. Submit the cancelled permit to the Safety chairperson for review and filing.
3. Notify the Plant Superintendent if any equipment, safety gear or tools need to be repaired or replaced.

## **APPENDIX C**

### **INSURANCE FORMS**

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## APPENDIX B: Common Insurance Industry Forms

- ACORD Certificates of Insurance:
  - Standard form
  - Annotated form
- Primary and Non-Contributory Endorsement
- ISO standard endorsements
  - CG 20 10, CG 20 33, CG 20 37, CG 20 38, CG 20 26, CG 20 39 and CG 20 40
- ISO endorsement: State or Political Subdivisions
- ISO endorsement: Waiver of Subrogation
- Four ISO endorsements used to amend policy limits:
  - Amendment of Limits of Insurance (Designated Project or Premises)
  - Amendment of Limits of Insurance
  - Amendment – Aggregate Limits of Insurance (Per Project)
  - Amendment – Aggregate Limits of Insurance (Per Location)
- Four State Compensation Insurance Fund Forms:
  - Certificate of Workers' Compensation Insurance
  - Additional Insured Employer
  - Waiver of Subrogation
  - Certificate Holders' Notice (Cancellation Notice)
- ISO policy for General Liability on an "Occurrence" basis
- Form MCS-90 – Endorsement for Motor Carrier Policies of Insurance for Public Liability
- Performance Bond
- Payment Bond Public Works

## Certificate of Liability Insurance (Standard Form)

|   |  |   |             |  |                            |                            |  |
|---|--|---|-------------|--|----------------------------|----------------------------|--|
|   |  | <b>CERTIFICATE OF LIABILITY INSURANCE</b> |             | DATE (MM/DD/YYYY)  |                            |                            |  |
| THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.   |  |   |             |  |                            |                            |  |
| <b>IMPORTANT:</b> If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).  |  |   |             |  |                            |                            |  |
| PRODUCER  | CONTACT NAME:<br>PHONE (A/C, No, Ext):      FAX (A/C, No):<br>E-MAIL ADDRESS:<br>INSURER(S) AFFORDING COVERAGE:      NAIC #  |   |             |  |                            |                            |  |
| INSURED   | INSURER A:<br>INSURER B:<br>INSURER C:<br>INSURER D:<br>INSURER E:<br>INSURER F:   |   |             |  |                            |                            |  |
| <b>COVERAGES</b>  |  | <b>CERTIFICATE NUMBER:</b>                |             | <b>REVISION NUMBER:</b>  |                            |                            |  |
| THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS. |  |   |             |  |                            |                            |  |
| INSR<br>LTR   | TYPE OF INSURANCE<br><br>COMMERCIAL GENERAL LIABILITY<br><input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR<br><br>GEN'L AGGREGATE LIMIT APPLIES PER:<br><input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC<br>OTHER: | ADDL<br>INSR                              | SUBR<br>WVD | POLICY NUMBER  | POLICY EFF<br>(MM/DD/YYYY) | POLICY EXP<br>(MM/DD/YYYY) | LIMITS<br>EACH OCCURRENCE \$<br>DAMAGE TO RENTED PREMISES (Ea occurrence) \$<br>MED EXP (Any one person) \$<br>PERSONAL & ADV INJURY \$<br>GENERAL AGGREGATE \$<br>PRODUCTS - COMP/OP AGG \$<br>\$ |
|   | AUTOMOBILE LIABILITY<br><input type="checkbox"/> ANY AUTO<br><input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS<br><input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS  |   |             |  |                            |                            | COMBINED SINGLE LIMIT (Ea accident) \$<br>BODILY INJURY (Per person) \$<br>BODILY INJURY (Per accident) \$<br>PROPERTY DAMAGE (Per accident) \$<br>\$  |
|   | UMBRELLA LIAB <input type="checkbox"/> OCCUR<br>EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE<br>DED    RETENTION \$  |   |             |  |                            |                            | EACH OCCURRENCE \$<br>AGGREGATE \$<br>\$   |
|   | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY<br>ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)<br>If yes, describe under DESCRIPTION OF OPERATIONS below   | Y/N                                       | N/A         |  |                            |                            | PER STATUTE    OTH-ER<br>E.L. EACH ACCIDENT \$<br>E.L. DISEASE - EA EMPLOYEE \$<br>E.L. DISEASE - POLICY LIMIT \$  |
| DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)  |  |   |             |  |                            |                            |  |
| <b>CERTIFICATE HOLDER</b>   |  |   |             | <b>CANCELLATION</b>  |                            |                            |  |
|   |  |   |             | SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. |                            |                            |  |
|   |  |   |             | AUTHORIZED REPRESENTATIVE  |                            |                            |  |

**Certificate of Liability Insurance (Annotated Form)**

**2** This notice confirms the provisions of the California Insurance Code, §384. Other states have similar provisions. It states that the policy, not the certificate governs coverage.

| CERTIFICATE OF LIABILITY INSURANCE   |  |   |   | DATE (MM/DD/YYYY) |
|--|--|---|---|-------------------|
| THIS IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS IS NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES. THIS CERTIFICATE OF LIABILITY INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED AGENT OR PRODUCER, AND THE CERTIFICATE HOLDER.   |  |   |   |                   |
| If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the provisions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the benefit of such endorsement(s).  |  |   |   |                   |
| <b>PRODUCER</b><br>This block identifies the Agent or Broker. <b>1</b>   |  | <b>CONTACT NAME:</b><br>PHONE (A/C, No, Ext): <b>FAX (A/C, No):</b><br>E-MAIL ADDRESS:<br>INSURER(S) AFFORDING COVERAGE: <b>NAIC #</b>  |   |                   |
| <b>INSURED</b><br>The insured is your entity's contractor or lessee. <b>4</b>  |  | INSURER A: <b>3</b><br>INSURER B:<br>INSURER C:<br>INSURER D:<br>INSURER E:<br>INSURER F: <p>The insurer will be identified here. The insurer letter appears again near the left margin at "3" to show which insurer provides which coverage.</p> |   |                   |
| <b>COVERAGES</b>   |  | <b>CERTIFICATE NUMBER:</b>  |   |                   |
| THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN HAVE BEEN REDUCED BY PAID CLAIMS. <b>5</b> |  |   |   |                   |
| <b>INSUR LTR</b><br><b>*3</b>  | <b>TYPE OF INSURANCE</b><br><input type="checkbox"/> COMMERCIAL GENERAL LIABILITY<br><input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR<br>GEN'L AGGREGATE LIMIT APPLIES PER:<br><input type="checkbox"/> POLICY <input type="checkbox"/> PROJECT <input type="checkbox"/> LOC<br>OTHER:<br><b>AUTOMOBILE LIABILITY</b><br><input type="checkbox"/> ANY AUTO<br><input type="checkbox"/> ALL OWNED AUTOS<br><input type="checkbox"/> HIRED AUTOS<br><input type="checkbox"/> SCHEDULED AUTOS<br><input type="checkbox"/> NONOWNED AUTOS<br><input type="checkbox"/> UMBRELLA LIAB<br><input type="checkbox"/> EXCESS LIAB<br><input type="checkbox"/> DED<br><input type="checkbox"/> RETENTION \$<br><b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b><br>ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)<br>If yes, describe under DESCRIPTION OF OPERATIONS below | <b>ADDL SUBR (INS)</b><br><b>WVD</b><br><b>PC</b>   | <b>LIMITS</b><br>MED EXP (Any one person) \$<br>PERSONAL & ADV INJURY \$<br>GENERAL AGGREGATE \$<br>PRODUCTS - COMPROP AGG \$<br>COMBINED SINGLE LIMIT \$<br>JURY (Per person) \$<br>JURY (Per accident) \$<br>DAMAGE \$<br>CURRENCE \$<br>TE \$<br>DATE \$<br>ACCIDENT \$<br>ILL. DISEASE - EA EMPLOYEE \$<br>ILL. DISEASE - POLICY LIMIT \$ |                   |
| <b>DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be)</b><br><b>9</b> This section will usually be used to restrict coverage to a specific job or lease. Watch for restrictions that would omit the coverage required by your specifications.   |  | These sections show the type of coverage provided through the agent or broker identified in "1" above. If the insured uses more than one broker, this certificate will not identify all existing.   |   |                   |
| <b>CERTIFICATE HOLDER</b><br><b>10</b> Certificate holder is your entity.  |  | <b>CANCELLATION</b><br>SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.<br><b>11</b> Cancellation provisions                        |   |                   |
|  |  | <b>AUTHORIZED REPRESENTATIVE</b><br><b>12</b> The authorized representative of the insurer should be an employee, unless the agent or broker is specifically authorized to sign on behalf of the company.   |   |                   |

**Reproduction of Insurance Services Office, Inc. Form****COMMERCIAL GENERAL LIABILITY  
CG 20 01 04 13****THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****PRIMARY AND NONCONTRIBUTORY –  
OTHER INSURANCE CONDITION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART  
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PARTThe following is added to the **Other Insurance** Condition and supersedes any provision to the contrary:**Primary And Noncontributory Insurance**

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured under your policy provided that:

- (1) The additional insured is a Named Insured under such other insurance; and

- (2) You have agreed in writing in a contract or agreement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

**Reproduction of Insurance Services Office, Inc. Form**

POLICY NUMBER:

**COMMERCIAL GENERAL LIABILITY  
CG 20 10 04 13**

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

**ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – SCHEDULED PERSON OR  
ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

**SCHEDULE**

| Name Of Additional Insured Person(s)<br>Or Organization(s)   | Location(s) Of Covered Operations |
|--|-----------------------------------|
|  |                                   |
| Information required to complete this Schedule, if not shown above, will be shown in the Declarations. |                                   |

**A. Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions, or
  2. The acts or omissions of those acting on your behalf;
- in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

**B.** With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

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- C.** With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or

2. Available under the applicable Limits of Insurance shown in the Declarations;  
whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

SAMPLE

**Reproduction of Insurance Services Office, Inc. Form**

POLICY NUMBER:

**COMMERCIAL GENERAL LIABILITY  
CG 20 10 07 04**

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

**ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – SCHEDULED PERSON OR  
ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

**SCHEDULE**

| Name Of Additional Insured Person(s)<br>Or Organization(s):  | Location(s) Of Covered Operations |
|--|-----------------------------------|
|  |                                   |
| Information required to complete this Schedule, if not shown above, will be shown in the Declarations. |                                   |

**A. Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

**B.** With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

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POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – (FORM B)**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART.

SCHEDULE

Name of Person or Organization:

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

WHO IS AN INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of "your work" for that insured by or for you.

**Modifications to ISO form CG 20 10 11 85:**

1. The Insured scheduled above includes the Insured's officers, officials, employees and volunteers.
2. This insurance shall be primary as respects the Insured shown in the schedule above, or if excess, shall stand in an unbroken chain of coverage excess of the Named Insured's scheduled underlying primary coverage. In either event, any other insurance maintained by the Insured scheduled above shall be in excess of this insurance and shall not be called upon to contribute with it.
3. The insurance afforded by this policy shall not be canceled except after thirty days prior written notice by certified mail return receipt requested has been given to the Entity.

CG 20 10 11 85

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Page 1 of 1

**Reproduction of Insurance Services Office, Inc. Form**COMMERCIAL GENERAL LIABILITY  
CG 20 33 04 13**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – AUTOMATIC STATUS WHEN  
REQUIRED IN CONSTRUCTION AGREEMENT WITH YOU**

This endorsement modifies insurance provided under the following:

## COMMERCIAL GENERAL LIABILITY COVERAGE PART

A. Section II – Who Is An Insured is amended to include as an additional insured any person or organization for whom you are performing operations when you and such person or organization have agreed in writing in a contract or agreement that such person or organization be added as an additional insured on your policy. Such person or organization is an additional insured only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured.

However, the insurance afforded to such additional insured:

1. Only applies to the extent permitted by law; and
2. Will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

A person's or organization's status as an additional insured under this endorsement ends when your operations for that additional insured are completed.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to:

1. "Bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:
  - a. The preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
  - b. Supervisory, inspection, architectural or engineering activities.

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage", or the offense which caused the "personal and advertising injury", involved the rendering of or the failure to render any professional architectural, engineering or surveying services.

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2. "Bodily injury" or "property damage" occurring after:

- a. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
- b. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

The most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement you have entered into with the additional insured; or
  2. Available under the applicable Limits of Insurance shown in the Declarations;
- whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

SAMPLE

## Reproduction of Insurance Services Office, Inc. Form

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY  
CG 20 37 07 04**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – COMPLETED OPERATIONS**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

**SCHEDULE**

| Name Of Additional Insured Person(s)<br>Or Organization(s):  | Location And Description Of Completed Operations |
|--|--|
|  |  |
| Information required to complete this Schedule, if not shown above, will be shown in the Declarations. |  |

**Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

**Reproduction of Insurance Services Office, Inc. Form**

POLICY NUMBER:

**COMMERCIAL GENERAL LIABILITY  
CG 20 37 04 13**

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

**ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – COMPLETED OPERATIONS**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART  
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

**SCHEDULE**

| Name Of Additional Insured Person(s)<br>Or Organization(s) | Location And Description Of Completed Operations |
|--|--|
|  |  |
|  |  |
|  |  |

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

**A. Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the Schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

**B.** With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

**Reproduction of Insurance Services Office, Inc. Form****COMMERCIAL GENERAL LIABILITY  
CG 20 38 04 13****THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – AUTOMATIC STATUS FOR OTHER  
PARTIES WHEN REQUIRED IN WRITTEN  
CONSTRUCTION AGREEMENT**

This endorsement modifies insurance provided under the following:

**COMMERCIAL GENERAL LIABILITY COVERAGE PART****A. Section II – Who Is An Insured** is amended to include as an additional insured:

1. Any person or organization for whom you are performing operations when you and such person or organization have agreed in writing in a contract or agreement that such person or organization be added as an additional insured on your policy; and
2. Any other person or organization you are required to add as an additional insured under the contract or agreement described in Paragraph 1. above.

Such person(s) or organization(s) is an additional insured only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

- a. Your acts or omissions; or
- b. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured.

However, the insurance afforded to such additional insured described above:

- a. Only applies to the extent permitted by law; and
- b. Will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

A person's or organization's status as an additional insured under this endorsement ends when your operations for the person or organization described in Paragraph 1. above are completed.

**B.** With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to:

1. "Bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:
  - a. The preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
  - b. Supervisory, inspection, architectural or engineering activities.

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage", or the offense which caused the "personal and advertising injury", involved the rendering of, or the failure to render, any professional architectural, engineering or surveying services.

2. "Bodily injury" or "property damage" occurring after:
  - a. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or

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b. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

c. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

The most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement described in Paragraph **A.1.**; or

2. Available under the applicable Limits of Insurance shown in the Declarations;  
whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

SAMPLE



Reproduction of Insurance Services Office, Inc. Form

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY  
CG 20 13 04 13

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – STATE  
OR GOVERNMENTAL AGENCY OR SUBDIVISION  
OR POLITICAL SUBDIVISION – PERMITS  
OR AUTHORIZATIONS RELATING TO PREMISES**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

|   |
|---|
| <p><b>State Or Governmental Agency Or Subdivision Or Political Subdivision:</b></p><br><br><br><br><br><br><br><br><br><br> |
|---|

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

**A. Section II – Who Is An Insured** is amended to include as an additional insured any state or governmental agency or subdivision or political subdivision shown in the Schedule, subject to the following additional provision:

This insurance applies only with respect to the following hazards for which the state or governmental agency or subdivision or political subdivision has issued a permit or authorization in connection with premises you own, rent or control and to which this insurance applies:

1. The existence, maintenance, repair, construction, erection or removal of advertising signs, awnings, canopies, cellar entrances, coal holes, driveways, manholes, marquees, hoist away openings, sidewalk vaults, street banners or decorations and similar exposures; or
2. The construction, erection or removal of elevators; or
3. The ownership, maintenance or use of any elevators covered by this insurance.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

**B. With respect to the insurance afforded to these additional insureds, the following is added to Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
  2. Available under the applicable Limits of Insurance shown in the Declarations;
- whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

## Reproduction of Insurance Services Office, Inc. Form

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY  
CG 20 26 12 19

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – DESIGNATED  
PERSON OR ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s):

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

**A. Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by your acts or omissions or the acts or omissions of those acting on your behalf:

1. In the performance of your ongoing operations; or
2. In connection with your premises owned by or rented to you.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

**B. With respect to the insurance afforded to these additional insureds, the following is added to Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable limits of insurance;

whichever is less.

This endorsement shall not increase the applicable limits of insurance.

## Reproduction of Insurance Services Office, Inc. Form

COMMERCIAL GENERAL LIABILITY  
CG 20 39 12 19

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – AUTOMATIC STATUS WHEN  
REQUIRED IN WRITTEN CONSTRUCTION AGREEMENT  
WITH YOU (COMPLETED OPERATIONS)**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART  
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

- A. Section II – Who Is An Insured** is amended to include as an additional insured any person or organization for whom you have performed operations when you and such person or organization have agreed in writing in a contract or agreement that such person or organization be added as an additional insured on your policy. Such person or organization is an additional insured only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" performed for that additional insured and included in the "products-completed operations hazard".
- However, the insurance afforded to such additional insured:
1. Only applies to the extent permitted by law; and
  2. Will not be broader than that which you are required by the contract or agreement to provide for such additional insured.
- B. With respect to the insurance afforded to these additional insureds, the following additional exclusion applies:**
- This insurance does not apply to:
- "Bodily injury" or "property damage" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:
1. The preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
  2. Supervisory, inspection, architectural or engineering activities.
- This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage" involved the rendering of or the failure to render any professional architectural, engineering or surveying services.
- C. With respect to the insurance afforded to these additional insureds, the following is added to Section III – Limits Of Insurance:**
- The most we will pay on behalf of the additional insured is the amount of insurance:
1. Required by the contract or agreement you have entered into with the additional insured; or
  2. Available under the applicable limits of insurance;
- whichever is less.
- This endorsement shall not increase the applicable limits of insurance.

## Reproduction of Insurance Services Office, Inc. Form

COMMERCIAL GENERAL LIABILITY  
CG 20 40 12 19

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – AUTOMATIC STATUS FOR OTHER  
PARTIES WHEN REQUIRED IN WRITTEN  
CONSTRUCTION AGREEMENT (COMPLETED  
OPERATIONS)**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART  
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART**A. Section II – Who Is An Insured** is amended to include as an additional insured:

1. Any person or organization for whom you have performed operations when you and such person or organization have agreed in writing in a contract or agreement that such person or organization be added as an additional insured on your policy; and
2. Any other person or organization you are required to add as an additional insured under the contract or agreement described in Paragraph 1. above.

Such person(s) or organization(s) is an additional insured only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" performed for the additional insured described in Paragraph 1. or 2. above and included in the "products-completed operations hazard"

However, the insurance afforded to such additional insured described above:

- a. Only applies to the extent permitted by law; and
- b. Will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

**B. With respect to the insurance afforded to these additional insureds, the following additional exclusion applies:**

This insurance does not apply to:

"Bodily injury" or "property damage" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:

1. The preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
2. Supervisory, inspection, architectural or engineering activities.

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage" involved the rendering of, or the failure to render, any professional architectural, engineering or surveying services.

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**Reproduction of Insurance Services Office, Inc. Form**

C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

The most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement described in Paragraph A.1.; or

2. Available under the applicable limits of insurance;

whichever is less.

This endorsement shall not increase the applicable limits of insurance.

SAMPLE

**Reproduction of Insurance Services Office, Inc. Form**

POLICY NUMBER:

**COMMERCIAL GENERAL LIABILITY**  
CG 24 04 05 09**WAIVER OF TRANSFER OF RIGHTS OF RECOVERY  
AGAINST OTHERS TO US**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART  
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART**SCHEDULE****Name Of Person Or Organization:**

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

**The following is added to Paragraph 8. Transfer Of  
Rights Of Recovery Against Others To Us of  
Section IV – Conditions:**

We waive any right of recovery we may have against the person or organization shown in the Schedule above because of payments we make for injury or damage arising out of your ongoing operations or "your work" done under a contract with that person or organization and included in the "products-completed operations hazard". This waiver applies only to the person or organization shown in the Schedule above.

**Reproduction of Insurance Services Office, Inc. Form****COMMERCIAL GENERAL LIABILITY  
CG 24 53 12 19****THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****WAIVER OF TRANSFER OF RIGHTS OF RECOVERY  
AGAINST OTHERS TO US (WAIVER OF SUBROGATION) –  
AUTOMATIC**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART  
ELECTRONIC DATA LIABILITY COVERAGE PART  
LIQUOR LIABILITY COVERAGE PART  
POLLUTION LIABILITY COVERAGE PART DESIGNATED SITES  
POLLUTION LIABILITY LIMITED COVERAGE PART DESIGNATED SITES  
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART  
RAILROAD PROTECTIVE LIABILITY COVERAGE PART  
UNDERGROUND STORAGE TANK POLICY DESIGNATED TANKS

The following is added to Paragraph 8. **Transfer Of Rights Of Recovery Against Others To Us** of Section IV – Conditions:

We waive any right of recovery against any person or organization, because of any payment we make under this Coverage Part, to whom the insured has waived its right of recovery in a written contract or agreement. Such waiver by us applies only to the extent that the insured has waived its right of recovery against such person or organization prior to loss.

**Reproduction of Insurance Services Office, Inc. Form**

POLICY NUMBER:

**COMMERCIAL GENERAL LIABILITY**  
CG 25 01 07 98

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

**AMENDMENT OF LIMITS OF INSURANCE  
(DESIGNATED PROJECT OR PREMISES)**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

**SCHEDULE**

|   | <b>Limits Of Insurance</b> |                        |
|---|----------------------------|------------------------|
| General Aggregate Limit                       | \$                         | _____                  |
| Products-Completed Operations Aggregate Limit | \$                         | _____                  |
| Personal & Advertising Injury Limit           | \$                         | _____                  |
| Each Occurrence Limit                         | \$                         | _____                  |
| Damage To Premises Rented To You Limit        | \$                         | _____ Any One Premises |
| Medical Expense Limit                         | \$                         | _____ Any One Person   |
| <b>Designation Of Project Or Premises:</b>    |                            |                        |
|   |                            |                        |

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

The limits of insurance shown in the Declarations are replaced by the limits designated in the Schedule with respect to the project or premises entered above. These limits are inclusive of and are not in addition to the limits being replaced.

**Reproduction of Insurance Services Office, Inc. Form**

POLICY NUMBER:

**COMMERCIAL GENERAL LIABILITY**  
 CG 25 02 07 98

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**
**AMENDMENT OF LIMITS OF INSURANCE**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

**SCHEDULE**

|   | <b>Limits Of Insurance</b> |
|---|----------------------------|
| General Aggregate Limit                       | \$ _____                   |
| Products-Completed Operations Aggregate Limit | \$ _____                   |
| Personal & Advertising Injury Limit           | \$ _____                   |
| Each Occurrence Limit                         | \$ _____                   |
| Damage To Premises Rented To You Limit        | \$ _____ Any One Premises  |
| Medical Expense Limit                         | \$ _____ Any One Person    |

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

The limits of insurance shown in the Declarations are replaced by the limits designated in the Schedule or in the Declarations as subject to this endorsement with respect to which an entry is made.

**Reproduction of Insurance Services Office, Inc. Form**

POLICY NUMBER:

**COMMERCIAL GENERAL LIABILITY  
CG 25 03 05 09****THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****DESIGNATED CONSTRUCTION PROJECT(S)  
GENERAL AGGREGATE LIMIT**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

**SCHEDULE****Designated Construction Project(s):**

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

- A.** For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under Section I – Coverage A, and for all medical expenses caused by accidents under Section I – Coverage C, which can be attributed only to ongoing operations at a single designated construction project shown in the Schedule above:
1. A separate Designated Construction Project General Aggregate Limit applies to each designated construction project, and that limit is equal to the amount of the General Aggregate Limit shown in the Declarations.
  2. The Designated Construction Project General Aggregate Limit is the most we will pay for the sum of all damages under Coverage A, except damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard", and for medical expenses under Coverage C regardless of the number of:
    - a. Insureds;
    - b. Claims made or "suits" brought; or
    - c. Persons or organizations making claims or bringing "suits".
  3. Any payments made under Coverage A for damages or under Coverage C for medical expenses shall reduce the Designated Construction Project General Aggregate Limit for that designated construction project. Such payments shall not reduce the General Aggregate Limit shown in the Declarations nor shall they reduce any other Designated Construction Project General Aggregate Limit for any other designated construction project shown in the Schedule above.
  4. The limits shown in the Declarations for Each Occurrence, Damage To Premises Rented To You and Medical Expense continue to apply. However, instead of being subject to the General Aggregate Limit shown in the Declarations, such limits will be subject to the applicable Designated Construction Project General Aggregate Limit.

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**Reproduction of Insurance Services Office, Inc. Form**

- B.** For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under Section I – Coverage A, and for all medical expenses caused by accidents under Section I – Coverage C, which cannot be attributed only to ongoing operations at a single designated construction project shown in the Schedule above:
1. Any payments made under Coverage A for damages or under Coverage C for medical expenses shall reduce the amount available under the General Aggregate Limit or the Products-completed Operations Aggregate Limit, whichever is applicable; and
  2. Such payments shall not reduce any Designated Construction Project General Aggregate Limit.
- C.** When coverage for liability arising out of the "products-completed operations hazard" is provided, any payments for damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard" will reduce the Products-completed Operations Aggregate Limit, and not reduce the General Aggregate Limit nor the Designated Construction Project General Aggregate Limit.
- D.** If the applicable designated construction project has been abandoned, delayed, or abandoned and then restarted, or if the authorized contracting parties deviate from plans, blueprints, designs, specifications or timetables, the project will still be deemed to be the same construction project.
- E.** The provisions of Section III – Limits Of Insurance not otherwise modified by this endorsement shall continue to apply as stipulated.

Reproduction of Insurance Services Office, Inc. Form

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY  
CG 25 04 05 09

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**DESIGNATED LOCATION(S)  
GENERAL AGGREGATE LIMIT**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

|  |
|--|
| Designated Location(s):  |
| Information required to complete this Schedule, if not shown above, will be shown in the Declarations. |

- A.** For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under Section I – Coverage A, and for all medical expenses caused by accidents under Section I – Coverage C, which can be attributed only to operations at a single designated "location" shown in the Schedule above:
1. A separate Designated Location General Aggregate Limit applies to each designated "location", and that limit is equal to the amount of the General Aggregate Limit shown in the Declarations.
  2. The Designated Location General Aggregate Limit is the most we will pay for the sum of all damages under Coverage A, except damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard", and for medical expenses under Coverage C regardless of the number of:
    - a. Insureds;
    - b. Claims made or "suits" brought; or
    - c. Persons or organizations making claims or bringing "suits".
  3. Any payments made under Coverage A for damages or under Coverage C for medical expenses shall reduce the Designated Location General Aggregate Limit for that designated "location". Such payments shall not reduce the General Aggregate Limit shown in the Declarations nor shall they reduce any other Designated Location General Aggregate Limit for any other designated "location" shown in the Schedule above.
  4. The limits shown in the Declarations for Each Occurrence, Damage To Premises Rented To You and Medical Expense continue to apply. However, instead of being subject to the General Aggregate Limit shown in the Declarations, such limits will be subject to the applicable Designated Location General Aggregate Limit.

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**Reproduction of Insurance Services Office, Inc. Form**

- B.** For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under Section I – Coverage A, and for all medical expenses caused by accidents under Section I – Coverage C, which cannot be attributed only to operations at a single designated "location" shown in the Schedule above:
1. Any payments made under Coverage A for damages or under Coverage C for medical expenses shall reduce the amount available under the General Aggregate Limit or the Products-completed Operations Aggregate Limit, whichever is applicable; and
  2. Such payments shall not reduce any Designated Location General Aggregate Limit.
- C.** When coverage for liability arising out of the "products-completed operations hazard" is provided, any payments for damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard" will reduce the Products-completed Operations Aggregate Limit, and not reduce the General Aggregate Limit nor the Designated Location General Aggregate Limit.
- D.** For the purposes of this endorsement, the Definitions Section is amended by the addition of the following definition:
- "Location" means premises involving the same or connecting lots, or premises whose connection is interrupted only by a street, roadway, waterway or right-of-way of a railroad.
- E.** The provisions of Section III – Limits Of Insurance not otherwise modified by this endorsement shall continue to apply as stipulated.

**Reproduction of State Compensation Insurance Fund Form**

|  |   |  |
|--|---|--|
| <b>STATE<br/>COMPENSATION<br/>INSURANCE<br/>FUND</b> | P.O. BOX 807, SAN FRANCISCO, CALIFORNIA 94101<br>CERTIFICATE OF WORKERS' COMPENSATION INSURANCE |  |
|  |   | POLICY NUMBER:<br>CERTIFICATE EXPIRES: |
|  |   |  |

This is to certify that we have issued a valid Workers' Compensation insurance policy in a form approved by the California Insurance Commissioner to the employer named below for the policy period indicated.

This policy is not subject to cancellation by the Fund except upon 30 day's written notice to the employer.

We will give you 30 day's advance notice should this policy be canceled prior to its normal expiration.

This certificate of insurance is not an insurance policy and does not amend, extend or alter the coverage afforded by the policies listed herein. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

\_\_\_\_\_  
 PRESIDENT

*(Note: following text is typewritten addition to printed form)*

THE STATE COMPENSATION INSURANCE FUND WAIVES ANY RIGHT OF SUBROGATION ENDORSEMENT #2570. AGAINST (ENTITY) \_\_\_\_\_, ITS OFFICIALS, EMPLOYEES AND VOLUNTEERS BY REASON OF ANY PAYMENT UNDER THIS POLICY.

ENDORSEMENT #0015 ENTITLED ADDITIONAL INSURED EMPLOYER EFFECTIVE 07-20-87 IS ATTACHED TO AND FORMS A PART OF THIS POLICY. ADDITIONAL INSURED EMPLOYER: \_\_\_\_\_.

ENDORSEMENT #2065 ENTITLED 30 DAY CANCELLATION NOTICE EFFECTIVE 07-20-87 IS ATTACHED TO AND FORMS A PART OF THIS POLICY.

LIABILITY OF THE STATE COMPENSATION INSURANCE FUND IS LIMITED TO \$3,000,000 FOR ALL DAMAGES FOR ONE OR MORE CLAIMS RESULTING FROM EACH ACCIDENT OF OCCURRENCE ARISING OUT OF ANY ONE EVENT.

\_\_\_\_\_  
 EMPLOYER

**Reproduction of State Compensation Insurance Fund Form**

|  |   |
|--|---|
| <b>STATE<br/>COMPENSATION<br/>INSURANCE<br/>FUND</b> | <b>ADDITIONAL INSURED EMPLOYER<br/>ENDORSEMENT AGREEMENT</b>  |
| Home Office<br>San Francisco                         | All Effective Dates are at 12:01 AM Pacific Standard Time<br>or the Time Indicated at Pacific Standard Time |

ANYTHING IN THIS POLICY TO THE CONTRACT NOTWITHSTANDING, IT IS AGREED THAT

|           |   |
|-----------|---|
| EMPLOYER: | NAMED OF ADDITIONAL INSURED<br>(ONE NAME PER ENDORSEMENT) |
|-----------|---|

IS HEREBY NAMED AS AN ADDITIONAL INSURED EMPLOYER ON THIS POLICY BUT ONLY AS RESPECTS EMPLOYEES WHOSE NAMES APPEAR ON THE PAYROLL RECORDS OF  
(POLICY NAME)

(HEREIN CALLED THE PRIMARY INSURED) WHILE THOSE EMPLOYEES ARE ENGAGED IN WORK UNDER THE SIMULTANEOUS DIRECTION AND CONTROL OF THE PRIMARY INSURED AND THE ADDITIONAL INSURED EMPLOYER.

IT IS FURTHER AGREED THAT THE PAYMENT OF THE FULL PREMIUM DUE AND PAYABLE UNDER THIS POLICY SHALL REMAIN THE SOLE RESPONSIBILITY OF THE PRIMARY INSURED.

NOTHING IN THIS ENDORSEMENT CONTAINED SHALL BE HELED TO VARY, ALTER, WAIVE OR EXTEND ANY OF THE TERMS, CONDITIONS, AGREEMENTS OR LIMITATIONS OF THIS POLICY OTHER THAN AS STATED. NOTHING ELSEWHERE IN THIS POLICY SHALL BE HELD TO VARY, ALTER, WAIVE OR LIMIT THE TERMS, CONDITIONS, AGREEMENTS OR LIMITATIONS OF THIS ENDORSEMENT.

COUNTERSIGNED AND ISSUED AT SAN FRANCISCO

0015

**Reproduction of State Compensation Insurance Fund Form**

|  |   |
|--|---|
| <b>STATE<br/>COMPENSATION<br/>INSURANCE<br/>FUND</b> | <b>ADDITIONAL INSURED EMPLOYER<br/>ENDORSEMENT AGREEMENT</b>  |
| Home Office<br>San Francisco                         | All Effective Dates are at 12:01 AM Pacific Standard Time<br>or the Time Indicated at Pacific Standard Time |

ANYTHING IN THIS POLICY TO THE CONTRARY NOTWITHSTANDING, IT IS AGREED THAT THE STATE COMPENSATION INSURANCE FUND WAIVES ANY RIGHT OF SUBROGATION AGAINST:

(SPECIFY 3RD PARTY REQUESTING WAIVER: ONE NAME PER ENDORSEMENT)

WHICH MIGHT ARISE BY REASON OF ANY PAYMENT UNDER THIS POLICY IN CONNECTION WITH WORK PERFORMED BY:

(POLICY NAME)

IT IS FURTHER AGREED THAT THE INSURED SHALL MAINTAIN PAYROLL RECORDS ACCURATELY SEGREGATING THE REMUNERATION OF EMPLOYEES WHILE ENGAGED IN WORK FOR THE ABOVE EMPLOYER.

IT IS FURTHER AGREED THAT PREMIUM ON THE EARNINGS OF SUCH EMPLOYEES SHALL BE INCREASED BY \_\_\_\_\_%.

NOTHING IN THIS ENDORSEMENT CONTAINED SHALL BE HALED TO VARY, ALTER, WAIVE OR EXTEND ANY OF THE TERMS, CONDITIONS, AGREEMENTS OR LIMITATIONS OF THIS POLICY OTHER THAN AS STATED. NOTHING ELSEWHERE IN THIS POLICY SHALL BEHELD TO VARY, ALTER, WAIVE OR LIMIT THE TERMS, CONDITIONS, AGREEMENTS OR LIMITATIONS OF THIS ENDORSEMENT.

COUNTERSIGNED AND ISSUED AT SAN FRANCISCO

2570

**Reproduction of State Compensation Insurance Fund Form**

|  |   |
|--|---|
| <b>STATE<br/>COMPENSATION<br/>INSURANCE<br/>FUND</b> | <b>ADDITIONAL INSURED EMPLOYER<br/>ENDORSEMENT AGREEMENT</b>  |
| Home Office<br>San Francisco                         | All Effective Dates are at 12:01 AM Pacific Standard Time<br>or the Time Indicated at Pacific Standard Time |

ANYTHING IN THIS POLICY TO THE CONTRARY NOTWITHSTANDING, IT IS AGREED THAT THIS POLICY SHALL NOT BE CANCELED UNTIL:

(SPECIFY NUMBER) \_\_\_\_\_ DAYS

AFTER WRITTEN NOTICE OF SUCH CANCELLATION HAS BEEN PLACED IN THE MAIL BY STATE FUND TO CURRENT HOLDERS OF CERTIFICATE OF WORKERS' COMPENSATION INSURANCE.

NOTHING IN THIS ENDORSEMENT CONTAINED SHALL BE HELED TO VARY, ALTER, WAIVE OR EXTEND ANY OF THE TERMS, CONDITIONS, AGREEMENTS OR LIMITATIONS OF THIS POLICY OTHER THAN AS STATED. NOTHING ELSEWHERE IN THIS POLICY SHALL BEHELD TO VARY, ALTER, WAIVE OR LIMIT THE TERMS, CONDITIONS, AGREEMENTS OR LIMITATIONS OF THIS ENDORSEMENT.

COUNTERSIGNED AND ISSUED AT SAN FRANCISCO

0015

## Reproduction of Insurance Services Office, Inc. Form

COMMERCIAL GENERAL LIABILITY  
CG 00 01 04 13

## COMMERCIAL GENERAL LIABILITY COVERAGE FORM

Various provisions in this policy restrict coverage. Read the entire policy carefully to determine rights, duties and what is and is not covered.

Throughout this policy the words "you" and "your" refer to the Named Insured shown in the Declarations, and any other person or organization qualifying as a Named Insured under this policy. The words "we", "us" and "our" refer to the company providing this insurance.

The word "insured" means any person or organization qualifying as such under Section II – Who Is An Insured.

Other words and phrases that appear in quotation marks have special meaning. Refer to Section V – Definitions.

**SECTION I – COVERAGES****COVERAGE A – BODILY INJURY AND PROPERTY DAMAGE LIABILITY****1. Insuring Agreement**

a. We will pay those sums that the insured becomes legally obligated to pay as damages because of "bodily injury" or "property damage" to which this insurance applies. We will have the right and duty to defend the insured against any "suit" seeking those damages. However, we will have no duty to defend the insured against any "suit" seeking damages for "bodily injury" or "property damage" to which this insurance does not apply. We may, at our discretion, investigate any "occurrence" and settle any claim or "suit" that may result. But:

- (1) The amount we will pay for damages is limited as described in Section III – Limits Of Insurance; and
- (2) Our right and duty to defend ends when we have used up the applicable limit of insurance in the payment of judgments or settlements under Coverages A or B or medical expenses under Coverage C.

No other obligation or liability to pay sums or perform acts or services is covered unless explicitly provided for under Supplementary Payments – Coverages A and B.

b. This insurance applies to "bodily injury" and "property damage" only if:

- (1) The "bodily injury" or "property damage" is caused by an "occurrence" that takes place in the "coverage territory";

(2) The "bodily injury" or "property damage" occurs during the policy period; and

(3) Prior to the policy period, no insured listed under Paragraph 1. of Section II – Who Is An Insured and no "employee" authorized by you to give or receive notice of an "occurrence" or claim, knew that the "bodily injury" or "property damage" had occurred, in whole or in part. If such a listed insured or authorized "employee" knew, prior to the policy period, that the "bodily injury" or "property damage" occurred, then any continuation, change or resumption of such "bodily injury" or "property damage" during or after the policy period will be deemed to have been known prior to the policy period.

c. "Bodily injury" or "property damage" which occurs during the policy period and was not, prior to the policy period, known to have occurred by any insured listed under Paragraph 1. of Section II – Who Is An Insured or any "employee" authorized by you to give or receive notice of an "occurrence" or claim, includes any continuation, change or resumption of that "bodily injury" or "property damage" after the end of the policy period.

d. "Bodily injury" or "property damage" will be deemed to have been known to have occurred at the earliest time when any insured listed under Paragraph 1. of Section II – Who Is An Insured or any "employee" authorized by you to give or receive notice of an "occurrence" or claim:

- (1) Reports all, or any part, of the "bodily injury" or "property damage" to us or any other insurer;
- (2) Receives a written or verbal demand or claim for damages because of the "bodily injury" or "property damage"; or
- (3) Becomes aware by any other means that "bodily injury" or "property damage" has occurred or has begun to occur.

e. Damages because of "bodily injury" include damages claimed by any person or organization for care, loss of services or death resulting at any time from the "bodily injury".

**Reproduction of Insurance Services Office, Inc. Form****2. Exclusions**

This insurance does not apply to:

**a. Expected Or Intended Injury**

"Bodily injury" or "property damage" expected or intended from the standpoint of the insured. This exclusion does not apply to "bodily injury" resulting from the use of reasonable force to protect persons or property.

**b. Contractual Liability**

"Bodily injury" or "property damage" for which the insured is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages:

- (1) That the insured would have in the absence of the contract or agreement; or
- (2) Assumed in a contract or agreement that is an "insured contract", provided the "bodily injury" or "property damage" occurs subsequent to the execution of the contract or agreement. Solely for the purposes of liability assumed in an "insured contract", reasonable attorneys' fees and necessary litigation expenses incurred by or for a party other than an insured are deemed to be damages because of "bodily injury" or "property damage", provided:
  - (a) Liability to such party for, or for the cost of, that party's defense has also been assumed in the same "insured contract"; and
  - (b) Such attorneys' fees and litigation expenses are for defense of that party against a civil or alternative dispute resolution proceeding in which damages to which this insurance applies are alleged.

**c. Liquor Liability**

"Bodily injury" or "property damage" for which any insured may be held liable by reason of:

- (1) Causing or contributing to the intoxication of any person;
- (2) The furnishing of alcoholic beverages to a person under the legal drinking age or under the influence of alcohol; or
- (3) Any statute, ordinance or regulation relating to the sale, gift, distribution or use of alcoholic beverages.

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in:

- (a) The supervision, hiring, employment, training or monitoring of others by that insured; or
- (b) Providing or failing to provide transportation with respect to any person that may be under the influence of alcohol;

if the "occurrence" which caused the "bodily injury" or "property damage", involved that which is described in Paragraph (1), (2) or (3) above.

However, this exclusion applies only if you are in the business of manufacturing, distributing, selling, serving or furnishing alcoholic beverages. For the purposes of this exclusion, permitting a person to bring alcoholic beverages on your premises, for consumption on your premises, whether or not a fee is charged or a license is required for such activity, is not by itself considered the business of selling, serving or furnishing alcoholic beverages.

**d. Workers' Compensation And Similar Laws**

Any obligation of the insured under a workers' compensation, disability benefits or unemployment compensation law or any similar law.

**e. Employer's Liability**

"Bodily injury" to:

- (1) An "employee" of the insured arising out of and in the course of:
  - (a) Employment by the insured; or
  - (b) Performing duties related to the conduct of the insured's business; or
- (2) The spouse, child, parent, brother or sister of that "employee" as a consequence of Paragraph (1) above.

This exclusion applies whether the insured may be liable as an employer or in any other capacity and to any obligation to share damages with or repay someone else who must pay damages because of the injury.

This exclusion does not apply to liability assumed by the insured under an "insured contract".

**Reproduction of Insurance Services Office, Inc. Form****f. Pollution**

- (1) "Bodily injury" or "property damage" arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants":
- (a) At or from any premises, site or location which is or was at any time owned or occupied by, or rented or loaned to, any insured. However, this subparagraph does not apply to:
    - (i) "Bodily injury" if sustained within a building and caused by smoke, fumes, vapor or soot produced by or originating from equipment that is used to heat, cool or dehumidify the building, or equipment that is used to heat water for personal use, by the building's occupants or their guests;
    - (ii) "Bodily injury" or "property damage" for which you may be held liable, if you are a contractor and the owner or lessee of such premises, site or location has been added to your policy as an additional insured with respect to your ongoing operations performed for that additional insured at that premises, site or location and such premises, site or location is not and never was owned or occupied by, or rented or loaned to, any insured, other than that additional insured; or
    - (iii) "Bodily injury" or "property damage" arising out of heat, smoke or fumes from a "hostile fire";
  - (b) At or from any premises, site or location which is or was at any time used by or for any insured or others for the handling, storage, disposal, processing or treatment of waste;
  - (c) Which are or were at any time transported, handled, stored, treated, disposed of, or processed as waste by or for:
    - (i) Any insured; or
    - (ii) Any person or organization for whom you may be legally responsible; or
  - (d) At or from any premises, site or location on which any insured or any contractors or subcontractors working directly or indirectly on any insured's behalf are performing operations if the "pollutants" are brought on or to the premises, site or location in connection with such operations by such insured, contractor or subcontractor. However, this subparagraph does not apply to:
    - (i) "Bodily injury" or "property damage" arising out of the escape of fuels, lubricants or other operating fluids which are needed to perform the normal electrical, hydraulic or mechanical functions necessary for the operation of "mobile equipment" or its parts, if such fuels, lubricants or other operating fluids escape from a vehicle part designed to hold, store or receive them. This exception does not apply if the "bodily injury" or "property damage" arises out of the intentional discharge, dispersal or release of the fuels, lubricants or other operating fluids, or if such fuels, lubricants or other operating fluids are brought on or to the premises, site or location with the intent that they be discharged, dispersed or released as part of the operations being performed by such insured, contractor or subcontractor;
    - (ii) "Bodily injury" or "property damage" sustained within a building and caused by the release of gases, fumes or vapors from materials brought into that building in connection with operations being performed by you or on your behalf by a contractor or subcontractor; or
    - (iii) "Bodily injury" or "property damage" arising out of heat, smoke or fumes from a "hostile fire".
  - (e) At or from any premises, site or location on which any insured or any contractors or subcontractors working directly or indirectly on any insured's behalf are performing operations if the operations are to test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants".

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(2) Any loss, cost or expense arising out of any:

- (a) Request, demand, order or statutory or regulatory requirement that any insured or others test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants"; or
- (b) Claim or suit by or on behalf of a governmental authority for damages because of testing for, monitoring, cleaning up, removing, containing, treating, detoxifying or neutralizing, or in any way responding to, or assessing the effects of, "pollutants".

However, this paragraph does not apply to liability for damages because of "property damage" that the insured would have in the absence of such request, demand, order or statutory or regulatory requirement, or such claim or "suit" by or on behalf of a governmental authority.

**g. Aircraft, Auto Or Watercraft**

"Bodily injury" or "property damage" arising out of the ownership, maintenance, use or entrustment to others of any aircraft, "auto" or watercraft owned or operated by or rented or loaned to any insured. Use includes operation and "loading or unloading".

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage" involved the ownership, maintenance, use or entrustment to others of any aircraft, "auto" or watercraft that is owned or operated by or rented or loaned to any insured.

This exclusion does not apply to:

- (1) A watercraft while ashore on premises you own or rent;
- (2) A watercraft you do not own that is:
  - (a) Less than 26 feet long; and
  - (b) Not being used to carry persons or property for a charge;
- (3) Parking an "auto" on, or on the ways next to, premises you own or rent, provided the "auto" is not owned by or rented or loaned to you or the insured;
- (4) Liability assumed under any "insured contract" for the ownership, maintenance or use of aircraft or watercraft; or

(5) "Bodily injury" or "property damage" arising out of:

- (a) The operation of machinery or equipment that is attached to, or part of, a land vehicle that would qualify under the definition of "mobile equipment" if it were not subject to a compulsory or financial responsibility law or other motor vehicle insurance law where it is licensed or principally garaged; or
- (b) The operation of any of the machinery or equipment listed in Paragraph **f.(2)** or **f.(3)** of the definition of "mobile equipment".

**h. Mobile Equipment**

"Bodily injury" or "property damage" arising out of:

- (1) The transportation of "mobile equipment" by an "auto" owned or operated by or rented or loaned to any insured; or
- (2) The use of "mobile equipment" in, or while in practice for, or while being prepared for, any prearranged racing, speed, demolition, or stunting activity.

**i. War**

"Bodily injury" or "property damage", however caused, arising, directly or indirectly, out of:

- (1) War, including undeclared or civil war;
- (2) Warlike action by a military force, including action in hindering or defending against an actual or expected attack, by any government, sovereign or other authority using military personnel or other agents; or
- (3) Insurrection, rebellion, revolution, usurped power, or action taken by governmental authority in hindering or defending against any of these.

**j. Damage To Property**

"Property damage" to:

- (1) Property you own, rent, or occupy, including any costs or expenses incurred by you, or any other person, organization or entity, for repair, replacement, enhancement, restoration or maintenance of such property for any reason, including prevention of injury to a person or damage to another's property;
- (2) Premises you sell, give away or abandon, if the "property damage" arises out of any part of those premises;
- (3) Property loaned to you;

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- (4) Personal property in the care, custody or control of the insured;
- (5) That particular part of real property on which you or any contractors or subcontractors working directly or indirectly on your behalf are performing operations, if the "property damage" arises out of those operations; or
- (6) That particular part of any property that must be restored, repaired or replaced because "your work" was incorrectly performed on it.

Paragraphs (1), (3) and (4) of this exclusion do not apply to "property damage" (other than damage by fire) to premises, including the contents of such premises, rented to you for a period of seven or fewer consecutive days. A separate limit of insurance applies to Damage To Premises Rented To You as described in Section III – Limits Of Insurance.

Paragraph (2) of this exclusion does not apply if the premises are "your work" and were never occupied, rented or held for rental by you.

Paragraphs (3), (4), (5) and (6) of this exclusion do not apply to liability assumed under a sidetrack agreement.

Paragraph (6) of this exclusion does not apply to "property damage" included in the "products-completed operations hazard".

**k. Damage To Your Product**

"Property damage" to "your product" arising out of it or any part of it.

**l. Damage To Your Work**

"Property damage" to "your work" arising out of it or any part of it and included in the "products-completed operations hazard".

This exclusion does not apply if the damaged work or the work out of which the damage arises was performed on your behalf by a subcontractor.

**m. Damage To Impaired Property Or Property Not Physically Injured**

"Property damage" to "impaired property" or property that has not been physically injured, arising out of:

- (1) A defect, deficiency, inadequacy or dangerous condition in "your product" or "your work"; or
- (2) A delay or failure by you or anyone acting on your behalf to perform a contract or agreement in accordance with its terms.

This exclusion does not apply to the loss of use of other property arising out of sudden and accidental physical injury to "your product" or "your work" after it has been put to its intended use.

**n. Recall Of Products, Work Or Impaired Property**

Damages claimed for any loss, cost or expense incurred by you or others for the loss of use, withdrawal, recall, inspection, repair, replacement, adjustment, removal or disposal of:

- (1) "Your product";
- (2) "Your work"; or
- (3) "Impaired property";

if such product, work, or property is withdrawn or recalled from the market or from use by any person or organization because of a known or suspected defect, deficiency, inadequacy or dangerous condition in it.

**o. Personal And Advertising Injury**

"Bodily injury" arising out of "personal and advertising injury".

**p. Electronic Data**

Damages arising out of the loss of, loss of use of, damage to, corruption of, inability to access, or inability to manipulate electronic data.

However, this exclusion does not apply to liability for damages because of "bodily injury".

As used in this exclusion, electronic data means information, facts or programs stored as or on, created or used on, or transmitted to or from computer software, including systems and applications software, hard or floppy disks, CD-ROMs, tapes, drives, cells, data processing devices or any other media which are used with electronically controlled equipment.

**q. Recording And Distribution Of Material Or Information In Violation Of Law**

"Bodily injury" or "property damage" arising directly or indirectly out of any action or omission that violates or is alleged to violate:

- (1) The Telephone Consumer Protection Act (TCPA), including any amendment of or addition to such law;
- (2) The CAN-SPAM Act of 2003, including any amendment of or addition to such law;
- (3) The Fair Credit Reporting Act (FCRA), and any amendment of or addition to such law, including the Fair and Accurate Credit Transactions Act (FACTA); or

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- (4) Any federal, state or local statute, ordinance or regulation, other than the TCPA, CAN-SPAM Act of 2003 or FCRA and their amendments and additions, that addresses, prohibits, or limits the printing, dissemination, disposal, collecting, recording, sending, transmitting, communicating or distribution of material or information.

Exclusions **c.** through **n.** do not apply to damage by fire to premises while rented to you or temporarily occupied by you with permission of the owner. A separate limit of insurance applies to this coverage as described in Section III – Limits Of Insurance.

**COVERAGE B – PERSONAL AND ADVERTISING INJURY LIABILITY****1. Insuring Agreement**

- a.** We will pay those sums that the insured becomes legally obligated to pay as damages because of "personal and advertising injury" to which this insurance applies. We will have the right and duty to defend the insured against any "suit" seeking those damages. However, we will have no duty to defend the insured against any "suit" seeking damages for "personal and advertising injury" to which this insurance does not apply. We may, at our discretion, investigate any offense and settle any claim or "suit" that may result. But:

- (1) The amount we will pay for damages is limited as described in Section III – Limits Of Insurance; and
- (2) Our right and duty to defend end when we have used up the applicable limit of insurance in the payment of judgments or settlements under Coverages **A** or **B** or medical expenses under Coverage **C**.

No other obligation or liability to pay sums or perform acts or services is covered unless explicitly provided for under Supplementary Payments – Coverages **A** and **B**.

- b.** This insurance applies to "personal and advertising injury" caused by an offense arising out of your business but only if the offense was committed in the "coverage territory" during the policy period.

**2. Exclusions**

This insurance does not apply to:

**a. Knowing Violation Of Rights Of Another**

"Personal and advertising injury" caused by or at the direction of the insured with the knowledge that the act would violate the rights of another and would inflict "personal and advertising injury".

**b. Material Published With Knowledge Of Falsity**

"Personal and advertising injury" arising out of oral or written publication, in any manner, of material, if done by or at the direction of the insured with knowledge of its falsity.

**c. Material Published Prior To Policy Period**

"Personal and advertising injury" arising out of oral or written publication, in any manner, of material whose first publication took place before the beginning of the policy period.

**d. Criminal Acts**

"Personal and advertising injury" arising out of a criminal act committed by or at the direction of the insured.

**e. Contractual Liability**

"Personal and advertising injury" for which the insured has assumed liability in a contract or agreement. This exclusion does not apply to liability for damages that the insured would have in the absence of the contract or agreement.

**f. Breach Of Contract**

"Personal and advertising injury" arising out of a breach of contract, except an implied contract to use another's advertising idea in your "advertisement".

**g. Quality Or Performance Of Goods – Failure To Conform To Statements**

"Personal and advertising injury" arising out of the failure of goods, products or services to conform with any statement of quality or performance made in your "advertisement".

**h. Wrong Description Of Prices**

"Personal and advertising injury" arising out of the wrong description of the price of goods, products or services stated in your "advertisement".

**Reproduction of Insurance Services Office, Inc. Form****i. Infringement Of Copyright, Patent, Trademark Or Trade Secret**

"Personal and advertising injury" arising out of the infringement of copyright, patent, trademark, trade secret or other intellectual property rights. Under this exclusion, such other intellectual property rights do not include the use of another's advertising idea in your "advertisement".

However, this exclusion does not apply to infringement, in your "advertisement", of copyright, trade dress or slogan.

**j. Insureds In Media And Internet Type Businesses**

"Personal and advertising injury" committed by an insured whose business is:

- (1) Advertising, broadcasting, publishing or telecasting;
- (2) Designing or determining content of web sites for others; or
- (3) An Internet search, access, content or service provider.

However, this exclusion does not apply to Paragraphs **14.a.**, **b.** and **c.** of "personal and advertising injury" under the Definitions section.

For the purposes of this exclusion, the placing of frames, borders or links, or advertising, for you or others anywhere on the Internet, is not by itself, considered the business of advertising, broadcasting, publishing or telecasting.

**k. Electronic Chatrooms Or Bulletin Boards**

"Personal and advertising injury" arising out of an electronic chatroom or bulletin board the insured hosts, owns, or over which the insured exercises control.

**l. Unauthorized Use Of Another's Name Or Product**

"Personal and advertising injury" arising out of the unauthorized use of another's name or product in your e-mail address, domain name or metatag, or any other similar tactics to mislead another's potential customers.

**m. Pollution**

"Personal and advertising injury" arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants" at any time.

**n. Pollution-related**

Any loss, cost or expense arising out of any:

- (1) Request, demand, order or statutory or regulatory requirement that any insured or others test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants"; or
- (2) Claim or suit by or on behalf of a governmental authority for damages because of testing for, monitoring, cleaning up, removing, containing, treating, detoxifying or neutralizing, or in any way responding to, or assessing the effects of, "pollutants".

**o. War**

"Personal and advertising injury", however caused, arising, directly or indirectly, out of:

- (1) War, including undeclared or civil war;
- (2) Warlike action by a military force, including action in hindering or defending against an actual or expected attack, by any government, sovereign or other authority using military personnel or other agents; or
- (3) Insurrection, rebellion, revolution, usurped power, or action taken by governmental authority in hindering or defending against any of these.

**p. Recording And Distribution Of Material Or Information In Violation Of Law**

"Personal and advertising injury" arising directly or indirectly out of any action or omission that violates or is alleged to violate:

- (1) The Telephone Consumer Protection Act (TCPA), including any amendment of or addition to such law;
- (2) The CAN-SPAM Act of 2003, including any amendment of or addition to such law;
- (3) The Fair Credit Reporting Act (FCRA), and any amendment of or addition to such law, including the Fair and Accurate Credit Transactions Act (FACTA); or
- (4) Any federal, state or local statute, ordinance or regulation, other than the TCPA, CAN-SPAM Act of 2003 or FCRA and their amendments and additions, that addresses, prohibits, or limits the printing, dissemination, disposal, collecting, recording, sending, transmitting, communicating or distribution of material or information.

**Reproduction of Insurance Services Office, Inc. Form****COVERAGE C – MEDICAL PAYMENTS****1. Insuring Agreement**

a. We will pay medical expenses as described below for "bodily injury" caused by an accident:

- (1) On premises you own or rent;
  - (2) On ways next to premises you own or rent; or
  - (3) Because of your operations;
- provided that:

- (a) The accident takes place in the "coverage territory" and during the policy period;
- (b) The expenses are incurred and reported to us within one year of the date of the accident; and
- (c) The injured person submits to examination, at our expense, by physicians of our choice as often as we reasonably require.

b. We will make these payments regardless of fault. These payments will not exceed the applicable limit of insurance. We will pay reasonable expenses for:

- (1) First aid administered at the time of an accident;
- (2) Necessary medical, surgical, X-ray and dental services, including prosthetic devices; and
- (3) Necessary ambulance, hospital, professional nursing and funeral services.

**2. Exclusions**

We will not pay expenses for "bodily injury":

**a. Any Insured**

To any insured, except "volunteer workers".

**b. Hired Person**

To a person hired to do work for or on behalf of any insured or a tenant of any insured.

**c. Injury On Normally Occupied Premises**

To a person injured on that part of premises you own or rent that the person normally occupies.

**d. Workers' Compensation And Similar Laws**

To a person, whether or not an "employee" of any insured, if benefits for the "bodily injury" are payable or must be provided under a workers' compensation or disability benefits law or a similar law.

**e. Athletics Activities**

To a person injured while practicing, instructing or participating in any physical exercises or games, sports, or athletic contests.

**f. Products-Completed Operations Hazard**

Included within the "products-completed operations hazard".

**g. Coverage A Exclusions**

Excluded under Coverage A.

**SUPPLEMENTARY PAYMENTS – COVERAGES A AND B**

1. We will pay, with respect to any claim we investigate or settle, or any "suit" against an insured we defend:

- a. All expenses we incur.
- b. Up to \$250 for cost of bail bonds required because of accidents or traffic law violations arising out of the use of any vehicle to which the Bodily Injury Liability Coverage applies. We do not have to furnish these bonds.
- c. The cost of bonds to release attachments, but only for bond amounts within the applicable limit of insurance. We do not have to furnish these bonds.
- d. All reasonable expenses incurred by the insured at our request to assist us in the investigation or defense of the claim or "suit", including actual loss of earnings up to \$250 a day because of time off from work.
- e. All court costs taxed against the insured in the "suit". However, these payments do not include attorneys' fees or attorneys' expenses taxed against the insured.
- f. Prejudgment interest awarded against the insured on that part of the judgment we pay. If we make an offer to pay the applicable limit of insurance, we will not pay any prejudgment interest based on that period of time after the offer.

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- g.** All interest on the full amount of any judgment that accrues after entry of the judgment and before we have paid, offered to pay, or deposited in court the part of the judgment that is within the applicable limit of insurance.

These payments will not reduce the limits of insurance.

- 2.** If we defend an insured against a "suit" and an indemnitee of the insured is also named as a party to the "suit", we will defend that indemnitee if all of the following conditions are met:

- a.** The "suit" against the indemnitee seeks damages for which the insured has assumed the liability of the indemnitee in a contract or agreement that is an "insured contract";
- b.** This insurance applies to such liability assumed by the insured;
- c.** The obligation to defend, or the cost of the defense of, that indemnitee, has also been assumed by the insured in the same "insured contract";
- d.** The allegations in the "suit" and the information we know about the "occurrence" are such that no conflict appears to exist between the interests of the insured and the interests of the indemnitee;
- e.** The indemnitee and the insured ask us to conduct and control the defense of that indemnitee against such "suit" and agree that we can assign the same counsel to defend the insured and the indemnitee; and
- f.** The indemnitee:
- (1)** Agrees in writing to:
- (a)** Cooperate with us in the investigation, settlement or defense of the "suit";
- (b)** Immediately send us copies of any demands, notices, summonses or legal papers received in connection with the "suit";
- (c)** Notify any other insurer whose coverage is available to the indemnitee; and
- (d)** Cooperate with us with respect to coordinating other applicable insurance available to the indemnitee; and
- (2)** Provides us with written authorization to:
- (a)** Obtain records and other information related to the "suit"; and
- (b)** Conduct and control the defense of the indemnitee in such "suit".

So long as the above conditions are met, attorneys' fees incurred by us in the defense of that indemnitee, necessary litigation expenses incurred by us and necessary litigation expenses incurred by the indemnitee at our request will be paid as Supplementary Payments. Notwithstanding the provisions of Paragraph **2.b.(2)** of Section **I – Coverage A – Bodily Injury And Property Damage Liability**, such payments will not be deemed to be damages for "bodily injury" and "property damage" and will not reduce the limits of insurance.

Our obligation to defend an insured's indemnitee and to pay for attorneys' fees and necessary litigation expenses as Supplementary Payments ends when we have used up the applicable limit of insurance in the payment of judgments or settlements or the conditions set forth above, or the terms of the agreement described in Paragraph **f.** above, are no longer met.

**SECTION II – WHO IS AN INSURED**

- 1.** If you are designated in the Declarations as:
- a.** An individual, you and your spouse are insureds, but only with respect to the conduct of a business of which you are the sole owner.
- b.** A partnership or joint venture, you are an insured. Your members, your partners, and their spouses are also insureds, but only with respect to the conduct of your business.
- c.** A limited liability company, you are an insured. Your members are also insureds, but only with respect to the conduct of your business. Your managers are insureds, but only with respect to their duties as your managers.
- d.** An organization other than a partnership, joint venture or limited liability company, you are an insured. Your "executive officers" and directors are insureds, but only with respect to their duties as your officers or directors. Your stockholders are also insureds, but only with respect to their liability as stockholders.
- e.** A trust, you are an insured. Your trustees are also insureds, but only with respect to their duties as trustees.

**Reproduction of Insurance Services Office, Inc. Form****2.** Each of the following is also an insured:

- a.** Your "volunteer workers" only while performing duties related to the conduct of your business, or your "employees", other than either your "executive officers" (if you are an organization other than a partnership, joint venture or limited liability company) or your managers (if you are a limited liability company), but only for acts within the scope of their employment by you or while performing duties related to the conduct of your business. However, none of these "employees" or "volunteer workers" are insureds for:

**(1)** "Bodily injury" or "personal and advertising injury":

- (a)** To you, to your partners or members (if you are a partnership or joint venture), to your members (if you are a limited liability company), to a co-"employee" while in the course of his or her employment or performing duties related to the conduct of your business, or to your other "volunteer workers" while performing duties related to the conduct of your business;

- (b)** To the spouse, child, parent, brother or sister of that co-"employee" or "volunteer worker" as a consequence of Paragraph **(1)(a)** above;

- (c)** For which there is any obligation to share damages with or repay someone else who must pay damages because of the injury described in Paragraph **(1)(a)** or **(b)** above; or

- (d)** Arising out of his or her providing or failing to provide professional health care services.

**(2)** "Property damage" to property:

- (a)** Owned, occupied or used by;

- (b)** Rented to, in the care, custody or control of, or over which physical control is being exercised for any purpose by;

you, any of your "employees", "volunteer workers", any partner or member (if you are a partnership or joint venture), or any member (if you are a limited liability company).

- b.** Any person (other than your "employee" or "volunteer worker"), or any organization while acting as your real estate manager.

- c.** Any person or organization having proper temporary custody of your property if you die, but only:

- (1)** With respect to liability arising out of the maintenance or use of that property; and

- (2)** Until your legal representative has been appointed.

- d.** Your legal representative if you die, but only with respect to duties as such. That representative will have all your rights and duties under this Coverage Part.

**3.** Any organization you newly acquire or form, other than a partnership, joint venture or limited liability company, and over which you maintain ownership or majority interest, will qualify as a Named Insured if there is no other similar insurance available to that organization. However:

- a.** Coverage under this provision is afforded only until the 90th day after you acquire or form the organization or the end of the policy period, whichever is earlier;

- b.** Coverage **A** does not apply to "bodily injury" or "property damage" that occurred before you acquired or formed the organization; and

- c.** Coverage **B** does not apply to "personal and advertising injury" arising out of an offense committed before you acquired or formed the organization.

No person or organization is an insured with respect to the conduct of any current or past partnership, joint venture or limited liability company that is not shown as a Named Insured in the Declarations.

**SECTION III – LIMITS OF INSURANCE**

- 1.** The Limits of Insurance shown in the Declarations and the rules below fix the most we will pay regardless of the number of:

- a.** Insureds;

- b.** Claims made or "suits" brought; or

- c.** Persons or organizations making claims or bringing "suits".

- 2.** The General Aggregate Limit is the most we will pay for the sum of:

- a.** Medical expenses under Coverage **C**;

- b.** Damages under Coverage **A**, except damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard"; and

- c.** Damages under Coverage **B**.

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3. The Products-Completed Operations Aggregate Limit is the most we will pay under Coverage **A** for damages because of "bodily injury" and "property damage" included in the "products-completed operations hazard".
  4. Subject to Paragraph **2.** above, the Personal And Advertising Injury Limit is the most we will pay under Coverage **B** for the sum of all damages because of all "personal and advertising injury" sustained by any one person or organization.
  5. Subject to Paragraph **2.** or **3.** above, whichever applies, the Each Occurrence Limit is the most we will pay for the sum of:
    - a. Damages under Coverage **A**; and
    - b. Medical expenses under Coverage **C** because of all "bodily injury" and "property damage" arising out of any one "occurrence".
  6. Subject to Paragraph **5.** above, the Damage To Premises Rented To You Limit is the most we will pay under Coverage **A** for damages because of "property damage" to any one premises, while rented to you, or in the case of damage by fire, while rented to you or temporarily occupied by you with permission of the owner.
  7. Subject to Paragraph **5.** above, the Medical Expense Limit is the most we will pay under Coverage **C** for all medical expenses because of "bodily injury" sustained by any one person.
- The Limits of Insurance of this Coverage Part apply separately to each consecutive annual period and to any remaining period of less than 12 months, starting with the beginning of the policy period shown in the Declarations, unless the policy period is extended after issuance for an additional period of less than 12 months. In that case, the additional period will be deemed part of the last preceding period for purposes of determining the Limits of Insurance.

### SECTION IV – COMMERCIAL GENERAL LIABILITY CONDITIONS

#### 1. Bankruptcy

Bankruptcy or insolvency of the insured or of the insured's estate will not relieve us of our obligations under this Coverage Part.

#### 2. Duties In The Event Of Occurrence, Offense, Claim Or Suit

- a. You must see to it that we are notified as soon as practicable of an "occurrence" or an offense which may result in a claim. To the extent possible, notice should include:
  - (1) How, when and where the "occurrence" or offense took place;
  - (2) The names and addresses of any injured persons and witnesses; and

- (3) The nature and location of any injury or damage arising out of the "occurrence" or offense.
- b. If a claim is made or "suit" is brought against any insured, you must:
    - (1) Immediately record the specifics of the claim or "suit" and the date received; and
    - (2) Notify us as soon as practicable.  
You must see to it that we receive written notice of the claim or "suit" as soon as practicable.
  - c. You and any other involved insured must:
    - (1) Immediately send us copies of any demands, notices, summonses or legal papers received in connection with the claim or "suit";
    - (2) Authorize us to obtain records and other information;
    - (3) Cooperate with us in the investigation or settlement of the claim or defense against the "suit"; and
    - (4) Assist us, upon our request, in the enforcement of any right against any person or organization which may be liable to the insured because of injury or damage to which this insurance may also apply.
  - d. No insured will, except at that insured's own cost, voluntarily make a payment, assume any obligation, or incur any expense, other than for first aid, without our consent.

#### 3. Legal Action Against Us

No person or organization has a right under this Coverage Part:

- a. To join us as a party or otherwise bring us into a "suit" asking for damages from an insured; or
- b. To sue us on this Coverage Part unless all of its terms have been fully complied with.

A person or organization may sue us to recover on an agreed settlement or on a final judgment against an insured; but we will not be liable for damages that are not payable under the terms of this Coverage Part or that are in excess of the applicable limit of insurance. An agreed settlement means a settlement and release of liability signed by us, the insured and the claimant or the claimant's legal representative.

**Reproduction of Insurance Services Office, Inc. Form****4. Other Insurance**

If other valid and collectible insurance is available to the insured for a loss we cover under Coverages **A** or **B** of this Coverage Part, our obligations are limited as follows:

**a. Primary Insurance**

This insurance is primary except when Paragraph **b.** below applies. If this insurance is primary, our obligations are not affected unless any of the other insurance is also primary. Then, we will share with all that other insurance by the method described in Paragraph **c.** below.

**b. Excess Insurance**

(1) This insurance is excess over:

- (a) Any of the other insurance, whether primary, excess, contingent or on any other basis:
  - (i) That is Fire, Extended Coverage, Builder's Risk, Installation Risk or similar coverage for "your work";
  - (ii) That is Fire insurance for premises rented to you or temporarily occupied by you with permission of the owner;
  - (iii) That is insurance purchased by you to cover your liability as a tenant for "property damage" to premises rented to you or temporarily occupied by you with permission of the owner; or
  - (iv) If the loss arises out of the maintenance or use of aircraft, "autos" or watercraft to the extent not subject to Exclusion **g.** of Section **I** – Coverage **A** – Bodily Injury And Property Damage Liability.
- (b) Any other primary insurance available to you covering liability for damages arising out of the premises or operations, or the products and completed operations, for which you have been added as an additional insured.

(2) When this insurance is excess, we will have no duty under Coverages **A** or **B** to defend the insured against any "suit" if any other insurer has a duty to defend the insured against that "suit". If no other insurer defends, we will undertake to do so, but we will be entitled to the insured's rights against all those other insurers.

(3) When this insurance is excess over other insurance, we will pay only our share of the amount of the loss, if any, that exceeds the sum of:

- (a) The total amount that all such other insurance would pay for the loss in the absence of this insurance; and
- (b) The total of all deductible and self-insured amounts under all that other insurance.

(4) We will share the remaining loss, if any, with any other insurance that is not described in this Excess Insurance provision and was not bought specifically to apply in excess of the Limits of Insurance shown in the Declarations of this Coverage Part.

**c. Method Of Sharing**

If all of the other insurance permits contribution by equal shares, we will follow this method also. Under this approach each insurer contributes equal amounts until it has paid its applicable limit of insurance or none of the loss remains, whichever comes first.

If any of the other insurance does not permit contribution by equal shares, we will contribute by limits. Under this method, each insurer's share is based on the ratio of its applicable limit of insurance to the total applicable limits of insurance of all insurers.

**5. Premium Audit**

- a. We will compute all premiums for this Coverage Part in accordance with our rules and rates.
- b. Premium shown in this Coverage Part as advance premium is a deposit premium only. At the close of each audit period we will compute the earned premium for that period and send notice to the first Named Insured. The due date for audit and retrospective premiums is the date shown as the due date on the bill. If the sum of the advance and audit premiums paid for the policy period is greater than the earned premium, we will return the excess to the first Named Insured.
- c. The first Named Insured must keep records of the information we need for premium computation, and send us copies at such times as we may request.

**6. Representations**

By accepting this policy, you agree:

- a. The statements in the Declarations are accurate and complete;

**Reproduction of Insurance Services Office, Inc. Form**

- b. Those statements are based upon representations you made to us; and
- c. We have issued this policy in reliance upon your representations.

**7. Separation Of Insureds**

Except with respect to the Limits of Insurance, and any rights or duties specifically assigned in this Coverage Part to the first Named Insured, this insurance applies:

- a. As if each Named Insured were the only Named Insured; and
- b. Separately to each insured against whom claim is made or "suit" is brought.

**8. Transfer Of Rights Of Recovery Against Others To Us**

If the insured has rights to recover all or part of any payment we have made under this Coverage Part, those rights are transferred to us. The insured must do nothing after loss to impair them. At our request, the insured will bring "suit" or transfer those rights to us and help us enforce them.

**9. When We Do Not Renew**

If we decide not to renew this Coverage Part, we will mail or deliver to the first Named Insured shown in the Declarations written notice of the nonrenewal not less than 30 days before the expiration date.

If notice is mailed, proof of mailing will be sufficient proof of notice.

**SECTION V – DEFINITIONS**

1. "Advertisement" means a notice that is broadcast or published to the general public or specific market segments about your goods, products or services for the purpose of attracting customers or supporters. For the purposes of this definition:
  - a. Notices that are published include material placed on the Internet or on similar electronic means of communication; and
  - b. Regarding web sites, only that part of a web site that is about your goods, products or services for the purposes of attracting customers or supporters is considered an advertisement.
2. "Auto" means:
  - a. A land motor vehicle, trailer or semitrailer designed for travel on public roads, including any attached machinery or equipment; or
  - b. Any other land vehicle that is subject to a compulsory or financial responsibility law or other motor vehicle insurance law where it is licensed or principally garaged.

However, "auto" does not include "mobile equipment".

3. "Bodily injury" means bodily injury, sickness or disease sustained by a person, including death resulting from any of these at any time.

4. "Coverage territory" means:

- a. The United States of America (including its territories and possessions), Puerto Rico and Canada;
- b. International waters or airspace, but only if the injury or damage occurs in the course of travel or transportation between any places included in Paragraph a. above; or
- c. All other parts of the world if the injury or damage arises out of:

- (1) Goods or products made or sold by you in the territory described in Paragraph a. above;

- (2) The activities of a person whose home is in the territory described in Paragraph a. above, but is away for a short time on your business; or

- (3) "Personal and advertising injury" offenses that take place through the Internet or similar electronic means of communication;

provided the insured's responsibility to pay damages is determined in a "suit" on the merits, in the territory described in Paragraph a. above or in a settlement we agree to.

5. "Employee" includes a "leased worker". "Employee" does not include a "temporary worker".

6. "Executive officer" means a person holding any of the officer positions created by your charter, constitution, bylaws or any other similar governing document.

7. "Hostile fire" means one which becomes uncontrollable or breaks out from where it was intended to be.

8. "Impaired property" means tangible property, other than "your product" or "your work", that cannot be used or is less useful because:

- a. It incorporates "your product" or "your work" that is known or thought to be defective, deficient, inadequate or dangerous; or

- b. You have failed to fulfill the terms of a contract or agreement;

if such property can be restored to use by the repair, replacement, adjustment or removal of "your product" or "your work" or your fulfilling the terms of the contract or agreement.

**Reproduction of Insurance Services Office, Inc. Form****9.** "Insured contract" means:

- a.** A contract for a lease of premises. However, that portion of the contract for a lease of premises that indemnifies any person or organization for damage by fire to premises while rented to you or temporarily occupied by you with permission of the owner is not an "insured contract";
- b.** A sidetrack agreement;
- c.** Any easement or license agreement, except in connection with construction or demolition operations on or within 50 feet of a railroad;
- d.** An obligation, as required by ordinance, to indemnify a municipality, except in connection with work for a municipality;
- e.** An elevator maintenance agreement;
- f.** That part of any other contract or agreement pertaining to your business (including an indemnification of a municipality in connection with work performed for a municipality) under which you assume the tort liability of another party to pay for "bodily injury" or "property damage" to a third person or organization. Tort liability means a liability that would be imposed by law in the absence of any contract or agreement.

Paragraph **f.** does not include that part of any contract or agreement:

- (1)** That indemnifies a railroad for "bodily injury" or "property damage" arising out of construction or demolition operations, within 50 feet of any railroad property and affecting any railroad bridge or trestle, tracks, road-beds, tunnel, underpass or crossing;
- (2)** That indemnifies an architect, engineer or surveyor for injury or damage arising out of:
  - (a)** Preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
  - (b)** Giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage; or
- (3)** Under which the insured, if an architect, engineer or surveyor, assumes liability for an injury or damage arising out of the insured's rendering or failure to render professional services, including those listed in **(2)** above and supervisory, inspection, architectural or engineering activities.

**10.** "Leased worker" means a person leased to you by a labor leasing firm under an agreement between you and the labor leasing firm, to perform duties related to the conduct of your business. "Leased worker" does not include a "temporary worker".

**11.** "Loading or unloading" means the handling of property:

- a.** After it is moved from the place where it is accepted for movement into or onto an aircraft, watercraft or "auto";
- b.** While it is in or on an aircraft, watercraft or "auto"; or
- c.** While it is being moved from an aircraft, watercraft or "auto" to the place where it is finally delivered;

but "loading or unloading" does not include the movement of property by means of a mechanical device, other than a hand truck, that is not attached to the aircraft, watercraft or "auto".

**12.** "Mobile equipment" means any of the following types of land vehicles, including any attached machinery or equipment:

- a.** Bulldozers, farm machinery, forklifts and other vehicles designed for use principally off public roads;
- b.** Vehicles maintained for use solely on or next to premises you own or rent;
- c.** Vehicles that travel on crawler treads;
- d.** Vehicles, whether self-propelled or not, maintained primarily to provide mobility to permanently mounted:
  - (1)** Power cranes, shovels, loaders, diggers or drills; or
  - (2)** Road construction or resurfacing equipment such as graders, scrapers or rollers;
- e.** Vehicles not described in Paragraph **a.**, **b.**, **c.** or **d.** above that are not self-propelled and are maintained primarily to provide mobility to permanently attached equipment of the following types:
  - (1)** Air compressors, pumps and generators, including spraying, welding, building cleaning, geophysical exploration, lighting and well servicing equipment; or
  - (2)** Cherry pickers and similar devices used to raise or lower workers;
- f.** Vehicles not described in Paragraph **a.**, **b.**, **c.** or **d.** above maintained primarily for purposes other than the transportation of persons or cargo.

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However, self-propelled vehicles with the following types of permanently attached equipment are not "mobile equipment" but will be considered "autos":

- (1) Equipment designed primarily for:
  - (a) Snow removal;
  - (b) Road maintenance, but not construction or resurfacing; or
  - (c) Street cleaning;
- (2) Cherry pickers and similar devices mounted on automobile or truck chassis and used to raise or lower workers; and
- (3) Air compressors, pumps and generators, including spraying, welding, building cleaning, geophysical exploration, lighting and well servicing equipment.

However, "mobile equipment" does not include any land vehicles that are subject to a compulsory or financial responsibility law or other motor vehicle insurance law where it is licensed or principally garaged. Land vehicles subject to a compulsory or financial responsibility law or other motor vehicle insurance law are considered "autos".

13. "Occurrence" means an accident, including continuous or repeated exposure to substantially the same general harmful conditions.
14. "Personal and advertising injury" means injury, including consequential "bodily injury", arising out of one or more of the following offenses:
  - a. False arrest, detention or imprisonment;
  - b. Malicious prosecution;
  - c. The wrongful eviction from, wrongful entry into, or invasion of the right of private occupancy of a room, dwelling or premises that a person occupies, committed by or on behalf of its owner, landlord or lessor;
  - d. Oral or written publication, in any manner, of material that slanders or libels a person or organization or disparages a person's or organization's goods, products or services;
  - e. Oral or written publication, in any manner, of material that violates a person's right of privacy;
  - f. The use of another's advertising idea in your "advertisement"; or
  - g. Infringing upon another's copyright, trade dress or slogan in your "advertisement".
15. "Pollutants" mean any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapor, soot, fumes, acids, alkalis, chemicals and waste. Waste includes materials to be recycled, reconditioned or reclaimed.

16. "Products-completed operations hazard":

- a. Includes all "bodily injury" and "property damage" occurring away from premises you own or rent and arising out of "your product" or "your work" except:

- (1) Products that are still in your physical possession; or

- (2) Work that has not yet been completed or abandoned. However, "your work" will be deemed completed at the earliest of the following times:

- (a) When all of the work called for in your contract has been completed.

- (b) When all of the work to be done at the job site has been completed if your contract calls for work at more than one job site.

- (c) When that part of the work done at a job site has been put to its intended use by any person or organization other than another contractor or subcontractor working on the same project.

Work that may need service, maintenance, correction, repair or replacement, but which is otherwise complete, will be treated as completed.

- b. Does not include "bodily injury" or "property damage" arising out of:

- (1) The transportation of property, unless the injury or damage arises out of a condition in or on a vehicle not owned or operated by you, and that condition was created by the "loading or unloading" of that vehicle by any insured;

- (2) The existence of tools, uninstalled equipment or abandoned or unused materials; or

- (3) Products or operations for which the classification, listed in the Declarations or in a policy Schedule, states that products-completed operations are subject to the General Aggregate Limit.

17. "Property damage" means:

- a. Physical injury to tangible property, including all resulting loss of use of that property. All such loss of use shall be deemed to occur at the time of the physical injury that caused it; or

- b. Loss of use of tangible property that is not physically injured. All such loss of use shall be deemed to occur at the time of the "occurrence" that caused it.

For the purposes of this insurance, electronic data is not tangible property.

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As used in this definition, electronic data means information, facts or programs stored as or on, created or used on, or transmitted to or from computer software, including systems and applications software, hard or floppy disks, CD-ROMs, tapes, drives, cells, data processing devices or any other media which are used with electronically controlled equipment.

**18.** "Suit" means a civil proceeding in which damages because of "bodily injury", "property damage" or "personal and advertising injury" to which this insurance applies are alleged. "Suit" includes:

- a.** An arbitration proceeding in which such damages are claimed and to which the insured must submit or does submit with our consent; or
- b.** Any other alternative dispute resolution proceeding in which such damages are claimed and to which the insured submits with our consent.

**19.** "Temporary worker" means a person who is furnished to you to substitute for a permanent "employee" on leave or to meet seasonal or short-term workload conditions.

**20.** "Volunteer worker" means a person who is not your "employee", and who donates his or her work and acts at the direction of and within the scope of duties determined by you, and is not paid a fee, salary or other compensation by you or anyone else for their work performed for you.

**21.** "Your product":

**a.** Means:

- (1)** Any goods or products, other than real property, manufactured, sold, handled, distributed or disposed of by:
  - (a)** You;
  - (b)** Others trading under your name; or
  - (c)** A person or organization whose business or assets you have acquired; and
- (2)** Containers (other than vehicles), materials, parts or equipment furnished in connection with such goods or products.

**b.** Includes:

- (1)** Warranties or representations made at any time with respect to the fitness, quality, durability, performance or use of "your product"; and
- (2)** The providing of or failure to provide warnings or instructions.

**c.** Does not include vending machines or other property rented to or located for the use of others but not sold.

**22.** "Your work":

**a.** Means:

- (1)** Work or operations performed by you or on your behalf; and
- (2)** Materials, parts or equipment furnished in connection with such work or operations.

**b.** Includes:

- (1)** Warranties or representations made at any time with respect to the fitness, quality, durability, performance or use of "your work"; and
- (2)** The providing of or failure to provide warnings or instructions.

### MCS-90: Motor Carrier Public Liability

FORM MCS-90 Revised 01/05/2017

OMB No.: 2126-0008 Expiration: 01/31/2020

USDOT Number: \_\_\_\_\_ Date Received: \_\_\_\_\_

A Federal Agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a current valid OMB Control Number. The OMB Control Number for this information collection is 2126-0008. Public reporting for this collection of information is estimated to be approximately 2 minutes per response, including the time for reviewing instructions, gathering the data needed, and completing and reviewing the collection of information. All responses to this collection of information are mandatory. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Information Collection Clearance Officer, Federal Motor Carrier Safety Administration, MC-RRR, Washington, D.C. 20590.



**Endorsement for Motor Carrier Policies of Insurance for Public Liability under Sections 29 and 30 of the Motor Carrier Act of 1980**

# FORM MCS-90

Issued to \_\_\_\_\_ of \_\_\_\_\_  
(Motor Carrier name) (Motor Carrier state or province)

Dated at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_

Amending Policy Number: \_\_\_\_\_ Effective Date: \_\_\_\_\_

Name of Insurance Company: \_\_\_\_\_

Countersigned by: \_\_\_\_\_  
(authorized company representative)

The policy to which this endorsement is attached provides primary or excess insurance, as indicated for the limits shown (check only one):

- This insurance is primary and the company shall not be liable for amounts in excess of \$ \_\_\_\_\_ for each accident.
- This insurance is excess and the company shall not be liable for amounts in excess of \$ \_\_\_\_\_ for each accident in excess of the underlying limit of \$ \_\_\_\_\_ for each accident.

Whenever required by the Federal Motor Carrier Safety Administration (FMCSA), the company agrees to furnish the FMCSA a duplicate of said policy and all its endorsements. The company also agrees, upon telephone request by an authorized representative of the FMCSA, to verify that the policy is in force as of a particular date. The telephone number to call is: \_\_\_\_\_

Cancellation of this endorsement may be effected by the company of the insured by giving (1) thirty-five (35) days notice in writing to the other party (said 35 days notice to commence from the date the notice is mailed, proof of mailing shall be sufficient proof of notice), and (2) if the insured is subject to the FMCSA's registration requirements under 49 U.S.C. 13901, by providing thirty (30) days notice to the FMCSA (said 30 days notice to commence from the date the notice is received by the FMCSA at its office in Washington, DC).

Filings must be transmitted online via the Internet at <http://www.fmcsa.dot.gov/urs>.

(continued on next page)

**MCS-90: Motor Carrier Public Liability (cont'd)**

FORM MCS-90 Revised 01/05/2017

OMB No.: 2126-0008 Expiration: 01/31/2020

**DEFINITIONS AS USED IN THIS ENDORSEMENT**

**Accident** includes continuous or repeated exposure to conditions or which results in bodily injury, property damage, or environmental damage which the insured neither expected nor intended.

**Motor Vehicle** means a land vehicle, machine, truck, tractor, trailer, or semitrailer propelled or drawn by mechanical power and used on a highway for transporting property, or any combination thereof.

**Bodily Injury** means injury to the body, sickness, or disease to any person, including death resulting from any of these.

**Property Damage** means damage to or loss of use of tangible property.

**Environmental Restoration** means restitution for the loss, damage, or destruction of natural resources arising out of the accidental discharge, dispersal, release or escape into or upon the land, atmosphere, watercourse, or body of water, of any commodity transported by a motor carrier. This shall include the cost of removal and the cost of necessary measures taken to minimize or mitigate damage to human health, the natural environment, fish, shellfish, and wildlife.

**Public Liability** means liability for bodily injury, property damage, and environmental restoration.

The insurance policy to which this endorsement is attached provides automobile liability insurance and is amended to assure compliance by the insured, within the limits stated herein, as a motor carrier of property, with Sections 29 and 30 of the Motor Carrier Act of 1980 and the rules and regulations of the Federal Motor Carrier Safety Administration (FMCSA).

In consideration of the premium stated in the policy to which this endorsement is attached, the insurer (the company) agrees to pay, within the limits of liability described herein, any final judgment recovered against the insured for public liability resulting from negligence in the operation, maintenance or use of motor vehicles subject to the financial responsibility requirements of Sections 29 and 30 of the Motor Carrier Act of 1980 regardless of whether or not each motor vehicle is specifically described in the policy and whether or not such negligence occurs on any route or in any territory authorized to be served by the insured or elsewhere. Such insurance as is afforded for public liability, does not apply to injury to or death of the insured's employees while engaged in the course of their employment, or property transported by the insured, designated as cargo. It is understood and agreed that no condition, provision, stipulation, or limitation contained in the policy, this endorsement, or any other endorsement thereon,

or violation thereof, shall relieve the company from liability or from the payment of any final judgment, within the limits of liability herein described, irrespective of the financial condition, insolvency or bankruptcy of the insured. However, all terms, conditions, and limitations in the policy to which the endorsement is attached shall remain in full force and effect as binding between the insured and the company. The insured agrees to reimburse the company for any payment made by the company on account of any accident, claim, or suit involving a breach of the terms of the policy, and for any payment that the company would not have been obligated to make under the provisions of the policy except for the agreement contained in this endorsement.

It is further understood and agreed that, upon failure of the company to pay any final judgment recovered against the insured as provided herein, the judgment creditor may maintain an action in any court of competent jurisdiction against the company to compel such payment.

The limits of the company's liability for the amounts prescribed in this endorsement apply separately to each accident and any payment under the policy because of anyone accident shall not operate to reduce the liability of the company for the payment of final judgments resulting from any other accident.

*(continued on next page)*

**MCS-90: Motor Carrier Public Liability (cont'd)**

FORM MCS-90 Revised 01/05/2017

OMB No.: 2126-0008 Expiration: 01/31/2020

**SCHEDULE OF LIMITS — PUBLIC LIABILITY**

| Type of carriage   | Commodity transported  | January 1, 1985 |
|--|--|-----------------|
| (1) For-hire (in interstate or foreign commerce, with a gross vehicle weight rating of 10,000 or more pounds).   | Property (nonhazardous)  | \$750,000       |
| (2) For-hire and Private (in interstate, foreign, or intrastate commerce, with a gross vehicle weight rating of 10,000 or more pounds).  | Hazardous substances, as defined in <a href="#">49 CFR 171.8</a> , transported in cargo tanks, portable tanks, or hopper-type vehicles with capacities in excess of 3,500 water gallons; or in bulk Division 1.1, 1.2, and 1.3 materials, Division 2.3, Hazard Zone A, or Division 6.1, Packing Group I, Hazard Zone A material; in bulk Division 2.1 or 2.2; or highway route controlled quantities of a Class 7 material, as defined in <a href="#">49 CFR 173.403</a> . | \$5,000,000     |
| (3) For-hire and Private (in interstate or foreign commerce, in any quantity; or in intrastate commerce, in bulk only; with a gross vehicle weight rating of 10,000 or more pounds). | Oil listed in <a href="#">49 CFR 172.101</a> ; hazardous waste, hazardous materials, and hazardous substances defined in <a href="#">49 CFR 171.8</a> and listed in <a href="#">49 CFR 172.101</a> , but not mentioned in (2) above or (4) below.  | \$1,000,000     |
| (4) For-hire and Private (in interstate or foreign commerce, with a gross vehicle weight rating of less than 10,000 pounds).   | Any quantity of Division 1.1, 1.2, or 1.3 material; any quantity of a Division 2.3, Hazard Zone A, or Division 6.1, Packing Group I, Hazard Zone A material; or highway route controlled quantities of a Class 7 material as defined in <a href="#">49 CFR 173.403</a> .   | \$5,000,000     |

\*The schedule of limits shown does not provide coverage. The limits shown in the schedule are for information purposes only.

SAMPLE

## RAILROAD PROTECTIVE LIABILITY COVERAGE FORM

Various provisions in this policy restrict coverage. Read the entire policy carefully to determine rights, duties and what is and is not covered.

Throughout this policy the words "you" and "your" refer to the Named Insured shown in the Declarations. The words "we", "us" and "our" refer to the company providing this insurance.

The word "insured" means any person or organization qualifying as such under Section II – Who Is An Insured.

Other words and phrases that appear in quotation marks have special meaning. Refer to Section V – Definitions.

### SECTION I – COVERAGES

#### COVERAGE A – BODILY INJURY AND PROPERTY DAMAGE LIABILITY

##### 1. Insuring Agreement

- a. We will pay those sums that the insured becomes legally obligated to pay as damages because of "bodily injury" or "property damage" to which this insurance applies. We will have the right and duty to defend the insured against any "suit" seeking those damages. However, we will have no duty to defend the insured against any "suit" seeking damages for "bodily injury" or "property damage" to which this insurance does not apply. We may, at our discretion, investigate any occurrence and settle any claim or "suit" that may result. But:

- (1) The amount we will pay for damages is limited as described in Section III – Limits Of Insurance; and
- (2) Our right and duty to defend ends when we have used up the applicable limit of insurance in the payment of judgments or settlements.

No other obligation or liability to pay sums or perform acts or services is covered unless explicitly provided for under Supplementary Payments – Coverage A.

- b. This insurance applies to "bodily injury" and "property damage" only if:

- (1) The "bodily injury" or "property damage" occurs during the policy period; and

- (2) The "bodily injury" or "property damage" arises out of acts or omissions at the "job location" which are related to or are in connection with the "work" described in the Declarations.

- c. Damages because of "bodily injury" include damages claimed by any person or organization for care, loss of services or death resulting at any time from the "bodily injury".

##### 2. Exclusions

This insurance does not apply to:

###### a. Expected Or Intended Injury

"Bodily injury" or "property damage" expected or intended from the standpoint of the insured. This exclusion does not apply to "bodily injury" resulting from the use of reasonable force to protect persons or property.

###### b. Contractual Liability

"Bodily injury" or "property damage" for which the insured is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages assumed in a contract or agreement that is a "covered contract".

###### c. Completed Work

"Bodily injury" or "property damage" occurring after the "work" is completed. The "work" will be deemed completed at the earliest of the following times:

- (1) When all the "work" called for in the "contractor's" contract has been completed.
- (2) When all the "work" to be done at the "job location" has been completed.
- (3) When that part of the "work" done at the "job location" has been put to its intended use by you, the governmental authority or other contracting party.

This exclusion does not apply to "bodily injury" or "property damage" resulting from the existence of or removal of tools, uninstalled equipment or abandoned or unused materials.

**d. Acts Or Omissions Of Insured**

"Bodily injury" or "property damage", the sole proximate cause of which is an act or omission of any insured other than acts or omissions of any of "your designated employees". This exclusion does not apply to injury or damage sustained at the "job location" by any of "your designated employees" or employee of the "contractor", or by any employee of the governmental authority or any other contracting party (other than you) specified in the Declarations.

**e. Workers' Compensation And Similar Laws**

Any obligation of the insured under a workers' compensation, disability benefits or unemployment compensation law or any similar law. This exclusion does not apply to any obligation of the insured under the Federal Employers Liability Act, as amended.

**f. Pollution**

"Bodily injury" or "property damage" arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants" at or from the "job location":

- (1) Due to the past or present use of the "job location" by you or for you or others for the handling, storage, disposal, processing or treatment of waste; or
- (2) Due to the dumping or disposal of waste on the "job location" by the "contractor" with the knowledge of you or any of "your designated employees"; or
- (3) On which you or "contractors" working directly or indirectly on any insured's behalf are performing operations if the "pollutants" are brought on or to the "job location" in connection with such operations by you, the "contractor" or "your designated employee". However, this subparagraph does not apply to:
  - (a) "Bodily injury" or "property damage" arising out of fuels or lubricants for equipment used at the "job location".
  - (b) "Bodily injury" or "property damage" arising out of heat, smoke or fumes from a "hostile fire".
- (4) On which you or "contractors" working directly or indirectly on any insured's behalf are performing operations if the operations are to test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants".

**g. Damage To Owned, Leased Or Entrusted Property**

"Property damage" to property owned by you or leased or entrusted to you under a lease or trust agreement.

**h. War**

"Bodily injury" or "property damage", however caused, arising, directly or indirectly, out of:

- (1) War, including undeclared or civil war;
- (2) Warlike action by a military force, including action in hindering or defending against an actual or expected attack, by any government, sovereign or other authority using military personnel or other agents; or
- (3) Insurrection, rebellion, revolution, usurped power, or action taken by governmental authority in hindering or defending against any of these.

**COVERAGE B – PHYSICAL DAMAGE TO PROPERTY**

**1. Insuring Agreement**

We will pay for "physical damage to property" to which this insurance applies. The "physical damage to property" must occur during the policy period. The "physical damage to property" must arise out of acts or omissions at the "job location" which are related to or in connection with the "work" described in the Declarations. The property must be owned by or leased or entrusted to you under a lease or trust agreement.

**2. Exclusions**

This insurance does not apply to "physical damage to property":

**a. Completed Work**

Occurring after the "work" is completed. The "work" will be deemed completed at the earliest of the following times:

- (1) When all the "work" called for in the "contractor's" contract has been completed.
- (2) When all the "work" to be done at the "job location" has been completed.
- (3) When that part of the "work" done at the "job location" has been put to its intended use by you, the governmental authority or other contracting party.

This exclusion does not apply to "physical damage to property" resulting from the existence of tools, uninstalled equipment or abandoned or unused materials.

**b. Acts Or Omissions Of Insured**

The sole proximate cause of which is an act or omission of any insured other than acts or omissions of any of "your designated employees".

**c. Nuclear Incidents Or Conditions**

Due to nuclear reaction, nuclear radiation or radioactive contamination or to any related act or condition.

**d. Pollution**

Due to the discharge, dispersal, seepage, migration, release or escape of "pollutants" excluded under Exclusion f. Pollution, Coverage A.

**SUPPLEMENTARY PAYMENTS – COVERAGE A**

We will pay, with respect to any claim we investigate or settle, or any "suit" against an insured we defend:

1. All expenses we incur.
2. All court costs taxed against the insured in the "suit". However, these payments do not include attorneys' fees or attorneys' expenses taxed against the insured.
3. All interest on the full amount of any judgment that accrues after entry of the judgment and before we have paid, offered to pay, or deposited in court the part of the judgment that is within the applicable limit of insurance.
4. The cost of bonds to release attachments, but only for bond amounts within the applicable limit of insurance. We do not have to furnish these bonds.
5. Expenses incurred by the insured for first aid administered to others at the time of an accident, for "bodily injury" to which this insurance applies.
6. All reasonable expenses incurred by the insured at our request to assist us in the investigation or defense of the claim or "suit", including actual loss of earnings up to \$250 a day because of time off from work.
7. Prejudgment interest awarded against the insured on that part of the judgment we pay. If we make an offer to pay the applicable limit of insurance, we will not pay any prejudgment interest based on that period of time after the offer.

These payments will not reduce the limits of insurance.

**SECTION II – WHO IS AN INSURED**

1. You are an insured.
2. Your "executive officers" and directors are insureds, but only with respect to their duties as your officers and directors.
3. Your stockholders are insureds, but only with respect to their liability as stockholders.

4. Any railroad operating over your tracks is an insured.

**SECTION III – LIMITS OF INSURANCE**

1. The Limits of Insurance shown in the Declarations and the rules below fix the most we will pay regardless of the number of:
  - a. Insureds;
  - b. Claims made or "suits" brought; or
  - c. Persons or organizations making claims or bringing "suits".
2. The Aggregate Limit is the most we will pay for the sum of all damages because of all "bodily injury", all "property damage" and all "physical damage to property".
3. Subject to Paragraph 2. above, the Each Occurrence Limit is the most we will pay for the sum of all damages because of all "bodily injury", all "property damage" and all "physical damage to property" arising out of any one occurrence.
4. Subject to Paragraph 3. above, the payment for "physical damage to property" shall not exceed the lesser of:
  - a. The actual cash value of the property at the time of loss, or
  - b. The cost to repair or replace the property with other property of like kind or quality.

The Limits of Insurance of this Coverage Part apply separately to each consecutive annual period and to any remaining period of less than 12 months, starting with the beginning of the policy period shown in the Declarations, unless the policy period is extended after issuance for an additional period of less than 12 months. In that case, the additional period will be deemed part of the last preceding period for purposes of determining the Limits of Insurance.

**SECTION IV – CONDITIONS**

- A. The following Conditions apply to Coverages A and B:
  1. **Assignment**

Assignment of interest under this Coverage Part shall not bind us unless we issue an endorsement consenting to the assignment.
  2. **Bankruptcy**

Bankruptcy or insolvency of the insured or of the insured's estate will not relieve us of our obligations under this Coverage Part.
  3. **Cancellation**
    - a. You may cancel this policy by mailing or delivering to us advance written notice of cancellation.

- b. We may cancel this policy by mailing or delivering to you, the "contractor" and any involved governmental authority or other contracting party designated in the Declarations, at the respective mailing addresses last known to us, written notice of cancellation at least 60 days before the effective date of cancellation.
- c. Notice of cancellation will state the effective date of cancellation. The policy period will end on that date.
- d. If this policy is cancelled, any unearned premium will be refunded. If we cancel, the refund will be pro rata. If you cancel, the refund may be less than pro rata. The cancellation will be effective even if we have not made or offered a refund.
- e. If notice is mailed, proof of mailing will be sufficient proof of notice.
- 4. Changes**  
This policy contains all the agreements between you and us concerning the insurance afforded. You are authorized to make changes in the terms of this policy with our consent. This policy's terms can be amended or waived only by endorsement issued by us and made a part of this policy.
- 5. Inspections And Surveys**
- a. We have the right to:
- (1) Make inspections and surveys at any time;
  - (2) Give you reports on the conditions we find; and
  - (3) Recommend changes.
- b. We are not obligated to make inspections, surveys, reports or recommendations and any such actions we do undertake relate only to insurability and the premiums to be charged. We do not make safety inspections. We do not undertake to perform the duty of any person or organization to provide for the health or safety of workers or the public. And we do not warrant that conditions:
- (1) Are safe or healthful; or
  - (2) Comply with laws, regulations, codes or standards.
- c. Paragraphs a. and b. of this condition apply not only to us, but also to any rating, advisory, rate service or similar organization which makes insurance inspections, surveys, reports or recommendations.
- d. Paragraph b. of this condition does not apply to any inspections, surveys, reports or recommendations we may make relative to certification, under state or municipal statutes, ordinances or regulations, of boilers, pressure vessels or elevators.
- 6. Other Insurance**  
The insurance afforded by this policy is:
- a. Primary insurance and we will not seek contribution from any other insurance available to you except if the other insurance is provided by a contractor other than the designated contractor for the same operation and "job location"; and
- b. If the other insurance is available, we will share with that other insurance by the method described below.  
If all of the other insurance permits contribution by equal shares, we will follow this method also. Under this approach, each insurer contributes equal amounts until it has paid its applicable limit of insurance or none of the loss remains, whichever comes first.  
If any of the other insurance does not permit contribution by equal shares, we will contribute by limits. Under this method, each insurer's share is based on the ratio of its applicable limit of insurance to the total applicable limits of insurance of all insurers.
- 7. Premium And Premium Audit**
- a. We will compute all premiums for this Coverage Part in accordance with our rules and rates.
- b. Contract cost, the premium base shown in the Declarations, means the total cost of the operations described in the Declarations.
- c. The premium shown in the Declarations as advance premium is a deposit premium only. At the close of each audit period we will compute the earned premium for that period and send notice to the "contractor" designated in the Declarations. The due date for audit and retrospective premiums is the date shown as the due date on the bill. If the sum of the advance and audit premiums paid for the policy period is greater than the earned premium, we will return the excess to the contractor designated in the Declarations.
- In no event shall the payment of premium be your obligation.

#### 8. Transfer Of Rights Of Recovery Against Others To Us

If the insured has rights to recover all or part of any payment we have made under this policy, those rights are transferred to us. The insured must do nothing after loss to impair them. At our request, the insured will bring "suit" or transfer those rights to us and help us enforce them.

#### 9. When We Do Not Renew

If we decide not to renew this Coverage Part, we will mail or deliver to the first Named Insured shown in the Declarations written notice of the nonrenewal not less than 30 days before the expiration date.

If notice is mailed, proof of mailing will be sufficient proof of notice.

#### B. The following Conditions apply to Coverage A only:

##### 1. Legal Action Against Us

No person or organization has a right under this policy:

- a. To join us as a party or otherwise bring us into a "suit" asking for damages from an insured; or
- b. To sue us on this policy unless all of its terms have been fully complied with.

A person or organization may sue us to recover on an agreed settlement or on a final judgment against an insured; but we will not be liable for damages that are not payable under the terms of this policy or that are in excess of the applicable limit of insurance. An agreed settlement means a settlement and release of liability signed by us, the insured and the claimant or the claimant's legal representative.

##### 2. Duties In The Event Of Occurrence, Claim Or Suit

- a. You must see to it that we are notified as soon as practicable of an occurrence which may result in a claim. To the extent possible, notice should include:
  - (1) How, when and where the occurrence took place;
  - (2) The names and addresses of any injured persons and witnesses; and
  - (3) The nature and location of any injury or damage arising out of the occurrence.
- b. If a claim is made or "suit" is brought against any insured, you must:
  - (1) Immediately record the specifics of the claim or "suit" and the date received; and

- (2) Notify us as soon as practicable.

You must see to it that we receive written notice of the claim or "suit" as soon as practicable.

- c. You and any other involved insured must:

- (1) Immediately send us copies of any demands, notices, summonses or legal papers received in connection with the claim or "suit";
- (2) Authorize us to obtain records and other information;
- (3) Cooperate with us in the investigation or settlement of the claim or defense against the "suit"; and
- (4) Assist us, upon our request, in the enforcement of any right against any person or organization which may be liable to the insured because of injury or damage to which this insurance may also apply.

- d. No insured will, except at that insured's own cost, voluntarily make a payment, assume any obligation, or incur any expense, other than for first aid, without our consent.

##### 3. Separation Of Insureds

Except with respect to the Limits of Insurance, this insurance applies:

- a. As if each Named Insured were the only Named Insured; and
- b. Separately to each insured against whom claim is made or "suit" is brought.

#### C. The following Conditions apply to Coverage B only:

##### 1. Appraisal

If you fail to agree with us on the value of the property, or the amount of loss, either you or we may make written demand for an appraisal of the loss within 60 days after proof of loss is filed. In this event, each party will select a competent appraiser. The two appraisers will select a competent and impartial umpire. The appraisers will state separately the value of the property and the amount of loss. If they fail to agree, they will submit their differences to the umpire. A decision agreed to by any two will be binding. Each party will:

- a. Pay its chosen appraiser; and
- b. Bear the other expenses of the appraisal and umpire equally.

If we submit to an appraisal, we still retain our right to deny the claim.

**2. No Benefit To Bailee**

No person or organization, other than you, having custody of the property will benefit from this insurance.

**3. Insured's Duties In The Event Of A Loss**

You must:

- a. Protect the property, whether or not the loss is covered by this policy. Any further loss due to your failure to protect the property shall not be recoverable under this policy. Reasonable expenses incurred in affording such protection shall be deemed to be incurred at our request; and
- b. Submit to us, as soon after the loss as possible, your sworn proof of loss containing the information we request to settle the loss and, at our request, make available the damaged property for examination.

**4. Legal Action Against Us**

No person or organization has a right under this policy to sue us on this policy unless all of its terms have been fully complied with and until 30 days after proof of loss is filed and the amount of loss is determined as provided in this policy.

**5. Payment Of Loss**

We may pay for the loss in money, but there can be no abandonment of any property to us.

**SECTION V – DEFINITIONS**

1. "Bodily injury" means bodily injury, sickness or disease sustained by a person, including death resulting from any of these at any time.
2. "Contractor" means the contractor designated in the Declarations and includes all subcontractors working directly or indirectly for that "contractor" but does not include you.
3. "Covered contract" means any contract or agreement to carry a person or property for a charge or any interchange contract or agreement respecting motive power, or rolling stock equipment.
4. "Executive officer" means a person holding any of the officer positions created by your charter, constitution, bylaws or any other similar governing document.
5. "Hostile fire" means one which becomes uncontrollable or breaks out from where it was intended to be.
6. "Job location" means the job location designated in the Declarations including any area directly related to the "work" designated in the Declarations. "Job location" includes the ways next to it.
7. "Physical damage to property" means direct and accidental loss of or damage to rolling stock and their contents, mechanical construction equipment or motive power equipment, railroad tracks, roadbeds, catenaries, signals, bridges or buildings.
8. "Pollutants" means any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapor, soot, fumes, acids, alkalis, chemicals and waste. Waste includes material to be recycled, reconditioned or reclaimed.
9. "Property damage" means:
  - a. Physical injury to tangible property, including all resulting loss of use of that property. All such loss of use shall be deemed to occur at the time of the physical injury that caused it; or
  - b. Loss of use of tangible property that is not physically injured. All such loss of use shall be deemed to occur at the time of the occurrence that caused it.
10. "Suit" means a civil proceeding in which damages because of "bodily injury" or "property damage" to which this insurance applies are alleged. "Suit" includes:
  - a. An arbitration proceeding in which such damages are claimed and to which the insured must submit or does submit with our consent; or
  - b. Any other alternative dispute resolution proceeding in which such damages are claimed and to which the insured submits with our consent.
11. "Work" means work or operations performed by the "contractor" including materials, parts or equipment furnished in connection with the work or operations.
12. "Your designated employee" means:
  - a. Any supervisory employee of yours at the "job location";
  - b. Any employee of yours while operating, attached to or engaged on work trains or other railroad equipment at the "job location" which are assigned exclusively to the "contractor"; or
  - c. Any employee of yours not described in Paragraph a. or b. above who is specifically loaned or assigned to the work of the "contractor" for the prevention of accidents or protection of property.

**Performance Bond**BOND NO. \_\_\_\_\_  
PREMIUM: \_\_\_\_\_

WHEREAS, The \_\_\_\_\_, (hereinafter designated as “Obligee”) and \_\_\_\_\_ (hereinafter designated as “Principal”) have entered into an agreement whereby principal agrees to install and complete certain designated public improvements, which said agreement, dated \_\_\_\_\_, and identified as project \_\_\_\_\_ is hereby referred to and made a part hereof; and

WHEREAS, Said principal is required under the terms of said agreement to furnish a bond for the faithful performance of said agreement;

NOW, THEREFORE, We, the principal and \_\_\_\_\_ as surety, are held and firmly bound unto the hereinafter called “The Obligee,” in the penal sum of \_\_\_\_\_ dollars (\$ \_\_\_\_\_) lawful money of the United States for the payment of which sum well and truly to be made, we bind ourselves, our heirs, successors, executors and administrators, jointly and severally firmly by these presents.

The condition of this obligation is such that if the above bound principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the said agreement and any alteration thereof made as therein provided, on his or their part, to be kept and perform and at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the Obligee, its officers, agents and employees, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As part of the obligation secured hereby and in addition to the face amount specified therefore, there shall be included costs and reasonable expenses and fees, including reasonable attorney’s fees, incurred by county in successfully enforcing such obligation, all to be taxed as costs and included in any judgment rendered.

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

IN WITNESS WHEREOF, this instrument has been duly executed by the principal and surety above named, on

By \_\_\_\_\_  
PRINCIPAL  
By: \_\_\_\_\_  
PRINCIPAL  
By: \_\_\_\_\_  
ATTORNEY-IN-FACT

**Payment (Labor & Materials) Bond**

BOND NO. \_\_\_\_\_

KNOW ALL MEN/WOMEN BY THESE PRESENT that we, \_\_\_\_\_ as Principal (also referred to herein as "CONTRACTOR"), and \_\_\_\_\_ as Surety, are held and firmly bound unto \_\_\_\_\_, hereinafter called "OWNER," in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these present.

The condition of the above obligation is such that, whereas said Principal has been awarded and is about to enter into the annexed Contract for the \_\_\_\_\_ [NAME OF PROJECT], in accordance with OWNER's Call for Bids documents and Principal's Bid Dated \_\_\_\_\_, and to which reference is hereby made for all particulars, and is required by said "OWNER" to give this bond in connection with the execution of said Contract;

NOW, THEREFORE, if said CONTRACTOR, its Subcontractors, its heirs, executors, administrators, successors, or assigns, shall fail to pay (a) for any materials, provisions, equipment, or other supplies used in, upon, for or about the performance of the WORK contracted to be done under the Contract, or (b) for any work or labor thereon of any kind contracted to be done under the Contract, or (c) for amounts due under the Unemployment Insurance Code with respect to work or labor performed pursuant to the Contract, or (d) for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the CONTRACTOR and its Subcontractors under Section 13020 of the Unemployment Insurance Code with respect to such work and labor, in each case, as required by the provisions of Sections 9550-9566 inclusive, of the Civil Code of the State of California and acts amendatory thereof, and sections of other codes of the State of California referred to therein and acts amendatory thereof, and provided that the persons, companies, corporations or other entities so furnishing said materials, provisions, provender, equipment, or other supplies, appliances, or power used in, upon, for, or about performance of the Work contracted to be executed or performed, or any person, company, corporation or entity renting or hiring implements or machinery or power for or contributing to said Work to be done, or any person who performs work or labor upon the same, or any person, company, corporation or entity who supplies both work and materials therefor, shall have complied with the provisions of said laws, then said Surety will pay in full the same in an amount not exceeding the sum hereinabove set forth and also will pay, in case suit is brought upon this bond, a reasonable attorney's fee, as shall be fixed by the Court. This bond shall inure to the benefit of any and all persons named in Section 9100 of the Civil Code of the State of California so as to give a right of action to them or their assigns in any suit brought upon this bond.

PROVIDED, that any alterations in the WORK to be done or the materials to be furnished, or changes in the time of completion, which may be made pursuant to the terms of said Contract



Documents, shall not in any way release said CONTRACTOR or said Surety thereunder, nor shall any extensions of time granted under the provisions of said Contract Documents release either said CONTRACTOR or said Surety, and notice of such alterations or extensions of the Agreement is hereby waived by said Surety.

IN WITNESS WHEREOF, the Principal and the Surety have executed this instrument in duplicate this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
Surety

\_\_\_\_\_  
Principal

By: \_\_\_\_\_

By: \_\_\_\_\_

\_\_\_\_\_  
Print Name/Title

\_\_\_\_\_  
Print Name/Title

\_\_\_\_\_  
Address

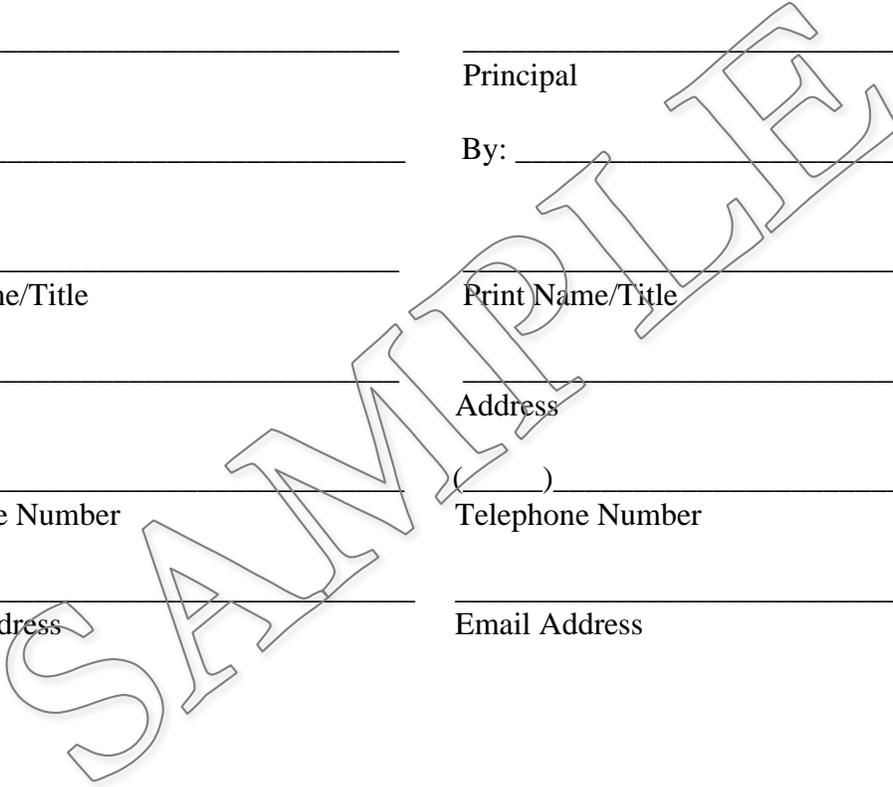
\_\_\_\_\_  
Address

(\_\_\_\_\_) \_\_\_\_\_  
Telephone Number

(\_\_\_\_\_) \_\_\_\_\_  
Telephone Number

\_\_\_\_\_  
Email Address

\_\_\_\_\_  
Email Address



**NOTARIAL CERTIFICATE OF ATTORNEY IN FACT AND SEAL OF SURETY  
MUST BE ATTACHED.**

(Optional Form)

**This blanket endorsement modifies insurance provided under the following:**

**Project Name:** \_\_\_\_\_

**Named Insured:** Las Gallinas Valley Sanitary District, its officers, officials, employees and volunteers, 300 Smith Ranch Road, San Rafael, CA 94903

**Effective Work Date(s):** \_\_\_\_\_

**Insuring Company:** \_\_\_\_\_ **Policy No.:** \_\_\_\_\_

**Description of Work/Locations/Vehicles:**

**AGENCY NAME AND ADDRESS:**

**ADDITIONAL INSURED:**

The Agency, its elected or appointed officers, officials, employees and, volunteers are included as insureds with regard to damages and defense of claims arising from: (Check all that apply)

**General Liability:** (a) activities performed by or on behalf of the Named Insured, (b) products and completed operations of the Named Insured, (c) premises owned, leased occupied or used by the Named Insured, and/or (d) permits issued for operations performed by the Named Insured. {Note: MEETS OR EXCEEDS ISO Form # CG 20 10 11 85}

**Auto Liability:** the ownership, operation, maintenance, use, loading or unloading of any auto owned, leased, hired or borrowed by the Named Insured, regardless of whether liability is attributable to the Named Insured or a combination of the Named Insured and the Agency, its elected or appointed officers, officials, employees or volunteers.

**Other:** \_\_\_\_\_

**PRIMARY/NON-CONTRIBUTORY:** This insurance is primary and is not additional to or contributing with any other insurance carried by or for the benefit of Additional Insureds.

**PROVISIONS REGARDING THE INSURED'S DUTIES AFTER ACCIDENT OR LOSS:** Any failure to comply with reporting provisions of the policy shall not affect coverage provided to the Agency, its elected or appointed officers, officials, employees, or volunteers.

**CANCELLATION NOTICE:** The insurance afforded by this policy shall not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) days' prior written notice (ten (10) days if canceled due to non-payment) by certified mail return receipt requested has been given to the Agency. Such notice shall be addressed as shown above.

**WAIVER OF SUBROGATION:**The insurer(s) named above agree to waive all rights of subrogation against the Agency, its elected or appointed officers, officials, agents, volunteers and employees for losses paid under the terms of this policy which arise from work performed by the Named Insured for the Agency.

Nothing herein contained shall vary, alter or extend any provision or condition of the Policy other than as above stated.

**SIGNATURE OF INSURER OR AUTHORIZED REPRESENTATIVE OF THE INSURER**

I, \_\_\_\_\_, (print/type name), warrant that I have authority to bind the above-named insurance company and by my signature hereon do so bind this company.

SIGNATURE OF AUTHORIZED REPRESENTATIVE (original signature required on endorsement furnished to the Agency)

**ORGANIZATION:** \_\_\_\_\_

**TITLE:** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_

**TELEPHONE: (\_\_\_\_\_) \_\_\_\_\_ DATE ISSUED: \_\_\_\_\_**

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## **APPENDIX D**

### **DIR FORM PWC-100 SUPPLEMENTAL QUESTIONNAIRE**

(Submit a completed form for the Contractor and each Subcontractor listed in the List of Proposed Subcontractors submitted with the bid. List Contractor's and all Subcontractors' license number, name, address, phone number, email address, and classification of workers they are providing at the time of the contract signing.)

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Add Contractor - Windows Internet Explorer

DIR https://www.dir.ca.gov/pwc100ext/AddContractorPopup.aspx?ProjectID=3108&GCID=1

Please enter all the information for the Contractor

**Contractor**

CSLB/Certificate Number:\*

Name:  
Address:  
Phone:  
Email:\*

**Classifications**

|  |  |   |  |
|--|--|---|--|
| <input type="checkbox"/> ASBESTOS        | <input type="checkbox"/> BOILERMAKER       | <input type="checkbox"/> BRICKLAYERS      | <input type="checkbox"/> CARPENTERS      |
| <input type="checkbox"/> CARPET/LINOLEUM | <input type="checkbox"/> CEMENT MASONS     | <input type="checkbox"/> DRYWALL FINISHER | <input type="checkbox"/> DRYWALL/LATHERS |
| <input type="checkbox"/> ELECTRICIANS    | <input type="checkbox"/> ELEVATOR MECHANIC | <input type="checkbox"/> GLAZIERS         | <input type="checkbox"/> IRON WORKERS    |
| <input type="checkbox"/> LABORERS        | <input type="checkbox"/> MILLWRIGHTS       | <input type="checkbox"/> OPERATING ENG    | <input type="checkbox"/> PAINTERS        |
| <input type="checkbox"/> PILE DRIVERS    | <input type="checkbox"/> PIPE TRADES       | <input type="checkbox"/> PLASTERERS       | <input type="checkbox"/> ROOFERS         |
| <input type="checkbox"/> SHEET METAL     | <input type="checkbox"/> SOUND/COMM        | <input type="checkbox"/> SURVEYORS        | <input type="checkbox"/> TEAMSTER        |
| <input type="checkbox"/> TILE WORKERS    |  |   |  |

100%

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**APPENDIX E**

**MISCELLANEOUS CONTRACT FORMS**

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300 SMITH RANCH ROAD, SAN RAFAEL, CA 94903

**Change Order**  
**No.    \_\_**

**Project No:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Project:** \_\_\_\_\_

**Contractor:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

\_\_\_\_\_ **Fax:** \_\_\_\_\_

The following change is hereby made to the contract:

**Description of Change:**

**Reason for Change:**

**Pricing Data:**

**Contract Extension:**

This Change Order added \_\_ working days to contract completion date.

Las Gallinas Valley Sanitary District (LGVSD), Owner, and the Contractor hereby agree that this change order constitutes full and mutual accord and satisfaction for all time, all costs, and all impacts related to this revision. In accepting this change order, the Contractor agrees that it represents a full and equitable adjustment to the contract, and further agrees to waive all rights to file claim with respect to any difficulties arising from, or as a result of, this change.

**Accounting Summary:**

|                                 |               |  |
|---------------------------------|---------------|--|
| <b>Original Contract:</b>       | <b>\$0.00</b> |  |
| <b>Previous Additions:</b>      | <b>\$0.00</b> |  |
| <b>Previous Deductions (-):</b> | <b>\$0.00</b> |  |
| <b>This Change Order (+/-):</b> | <b>\$0.00</b> |  |
| <b>Contract to Date:</b>        | <b>\$0.00</b> |  |

**APPROVED:**

---

Michael Cortez, PE                      Date  
District Engineer

---

Curtis Paxton, PE                      Date  
General Manager

---

Contractor                                      Date

To:

**Project Name:**  
**Project No:**  
**Contractor:**  
**Reference:**

**Date Submitted By Contractor:**

**Description:** \_\_\_\_\_

| <b>COST BREAKDOWN FOR CHANGE ORDER PROPOSAL</b>                  |     |      |       |          |       |        |     |       |
|--|-----|------|-------|----------|-------|--------|-----|-------|
| Description  | Qty | Unit | Labor | Material | Equip | Rental | Sub | Total |
|  |     |      |       |          |       |        |     |       |
| Subtotal:  |     |      |       |          |       |        |     |       |
| Markup Rate for Self Performed Labor/Mat. & Suppliers/Equipment: |     |      |       |          |       |        |     |       |
| Markup on Subcontractors:  |     |      |       |          |       |        |     |       |
|  |     |      |       |          |       |        |     |       |
| Total:   |     |      |       |          |       |        |     |       |

Time extension required for this change: \_\_\_\_\_

**Change Order Pricing**

Paragraph 4.5.2 of the General Conditions, Page 1-28 states: "Indirect costs added under a change order **may not exceed an allowance of fifteen (15) percent of the total of combined Contractor and subcontractor direct costs added under the change order.** Such allowance covers Contractor overhead and profit under the change order and includes the cost of insurance in addition to that required pursuant to Section 8.8, bond premiums, superintendent labor, clerical labor, home office expenses, worksite office expenses, and utility costs under the change order. Such costs may not be itemized as direct costs under a change order."

See General Conditions, Paragraph 4 CHANGES IN WORK for more information.

**UNCONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT**

**NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.**

---

**Identifying Information**

Name of Claimant:

Name of Customer:

Job Location:

Owner:

Through Date:

---

**Unconditional Waiver and Release**

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment:

\$ \_\_\_\_\_

---

**Exceptions**

This document does not affect any of the following:

- (1) Retentions.
  - (2) Extras for which the claimant has not received payment.
  - (3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.
- 

**Signature**

Claimant's Signature:

Claimant's Title:

Date of Signature:

---

**UNCONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT**

**NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.**

---

**Identifying Information**

Name of Claimant:

Name of Customer:

Job Location:

Owner:

---

**Unconditional Waiver and Release**

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

---

**Exceptions**

This document does not affect any of the following:  
Disputed claims for extras in the amount of: \$

---

**Signature**

Claimant's Signature:

Claimant's Title:

Date of Signature:

---

**CONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT**

**NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.**

---

**Identifying Information**

Name of Claimant:

Name of Customer:

Job Location:

Owner:

Through Date:

---

**Conditional Waiver and Release**

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check:

Amount of Check: \$

Check Payable to:

---

**Exceptions**

This document does not affect any of the following:

- (1) Retentions.
  - (2) Extras for which the claimant has not received payment.
  - (3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:  
Date(s) of waiver and release: \_\_\_\_\_  
Amount(s) of unpaid progress payment(s): \$ \_\_\_\_\_
  - (4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.
- 

**Signature**

Claimant's Signature:

Claimant's Title:

Date of Signature:

---

**CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT**

**NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.**

---

**Identifying Information**

---

Name of Claimant:

---

Name of Customer:

---

Job Location:

---

Owner:

---

---

**Conditional Waiver and Release**

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

---

Maker of Check:

---

Amount of Check: \$

---

Check Payable to:

---

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**Exceptions**

---

This document does not affect any of the following:  
Disputed claims for extras in the amount of: \$

---

---

**Signature**

---

Claimant's Signature:

---

Claimant's Title:

---

Date of Signature:

---

Project: \_\_\_\_\_

Project No. \_\_\_\_\_



|                      |                          |                                   |                                      |                      |
|----------------------|--------------------------|-----------------------------------|--------------------------------------|----------------------|
| Progress Payment No: | <input type="text"/>     | <input type="checkbox"/> Contract | Period to:                           | <input type="text"/> |
|                      | <input type="checkbox"/> | Change Order                      | Attach Detail Sheet by Bid Line Item |                      |

|                           |                                       |                             |                        |
|---------------------------|---------------------------------------|-----------------------------|------------------------|
| To Owner:                 | Las Gallinas Valley Sanitary District | Contract Time working days) |                        |
| From Contractor:          |                                       | Orig. Contract:             | <input type="text"/> 0 |
| Via Construction Manager: |                                       | Added by CCOs:              | <input type="text"/> 0 |
|                           |                                       | Revised Total:              | 0 days                 |

|                              |                      |                               |                      |
|------------------------------|----------------------|-------------------------------|----------------------|
| <b>Contract Summary:</b>     |                      |                               |                      |
| Original Contract Amount:    | <input type="text"/> | Previous Total Change Orders: | <input type="text"/> |
| Net Change by Change Orders: | <input type="text"/> | Change Orders This Month:     | <input type="text"/> |
| <b>Total Contract Amount</b> | <b>\$0</b>           | <b>Total Change Orders:</b>   | <b>\$0</b>           |

**CONTRACT AND CHANGE ORDER WORK**

|  |                      |
|--|----------------------|
| Previous Total Work Completed:             | <input type="text"/> |
| Previous Total Completed and Stored:       | \$0.00               |
| Previous Total Earned Less Retainage:      | <input type="text"/> |
| Work Completed This Period*:               | <input type="text"/> |
| Work Completed Retention this Period (5%): | \$0.00 (a)           |
| <b>Payment For Work Completed:</b>         | <b>\$0.00 (b)</b>    |
| Total Work Completed to Date               | \$0.00 *             |

|  |                      |
|--|----------------------|
| <i>reference only - no progress payment toward matls stored until included as work complete; use other template if pymt for matls stored is contracted</i> |                      |
| Previous Materials Stored:   | <input type="text"/> |
| Materials Added This Period:   | <input type="text"/> |
| Materials Moved to Work Completed:   | <input type="text"/> |
| Total Materials Stored:  | \$0.00               |
| Total Work Completed and Stored to Date:   | \$0.00               |

|   |        |
|---|--------|
| Balance to Finish (incl CO's/NIC matls stored): | \$0.00 |
| Percent Work Completed:                         | 0.0%   |
| Percent Completed and Stored:                   | 0.0%   |
| Percent Paid to Contractor:                     | 0%     |

|  |                      |
|--|----------------------|
| Previous Retainage:                        | <input type="text"/> |
| Current Total Retainage:                   | \$0.00 *             |
| <b>Retainage / Escrow for this Period:</b> | <b>\$0.00 (e)</b>    |
| Percent to Finish:                         | 100.0%               |
| Percent Change Orders:                     | 0.00%                |

|   |               |   |                         |
|---|---------------|---|-------------------------|
| <b>Current Payment Due to Contractor:</b> | <b>\$0.00</b> | <b>Current Amount Retained/to Escrow:</b> | <b>\$0.00</b>           |
|   | (b)           |   | (a) / not to exceed (e) |

**CONTRACTOR CERTIFICATION**

The Undersigned Contractor certifies that to the best of the Contractor's knowledge, information, and belief, the Work covered by this application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work which previous Certificates for Payment were issued and Payments received from the Owner, and the current payment shown herein is no due.

\_\_\_\_\_  
Contractor

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

**CONSTRUCTION MANAGER'S CERTIFICATE FOR PAYMENT**

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Construction Manager certifies to the Owner that to the best of the Construction Manager's knowledge, information, and belief, the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

**AMOUNT CERTIFIED:** **\$0.00**

\_\_\_\_\_  
Construction Management

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

**OWNER APPROVAL**

\_\_\_\_\_  
Las Gallinas Valley Sanitary District

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





**Project:** \_\_\_\_\_

**Project No.** \_\_\_\_\_

**Progress Payment No:**

**Period to:**

| Item No.                            | Description                        | Quantity | Units | Unit Price | Bid Price              | Units To Date | Cost To Date |
|-------------------------------------|------------------------------------|----------|-------|------------|------------------------|---------------|--------------|
| 1                                   |                                    |          |       |            |                        |               |              |
| 2                                   |                                    |          |       |            |                        |               |              |
| 3                                   |                                    |          |       |            |                        |               |              |
| 4                                   |                                    |          |       |            |                        |               |              |
| 5                                   |                                    |          |       |            |                        |               |              |
| 6                                   |                                    |          |       |            |                        |               |              |
| 7                                   |                                    |          |       |            |                        |               |              |
| 8                                   |                                    |          |       |            |                        |               |              |
| 9                                   |                                    |          |       |            |                        |               |              |
| 10                                  |                                    |          |       |            |                        |               |              |
| 11                                  |                                    |          |       |            |                        |               |              |
| 12                                  |                                    |          |       |            |                        |               |              |
| 13                                  |                                    |          |       |            |                        |               |              |
| 14                                  |                                    |          |       |            |                        |               |              |
| 15                                  |                                    |          |       |            |                        |               |              |
|                                     | BASE CONTRACT                      |          |       |            |                        |               |              |
|                                     | ALTERNATES                         |          |       |            |                        |               |              |
|                                     | BASE CONTRACT INCLUDING ALTERNATES |          |       |            |                        |               |              |
|                                     | <b><u>CHANGE ORDERS</u></b>        |          |       |            |                        |               |              |
| 1                                   |                                    |          |       |            |                        |               |              |
| 2                                   |                                    |          |       |            |                        |               |              |
|                                     | TOTAL CHANGE ORDERS                |          |       |            |                        |               |              |
|                                     |                                    |          |       |            | Contract to Date       |               |              |
| BASE CONTRACT                       |                                    |          |       |            | Less 5% Retention      |               |              |
| CHANGE ORDERS / WORK ORDERS / MISC. |                                    |          |       |            | Net Contract to Date   |               |              |
| TOTAL CONTRACT                      |                                    |          |       |            | Less Previous Payments |               |              |
| PERCENT COMPLETED TO DATE           |                                    |          |       |            | Amount Due             |               |              |

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## **APPENDIX F**

### **LABOR COMPLIANCE PROGRAM**

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## LABOR COMPLIANCE PROGRAM HANDOUT

The Agency is committed to enforcing State prevailing wage requirements. The provisions of this law require all contractors to comply with the current prevailing wage rate requirements and all apprenticeship requirements.

The submission of complete and accurate certified payrolls records, including fringe benefit statements, DAS-140, DAS-142, CAC2 and similar forms are a prerequisite to receiving progress payments. Failure to comply with these rules and regulations can result in monies being withheld and penalties imposed. Contractors are advised to be familiar with Labor Code Section 1720 et. seq. For all projects advertised for bid after March 1<sup>st</sup> 2015 and all projects awarded after April 1, 2015 certified payrolls must be also be submitted to the CMU using eCPR.

- Prime contractor must set up all subcontractors in the eCPR system.
- Any subcontractor must also add all of their subtiers to the eCPR system.

At the time the General Contractor submits any progress payment to the Agency, the following documents are to be submitted by the General Contractor **directly to the CCMI** for all work performed, including work by subcontractors:

- 1 copy of the progress payment request
- A copy of the certified payroll report submitted to the eCPR
- PW26 or similar form listing fringe benefits being paid.
- CAC2 form or equivalent relating to monthly training contributions
- DAS-140 form for each craft employed on the project
- DAS-142 request to train apprentices
- Electrician Certification – Those employing electricians may need to submit additional data to verify the certification status of those employed

Subcontractors are to submit all documentation directly to the General Contractor in a timely (not less than monthly) basis. The General Contractor will then forward all information to CCMI. Failure to submit these documents to CCMI may result in the progress payment being delayed.

Should you have any questions or concerns, you are welcome to contact:  
Contractor Compliance and Monitoring (CCMI) directly at:

**CONTRACTOR COMPLIANCE AND MONITORING**  
**635 Mariners Island Blvd. Suite 200**  
**San Mateo, CA 94404**  
**Phone (650) 522-4403**  
**Fax (650) 522-4402**

## FOR REVIEW AT JOB START MEETINGS

The state labor law requirements applicable to the contract are composed of, but not limited to, the following:

### 1. Payment of Prevailing Wage Rates

The award of a public works contract requires that all workers employed on the project be paid not less than the specified general prevailing wage rates by the contractor and its subcontractors. Prevailing wage determinations for this project can be obtained at: [www.dir.ca.gov](http://www.dir.ca.gov). This includes a total package including fringe benefits and training contributions which are paid to the employee or for the benefit of the employee to a bona fide ERISA approved or otherwise unconditionally paid for the benefit of the employee Trust Fund.

The contractor is responsible for obtaining and complying with all applicable general prevailing wage rates for trades workers and any rate changes, which may occur during the term of the contract. Prevailing wage rates and rate changes are to be posted at the job site for workers to view. Or the contractor may post a notice stating where the prevailing wage determinations are available on the jobsite and the contractor shall provide access to such information upon reasonable notice.

2. All individuals or companies performing prevailing wage work on this project must be registered as a public works contractor and pay an annual fee of \$300 to the Department of Industrial Relations (DIR). This includes all work covered by prevailing wage such as trucking, surveying, building inspection and so on.

### 3. Apprentices

It is the duty of the contractor and subcontractors to employ registered apprentices on public works projects per Labor Code Section 1777.5; Contractors and subcontractors must submit proof of Public Works Contract Award Information (DAS140) or other documentation for Division of Apprenticeship Standards approved apprenticeship programs. Apprentices are to be employed in all crafts and in all trades with approved training programs. Contractors are to employ apprentices on a ratio of 1 apprentice hour for every 5 journeymen hours or as otherwise approved by the DAS approved Apprenticeship Training Committee. Contractors and subcontractors who do not meet this ratio must submit documentation that apprentices were requested and were not provided and/or not available in sufficient number to meet this ratio. The submission of an accurate DAS142(s) meets this requirement. Additional documentation may be required to verify the apprenticeship status of employees.

### 4. Penalties

Penalties, including forfeitures and debarment, shall be imposed for contractor/subcontractor failure to pay prevailing wages, failure to maintain and submit accurate certified payroll records upon request, failure to employ apprentices, and for failure to pay employees for all hours worked at the correct prevailing wage rate, in accordance with Labor Code Sections 1775, 1776, 1777.7, and 1813. Monetary penalties of \$200 per day per worker shall be imposed for failure to pay correct prevailing wage; \$25 per day per worker shall be imposed for overtime violated; \$100 per day per worker for failure to provide certified payroll information; \$100-\$300 per calendar day for noncompliance of Apprenticeship issues.

### 5. Certified Payroll Records

Per Labor Code Section 1776, contractors and subcontractors are required to keep accurate payroll records which reflect the name, address, social security number, and work classification of each employee; the straight time and overtime hours worked each day and each week; the fringe benefits; and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee hired in connection with a public works project. A listing of all current prevailing wage determinations can be obtained from the Agency's main office or by accessing the Department of Industrial Relation's website at: [www.dir.ca.gov](http://www.dir.ca.gov)

Employee payroll records shall be certified (signed under penalty of perjury by someone in authority at the company) and shall be made available for inspection at all reasonable hours at the principal office of the contractor/subcontractor, or shall be furnished to any employee, or to his or her authorized representative on request. Disclosure of certified payroll information to anyone other than the Awarding Body, its agent, or the Department of Industrial Relations requires that personal information about the employees (name, address and social security number) listed on the forms be redacted (omitted) to protect employee privacy.

Contractors and subcontractors shall maintain their certified payrolls on a weekly basis and shall submit said payrolls on a monthly basis in conjunction with contractor's requests progress or final payment. In the event that there has been no work performed during a given week, the Certified Payroll Record shall be annotated "No Work" for that week. The Agency or its authorized representative is also authorized to request and review all related payroll records such as time cards, cancelled checks, etc. For all projects awarded after April 1, 2015, certified payrolls must also be submitted to the DIR the electronically through their eCPR system.

While the DIR accepts electronic versions of your certified payroll, the DIR and this agency may also request copies of the original certified payroll and supporting documentation at any time.

6. Nondiscrimination in Employment

Prohibitions against employment discrimination are contained in Labor Code Sections 1735 and 1777.6; the Government Code; the Public Contracts Code; and Title VII of the Civil Rights Act of 1964, as amended. All contractors and subcontractors are required to implement equal employment opportunities as delineated below:

a. Equal Employment Poster

The equal employment poster shall be posted at the job site in a conspicuous place visible to employees and employment applicants for the duration of the project. All other labor and employment related posters are also to be properly displayed on the jobsite.

7. Kickback Prohibited

Per Labor Code Section 1778, contractors and subcontractors are prohibited from accepting, taking wages illegally, or extracting "kickback" from employee wages;

8. Acceptance of Fees Prohibited

Contractors and subcontractors are prohibited from exacting any type of fee for registering individuals for public work (Labor Code Section 1779); or for filling work orders on public works contracts (Labor Code Section 1780);

9. Listing of Subcontractors

Contractors are required to list all subcontractors hired to perform work on a public works project when that work is equivalent to more than one-half of one percent of the total contract amount or \$10,000 whichever is greater. (Public Contract Code Section 4100, et seq.);

10. Proper Licensing

Contractors and subcontractors are required to be properly licensed. Penalties will be imposed for employing workers while unlicensed (Labor Code Section 1021 and Business and Professions Code Section 7000, et seq. under California Contractors License Law);

11. Unfair Competition Prohibited

Contractors and subcontractors are prohibited from engaging in unfair competition (Business and Professions Code Sections 17200-17208);

12. Workers' Compensation Insurance

All contractors and subcontractors are required to be insured against liability for workers' compensation, or to undertake self-insurance in accordance with the provisions of Labor Code Section 3700 (Labor Code Section 1861);

13. OSHA

Contractors and subcontractors are required to comply with the Occupational, Safety and Health laws and regulations applicable to the particular public works project.

14. Prompt Payment of Subcontractors and Suppliers

Contractors are required by law to promptly pay their subcontractors and suppliers within seven (7) days of receipt of any progress or final payment from the Public Agency. Likewise the subcontractor and supplier are required to pay their respective subcontractors and suppliers within seven (7) days of receipt of payment from the general contractor. When the payment to the contractor is a release of final retention on the project, those funds must be paid within seven (7) days of receipt.

15. IRCA

Pursuant to the Immigration Reform and Control Act of 1986, employers are required to verify that all employees working on public works contracts are legally able to work in the United States. Employers shall keep on file appropriate I-9 forms and documentation for all workers employed on the jobsite and make such forms available to inspection and review by the LCO upon request.

16. Jobsite Interviews

Jobsite interviews are not required on this project. If the need arises, CCMI may conduct random jobsite interviews on this project.

17. Certification of Electricians

Those employing electricians must comply with employment testing and certification requirements for electricians. Additional information may be required to verify the certification status of those employed.

18. Employee Wage Statements - It is required to provide itemized wage statements (pay stubs) to Employees under Labor Code Section 226.

19. Public Works Contractor Registration – Only those businesses who have registered and paid the applicable fee to the Department of Industrial Relations as a Public Works Contractor will be allowed to work on the project.

In accordance with federal and state laws, and with the Public Agency's policy and contract documents, the undersigned contractor herein certifies that they will comply with the foregoing labor law requirements; and fully understands that failure to comply with these requirements will subject them to the penalties cited herein.

The contractor also herein certifies that it has been provided with a copy of the Labor Compliance Program Package for Contractors with includes:

1. Labor Law Requirements Checklist (included herein)
2. The Location of Applicable General Prevailing Wage Rate Determinations
3. Blank Certified Payroll Record form
4. Fringe Benefit Statements
5. State apprenticeship contribution form (CAC2)
6. State apprenticeship requirements and form to register apprentices (DAS-140)
7. Request for apprentices (DAS-142)
8. Copy of the Labor Code relating to Public Works and Public Agencies (Part 7, Chapter 1, Sections 1720-1816 can be found at [www.dir.ca.gov](http://www.dir.ca.gov)).

**IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE COPIES OF THE LABOR COMPLIANCE PROGRAM PACKAGE TO ALL LISTED SUBCONTRACTORS AND TO ANY SUBSTITUTED SUBCONTRACTORS.**

Project Name and Number: \_\_\_\_\_

Public Agency: \_\_\_\_\_

Contractor: Name \_\_\_\_\_

Contractor Address: \_\_\_\_\_

Contractor Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

License Number: \_\_\_\_\_ Date: \_\_\_\_\_

I acknowledge that I have been informed and am aware of the foregoing requirements and that I am authorized to make this certification on behalf of \_\_\_\_\_  
 (Name of Contractor)

\_\_\_\_\_  
 Signature/Name/Title of Contractor Authorized Representative

**Additional Explanation And Instructions Relating To Required LCP Forms and Information**

**Certified payroll or non performance documentation** - is required for each week from the beginning of the contractor's /subcontractor's work on the project until completion of that contractor's/subcontractor's work. These documents need to reflect a consistent 7 day work week for the entirety of the project. The certified payroll forms need to be complete, listing the employee's correct name, address, social security number, hours worked per day, total hours worked per week, wages, deductions and check number. It is critical that the employee's craft classification be listed correctly. Just listing "Journeyman" or "Laborer" is

not sufficient. Many trades have sub-classifications and it is the contractor's obligation to correctly classify the employees. Employees must be classified and paid based on what type of work they are performing, not merely by title. It is acceptable for an employee to work in more than one trade category per day, but it is the employer's obligation to keep accurate records of the different type of work performed by the employee.

Please be aware non performance statements must be submitted for weeks in which no work is performed. More information about trade classifications and wage rates can be found at [www.dir.ca.gov](http://www.dir.ca.gov).

**Fringe Benefit Statement** - In order to complete a payroll audit, we need a copy of the fringe benefit statement listing the fringes being paid to each employee or employees on each trade. You are not required to use the worksheet in the packet, however all the information on that worksheet needs to be included in the documentation we receive. This should show an hourly breakdown of the specific contributions (health, pension, etc.) for each trade and the addresses of the plans being paid into. For contractors who pay medical benefits directly to a medical plan, such as Kaiser or Blue Shield, the monthly payment for each employee must be amortized into an hourly rate. (For example: Joe's health premium is \$300 a month, that rate multiplied by 12 (months) divided by 2080 (hours) yields an hourly rate of \$1.72 per hour). Similar amortization is allowed for vacation and holiday time paid. Training contributions paid to an approved apprenticeship committee needs to be listed as a separate item on this form (i.e. not just training/other together).

### **Apprenticeship**

#### **Submit contract award information- DAS-140**

Submit the contract award information in writing to each of the apprenticeship program sponsors in the area of your public works project within 10 days of the prime execution of the contract or subcontract, but in no event later than the first day in which the contractor has workers employed on the public work. This is simply a notification of award, it is not automatically a request for dispatch of a registered apprentice.

If you are not already approved to train apprentices with an approved apprenticeship committee and you are not willing to abide by the terms of and conditions of an apprenticeship program for this project, then (check Box 3) you must send a copy of the DAS-140 form to ALL approved apprenticeship Training Committee for that craft in the County in which the work is being performed.

#### **Request to employ registered apprentices- DAS-142**

A contractor on a public works project must employ one (1) hour of apprentice work for every five (5) hours performed by a journeyman.

All contractors must request for dispatch of an apprentice from an apprenticeship program (for each apprenticeable craft or trade) by giving the program actual notice of the request at least 72 hours (business days only) before the date on which apprentices are required. Contractors who do not receive sufficient number of apprentices from their initial request must continue to request apprentices from all other approved apprenticeship committees in the county, if more than one exists, until the proper ratio of apprentices is reached or until all apprenticeship committees (for that trade) have been contacted at least once.

When an apprentice is dispatched, the employer is required to employ the apprentice for at least one full day of work (8 hours) or 20% of the total apprenticeship hours calculated for the project- unless the total number of journeyman hours total under 40 hours for that craft.

### **Make training fund contributions – CAC 2**

Contractors who are awarded public works jobs must make training fund contributions in the amount established in the prevailing wage rate publication for journeymen and apprentices. This nominal fee contributes to the assurance that new apprentices coming into the craft will be guaranteed the highest level of training and as those skilled craftsmen retire, the trade will survive.

Contractors who contribute to an apprenticeship program are entitled to a full credit in the amount of those contributions for each apprentice working on the project and to not more than the specified training contribution amount for journeyman.. Contractors who do not contribute to an apprenticeship program must submit their contributions to the California Apprenticeship Council, PO Box 511283, Los Angeles, CA 90051-7838.

Training fund contributions to the Council are due and payable on the 15th day of the month for work performed during the preceding month. The contribution should be paid by check and be accompanied by a computer generated training fund contribution form (CAC – 2) or a letter containing the following information:

1. The name, address and telephone number of the contractor making the contribution.
2. The contractor's license number.
3. The name and address of the public agency that awarded the contract.
4. The jobsite location, including the county where the work was performed.
5. The contract or project number.
6. The time period covered by the enclosed contributions.
7. The contribution rate and total hours worked by apprenticeable occupation.
8. The name of the program(s) that provide apprentices if any.
9. The number if apprentice hours worked, by apprenticeable occupations and by program.

Comments, suggestions and questions welcome. Email to [daspublicworks@dir.ca.gov](mailto:daspublicworks@dir.ca.gov) or call your local district office.

\* \* \* \* \*

\* DAS-140 and DAS-142 forms are not required when the Prime contract is less than \$30,000 or when the company performing the work is a sole proprietor and is the only worker employed by that company on the project.

## PUBLIC WORKS CONTRACT AWARD INFORMATION

Contract award information must be sent to your Apprenticeship Committee if you are approved to train. If you are not approved to train, you must send the information (which may be this form) to ALL applicable Apprenticeship Committees in your craft or trade in the area of the site of the public work. Go to: <http://www.dir.ca.gov/das/PublicWorksForms.htm> for information about programs in your area and trade. You may also consult your local Division of Apprenticeship Standards (DAS) office whose telephone number may be found in your local directory under California, State of, Industrial Relations, Division of Apprenticeship Standards.

**Do not send this form to the Division of Apprenticeship Standards.**

|   |   |
|---|---|
| NAME OF YOUR COMPANY  | CONTRACTOR'S STATE LICENSE NO               |
| MAILING ADDRESS- NUMBER & STREET, CITY, ZIP CODE                          | AREA CODE & TELEPHONE NO.                   |
| NAME & ADDRESS OF PUBLIC WORKS PROJECT                                    | DATE YOUR CONTRACT EXECUTED                 |
|   | DATE OF EXPECTED OR ACTUAL START OF PROJECT |
| NAME & ADDRESS OF PUBLIC AGENCY AWARDED CONTRACT                          | ESTIMATED NUMBER OF JOURNEYMEN HOURS        |
|   | OCCUPATION OF APPRENTICE                    |
| THIS FORM IS BEING SENT TO: (NAME & ADDRESS OF APPRENTICESHIP PROGRAM(S)) | ESTIMATED NUMBER OF APPRENTICE HOURS        |
|   | APPROXIMATE DATES TO BE EMPLOYED            |

***This is not a request for dispatch of apprentices.***

*Contractors must make a separate request for actual dispatch, in accordance with Section 230.1(a) California Code of Regulations*

***Check One Of The Boxes Below***

1.  We are already approved to train apprentices by the \_\_\_\_\_  
Apprenticeship Committee. We will employ and train under their Standards. Enter name of the Committee
2.  We will comply with the standards of \_\_\_\_\_  
Apprenticeship Committee for the duration of this job only. Enter name of the Committee
3.  We will employ and train apprentices in accordance with the California Apprenticeship Council regulations, including § 230.1 (c) which requires that apprentices employed on public projects can only be assigned to perform work of the craft or trade to which the apprentice is registered and that the apprentices must at all times work with or under the direct supervision of journeyman/men.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed Name \_\_\_\_\_

Title \_\_\_\_\_

**State of California - Department of Industrial Relations DIVISION  
OF APPRENTICESHIP STANDARDS**

# REQUEST FOR DISPATCH OF AN APPRENTICE – DAS 142 FORM

DO NOT SEND THIS FORM TO DAS

You may use this form to request dispatch of an apprentice from the Apprenticeship Committee in the craft or trade in the area of the public work. Go to: <http://www.dir.ca.gov/DAS/PublicWorksForms.htm> for information about programs in your area and trade. You may also consult your local Division Apprenticeship Standards (DAS) office whose telephone number may be found in your local directory under California, State of, Industrial Relations, Division of Apprenticeship Standards. **Except for projects with less than 40 hours of journeyman work, you must request and employ apprentices in no less than 8 hour increments.**

|  |  |
|--|--|
| <b>Date:</b> _____                             | <b>Contractor Requesting Dispatch:</b>     |
| <b>To Applicable Apprenticeship Committee:</b> | <b>Name:</b> _____                         |
| <b>Name:</b> _____                             | <b>Address:</b> _____                      |
| <b>Address:</b> _____                          | _____                                      |
| _____  | <b>License No.</b> _____                   |
| <b>Tel. No.</b> _____ <b>Fax No.</b> _____     | <b>Tel. No.</b> _____ <b>Fax No.</b> _____ |

**Project Information:**

**Contract No.** \_\_\_\_\_

**Name of the Project:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Dispatch Request Information:**

**Number of Apprentice(s) Needed:** \_\_\_\_\_ **Craft or Trade:** \_\_\_\_\_

**Date Apprentice(s) to Report:** \_\_\_\_\_ (72 hrs. notice required) **Time to Report:** \_\_\_\_\_

**Name of Person to Report to:** \_\_\_\_\_

**Address to Report to:** \_\_\_\_\_

*You may use this form to make your written request for the dispatch of an apprentice. Requests for dispatch must be in writing and submitted at least 72 hours in advance (excluding weekends and holidays) via either first class mail, fax or email. **Proof of submission may be required.** Please take note of California Code of Regulations, Title 8, § 230.1 (a) for all applicable requirements regarding apprenticeship requests and/or visit <http://www.dir.ca.gov/DAS/DASApprenticesOnPublicWorksSummaryOfRequirements.htm>*

DAS 142 (Revised 12/11)

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS  
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: # CEMENT MASON**

**DETERMINATION:** NC-23-203-1-2014-2

**ISSUE DATE:** August 22, 2014

**EXPIRATION DATE OF DETERMINATION:** June 28, 2015\*\* The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Kings, Lake, Lassen, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Monterey, Napa, Nevada, Placer, Plumas, Sacramento, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Yolo, and Yuba counties.

| CLASSIFICATION<br>(JOURNEYPERSON)  | Employer Payments       |                          |         |                            |          | Straight-Time               |                | Overtime Hourly Rate |                                 |                          |
|--|-------------------------|--------------------------|---------|----------------------------|----------|-----------------------------|----------------|----------------------|---------------------------------|--------------------------|
|  | Basic<br>Hourly<br>Rate | Health<br>and<br>Welfare | Pension | Vacation<br>and<br>Holiday | Training | Hours <sup>d</sup><br>Total | Hourly<br>Rate | Daily<br>1 1/2X      | Saturday <sup>a</sup><br>1 1/2X | Sunday<br>and<br>Holiday |
| Cement Mason   | \$30.00                 | 8.15                     | 9.80    | 5.24 <sup>b</sup>          | 0.47     | 8                           | 53.66          | 68.660               | 68.660 <sup>c</sup>             | 83.66                    |
| Mastic Magnesite Gypsum, Epoxy,<br>Polyester, Resin and all composition<br>masons, swing or slip form<br>scaffolds | \$30.75                 | 8.15                     | 9.80    | 5.24 <sup>b</sup>          | 0.47     | 8                           | 54.41          | 69.785               | 69.785 <sup>c</sup>             | 85.16                    |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ <http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp>. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at <http://www.dir.ca.gov/das/das.html>.

<sup>a</sup> Saturdays in the same work week may be worked at straight time if a job is shut down during the normal work week due to inclement weather or major mechanical breakdown (limited to curb and gutter machine, concrete pump, and concrete plant).

<sup>b</sup> Includes an amount for supplemental dues.

<sup>c</sup> Rate applies to the first 8 hours of work on Saturday. All other hours worked on Saturday are paid at the Sunday/Holiday rate.

<sup>d</sup> Where multiple shifts are worked, the day shift shall work eight (8) hours and for such work they shall be paid the regular straight time rate for eight (8) hours; the second (2<sup>nd</sup>) shift shall work seven and one-half (7 ½) hours, and for such work they shall be paid the regular straight time rate for eight (8) hours; if a third (3<sup>rd</sup>) shift is worked, they shall work seven (7) hours and for such work they shall be paid eight (8) hours regular straight time pay. No multiple shift shall be started for less than five (5) consecutive days.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at <http://www.dir.ca.gov/OPRL/PWD>. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at <http://www.dir.ca.gov/OPRL/PWD>. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

SAMPLE<sup>53</sup>

## California Apprenticeship Council - Training Fund Contributions

1. Go to this web link: <https://www.dir.ca.gov/DAS/tf/cac2.asp> and add it to your favorites.
2. Fill out the New Easy Web App with the necessary information.
3. Please use your Contractor's License Number without the alpha digit. This number can also be used to look up your contributions on the website at:  
<http://www.dir.ca.gov/CA/trainingfund/Tfsearch.html>
4. Select the County and Occupation, then fill in the hours and rate and when you hit "tab" the amount is calculated for you.
5. Once you are done filling out the form and verified your information, print out your invoice.
6. **VERY IMPORTANT:** Mail **both** the **invoice** and your **check** payable to:  
**California Apprenticeship Council** to:

**Remit to: CALIFORNIA APPRENTICESHIP COUNCIL  
PO BOX 511283  
Los Angeles, CA 90051-7838**

# CONTRACTOR FRINGE BENEFIT STATEMENT

|                                  |                    |                   |
|----------------------------------|--------------------|-------------------|
| Contract Number / Name:          | Contract Location: | Today's Date:     |
| Contractor / Subcontractor Name: |                    | Business Address: |

In order that the proper Fringe Benefit rates can be verified when checking payrolls on the above contract, the hourly rates for fringe benefits, subsistence and/or travel allowance payment made for employees on the various classes of work are tabulated below.

|                 |   |   |
|-----------------|---|---|
| Classification: | Effective Date:                               | Subsistence or Travel Pay:<br>\$ _____    |
| FRINGE BENEFITS | Health & Welfare     \$ _____                 | PAID TO:    Name: _____<br>Address: _____ |
|                 | Pension                 \$ _____              | PAID TO:    Name: _____<br>Address: _____ |
|                 | Vacation/<br>Holiday                 \$ _____ | PAID TO:    Name: _____<br>Address: _____ |
|                 | Training<br>Other                    \$ _____ | PAID TO:    Name: _____<br>Address: _____ |

|                 |   |   |
|-----------------|---|---|
| Classification: | Effective Date:                               | Subsistence or Travel Pay:<br>\$ _____    |
| FRINGE BENEFITS | Health & Welfare     \$ _____                 | PAID TO:    Name: _____<br>Address: _____ |
|                 | Pension                 \$ _____              | PAID TO:    Name: _____<br>Address: _____ |
|                 | Vacation/<br>Holiday                 \$ _____ | PAID TO:    Name: _____<br>Address: _____ |
|                 | Training<br>Other                    \$ _____ | PAID TO:    Name: _____<br>Address: _____ |

|                 |   |   |
|-----------------|---|---|
| Classification: | Effective Date:                               | Subsistence or Travel Pay:<br>\$ _____    |
| FRINGE BENEFITS | Health & Welfare     \$ _____                 | PAID TO:    Name: _____<br>Address: _____ |
|                 | Pension                 \$ _____              | PAID TO:    Name: _____<br>Address: _____ |
|                 | Vacation/<br>Holiday                 \$ _____ | PAID TO:    Name: _____<br>Address: _____ |
|                 | Training<br>Other                    \$ _____ | PAID TO:    Name: _____<br>Address: _____ |

|                                       |                  |
|---------------------------------------|------------------|
| Submitted: Contractor / Subcontractor | By: Name / Title |
|---------------------------------------|------------------|



PUBLIC WORKS PAYROLL REPORTING FORM

NAME OF CONTRACTOR OR SUB CONTRACTOR ADDRESS CONTRACTORS LICENSE # SPECIALTY LICENSE #

PAYROLL NO. FOR WEEK ENDING SELF-INSURED CERTIFICATE # WORKERS' COMPENSATION POLICY # PROJECT OR CONTRACT NO. PROJECT AND LOCATION

Table with columns for employee info (1), work classification (3), hours worked (4), total hours (5), hourly rate (6), gross amount earned (7), and various deductions (8) including FICA, state tax, and pension. Includes a 'CHECK NO.' column (9).

Form A 1-131 (New 2-80) (form has been reduced to fit page) S = Straight Time O = Overtime SDI = State Disability Insurance \*OTHER - Any other deductions, contributions and/or payment whether or not included or required by prevailing wage determinations must be separately listed. Use extra sheet if necessary CERTIFICATION must be completed

I, \_\_\_\_\_, the undersigned, am \_\_\_\_\_ with the authority to act for and on behalf of \_\_\_\_\_ (name of business and/or contractor) certify under penalty of perjury that the records or copies thereof submitted and consisting of \_\_\_\_\_ are the originals or true, full and correct copies of the originals which depict the payroll record(s) of the actual disbursements by way of cash, check, or whatever form to the individual or individuals named. (description, no. of pages)

Date: \_\_\_\_\_ Signature: \_\_\_\_\_ A public entity may require a more strict and/or more extensive form of certification.

In accordance with federal and state laws, and with the Public Agency's policy and contract documents, the undersigned contractor herein certifies that they will comply with the foregoing labor law requirements; and fully understands that failure to comply with these requirements will subject them to the penalties cited herein.

The contractor also herein certifies that it has been provided with a copy of the Labor Compliance Program Package for Contractors with includes:

1. Labor Law Requirements Checklist (included herein)
2. The Location of Applicable General Prevailing Wage Rate Determinations
3. Blank Certified Payroll Record form
4. Fringe Benefit Statements
5. State apprenticeship contribution form (CAC2)
6. State apprenticeship requirements and form to register apprentices (DAS-140)
7. Request for apprentices (DAS-142)
8. Copy of the Labor Code relating to Public Works and Public Agencies (Part 7, Chapter 1, Sections 1720-1816 can be found at [www.dir.ca.gov](http://www.dir.ca.gov)).

**IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE COPIES OF THE LABOR COMPLIANCE PROGRAM PACKAGE TO ALL LISTED SUBCONTRACTORS AND TO ANY SUBSTITUTED SUBCONTRACTORS.**

Project Name and Number: \_\_\_\_\_

Public Agency: \_\_\_\_\_

Contractor: Name \_\_\_\_\_

Contractor Address: \_\_\_\_\_

Contractor Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

License Number: \_\_\_\_\_ Date: \_\_\_\_\_

I acknowledge that I have been informed and am aware of the foregoing requirements and that I am authorized to make this certification on behalf of \_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
Signature/Name/Title of Contractor Authorized Representative

**VOLUME 3**  
**TECHNICAL SPECIFICATIONS**

## SECTION 011000 – SUMMARY OF WORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work under separate contracts.
5. Access to site.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and drawing conventions.
9. Miscellaneous provisions.

##### B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for details regarding temporary bypass pumping, limitations and procedures governing temporary use of Owner's facilities.

#### 1.2 PROJECT INFORMATION

##### A. Project Identification: **Secondary Effluent Line Modifications**

1. Project Location: 300 Smith Ranch Road, San Rafael, California 94903

##### B. Owner: Las Gallinas Valley Sanitary District (LGVSD)

##### C. Design Engineer: AQUA Engineering, (801) 299-1327

##### D. Construction Managers TBD

##### E. Owner's Programmer: ArcSine Engineering 530-222-7204

1. Consultants have been engaged for this Project to provide engineering and construction services and to serve as Project's coordinator.

#### 1.3 WORK COVERED BY CONTRACT DOCUMENTS

- ##### A.
- The following list has been furnished for the convenience of the Contractor and shall not be considered as representing all Work required in the Contract Documents. Contractor shall not take advantage of any errors or omissions in this listing and shall report any discrepancies or

questionable items to the Engineer for clarification. The Work of Project is defined by the Contract Documents and consists of the following:

**PHASE 1:**

1. Install new 36" HDPE and buried gate valve to connect existing 24" HDPE flange connection to existing 36" chlorine contact chamber piping.
2. Install new 8-foot diameter manhole #1 (dog-house style with cast-in-place floor) to connect 36" piping from Item #1 to existing 36" piping.

**PHASE 2:**

1. Concrete encase existing 30" HDPE that sits beneath manhole #2.
2. Install 8-foot diameter manhole #2 (dog-house style with cast-in-place floor) over existing 42"/24" secondary clarifier effluent piping.
3. Disconnect existing 24" HDPE from tee fitting and remove concrete encased 24" HDPE from CCC Weir Box to allow for installation of new core and piping.
4. Install new 42" HDPE form manhole #2 to CCC Weir Box.
5. Install new doppler ultrasonic flow meter in manhole #2.
6. Route 3"x1" containment PVC piping from existing line to new manhole #2.

**PHASE 3:**

1. Install temporary bypass pumping to allow for cutting/completion of work in manhole #2.
2. Cut and remove 42"/24" piping (and reducers) to allow for installation of grout and completion of installation of manhole #2.
3. Remove 20" flow meter from vault and install blind flanges on 20" DIP piping in vault.

**OTHER WORK:**

1. All associated site grading, yard piping, electrical, valving, paving, and other appurtenances as indicated in the design drawings and specifications.
2. Coordination of all construction activities with plant operators to ensure the reliable and efficient operation of the plant during construction and transition to new processes. The WWTP is an active plant that must remain operational at all times.
3. Project Construction Survey – The Contractor shall be responsible to survey the location of all buried piping and fittings. The survey information shall be presented on the Record Drawings and each surveyed point shall have the Station, Offset, Elevation information and a brief description. The survey shall be performed and data certified by a licensed surveyor in the State of California.
4. Coordination with the District's Programmer, including startup and testing.

List above is intended to provide an overview of the major project components and does not include all work described in Contract Documents.

B. Type of Contract.

1. Project will be constructed under a single prime contract.

1.4 CONSTRUCTION DOCUMENTS

- A. The Contractor may obtain copies of the construction documents as directed in Volume I, "Contract Documents." Electronic copies of the existing plant drawings will be available to the successful Contractor through the same means. Please note that hard copies of "record drawings" or "as-constructed drawings" from previous construction projects are not available. The contractor may produce hard copies as they may require internally from the electronic files provided.
- B. The Contractor's Schedule shall include work phases and completion dates. It shall also be coordinated with the phasing and sequencing plan. It is anticipated and expected that work on all Phases will begin with the Notice to Proceed and only the completion dates of these Phases will be different. Items in later phases may be completed earlier based on an approved Contractor Schedule.
- C. There will be several local tie-ins and shut downs in order to bring on-line new equipment and infrastructure. The contractor shall coordinate ahead of time local tie-ins and shut-downs with the Plant staff and will be responsible for planning and coordinating all aspects of the work. The Contractor is required to submit a detailed work plan for each shutdown or tie-in event.
- D. While localized shut downs or bypassing may be required, the Plant shall continue to process influent flows and meet the current Water Discharge Permit (available upon request). It shall be the responsibility of the Contractor to ensure that each process maintains operability throughout the construction. All bypass pumping shall be provided with complete redundancy. The Contractor shall bear any fines associated with the failure to meet Water Discharge Permit requirements due to construction activities. The Contractor shall also be held liable for violations of applicable permits due to construction activities. The Contractor shall be held liable for damages resulting from sewage spills caused by improperly performed shutdowns and bypasses.
- E. For each proposed bypass operation, the Contractor shall submit a bypass plan in accordance with Section 020960 of the Specifications. Prior to any bypassing, the plan must be approved by the Owner and Engineer. The Contractor shall be responsible for clean-up and repair of any damage caused during bypassing.

1.5 OWNER FURNISHED EQUIPMENT

There is no Owner Furnished Equipment associated with this project.

1.6 OWNER SELECTED EQUIPMENT

- A. There is no Owner Selected Equipment associated with this project.

## 1.7 ACCESS TO SITE

- A. General: Contractor shall have access to the Project site, defined as the limits of construction, for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors for work on the site or facilities. Contractor shall coordinate and confirm with Owner the areas that are essential for facility operation which shall not be disturbed, blocked, or impacted by the construction efforts.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  - 1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. This includes maintaining access to the county facility located just south of the MMWD treatment facility.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

## 1.8 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and existing building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
  - 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
  - 2. Provide not less than 72 hours notice to Owner of activities that will affect Owner's operations.
- C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1. Engineer will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
3. Before limited Owner occupancy, mechanical and electrical systems shall be Substantially Complete, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

#### 1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
  1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work at the existing site to normal business working hours, which are 7:00 AM to 6:00 PM Monday through Friday and 9:00 AM to 6:00 PM on Saturday with Sunday and Holidays being prohibited. Work outside these hours must be approved by the District.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
  1. Notify Owner not less than 72 hours in advance of proposed utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate with Owner all operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy.
  1. Notify Owner not less than 72 hours in advance of proposed disruptive operations.
  2. Additional limits on allowable vibrations are applicable for shoring/pile driving required for excavation near existing structures and improvements. Refer to Section 312000 for additional details.
- E. Smoking requirements are to comply with California State law.

#### 1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. General and Special Conditions: Requirements of General and Special conditions provided in Volume I of Contract Documents apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  2. Abbreviations: Materials and products are identified by abbreviations and scheduled on Drawings.
  3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

END OF SECTION 011000

## SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. Coordination drawings.
  - 2. Requests for Information (RFIs).
  - 3. Requests for Change (RFCs)
  - 4. Project Web site.
  - 5. Project meetings.

#### 1.2 DEFINITIONS

- A. RFI: Request from Owner, Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.
- B. RFC: Request from Contractor proposing a change to the contract requirements.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.

#### 1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.

#### 1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
  - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
  - 1. Piping and manhole/vault plans. Locate invert elevations, penetration locations, electrical connections, etc. relevant to site yard piping and hydraulic structural elements.
  - 2. Review: Engineer will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

## 1.6 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified. A sample RFI form is included at the end of this Specification.
1. Engineer will return RFIs submitted to Engineer by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
  3. Owner or Engineer will not review the Contractor's RFIs that are in fact Requests for Changes (RFCs), as determined by the Owner. In such cases, Contractor will be required to resubmit on the appropriate RFC form.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Engineer.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Engineer.
- D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven (7) working days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. PST will be considered as received the following working day.
1. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for coordination information already indicated in the Contract Documents.
    - d. Requests for adjustments in the Contract Time or the Contract Sum.
    - e. Requests for interpretation of Engineer's actions on submittals.
    - f. Incomplete RFIs or inaccurately prepared RFIs.

2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.
  3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit a Change Proposal.
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer and Construction Manager in writing within 10 (10) days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Engineer.
  4. RFI number including RFIs that were dropped and not submitted.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Engineer's response was received.
- F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven (7) days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

#### 1.7 REQUEST FOR CHANGE (RFCs)

- A. Contractor shall submit a Request for Change when Contractor proposes a change in the Contract requirements. All change requests shall be submitted on the RFC form attached to this Specification. As shown therein, Contractor is required to fully describe the benefit(s) to the Owner, benefit(s) to the Contractor, the cost and/or schedule impact(s) associated with the requested change, along with whether or not Contractor proposes or requires a Contract Change Order for implementing the change. Except for as described in Section 1.6 herein, any Contractor RFC that is submitted on the RFI form will be returned without review.
- B. As noted on the RFC form, it is understood that certain RFCs can be responded to promptly, with minimal expenditures required by Owner. It is also understood that other RFCs require significant expenditures by Owner in order to properly evaluate and respond to Contractor's RFC. For those RFCs that fall in the latter category, Owner will provide an estimate (time and money) to Contractor as an initial response to RFC. Contractor may then elect to have Owner proceed with evaluating Contractor's RFC (with estimated value deducted from Contractor's Contract with the Owner), or elect to withdraw Contractor's RFC.

## 1.8 PROJECT MEETINGS

- A. General: Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Engineer, within three (3) days of the meeting.
- B. Preconstruction Conference: Engineer will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than fifteen (15) days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Construction Manager, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Procedures for processing field decisions and Change Orders.
    - f. Procedures for RFIs.
    - g. Procedures for testing and inspecting.
    - h. Procedures for processing Applications for Payment.
    - i. Distribution of the Contract Documents.
    - j. Submittal procedures.
    - k. Preparation of record documents.
    - l. Use of the premises and existing building.
    - m. Work restrictions.
    - n. Working hours.
    - o. Owner's occupancy requirements.
    - p. Responsibility for temporary facilities and controls.
    - q. Procedures for disruptions and shutdowns.
    - r. Construction waste management and recycling.
    - s. Parking availability.
    - t. Office, work, and storage areas.
    - u. Equipment deliveries and priorities.
    - v. First aid.
    - w. Security.
    - x. Progress cleaning.
  3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Engineer, Construction Manager of scheduled meeting dates.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility problems.
    - k. Time schedules.
    - l. Weather limitations.
    - m. Manufacturer's written instructions.
    - n. Warranty requirements.
    - o. Compatibility of materials.
    - p. Acceptability of substrates.
    - q. Temporary facilities and controls.
    - r. Space and access limitations.
    - s. Regulations of authorities having jurisdiction.
    - t. Testing and inspecting requirements.
    - u. Installation procedures.
    - v. Coordination with other work.
    - w. Required performance results.
    - x. Protection of adjacent work.
    - y. Protection of construction and personnel.
  3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Construction Manager will conduct progress meetings at weekly intervals or at an interval agreed upon between the District and Contractor.
1. Attendees: In addition to representatives of Owner, Construction Manager, and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be

- represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Contractor shall prepare three-week look ahead schedules for review at each progress meeting. The three-week look ahead schedules are not an acceptable substitute for CPM schedule updates that must be submitted with Contractor's monthly partial payment requests.
    - c. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Status of documentation.
      - 5) Deliveries.
      - 6) Off-site fabrication.
      - 7) Access.
      - 8) Site utilization.
      - 9) Temporary facilities and controls.
      - 10) Progress cleaning.
      - 11) Quality and work standards.
      - 12) Status of correction of deficient items.
      - 13) Field observations.
      - 14) Status of RFIs.
      - 15) Status of proposal requests.
      - 16) Pending changes.
      - 17) Status of Change Orders.
      - 18) Pending claims and disputes.
      - 19) Documentation of information for payment requests.
  3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
  4. It is noted that inspection will not be provided during scheduled progress meetings. Contractor is not permitted to perform work that requires inspection (as determined by

Owner) during the progress meetings. Contractor shall adjust his schedule to accommodate said bi-weekly progress meetings and no additional compensation will be provided for same. Contractor's bid shall consider Owner's requirements for weekly progress meetings. Owner, at its sole discretion, may decrease the frequency of progress meetings if deemed appropriate.

## 1.9 WORKSHOPS

- A. The Contractor shall schedule, prepare agendas, conduct, and prepare minutes for coordination workshops. The workshops shall be attended by:
  - 1. Contractor's Project Manager.
  - 2. Other members of the Contractor's organization.
  - 3. Owner's representatives.
  - 4. Other parties as required.
  
- B. Workshops may be requested to coordinate any efforts requiring bypass, shutdown, or otherwise impact the daily operation of the plant and plant staff. The timing, number, and duration of workshops will be coordinated between the Contractor and Owner depending on the Contractor's request for outages for tie-ins and other related work.
  
- C. Workshops shall be by teleconference or in-person at the Plant, as noted. However, the District will consider, but is under no obligation to, allow selected parties to attend remotely. In this case, the Contractor shall provide suitable means to cover the subject matter (such as Web-X, etc.)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**SAMPLE**  
**CONTRACTOR'S REQUEST FOR INFORMATION (RFI) # \_\_\_\_\_**

|   |                                   |
|---|-----------------------------------|
| <b>To (Engineer):</b>                       |                                   |
| <b>From (Contractor):</b>                   |                                   |
| <b>Subject:</b>                             |                                   |
| <b>Reference:</b> Construction Drawing:     | Specification (Section and Page): |
| <b>REQUEST</b>                              |                                   |
| <b>Information is requested as follows:</b> |                                   |
| <b>Information Requested By (Name):</b>     | <b>Date:</b>                      |
| <b>Response Requested By (Date):</b>        |                                   |
| <b>Received by CM (Date):</b>               |                                   |
| <b>RESPONSE</b>                             |                                   |
| <b>Response to Information Request:</b>     |                                   |
| <b>Response By (Name):</b>                  | <b>Date:</b>                      |

Final Distribution:

Page \_\_\_ of \_\_\_

**SAMPLE**  
**CONTRACTOR'S REQUEST FOR CHANGE (RFC) # \_\_\_\_\_**

|  |  |
|--|--|
| <b>To (Engineer):</b>  |  |
| <b>From (Contractor):</b>                                      |  |
| <b>Subject:</b>  |  |
| <b>Reference: Construction Drawing:</b>                        | <b>Specification (Section and Page):</b> |
| <b>REQUEST</b>   |  |
| <b>The following change is requested:</b>                      |  |
| <b>Change Requested By (Name):</b>                             | <b>Date:</b>                             |
| <b>Response Requested By (Date):</b>                           |  |
| <b>Received by CM (Date):</b>                                  |  |
| <b>Benefit to Owner:</b>                                       |  |
| <b>Benefit to Contractor:</b>                                  |  |
| <b>Cost and/or Schedule Impact:</b>                            |  |
| <b>Change Order Required or Proposed?    ___ YES    ___ NO</b> |  |
| <b>RESPONSE</b>  |  |

**Response to Change Request: <sup>(1)</sup>**

**RESPONSE (Continued)**

**Response By (Name):**

**Date:**

(1) It is understood that certain RFCs can be responded to promptly, with minimal expenditures required by Owner. It is also understood that other RFCs require significant expenditures by Owner in order to properly evaluate and respond to Contractor's RFC. For those RFCs that fall in the latter category, Owner will provide an estimate (time and money) to Contractor as an initial response to RFC. Contractor may then elect to have Owner proceed with evaluating Contractor's RFC (with estimated value deducted from Contractor's Contract with Owner), or elect to withdraw Contractor's RFC.

Final Distribution:

END OF SECTION 013100

## SECTION 013110 – SCHEDULE OF VALUES

### PART 1 - GENERAL

#### 1.1 WORK OF THIS SECTION

- A. The Contractor shall develop the Schedule of Values (lump sum price breakdown) to be incorporated into the cost loading function of the Construction Schedule as specified in Section 013100. Monthly progress payment amounts shall be determined from the monthly progress updates of the Construction Schedule activities.
- B. The Schedule of Values shall be developed independent of but simultaneous with the development of the Construction Schedule activities and logic as follows:

#### 1.2 RELATED SECTIONS

- A. The Work of the following Sections apply to Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of the Work.
  - 1. Measurement and Payment (General Conditions Section 9)
  - 2. Section 013100 Project Management and Coordination
  - 3. Section 013200 Construction Progress Documentation

#### 1.3 SUBMITTALS

- A. Preliminary Schedule of Values
- B. Detailed Schedule of Values

### PART 2 - PRODUCTS

#### 2.1 PRELIMINARY SCHEDULE OF VALUES

- A. The CONTRACTOR shall submit a preliminary Schedule of Values for the major components of the Work at the Preconstruction Conference in accordance with Section 013100, 1.8, B. The listing shall include a detailed breakdown of cost for each lump sum bid item.

The CONTRACTOR and CONSTRUCTION MANAGER shall meet and jointly review the preliminary Schedule of Values and make any adjustments in value allocations if, in the opinion of the CONSTRUCTION MANAGER, these are necessary to establish fair and reasonable allocation of values for the major Work components. Front end loading will not be permitted. The CONSTRUCTION MANAGER may require reallocation of major Work components from items in the above listing if in the opinion of the CONSTRUCTION MANAGER such reallocation is necessary.

## 2.2 DETAILED SCHEDULE OF VALUES

- A. The CONTRACTOR shall prepare and submit a detailed Schedule of Values to the CONSTRUCTION MANAGER within 30 days from the date of Notice to Proceed. The detailed Schedule of Values shall be based on the accepted preliminary Schedule of Values for major Work components. Because the ultimate requirement is to develop a detailed Schedule of Values sufficient to determine appropriate monthly progress payment amounts through cost loading of the Construction Schedule activities, sufficient detailed breakdown shall be provided to meet this requirement. The CONSTRUCTION MANAGER shall be the sole judge of acceptable numbers, details and description of values established. If, in the opinion of the CONSTRUCTION MANAGER, a greater number of Schedule of Values items than proposed by the CONTRACTOR is necessary, the CONTRACTOR shall add the additional items so identified by the CONSTRUCTION MANAGER.
1. The minimum detail of breakdown of the major Work components is indicated below. Greater detail shall be provided as directed by the CONSTRUCTION MANAGER.
    - a. Mobilization - no breakdown required.
    - b. The electrical Work shall be broken down by structure and yard facilities. Structures electrical Work shall be broken down into conduit and raceway installation, cable and wire installation, electrical equipment installation, terminations and lighting. Yard facilities shall be broken down by duct bank designation and substations.
    - c. Instrumentation and Control Work shall be broken down by structure.
    - d. Protective Coating Work shall be broken down by structure and yard area. Where specific coating Work at structures or yard areas may be critical to performing the Work to meet milestone and Contract dates, such Work shall be included as individual cost and Construction Schedule activity items.
    - e. Site preparation and demolition Work shall be broken down by site and structure. Each item of work shall be an individual cost item unless otherwise allowed by the CONSTRUCTION MANAGER.
    - f. Mechanical Work shall be broken down within each structure to identify individual piping systems, equipment installation by equipment name and number, and equipment testing and checkout.
    - g. Concrete structures shall be broken down into excavation, subgrade preparation, and appurtenant prefoundation Work, concrete foundation construction, slabs on grade, walls/columns, suspended slabs, stairs, etc. (sufficient breakdown shall be provided to accommodate necessary Schedule detail), hydrostatic structure testing where required and backfill.
    - h. Site improvement Work shall be broken down into individual drainage piping, drainage structures, site concrete, paving, excavation cut and fill, removal of existing pipe, clearing and grubbing and any other items determined to be necessary for the establishment of cost and Construction Schedule Activity items.
    - i. Equipment testing and plant startup broken down for completion milestones for each.
    - j. All other Work not specifically included in the above items shall be broken down as necessary for establishment of cost and Construction Schedule activity items.
    - k. Manways, air vacuum assemblies, yard valves, and blowoff assemblies, shall be broken down into excavation, backfill, pipelines, valves, concrete, piping, pipe fittings and specials, and any other item necessary for establishment of cost and construction schedule activity items.
    - l. Plant shutdowns and tie-ins to existing facilities; including structures, pipelines, MCCs, etc.

The CONTRACTOR and CONSTRUCTION MANAGER shall meet and jointly review the detailed Schedule of Values within 35 days from the date of Notice to Proceed. The value allocations and extent of detail shall be reviewed to determine any necessary adjustments to the values and to determine if sufficient detail has been proposed to provide cost loading of the Construction Schedule activities.

2. Following acceptance of the detailed Schedule of Values, the CONTRACTOR shall incorporate the values into the cost loading portion of the Construction Schedule. The Construction Schedule activities and logic shall have been developed concurrent with development of the detailed Schedule of Values, however, it shall be necessary to adjust the detailed Schedule of Values to correlate to individual Schedule activities. It is anticipated that instances will occur, due to the independent but simultaneous development of the Schedule of Values and the Construction Schedule activities, where interfacing these two documents will require changes to each document. Schedule activities may need to be added to accommodate the detail of the Schedule of Values. Schedule of Value items may need to be added to accommodate the detail of the Construction Schedule activities. Where such instances arise, the CONTRACTOR shall propose changes to the Schedule of Values and to the Construction Schedule activities to satisfy the Construction Schedule cost loading requirements.

### 2.3 CROSS REFERENCE LISTING

- A. To assist in the correlation of the Schedule of Values and the Construction Schedule, the CONTRACTOR shall provide a Cross Reference Listing which shall be furnished in two parts. The first part shall list each Scheduled Activity with the breakdown of the respective valued items making up the total cost of the activity. The second part shall list the valued item with the respective Scheduled Activity or Activities that make up the total cost indicated. In the case where a number of schedule activities make up the total cost for a valued item (shown in the Schedule of Values) the total cost for each scheduled activity should be indicated.
- B. These listings shall be updated and submitted in conjunction with the Construction Schedule monthly submittals as stated in Section 013200 - Construction Progress Documentation.
- C. Approved change orders reflected in the Construction Schedule shall be incorporated into the Schedule of Values as a single unit identified by the change order number.

### 2.4 CHANGES TO SCHEDULE OF VALUES

- A. Changes to the Construction Schedule which add activities not included in the original schedule but included in the original Work (schedule omissions) shall have values assigned as approved by the CONSTRUCTION MANAGER. Other activity values shall be reduced to provide equal value adjustment increases for added activities as approved by the CONSTRUCTION MANAGER.
- B. In the event that the CONTRACTOR and CONSTRUCTION MANAGER agree to make adjustments to the original Schedule of Values because of inequities discovered in the original accepted detailed Schedule of Values, increases and equal decreases to values for activities may be made.

## PART 3 - PRODUCTS

### 3.1 SCHEDULE OF VALUES SUBMITTAL

- A. Preliminary Schedule of Values shall be completed and submitted within 15 days from the date of Notice to Proceed, or at the preconstruction conference, whichever occurs first.
- B. Detailed Schedule of Values shall be completed and submitted within 30 days from the date of Notice to Proceed.
- C. Following a meeting and joint review of the CONTRACTOR's detailed Schedule of Values by the CONTRACTOR and the CONSTRUCTION MANAGER, CONTRACTOR will submit a revised detailed Schedule of Values within 40 days of the date of Notice to Proceed.

END OF SECTION 013110

## SECTION 013130 - SAFETY

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Contractor's safety program shall conform to the requirements specified in the General Conditions and Supplementary Conditions.
- B. This specification provides general guidance for site safety and a site safety program. This specification is supplemental to but does not replace or supersede the **District Safe Work Requirements and Confined Space Entry Program as provided in Appendix A and Appendix B** respectively in Volume 2 of the Bid Documents.

#### 1.2 DEFINITIONS

- A. For the purposes of this Section, an "active construction area" is any area where construction activities are occurring or construction activities could be considered a potential hazard to people.
- B. A "Designated Safety Officer" or "Safety Representative" for the purposes of this Contract, means anyone who is capable of identifying the existing and predictable hazards in the areas surrounding a construction project or those working conditions at a construction project that are unsanitary or dangerous to employees. A "Designated Safety Officer" has the authority to make prompt corrective measures to eliminate those hazards.
- C. For the purposes of this Section, a "classified area" represents any area within the classified boundary or envelope of an active wastewater treatment process basin, channel, or other facility. A table summarizing the classified areas present within the boundaries and scope of this project is provided in paragraph 1.4 of this Section.

#### 1.3 SUBMITTALS

- A. Demonstrate compliance action with the stipulations of California Occupational Safety and Health Administration (CAL OSHA), Mine Safety and Health Administration (MSHA), and other applicable local, state, and federal safety requirements by submitting to Engineer a copy of all safety plans, programs, and permits. Such plans and programs shall include, but are not limited to:
  - 1. Hazard Analysis Prior to Major Activities (job safety analysis, JSA).
  - 2. Emergency Plan.
  - 3. Rigging and Hoisting Plans.
  - 4. Excavation and Trenching Plans.
  - 5. Fire Protection Plan.
  - 6. Confined Space Entry Program.
  - 7. Electrical Safety (drop cords, temporary power, GFCI's, etc.)
  - 8. Lock Out/Tag Out.
  - 9. Fall Protection.
  - 10. Heavy Equipment Operations.
  - 11. Burning and Welding Operations.
  - 12. Training Plan.
  - 13. Tunneling/Underground/Jacking/Boring Operations.
  - 14. Project Site Rules and Regulations (hazard protection plan).

15. Material Handling (storage-disposal).
  16. Fuel Storage and Refueling.
  17. Hazard Communication/Right to Know.
  18. Subcontractor Requirements.
  19. Ventilation.
  20. Personal Protective Equipment (hearing, eye, face).
  21. Power Transmission/Distribution (temporary and/or permanent).
  22. Traffic Control.
  23. Environmental Controls.
  24. Safety Meetings.
  25. Spill Control Plan.
  26. First Aid Facilities.
- B. Engineer's receipt of safety plans or programs will not relieve Contractor in any way from the full and complete responsibility for safety and training of its personnel, and the onsite personnel of Owner, Engineer, and other visitors to areas of active construction areas. On a daily basis, inform Engineer of changes to the boundaries of the active construction areas.
- C. Be responsible for safety training all personnel who will have access to the active construction areas to meet state, federal, local and Contractor requirements. Maintain reasonable, regularly scheduled training sessions in mutually accessible facilities through entire Contract. Training costs for all personnel and visitors, except those costs associated with training personnel of Contractor, subcontractors, suppliers, and visitors will be considered incidental to other lump-sum portions of the Work and no additional compensation for such training will be provided.
- D. Safety Program Requirements:
1. Safety Representative Requirements:
    - a. Assign a Safety Representative as defined in the General Conditions of the Contract.
    - b. The Safety Representative's duties and responsibilities will be hazard recognition, accidents prevention, new employee orientation (including subcontractors), and the maintaining and supervising of safety precautions and program. This person shall have no other duties. The Safety Representative or a qualified and approved deputy shall be onsite at all times while Work is ongoing.
    - c. The Safety Representative will, as a minimum, meet the requirements of regulations per the CAL OSHA Enforcement Branch Program and be approved by the District or the District's representatives prior to any work starting on site.
  2. Hazardous Substances:
    - a. Provide Engineer with a list of all hazardous substances anticipated to be brought on-site.
    - b. Maintain on site Material Safety Data Sheets (MSDS) prior to arrival of any hazardous substances on the Project.
    - c. Use storage area(s) as outlined in the spill control plan.
  3. Job Safety Analysis (JSA):
    - a. Outline the sequence of the Work, equipment to be used, identify hazards that may exist or may be created and what procedures and/or safety equipment will be used to eliminate or reduce these hazards. A Scope of Work JSA shall be prepared and provided to the Engineer prior to the start of unusual, hazardous, or have risk potential activities on the Project. The name of the competent person assigned to this activity will be included on the JSA.

- b. Complete a JSA for any activity, which may be of an unusual nature or involves unique hazards.
4. Reports
- a. Provide to Engineer copies of Contractor's and subcontractor's:
    - 1) First aid, recordable, lost time and near miss, monthly logs.
    - 2) OSHA 200 injury log (annually).
    - 3) Safety meeting reports and topics (weekly).
    - 4) List of competent persons as required by OSHA and the Project Health and Safety Manual for each required task and their qualification as such.
    - 5) Injury and accident reports will be submitted to Engineer within 24 hours of any incident. **Immediate** notification to Engineer of an accident is **required**. Full cooperation with Engineer in accident investigation is required.
  - b. Conduct weekly safety inspections. Corrective actions shall be taken within 24 hours to address all deficiencies identified during inspections. Deficiency reports shall be prepared and submitted to Engineer within 48 hours indicating corrective actions taken. Failure to comply with required corrective measures identified in the safety inspection will result in the delayed signing of the monthly application for progress payment by Engineer.
  - c. Provide Engineer with a report of any periodic audit of Contractor's safety performance and/or records.

#### 1.4 CLASSIFIED AREAS

- A. The Site is an active wastewater treatment plant that must remain operational and online at all times. Consequently, construction activities for this project will involve working near process basins and equipment that must remain online and operational. In addition to the usual hazards of open, deep basins containing and equipment/machinery that is actively operating, many of these basins and structures are considered classified zones (per NFPA 820) with potential hazards for fire and explosions due to the presence of explosive gases associated with wastewater.
- B. Contractor shall take all additional precautions necessary when working within the classified zones and envelopes in these areas to prevent sparks, open flames, ignitions, and reduce the risk of fire or explosion. Precautions include but are not limited to: reviewing classified areas with all workers and subcontractors as part of the regular safety meetings and site orientation; providing proper PPE for workers entering classified areas; avoid using electrical tools, plugs, extension cords, welding equipment, open flames/heaters, and other potential sources for sparks or ignition within the classified envelopes; and following all guidelines and recommendations provided in NFPA and CALOSHA for working in classified areas,
- C. The following table is provided as a reference to the guidelines provided in NFPA 820 regarding classified areas that are in or near the construction area associated with this project:

| Location                     | Classification/Description   | Fire Protection Requirement* |
|------------------------------|--|------------------------------|
| Headworks<br>Screen Channels | Open to Atmosphere – <b>Class 1/Div 2</b> for a <b>10-foot envelope</b> around open channel (vertical and horizontal).   | FE, H                        |
| Grit Chambers                | Open to Atmosphere – <b>Class 1/Div 2</b> for a <b>10-foot envelope</b> around open basin (vertical and horizontal).   | FE, H                        |
| Primary Clarifiers           | Open to Atmosphere - <b>Class 1/Div 2</b> for an envelope extending 18-inches above basin top of wall and horizontally for 3-feet from the edge of the basin wall.       | H                            |
| Scum Pits                    | Open to Atmosphere – <b>Class 1/Div 2</b> for a <b>10-foot envelope</b> around open channel/pit (vertical and horizontal).   | FE, H                        |
| Sludge Storage               | Enclosed (non-ventilated) – <b>Class 1/Div 1</b> for the entire space.   | FE, H, OCG                   |
| Sludge Thickener             | Open to Atmosphere - <b>Class 1/Div 2</b> for an envelope extending 18-inches above basin top of wall and horizontally for 3-feet from the edge of the basin wall.       | H                            |
| Flares                       | <b>Class 1/Div 1</b> for a <b>10-foot envelope</b> around fixtures and housing. <b>Class 1/Div 2</b> for additional 15-feet vertically above the Class 1/Div 1 envelope. | -                            |
| Biogas Storage               | Open to Atmosphere – <b>Class 1/Div 1</b> for a <b>10-foot envelope</b> around storage vessel.   | FE                           |

\* Fire Protection Requirements Code (per NFPA 820) – additional precautions required to have on site in or immediately adjacent to area.  
FE: Fire Extinguisher  
H: Hydrant access and protection per 7.2.4  
CGD: Combustible gas detection (treat as confined space including CGD monitoring when entering the space).

END OF SECTION 013130

## SECTION 013200 – CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 WORK OF THIS SECTION

- A. The CONTRACTOR'S planning, scheduling and execution of the Work shall be presented to the OWNER by submission of the Construction Schedule information and data specified in this Section.

#### 1.2 RELATED SECTIONS

- A. The Work of the following Section applies to Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of the Work.
  - 1. Measurement and Payment (General Conditions Section 9)
  - 2. Section 013300 Submittals
  - 3. Section 013110 Schedule of Values

#### 1.3 SUBMITTALS

- A. Interim Construction Schedule.
- B. Detailed Construction Schedule.
- C. Monthly Construction Schedule Updates.
- D. Construction Schedule Revisions.
- E. Sub-Network Analysis.

#### 1.4 CONSTRUCTION SCHEDULE - GENERAL

- A. Provide, maintain, and use a computer-based Construction Schedule utilizing a cost-loaded, critical path method (CPI) network analysis system showing in detail the CONTRACTOR'S plan to execute and coordinate Work. The Construction Schedule shall include in cost-loaded, critical path method (CPM) the following:
  - 1. Milestones and the Completion Date specified in the Contract Agreement.
  - 2. The order in which Work shall be performed.
  - 3. Planned dates of start-up and testing for equipment, subsystems, and systems.
  - 4. Activities and matters involving mutual support between Contractor, Subcontractors, Suppliers, and OWNER.
- B. The CONTRACTOR is responsible for coordinating its own schedules (including subcontractors) as well as construction activities of others as directed by the CONSTRUCTION MANAGER. The CONTRACTOR should refer to the Construction Schedule to ensure that project site coordination and work by others at the site properly depicts the CONTRACTOR'S planning. In preparing all contract schedules, it is the responsibility of the CONTRACTOR to work with each subcontractor and supplier to

obtain information pertinent to the planning and updating of their respective activities and schedules.

#### 1.5 SCHEDULE SOFTWARE

- A. The CPM Schedule and all reports shall be prepared with Primavera Project Planner (P6). The CONTRACTOR shall provide all schedules and schedule updates using hard copy and electronic files on USB thumb drives.

#### 1.6 CONSTRUCTION SCHEDULE ACTIVITIES

- A. Each activity shall include the following attributes:
  - 1. Sub CIP number.
  - 2. Responsibility Code such as Owner, Construction Manager, Contractor, Sub-Contractor, Supplier.
  - 3. Resources.
  - 4. Duration.
  - 5. Remaining Duration.
  - 6. Activity Identification.
  - 7. Title.
  - 8. Cost in accordance with Section 013110 Schedule of Values.
- B. The CPM Schedule activities shall be cost-loaded based upon the Schedule of Values as approved by the CONSTRUCTION MANAGER in accordance with the requirements of Section 013110.
- C. The contract schedules shall show the breakdown of Work into activities and relationships to the extent required to effectively manage the Work. The contract schedules shall show the division of the Work into activities and specify the progression from the Notice to Proceed to the end of the Work. The contract schedule shall include appropriate time allowances and constraints for submittals, items of interface with work performed by others, and specified construction, start-up and performance tests. Activities shall not reflect a combining of Work located in separate Work areas, Work corresponding to different divisions of the Contract Documents, work performed by different subcontractors (first and second tiers), or rough-in and finish work of the same trade. The duration estimate for each activity shall be in working days and shall represent the single best estimate considering the scope of the activity work and the resources planned for the activity. The maximum duration of any activity shall be fifteen (15) working days, unless approved by the CONSTRUCTION MANAGER.
- D. The contract schedules shall be in a precedence diagram format, shall be plotted with a time-scaled calendar, and shall expressly identify the contract time, milestones, the critical path(s), and all activities. Activities shall be shown on their early dates, with total float noted. Connections between activities, whether on the same sheet or on different sheets, shall identify both predecessor and successor work. Activity data shall include description of the Work, activity costs, activity duration, and special codes. The use of start or finish restraint dates other than the ones specified in the Contract Documents must be approved by the CONSTRUCTION MANAGER.
- E. The CONTRACTOR'S Construction Schedule shall include all procurement related activities which lead to the delivery of permanent materials to the site in a timely manner.

Procurement activities should include, but not be limited to, preparation of Shop Drawings, review and approval of Shop Drawings, materials fabrication, materials delivery, etc., as appropriate. Upon written approval of the CONSTRUCTION MANAGER, these activities may be displayed or reported as a separate Off-Site Activities Schedule, properly correlated to the CONTRACTOR'S Construction Schedule.

The CONTRACTOR shall schedule the requisite duties and responsibilities of the OWNER, the CONSTRUCTION MANAGER and others (performing work for the OWNER) indicated in or required by the Contract Documents within the contract time. The contract schedules shall incorporate appropriate activities and sequences based on the information given in the Contract Documents, and if not given, as indicated by the CONSTRUCTION MANAGER, in writing.

#### 1.7 DEALING WITH SUBSTITUTES

- A. All versions of the CONTRACTOR'S schedule shall be based solely on the Work awarded, and shall exclude any material or equipment substitution proposals, even if the CONTRACTOR pursues a substitution in accordance with provisions of the Contract.
- B. The OWNER'S final determination on any proposed substitutions may not be made until after the CONTRACTOR'S Detailed Construction Schedule is prepared and accepted as provided in this Section.

#### 1.8 USE OF FLOAT

- A. Total Float is the number of days by which a part of the Work in the Construction Schedule may be delayed from its early dates without necessarily extending the contract time. Contract Float is the number of days between the CONTRACTOR'S anticipated date for early completion of the Work, or specified part, and the corresponding contract time. Total Float and Contract Float belong to the project and are not the exclusive benefit of any party. They shall be available to the OWNER or the CONTRACTOR, to accommodate changes in the Work, or to mitigate the effect of events which may delay performance or completion.

#### 1.9 EARLY COMPLETION

- A. An early completion schedule is one which anticipates completion of all or specified part of the Work ahead of the corresponding contract time. Since Contract Float belongs to the Project, the CONTRACTOR shall not be entitled to any extension in contract time, or recovery for any delay incurred because of extensions in an early completion date, until all Contract Float is used or consumed and performance or completion of the Work extends beyond the corresponding contract time. The CONTRACTOR shall adjust or remove any Float suppression techniques, e.g., preferential sequencing (crew movements, equipment use, form reuse, etc.), extended durations, imposed dates, scheduling of Work not required for a contract time as required Work, and others, as a prerequisite to a request for an increase in contract price or contract time. Use of restraint dates should be minimized and require approval by the CONSTRUCTION MANAGER.

## PART 2 - PRODUCTS

### 2.1 CONSTRUCTION SCHEDULE – DETAILED

- A. The Detailed Construction Schedule submittal shall consist of the time scaled CPM logic diagrams, activity reports, cost and resource reports, narrative, and a USB thumb drive with CPM software files duplicating the CONTRACTOR'S files in a P6 format CPM reports in the following sorts, shall be provided by the CONTRACTOR:
1. Critical Path. Report (sorted by Early Start).
  2. Activity report sorted by Total Float.
  3. Responsibility Schedule Report.
  4. Successor-Predecessor Report.
  5. 60-day Look Ahead Report.
  6. Three (3) Week Look Ahead Report.
  7. Cost Summary.
- B. No Work shall be scheduled on OWNER Holidays without prior written approval from the CONSTRUCTION MANAGER. OWNER holidays are:
1. January 1st, New Year's Day";
  2. Third Monday in February, "President's Birthday";
  3. Last Monday in May, "Memorial Day";
  4. July 4th, "Independence Day";
  5. First Monday in September, "Labor Day";
  6. Fourth Thursday in November, "Thanksgiving Day";
  7. Day after Thanksgiving in November;
  8. December 24th, "Christmas Eve";
  9. December 25th, "Christmas Day".

### 2.2 CONTRACTORS CONSTRUCTION SCHEDULE

- A. When the Detailed Construction Schedule Submittal is reviewed and accepted it becomes the CONTRACTOR'S baseline schedule and is referred to as the CONTRACTOR'S Construction Schedule. From then on, all activities and their relationships may not be changed, added, or deleted without the consent of both the CONSTRUCTION MANAGER and the CONTRACTOR. All changes must be reviewed and approved by the CONSTRUCTION MANAGER. Contract time (including all contracted milestones) cannot be changed without a formal Change. Order approved by the OWNER.

### 2.3 SCHEDULE NARRATIVES

- A. The Schedule Narrative accompanying the Detailed Construction Schedule submittal shall stand alone in describing the approach to the Work and the rationale used to develop the schedule relationships and logic. The written narrative shall describe critical activities, number of shifts per day, number of hours per shift, and the composition and number of crews and equipment to be utilized on each critical activity.
- B. The Schedule Narratives accompanying each subsequent schedule update and/or revision shall, at a minimum, compare the current early dates versus the corresponding baseline dates for milestones and the contract time. It shall also provide sufficient detail to allow verification of the progress of the Work, identify the assumptions made in incorporating work related to Change Orders, describe actual or potential delays, including related

causes, and the steps taken or anticipated to mitigate their impact, and itemize any proposed changes in network activities and sequences, and their basis.

## 2.4 SCHEDULE REVISIONS

- A. Construction Schedule revisions shall accurately represent all changes and adjustments in the sequencing and timing of Work remaining. The schedule revisions shall incorporate all changes which have been agreed upon in. Change Orders approved since the last revision. These revisions shall reflect the requirements of the applicable Change Orders. Schedule revision costs shall be included in all Change Orders and shall be limited to \$200 or 5% of the Change Order total, whichever is less.
- B. The Construction Schedule revision shall consist of the time scaled CPM logic diagrams, activity reports, cost and resources reports, narrative, and a copy of CPM software files duplicating the CONTRACTOR'S files in a P6 format. The CPM reports shall be sorted in the same manner as the Construction Schedule.
- C. Each Construction Schedule revision shall be assigned a revision number, starting with "Rev. 0" on the CONTRACTOR'S Construction Schedule for the Work as awarded. Resubmittals shall use the same revision number followed by the letters "A", "B", etc., as applicable.
- D. When a delay or disruption to the Work is identified.

## PART 3 - EXECUTION

### 3.1 DETAILED CONSTRUCTION SCHEDULE

- A. The CONTRACTOR shall provide eight (8) hard copies and two (2) electronic file copies each on an individual USB thumb drives of the Detailed Construction Schedule submittal due within thirty (30) calendar days after the date of the Notice to Proceed. This submittal shall reflect the entire scope of the Work as awarded.
- B. The CONTRACTOR'S Detailed Construction Schedule shall bear the CONTRACTOR'S stamp of approval signed by the CONTRACTOR. The CONTRACTOR'S stamp of approval shall constitute a representation to the OWNER and CONSTRUCTION MANAGER that the CONTRACTOR has determined or verified all data on that CONTRACTOR'S Construction Schedule or assumes full responsibility for doing so, and that the CONTRACTOR has reviewed and coordinated the sequences in that CONTRACTOR'S Detailed Construction Schedule with the requirements of the Work.
- C. The CONSTRUCTION MANAGER shall review and return the Detailed Construction Schedule Submittal to the CONTRACTOR within fifteen (15) working days. One (1) copy of the CONTRACTOR'S Detailed Construction Schedule will be returned to the CONTRACTOR with comments.
- D. The CONSTRUCTION MANAGER review and comments shall be for conformance with the contract time and those sequences of Work indicated in or required by the Contract Documents, to record early and late dates for milestones, and for conformance with the requirements of this Section and other information given in the Contract Documents which

may have a bearing on the schedule. The CONSTRUCTION MANAGER'S review will also be for reasonableness and consistency in the cost loading of the schedule activities. The CONSTRUCTION MANAGER'S review shall not extend to the CONTRACTOR'S means, methods, or techniques, the correctness of which shall remain the sole responsibility of the CONTRACTOR.

- E. If a resubmittal is required, the CONTRACTOR shall make appropriate adjustments or corrections in the CONTRACTOR'S Detailed Construction Schedule returned as "Revise and Resubmit," and shall deliver to the CONSTRUCTION MANAGER four (4) stamped and signed copies of the resubmitted CONTRACTOR'S Construction Schedule directing specific attention, in writing, to adjustments or corrections made other than those made in response to the CONSTRUCTION MANAGER'S comments on the previous submittal. The CONSTRUCTION MANAGER shall review and return one (1) copy of the resubmittal within ten (10) working days. Acceptance of the Detailed Construction Schedule by the CONSTRUCTION MANAGER shall be a condition precedent to processing the Applications for payment, after the first full month following return of the original submittal review comments.

### 3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE UPDATES

- A. Schedule Update Submittals.
  - 1. Schedule Update Submittals are due monthly and consist of the schedule update, cost and resource reports, activity reports, 60-day look-ahead and schedule narrative. Receipt and approval of a Schedule Update Submittal by the CONSTRUCTION MANAGER will be a condition precedent to processing each Application for Payment.
  - 2. Each Schedule Update Submittal shall consist of four (4) hard copies of all schedules and reports and two (2) electronic copies of the CPM file each on an individual USB thumb drive.
  - 3. Neither the updating of the CONTRACTOR'S Construction Schedule nor the updating of any report or schedule submitted to the CONSTRUCTION MANAGER by the CONTRACTOR under this Section, shall have the effect of amending or modifying, in any way, the contract time, contract completion date, or contract milestone dates.
  - 4. The CONSTRUCTION MANAGER and the CONTRACTOR will agree on an updating method for physical progress of the different activities, Options include quantities installed, man-hours spent, milestones reached, unit measurements (accomplished) and percent of Work completed.
- B. Monthly Reviews:
  - 1. Monthly review meetings between the CONSTRUCTION MANAGER and the CONTRACTOR shall be held within an agreed upon time, prior to the end of each month. The purpose of this meeting is to review current month actual schedule data against field and submittal records, evaluate actual physical progress and make recommendations as to payment for Work performed, review the schedule status, identify problem areas, address critical issues, determine causes for delay and formulate recommendations for corrective action.
  - 2. The monthly review meetings shall be held on the same day for each succeeding month, as agreed upon by the CONSTRUCTION MANAGER and CONTRACTOR.
  - 3. The CONTRACTOR shall make appropriate revisions in the Schedule Update. Submittals as may be required at the meeting, and shall include the updated schedule

with the CONTRACTOR'S submittal of the Application for Payment within five (5) days from the date of the monthly meeting.

4. The CONTRACTOR shall provide the following to support each monthly review:
  - a. The complete time scaled CPM network for the project including the base line and current construction schedules.
  - b. Bar Charts for near term window (60 working days) showing baseline and current activities.
  - c. Schedule or activity reports sorted by activity number and total float.
  - d. Logic report sorted by activity number, indicating predecessors, and successors.
  - e. Cost and resource plots.
  - f. Written Narrative explaining the progress highlight, problem areas, and the reasons for any logic, duration and critical path modification.
  - g. A sub network analysis showing the impacts due to any delay or disruption identified in the written narrative.

C. Schedule Recovery:

1. Within ten (10) working days after a Schedule Update submittal and having the schedule reflecting negative float the CONTRACTOR shall submit a written recovery statement to the CONSTRUCTION MANAGER describing the cause of the problem and the actions planned by the CONTRACTOR to recover schedule. The CONTRACTOR shall promptly undertake appropriate action at no additional cost to the OWNER to recover schedule whenever the current schedule shows that the CONTRACTOR did not/cannot achieve a milestone established on the Construction Schedule.
2. Appropriate recovery actions may include, but not be limited to, assignment of additional labor, subcontractors, equipment, shift or overtime work, expediting of submittal or deliveries, or any combination of them. Overlapping of activities or sequencing changes to increase concurrence, shall be deemed appropriate only if properly substantiated in the submittal. Recovery plans that require a change in the baseline schedule must be handled as a schedule revision in accordance with Paragraph 3.5, below. The CONTRACTOR shall pay for all costs that the OWNER incurs (additional inspection, etc.) as a result of these overtime shifts.

D. Lack of Action:

1. The CONTRACTOR'S refusal, failure or neglect to take appropriate recovery action or to submit a written recovery statement shall constitute reasonable evidence that the CONTRACTOR is not prosecuting the Work, or separable part, with the diligence that will insure its completion within the applicable contract time Such lack of action shall constitute sufficient basis for the CONSTRUCTION MANAGER to recommend the withholding of some or all of any payment due, and/or shall be considered ground for termination by the OWNER.

### 3.3 SCHEDULE REVISIONS

- A. The CONTRACTOR'S Construction Schedule must be revised when it is no longer useful as a status and control mechanism as determined by the CONSTRUCTION MANAGER or when a Change Order impacts the CONTRACTOR'S timing and sequence of the Work.

Contract time (including all contracted milestones) cannot be changed without a formal Change Order approved by the OWNER.

- B. All schedule revisions must be reviewed and approved by the CONSTRUCTION MANAGER. Scheduling of changes is the responsibility of the CONTRACTOR. The CONTRACTOR shall identify all changes arising from a Change Order and submit the revised CONTRACTOR'S Construction Schedule to the CONSTRUCTION MANAGER for review and approval. The CONTRACTOR shall provide a separate sub-network schedule for each Change Order showing the revised activities, whether the change is concurrent or sequential, the duration of the change and the restraints on pricing of the change. Failure to provide the sub-network schedule in a timely manner will result in the CONTRACTOR waiving his right for additional time. No time will be granted under the contract for the cumulative effect of changes.
- C. The CONTRACTOR shall submit to the CONSTRUCTION MANAGER, three (3) copies and one (1) copy on a USB thumb drives of the CONTRACTOR'S Construction Schedule revision which shall bear the CONTRACTOR'S stamp of approval, signed by the CONTRACTOR. The CONSTRUCTION MANAGER'S review shall be for the same items identified for the review of the Construction Schedule Submittal, as well as to identify the CONTRACTOR'S use of float. The correctness of the CONTRACTORS Construction Schedule revision shall remain the sole responsibility of the CONTRACTOR.

All Schedule revisions must include a written narrative describing the reason for the revision, the revised critical path and all logic and duration revisions. The reasons shall include, but not be limited to, changes in the Specifications, extra work, addition or deletion of work, increased or decreased quantities, defective work and acceleration of the work.

END OF SECTION 013200

## SECTION 013300 – CONTRACTOR SUBMITTALS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals. The Contractor shall coordinate the submittal requirements in this section with those given in the General Conditions of Volume 1, “Bid and Contract Documents.”
- B. Related Requirements:
  - 1. Section 013200 “Construction Progress Documentation” for submitting schedules and reports, including Contractor's construction schedule.
  - 2. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

#### 1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

#### 1.3 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.
- B. Construction Schedule: Within fourteen (14) days after the date of Notice to Proceed, the Contractor shall submit a construction schedule providing the starting and completion dates of the various stages of the Work. The Contractor shall be prepared to discuss its construction schedule at the pre-construction conference.
- C. Schedule of Values or lump sum price breakdown: Within fifteen (15) days after the date of Notice to Proceed or at the preconstruction conference, the Contractor shall submit a preliminary schedule of values in accordance with Section 013110 – Schedule of Values.

Subsequent requirements to submit a detailed Schedule of Values and any further revisions shall also comply with the requirements of Section 013110.

#### 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Engineer's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.
  - 1. Engineer will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
    - a. Engineer makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    - b. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Engineer.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow fifteen (15) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  - 3. Resubmittal Review: Allow fifteen (15) days for review of each resubmittal.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
  - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
  - 2. Include the following information for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name of Engineer.
    - d. Name of Construction Manager.

- e. Name of Contractor.
  - f. Name of subcontractor.
  - g. Name of supplier.
  - h. Name of manufacturer.
  - i. Submittal number or other unique identifier, including revision identifier.
    - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
  - j. Number and title of appropriate Specification Section.
  - k. Drawing number and detail references, as appropriate.
  - l. Location(s) where product is to be installed, as appropriate.
  - m. Other necessary identification.
3. Submittal Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
4. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return without review submittals received from sources other than Contractor.
- a. Transmittal Form for Paper Submittals: Use facsimile of sample form included in Project Manual.
  - b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
    - 1) Project name.
    - 2) Date.
    - 3) Destination (To:).
    - 4) Source (From:).
    - 5) Name and address of Engineer.
    - 6) Name of Construction Manager.
    - 7) Name of Contractor.
    - 8) Name of firm or entity that prepared submittal.
    - 9) Names of subcontractor, manufacturer, and supplier.
    - 10) Category and type of submittal.
    - 11) Submittal purpose and description.
    - 12) Specification Section number and title.
    - 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
    - 14) Drawing number and detail references, as appropriate.
    - 15) Indication of full or partial submittal.
    - 16) Transmittal number.
    - 17) Submittal and transmittal distribution record.
    - 18) Remarks.
    - 19) Signature of transmitter.

- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
  4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of Engineer.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Name of firm or entity that prepared submittal.
    - g. Names of subcontractor, manufacturer, and supplier.
    - h. Category and type of submittal.
    - i. Submittal purpose and description.
    - j. Specification Section number and title.
    - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
    - l. Drawing number and detail references, as appropriate.
    - m. Location(s) where product is to be installed, as appropriate.
    - n. Related physical samples submitted directly.
    - o. Indication of full or partial submittal.
    - p. Transmittal number.
    - q. Submittal and transmittal distribution record.
    - r. Other necessary identification.
    - s. Remarks.
  5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
    - a. Project name.
    - b. Number and title of appropriate Specification Section.
    - c. Manufacturer name.
    - d. Product name.
- F. Options: Identify options requiring selection by Engineer.
- G. Deviations: Identify deviations from the Contract Documents on submittals.

- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements:
  - 1. Action Submittals: Submit one (1) electronic copy and/or one (1) hard copy (if requested by the Authority) of each submittal unless otherwise indicated.
  - 2. Informational Submittals: Submit one (1) electronic copy and/or one (1) hard copy (if requested by the Authority) of each submittal unless otherwise indicated. Engineer will not return copies.
  - 3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.

- f. Application of testing agency labels and seals.
  - g. Notation of coordination requirements.
  - h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
- a. Wiring diagrams showing factory-installed wiring.
  - b. Printed performance curves.
  - c. Operational range diagrams.
  - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
- a. Identification of products.
  - b. Schedules.
  - c. Compliance with specified standards.
  - d. Notation of coordination requirements.
  - e. Notation of dimensions established by field measurement.
  - f. Relationship and attachment to adjoining construction clearly indicated.
  - g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
- a. Generic description of Sample.
  - b. Product name and name of manufacturer.
  - c. Sample source.
  - d. Number and title of applicable Specification Section.
3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

- a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
  - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  - a. Number of Samples: Submit two (2) full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
- 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit two (2) sets of Samples. Engineer will retain one (1) Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
    - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  - 1. Submit product schedule in the following format:
    - a. Four (4) paper copies of product schedule or list unless otherwise indicated. Engineer will return three (3) copies.
- F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

- J. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of engineers and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- T. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed and certified.

### 3.2 ENGINEER'S ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
  - 1. "NO EXCEPTIONS TAKEN" or "EXCEPTIONS AS NOTED" will require no formal revision and resubmission.
  - 2. "REVISE AND RESUBMIT" or "REJECTED" will require the Contractor to revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.
- C. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
- F. Fabrication of an item shall commence only after the Engineer has reviewed the submittal and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN" or "EXCEPTIONS AS NOTED". Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis of claims for extra work.

END OF SECTION 013300

## SECTION 013550 – SECURITY

### GENERAL

#### 1.1 SUMMARY

- A. Protect the active construction areas of the Work, including all material, equipment, field office trailers, and their contents from theft, vandalism, and unauthorized entry.
- B. Contractor is responsible for securing the site, including installing and maintaining temporary security fence to protect the project site, existing treatment plant/facilities, and other work/storage areas.

#### 1.2 DEFINITIONS

- A. For the purposes of this Section, an “active construction area” is any area where construction activities are occurring or construction activities could be considered a potential hazard to people.

#### 1.3 RELATED SECTIONS

- A. Section 015000 - Temporary Facilities and Controls
- B. Section 015600– Project Environmental Controls

#### 1.4 SUBMITTALS

- A. Prior to performance of any work at the Project Site, submit to Engineer for record only, two copies of the security plan commensurate with the needs of the Project, signed by officer of Contractor. Contractor to be solely responsible for adequacy of the security plan.
- B. Provide Engineer and Owner/Operators with drawing and data showing temporary fencing and gate locations, along with materials to be used.
- C. Provide Engineer and Owner with a list of 24-hour emergency phone numbers for Contractor personnel.
- D. Submit to Engineer and Owner an updated progressive inventory of materials and equipment received on-site.
- E. Submit log of workmen and visitors to Project Site.

#### 1.5 SECURITY PROGRAM

- A. Protect Work and existing premises, including the field office trailers and their contents, from theft, vandalism, and unauthorized entry during working and non-working hours.
- B. Accept sole responsibility for Project Site security and protection of the Work.

- C. Initiate the security program at job mobilization and maintain the security program throughout construction period.
- D. Limit lighting to basic safety and security requirements, and shield when possible.
- E. Be responsible for the security of storage compound and lay down area, and for all plant material, equipment, and tools at all times.
- F. Prohibit firearms for the Project Site.
- G. Prohibit dogs from the Project Site, with the exception of those clearly used for security purposes within fenced areas.
- H. Erect and maintain temporary security fencing as required to protect the Work, the Project Site, and existing facilities on the Project Site. The location of all temporary security fencing shall be approved in advance by Engineer.
  - 1. Fence Height: 6 feet
  - 2. Fence Material: Galvanized Steel

1.6 ENTRY CONTROL

- A. Entry control shall not unreasonably limit the personnel of Owner, Engineer, and their operations and maintenance groups from performing assigned duties. Temporary access limitations will be identified to Engineer and the operations and maintenance groups at least 24 hours prior to such limitation.
- B. Restrict entry of unauthorized persons and vehicles into Project Site and allow entry only to authorized persons with proper identification.
- C. Maintain a log of workmen and visitors and make log available to Owner on request. This log shall be submitted to Engineer biweekly or as necessary.
- D. Require all visitors to sign the visitor log acknowledgment of the project rules included in this Section. A copy of the project rules shall be given to each visitor. Submit copies of these forms to Engineer biweekly. Give jobsite security orientation training to all affected employees, including subcontractor employees. Employee participation in the security orientation shall be acknowledged by their respective individual signatures affixed to an orientation roster.
- E. Contractor has the right to refuse access to the Project Site or require that a person or vehicle be removed from the Project Site if found violating any of the project rules.

**PRODUCTS (NOT USED)**

**EXECUTION (NOT USED)**

END OF SECTION 013550

## SECTION 014000 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 2. Requirements for Contractor to provide quality-assurance and -control services required by Engineer, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
  - 3. Specific test and inspection requirements are not specified in this Section.

#### 1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer or Construction Manager.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
  - 1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

### 1.3 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
- B. In instances where a conflict arises between standards and/or between the Technical Specifications and the Design Drawings, the more stringent standard or requirement shall govern at the discretion of Owner and Engineer.
- C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Engineer.
  2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Engineer.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

## 1.5 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
  2. Project title and number.
  3. Name, address, and telephone number of testing agency.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.
  6. Description of the Work and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and re-inspecting.
- B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  5. Other required items indicated in individual Specification Sections.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.

- b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
  - c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
  - d. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Engineer, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

## 1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services. Testing services provided by Owner, if any, are for the sole benefit of Owner. However, test results shall be available to Contractor. It is the Contractor's responsibility to schedule the testing provided by such agencies. Testing necessary to satisfy Contractor's internal quality control procedures shall be the sole responsibility of Contractor.
- 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  - 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
  - 3. Testing Services furnished by Owner: Unless otherwise specified, Owner will provide quality control testing services in connection with the following materials and equipment incorporated in the Work;
    - a. Concrete strength tests.
    - b. Moisture-density and relative density tests on embankment, fill, and backfill materials.
    - c. In-place field density test on embankments, fills, and backfill.
    - d. Other materials and equipment as specified herein.
    - e. Testing, including sampling, shall be performed by Engineer or testing firm's laboratory personnel, in general manner and frequency indicated in the Specifications.
    - f. Furnish all sample materials and cooperate in the testing activities, including sampling. Interrupt the Work when necessary to allow testing, including sampling to be performed. There shall be no claim for an increase in Contract Price or Contract Times due to such interruption. When testing activities, including sampling, are performed in the field by the testing firm's laboratory personnel, furnish personnel and facilities to assist in the activities.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services:
  - a. Concrete materials and mix designs.
  - b. Embankment, fill, and backfill materials.
  - c. Quality control testing of all precast concrete.
  - d. All other tests and engineering data required for Engineer's review of materials and equipment proposed to be used in the Work.
  - e. In addition, the following quality control tests shall be performed by Contractor:
    - 1) Holiday testing of pipeline coatings.
    - 2) Air testing of field-welded joints for steel pipe or pipe cylinders and fabricated specials.
    - 3) All testing and inspection of welding work including, but not limited to, welding procedure qualifications, welder operator qualifications, all work performed by the certified welding inspector, all appropriate nondestructive testing of welds and all repair and retest of weld defects.

1.8 The testing firm's laboratory shall perform all laboratory tests within a reasonable time consistent with the specified standards and will furnish a written report of each test. Distribution of the reports shall be as directed by Engineer.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least twenty-four (24) hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

C. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Engineer, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Engineer, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

## 1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections and in Statement of Special Inspections included in the Contract Documents (Drawings), and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Engineer, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Engineer, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and re-inspecting corrected work.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
  1. Date test or inspection was conducted.
  2. Description of the Work tested or inspected.
  3. Date test or inspection results were transmitted to Engineer.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Engineer's and Construction Manager's reference during normal working hours.

### 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

## SECTION 014120 - PERMITS

### PART 1 - GENERAL

#### 1.1 ADMINISTRATIVE REQUIREMENTS

- A. Obtain permits required for the execution of Work in accordance with the Contract Documents. Provide copies of these permits to Owner.
- B. The intent of this Section is to furnish the known list of required permits for the Work under the Contract Documents. **Contractor is responsible for determining and verifying the extent of all permits required and for obtaining such permits.**
- C. In the Bid Price, include costs for obtaining all necessary permits, including application fees and other costs, and the costs of complying with the conditions of all permits. Any fees listed in this section are estimates and are for information only. Verify and pay all actual fees.
- D. Within 30 Days of the Limited Notice to Proceed, submit a list of all permits and licenses to be obtained, indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.

#### 1.2 SUMMARY OF PERMITS TO BE OBTAINED BY CONTRACTOR

- A. Obtain the following permits. Submit copies of these permits to Engineer and maintain copies on-site. Comply with all conditions of the permits and pay all applicable fees. Types of permits that may be required include:
  - 1. SWPPP
  - 2. Any required construction permits from City, County, or State agencies
  - 3. Permits for road construction
  - 4. Permits for transport of equipment and materials to/from the site.
  - 5. Permits for disposal of any debris or demolition materials (as needed)
  - 6. Permits required for environmental protection including dewatering and discharging of waters.
  - 7. Permits for noise or pollution control as required.

#### 1.3 SUMMARY OF PERMITS OBTAINED BY OWNER

- A. Owner is not responsible for obtaining any permits.

#### 1.4 NPDES PERMIT

A copy of the District's NPDES permit is available to the Contractor upon request. The plant must comply with these requirements at all time and, accordingly, all construction activity including tie-ins, downtime, demolition, startup, etcetera, must be coordinated with operators to ensure the plant continues to operate as required.

END OF SECTION 014120

## SECTION 014200 – ABBREVIATIONS AND REFERENCE STANDARDS

### PART 1 - GENERAL

#### 1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Engineer. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

#### 1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
- D. All work specified herein shall conform to or exceed the requirements of the referenced specifications, codes and standards to the extent that the provisions of such documents are not in conflict with the requirements of these Specifications.
- E. References herein to "Building Code" shall mean the California Building Code (CBC) of the International Code Council (ICC). The 2016 edition of the code, as approved and adopted by the agency having jurisdiction, including all addenda, modifications, amendments or other lawful changes thereto, shall apply to the Work.
- F. In case of conflict between codes, reference standards, drawings and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The Contractor shall bid the most stringent requirements.
- G. Applicable Standard Specifications: The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards and specifications listed herein.
- H. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

### 1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
 

|        |  |
|--------|--|
| AA     | Aluminum Association   |
| AAMA   | American Architectural Manufacturers Association                   |
| AASHTO | American Association of State Highway and Transportation Officials |
| ACI    | American Concrete Institute (Formerly: ACI International)          |
| ACPA   | American Concrete Pipe Association                                 |
| AGA    | American Gas Association   |
| AGC    | Associated General Contractors                                     |
| AHRI   | Air-Conditioning, Heating, and Refrigeration Institute (The)       |
| AI     | Asphalt Institute  |
| AIA    | American Institute of Architects (The)                             |
| AISC   | American Institute of Steel Construction                           |
| AISI   | American Iron and Steel Institute                                  |
| AITC   | American Institute of Timber Construction                          |
| AMCA   | Air Movement and Control Association International, Inc.           |
| ANSI   | American National Standards Institute                              |
| APA    | APA - The Engineered Wood Association                              |

|          |   |
|----------|---|
| APA      | Architectural Precast Association   |
| API      | American Petroleum Institute  |
| APWA     | American Public Works Association   |
| ASA      | Acoustical Society of America   |
| ASAE     | American Society of Agriculture Engineer  |
| ASCE     | American Society of Civil Engineers   |
| ASCE/SEI | American Society of Civil Engineers/Structural Engineering Institute (See ASCE) |
| ASHRAE   | American Society of Heating, Refrigerating and Air-Conditioning Engineers       |
| ASLE     | American Society of Lubricating Engineers                                       |
| ASME     | American Society of Mechanical Engineers  |
| ASQC     | American Society for Quality Control  |
| ASSE     | American Society of Safety Engineers (The)                                      |
| ASSE     | American Society of Sanitary Engineering  |
| ASTM     | American Society for Testing and Materials International                        |
| ATIS     | Alliance for Telecommunications Industry Solutions                              |
| AWPA     | American Wood Protection Association  |
| AWPI     | American Wood Preservers Institute  |
| AWS      | American Welding Society  |
| AWWA     | American Water Works Association  |
| BHMA     | Builders Hardware Manufacturers Association                                     |
| BIA      | Brick Industry Association (The)  |
| BOCA     | BOCA (Building Officials and Code Administrators International Inc.)            |
| CDA      | Copper Development Association  |
| CGA      | Compressed Gas Association  |
| CLFMI    | Chain Link Fence Manufacturers Institute  |
| CMA      | Concrete Masonry Association  |
| CPA      | Composite Panel Association   |
| CRSI     | Concrete Reinforcing Steel Institute  |
| DASMA    | Door and Access Systems Manufacturers Association                               |
| DHI      | Door and Hardware Institute   |
| ETL      | Electrical Test Laboratories  |
| GA       | Gypsum Association  |
| GANA     | Glass Association of North America  |
| HI       | Hydraulic Institute   |
| HMMA     | Hollow Metal Manufacturers Association (See NAAMM)                              |
| HPVA     | Hardwood Plywood & Veneer Association   |
| ICBO     | International Conference of Building Officials (See ICC)                        |
| ICC      | International Code Council  |
| ICEA     | Insulated Cable Engineers Association, Inc.                                     |
| ICPA     | International Cast Polymer Alliance   |
| ICRI     | International Concrete Repair Institute, Inc.                                   |
| IEEE     | Institute of Electrical and Electronics Engineers, Inc. (The)                   |
| IES      | Illuminating Engineering Society  |
| IPC      | Institute of Printed Circuits   |
| IPCEA    | Insulated Power Cable Engineers Association                                     |
| ISA      | International Society of Automation   |
| ISO      | International Organization for Standardization                                  |
| LPI      | Lightning Protection Institute  |
| MBMA     | Metal Building Manufacturers Association  |
| MCA      | Metal Construction Association  |
| MHIA     | Material Handling Industry of America   |

|          |   |
|----------|---|
| MPI      | Master Painters Institute   |
| MSS      | Manufacturers Standardization Society of The Valve and Fittings Industry Inc.   |
| NAAMM    | National Association of Architectural Metal Manufacturers                       |
| NACE     | NACE International (National Association of Corrosion Engineers International)  |
| NAIMA    | North American Insulation Manufacturers Association                             |
| NBS      | National Bureau of Standards  |
| NCMA     | National Concrete Masonry Association   |
| NEC      | National Electrical Code  |
| NECA     | National Electrical Contractors Association                                     |
| NEMA     | National Electrical Manufacturers Association                                   |
| NFPA     | NFPA (National Fire Protection Association)                                     |
| NFPA     | National Forest Products Association  |
| NFRC     | National Fenestration Rating Council  |
| NHLA     | National Hardwood Lumber Association  |
| NLGI     | National Lubricating Grease Institute   |
| NRCA     | National Roofing Contractors Association  |
| NRMCA    | National Ready Mixed Concrete Association                                       |
| NSF      | NSF International (National Sanitation Foundation International)                |
| NSPE     | National Society of Professional Engineers                                      |
| NSSGA    | National Stone, Sand & Gravel Association                                       |
| OSHA     | Occupational Safety and Health Administration                                   |
| PCA      | Portland Cement Association   |
| PCI      | Precast/Prestressed Concrete Institute  |
| PDI      | Plumbing & Drainage Institute   |
| SDI      | Steel Door Institute  |
| SEI/ASCE | Structural Engineering Institute/American Society of Civil Engineers (See ASCE) |
| SJI      | Steel Joist Institute   |
| SMA      | Screen Manufacturers Association  |
| SMACNA   | Sheet Metal and Air Conditioning Contractors' National Association              |
| SPFA     | Spray Polyurethane Foam Alliance  |
| SPRI     | Single Ply Roofing Industry   |
| SSPC     | Society for Protective Coatings   |
| SSPC     | Steel Structures Painting Council   |
| SSPWC    | Standard Specifications for Public Works Construction                           |
| SWPA     | Submersible Wastewater Pump Association   |
| UBC      | Uniform Building Code (See ICC)   |
| UL       | Underwriters Laboratories Inc.  |
| WASTEC   | Waste Equipment Technology Association  |
| WCRSI    | Western Concrete Reinforcing Steel Institute                                    |
| WDMA     | Window & Door Manufacturers Association   |
| WRI      | Wire Reinforcement Institute, Inc.  |
| WWPA     | Western Wood Products Association   |

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. DIN- Deutsches Institut für Normung e. V.; [www.din.de](http://www.din.de).
  2. IAPMO – International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
  3. ICC – International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
  4. ICC-ES – ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. COE - Army Corps of Engineers; [www.usace.army.mil](http://www.usace.army.mil).
2. CPSC - Consumer Product Safety Commission; [www.cpsc.gov](http://www.cpsc.gov).
3. DOC - Department of Commerce; National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
4. DOD - Department of Defense; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
5. DOE - Department of Energy; [www.energy.gov](http://www.energy.gov).
6. EPA - Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
7. FAA - Federal Aviation Administration; [www.faa.gov](http://www.faa.gov).
8. FG - Federal Government Publications; [www.gpo.gov](http://www.gpo.gov).
9. GSA - General Services Administration; [www.gsa.gov](http://www.gsa.gov).
10. HUD - Department of Housing and Urban Development; [www.hud.gov](http://www.hud.gov).
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; [www.eetd.lbl.gov](http://www.eetd.lbl.gov).
12. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).
13. SD - Department of State; [www.state.gov](http://www.state.gov).
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; [www.trb.org](http://www.trb.org).
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; [www.ars.usda.gov](http://www.ars.usda.gov).
16. USDA - Department of Agriculture; Rural Utilities Service; [www.usda.gov](http://www.usda.gov).
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; [www.ojp.usdoj.gov](http://www.ojp.usdoj.gov).
18. USP - U.S. Pharmacopeial Convention; [www.usp.org](http://www.usp.org).  
USPS - United States Postal Service; [www.usps.com](http://www.usps.com).

END OF SECTION 014200

## SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 011000 "Summary of Work" for work restrictions and limitations on utility interruptions.
  - 2. Section 020960 "Temporary Bypass Pumping Systems"
  - 3. Requirements given in the General Conditions.

#### 1.2 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Engineer, occupants of Project, testing agencies, and authorities having jurisdiction.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel. Coordinate location with the Owner.
- B. Erosion- and Sedimentation-Control Plan for projects disturbing more than 1 acre: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

#### 1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

## 1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
- C. Wood Enclosure Fence: Plywood, 6 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

### 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Contractor's Field Office: Of sufficient size to accommodate needs of Owner, Engineer, Construction Manager, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations as required.
- D. Final location of Contractor's temporary facilities shall be coordinated with the Owner to ensure that access critical to plant operations is maintained at all times.

### 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures. The Contractor shall provide fire extinguishers and

other fire protection equipment to adequately protect new and existing facilities and temporary facilities against damage by fire. Hose connections and hose, water casks, chemical equipment or other sufficient means shall be provided for fighting fires in the new, existing and temporary structures and other portions of the Work and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire. The Contractor's fire protection program shall conform to the requirements of the OSHA Standards for Construction. The Contractor shall employ every reasonable means to prevent the hazard of fire.

- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
  3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures".
- C. Contractor shall furnish and pay for following services for the Field Office:
1. Janitorial service, including weekly dusting, floor cleaning, and trash removal, and monthly comprehensive cleaning (including windows).
  2. Electric wiring, power, and lighting fixtures capable of providing at least 75-foot candles of light on work surfaces.
  3. Bottled drinking water service with hot- and cold-water dispenser.
  4. Provide 480VAC, 3 phase power and step-down transformer (480VAC, 3 phase to 120/240VAC single phase) and lighting panel with circuit breakers suitably sized to supply electrical loads for Field Office.
  5. A continuous supply of toilet paper, paper hand towels, paper toilet seat covers, and hand soap for Portable Toilet.
  6. Maintenance/janitorial service of Portable Toilet, including weekly removal and disposal of waste, refuse, and trash, and weekly cleaning of interior surfaces and sink.
- D. Contractor shall provide high-speed internet access for the Field Office (trailer), including necessary data service and hardware. Contractor shall coordinate with the telephone company for high-speed internet service. As an alternative, Contractor may provide high-speed wireless internet access (air cards).
- E. Remove temporary buildings and furnishings before inspection for Final Completion or when directed by Owner. The Contractor shall remove the Field Office and associated furnishings after acceptance of Final Completion by Owner.
1. Clean and repair damage caused by installation or use of temporary facilities.
  2. Remove underground installations to minimum depth of 24 inches below grade and finish grade to match surrounding conditions.
  3. Restore existing facilities used during construction to specified or original condition.

4. Restore existing facilities affected by temporary facilities, including temporary Field Office and associated utilities to pre-construction conditions.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary of Work."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
  1. The Contractor shall provide an adequate supply of water of a quality suitable for all domestic and construction purposes.
  2. Non-Potable water (plant effluent water) may be used for grading and hydraulic structures and pipeline testing as approved by the Engineer. Quantity of utility water available for construction will vary seasonally and daily. The Contractor shall be responsible to obtain information from the Owner and understand the availability of utility water relative to planned construction activities.
  3. The Contractor shall properly identify all construction water trucks and vessels and inform all workmen and the general public when reclaimed waste water is used as construction water.
  4. All drinking water on the site during construction shall be furnished by the Contractor and shall be bottled water or water furnished in approved metal dispensers. Notices shall be posted conspicuously throughout the site warning the Contractor's personnel that piped water may be contaminated.
  5. The Contractor shall not make connection to, or draw water from, any fire hydrant or pipeline without first obtaining permission of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the water system. For each such connection made the Contractor shall first attach to the fire hydrant or pipeline

a valve, backflow preventer and a meter, if required by the said authority, of a size and type acceptable to said authority and agency.

6. Before final acceptance of the Work all temporary water connections and piping installed by the Contractor shall be entirely removed, and all affected improvements shall be restored to their original condition, or better, to the satisfaction of the Engineer and to the agency owning the affected utility.
- C. Waste Collection: Provide trash cans and instruct personnel to maintain a clean site.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
1. Toilets: Portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Subpart D, Section 1926.51 of the OSHA Standards for Construction. The Owner's toilet facilities shall not be used by the Contractor's work force.
  2. The Contractor shall establish adequate and regular collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Electric Power Service from Existing System: Electric power from Owner's existing system will be made available for all Field office power requirements and construction activities limited by the plants' electrical system capacity as a whole or at a specific location. All use of power from Owner's existing system shall be coordinated with the Owner and shall be associated with the activities related to construction.

The Contractor shall be responsible to provide necessary electrical power. The contractor will be responsible for all temporary power and generators required during the construction and planned power shut-downs. The Contractor shall provide all necessary temporary power connection, disconnects and distribution lines required for its operations under the Contract and shall provide and maintain all temporary power systems required to perform the Work in a safe and satisfactory manner. All temporary connections for electricity shall be subject to approval of the Engineer and shall be completely removed at the Contractor's expense prior to final acceptance of the Work. All wiring for temporary electric light and power shall be properly

installed and maintained and shall be securely fastened in place. All electrical facilities shall conform to the requirements of the OSHA Safety and Health Standards for Construction.

- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- I. Telephone Service: The Owner's telephone system shall not be used by the Contractor's work force.
  - 1. Post a list of important telephone numbers in the project field office.
    - a. Police and fire departments.
    - b. Ambulance service.
    - c. Contractor's home office.
    - d. Contractor's emergency after-hours telephone number.
    - e. Engineers' offices.
    - f. Owner's office.
    - g. Principal subcontractors' field and home offices.
  - 2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
  - 3. The Contractor shall provide a telephone in their facility with an adequate speaker phone for use on conference calls. This system may be used for weekly conference calls/project progress meetings.
- J. Electronic Communication Service: Provide a computer in the primary field office adequate for use by Engineer and Owner to access project electronic documents and maintain electronic communications.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
  - 2. Maintain support facilities until Engineer schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, with prior consent from the Owner and under conditions acceptable to Owner.
- B. Temporary Roads: Access to the site shall be permitted by the Owner. The Contractor shall not construct any staging areas, haul roads, and access roads without the approval of the Owner.
  - 1. Contractor to maintain clear access roadways and walkways necessary for the daily operation and maintenance of the plant. All road closures, trenching/excavation, or other

- construction activities that may interfere or impede access must be coordinated with and approved by Owner.
2. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
  3. All SWPPP requirements and plans must be met and provided, including along temporary/non-paved roadways.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction and coordinate with the LGVSD managers and staff.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  2. Maintain access for fire-fighting equipment and access to fire hydrants.
  3. Contractor shall provide all lights, signs, barricades, flaggers, and other appurtenances necessary for safety.
- D. Parking: Parking at and near the project area is limited and will not be available for the Contractor's personnel. **Contractor shall arrange for personnel parking outside of the plant's premises.**
- E. Dewatering Facilities and Drains: Comply with all Federal, State, and Local Government requirements. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  2. Remove snow and ice as required to minimize accumulations.
- F. Project Signs: Provide Project sign. Unauthorized signs are not permitted.
1. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  2. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

- J. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
  - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
- K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- G. Site Access: Prior to commencing work the Owner will supply the contractor with access key(s) for the facility front gate. The contractor is responsible to:
  - 1. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner for any gates, enclosures or fenced areas constructed by the contractor.
  - 2. The contractor shall be responsible for security of the site during non-working hours of the facility personnel.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
  - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
  - 2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
    - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
  - 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  - 4. Insulate partitions to control noise transmission to occupied areas.
  - 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  - 6. Protect air-handling equipment.
  - 7. Provide walk-off mats at each entrance through temporary partition.
- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
  - 1. Prohibit smoking in construction areas.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - 2. Keep interior spaces reasonably clean and protected from water damage.
  - 3. Discard or replace water-damaged and wet material.
  - 4. Discard, replace, or clean stored or installed material that begins to grow mold.
  - 5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  - 2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

### 3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

## SECTION 015300 – PROTECTION OF EXISTING FACILITIES

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. The Contractor shall protect all existing utilities, piping and improvements not designated for removal and shall restore damaged or temporarily relocated utilities, piping and improvements to a condition equal to or better than they were prior to such damage or temporary relocation. Where required, existing improvements shall be protected with shoring, sheeting, piles, or other necessary means.
- B. The Contractor shall verify the exact locations and depths of all underground piping and utilities shown and not shown and shall make exploratory excavations of all piping and utilities that may interfere with the Work. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities, piping and other improvements that will be encountered in its construction operations and to see that such utilities or other improvements are adequately protected from damage due to such operations.
- C. The Contractor shall notify the Owner's representative of any change of condition or extra work as soon as it is discovered, including any damage to existing facilities, pipelines and improvements not designated for removal. The Contractor shall also notify the Owner's representative of any plans to relocate existing piping or facilities to accommodate new construction.
- D. Maintaining in Service: All pipelines, electrical, power, telephone, communication cables, gas and water mains shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the Owner. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement the Contractor, after necessary scheduling and approval, shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the owner of the facility. In all cases of such temporary removal or relocation, the Work shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement to a new condition meeting the specification requirements.
- E. Buried pipelines, utilities, conduits, duct banks, or other improvements that must remain in service and are exposed due to excavation or construction activities shall be protected and supported as required. Segments of pipelines or duct that is suspended over excavated areas shall be temporarily supported until they can be properly backfilled. All temporary support strategies shall be reviewed and approved by Owner and Engineer.
- F. All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the improvement owner before being concealed by backfill or other work.

#### 1.2 RIGHTS-OF-WAY

- A. The Contractor shall not do any work or enter upon the rights-of-way of any oil, gas, sewer or

water pipeline; any telephone or electric transmission line; any fence; or any other structure, until notified by the Engineer that the Owner has secured authority to do so. After authority has been obtained, the Contractor shall give the governing utility proper advanced notice of its intention to begin work.

### 1.3 RESTORATION OF PAVEMENT AND SIDEWALKS

- A. All paved areas and sidewalks not designated for replacement, cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas unless otherwise noted. All sidewalks and pavements which are subject to partial removal shall be neatly saw-cut in straight lines. All restoration shall be at the Contractor's expense.

### 1.4 UNDERGROUND UTILITIES

- A. All care shall be exercised to protect existing underground utilities during construction activity. This site has very limited access and will likely require heavy equipment to be operated above existing buried utilities. The contractor shall protect these pipelines (existing and new) from heavy vehicle loads and ensure that cranes or other heavy outrigging equipment is not parked or stored directly above these utilities without added protection.
- B. If the Contractor damages existing utilities, piping or improvements that are not shown or the location of which was not made known to the Contractor prior to excavation and the damage was not due to failure of the Contractor to exercise reasonable care the Contractor shall immediately notify the Engineer. If directed by the Engineer, repairs shall be made by the Contractor under the provisions for changes and extra work contained in the Contract (Article 6 – Changes and Extra Work).

### 1.5 NOTIFICATION BY THE CONTRACTOR:

- A. Prior to any excavation in the vicinity of any existing underground facilities, including water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications or telecommunication cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than three (3) working days prior to excavation so that a representative can be present during such work if they are required to do so.

END OF SECTION 015300

## SECTION 015600 – PROJECT ENVIRONMENTAL CONTROLS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. The following sections include mitigation measures to be integrated into the project to reduce the potentially environmental impacts resulting from the construction activities. The Contractor shall implement mitigation measures identified below during the construction process, as well as any other measures required in these documents, on the design drawings, and as required by other local, state, and federal agencies.

#### 1.2 WATER QUALITY

- A. NPDES Construction Activity Stormwater Permit. Contractor shall comply with the provisions of the NPDES Construction Activity Stormwater permit, including preparation of Notice of Intent to comply with the provisions of this General Permit and preparation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP will identify implementation measures necessary to mitigate potential water quality degradation as a result of construction-related runoff. These measures will include BMPs and other standard pollution prevention actions, such as erosion and sediment control measures, proper control of non-stormwater discharges, and hazardous spill prevention and response. The SWPPP will also include requirements for BMP inspections, monitoring, and maintenance.
- B. The following items are examples of BMPs that would be implemented during construction to avoid causing water quality degradation:
  - 1. Erosion control BMPs, such as use of mulches or hydroseeding to prevent detachment of soil, following guidance presented in the California BMP Handbooks – Construction (CASQA 2003). A detailed site map will be included in the SWPPP outlining specific areas where soil disturbance may occur, and drainage patterns associated with excavation and grading activities. In addition, the SWPPP will provide plans and details for the BMPs to be implemented prior, during, and after construction to prevent erosion of exposed soils and to treat sediments before they are transported offsite.
  - 2. Sediment control BMPs such as silt fencing or detention basins that trap soil particles.
  - 3. Construction staging areas designed so that stormwater runoff during construction will be collected and treated in a detention basin or other appropriate structure.
  - 4. Management of hazardous materials and wastes to prevent spills.
  - 5. Groundwater treatment BMPs such that localized trench dewatering does not impact surface water quality.
  - 6. Vehicle and equipment fueling BMPs such that these activities occur only in designated staging areas with appropriate spill controls.
  - 7. Maintenance checks of equipment and vehicles to prevent spills or leaks of liquids of any kind.

### 1.3 AIR QUALITY

- A. Construction Fugitive Dust Control Plan: Contractor shall prepare, submit for review and approval, and implement a dust control plan that conforms to the local requirements. The dust control plan shall include the following dust control procedures, or others as required the local authority:
1. Water all active construction areas at least twice daily, taking into consideration temperature and wind conditions.
  2. Cover all trucks hauling soil, sand, and other loose materials or require trucks to maintain at least two feet of freeboard.
  3. Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on unpaved access roads, parking areas and staging areas at construction sites.
  4. Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.
  5. Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
  6. Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
  7. Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.)
  8. Limit traffic speeds on unpaved roads to 5 mph.
  9. Install sandbags or other erosion control measures to prevent silt runoff to public roadways, consistent with Mitigation Measures for Erosion Control.
  10. Replant vegetation in disturbed areas as quickly as possible.
  11. Contractor may use onsite treated effluent for dust abatement. Coordinate access and allowable volumes with Owner.
- B. Construction Exhaust Emissions Control Plan: Contractor shall implement an exhaust emissions control plan that shall include the following controls and practices:
1. On road vehicles with a gross vehicular weight rating of 10,000 pounds or greater shall not idle for longer than five minutes at any location as required by Section 2485 of Title 13, Division 3, Chapter 10, Article 1 of the California Code of Regulations. This restriction does not apply when vehicles remain motionless during traffic or when vehicles are queuing.
  2. Off road equipment engines shall not idle for longer than five minutes per Section 2449(d)(3) of Title 13, Division 3, Chapter 9, Article 4.8 of the California Code of Regulations. All vehicle operators shall receive a written idling policy to inform them of idling restrictions. The policy shall list exceptions to this rule that include the following: idling when queuing; idling to verify that the vehicle is in safe operating condition; idling for testing, servicing, repairing or diagnostic purposes; idling necessary to accomplish work for which the vehicle was designed (such as operating a crane); idling required to bring the machine to operating temperature as specified by the manufacturer; and idling necessary to ensure safe operation of the vehicle.
  3. Off road engines greater than 50 horsepower shall, at a minimum, meet Tier 2 emissions standards. When available, higher Tier engines shall be utilized.

## 1.4 NOISE

- A. Contractor shall develop, submit for review and approval, and implement a Construction Noise Reduction Plan that requires, at a minimum, the following:
1. The contractor shall locate all stationary noise-generating equipment, including hammer bore and drill rigs, as far as possible from nearby noise-sensitive receptors. Stationary noise sources located within 500 feet of noise-sensitive receptors shall be equipped with noise reducing engine housings, and the line of sight between such sources and nearby sensitive receptors shall be blocked by portable acoustic barriers.
  2. The contractor shall assure that construction equipment with internal combustion engines have sound control devices at least as effective as those provided by the original equipment manufacturer. No equipment shall be permitted to have an un-muffled exhaust.
  3. All construction activities within unincorporated areas shall be limited to between the hours depending upon the jurisdiction.
  4. Construction equipment including compressors, generators, and mobile equipment shall be fitted with properly working mufflers.
  5. Residences and other sensitive receptors within 200 feet of a construction area shall be notified of the construction schedule in writing, at least two weeks prior to the commencement of construction activities. This notice shall indicate the allowable hours of construction activities as specified by the applicable local jurisdiction or as defined by this mitigation measure. The Owner shall designate a noise disturbance coordinator who would be responsible for responding to complaints regarding construction noise. The coordinator shall determine the cause of the complaint and ensure that reasonable measures are implemented to correct the problem. A contact number for the noise disturbance coordinator shall be conspicuously placed on construction site fences and entrances by the contractor and included in the construction schedule notification sent to nearby residences and sensitive receptors.

## 1.5 HAZARDS AND HAZARDOUS MATERIALS

- A. In the event that evidence of potential soil contamination such as soil discoloration, noxious odors, debris, or buried storage containers, is encountered during construction, the contractor will have a contingency plan for sampling and analysis of potentially hazardous substances, including use of a photoionization detector. The required handling, storage, and disposal methods shall depend on the types and concentrations of chemicals identified in the soil. Any site investigations or remediation shall comply with applicable laws and will coordinate with the appropriate regulatory agencies.
- B. If unknown USTs are discovered during construction, the UST, associated piping, and impacted soil shall be removed by a licensed and experienced UST removal contractor. The UST and contaminated soil shall be removed in compliance with applicable county and state requirements governing UST removal.
- C. Contractor shall prepare, submit for review and approval, and implement a project-specific Health and Safety Plan that would apply to excavation activities. The plan shall establish policies and procedures to protect workers and the public from potential hazards posed by hazardous materials. The plan shall be prepared according to federal and California OSHA regulations and submitted to the appropriate agency with jurisdiction prior to beginning site

activities. The health and safety plan shall also be submitted to the District for review and approval.

- D. Consistent with the SWPPP requirements, the construction contractor shall be required to implement BMPs for handling hazardous materials onsite. The use of construction BMPs will minimize any adverse effects on groundwater and soils, and will include, but not limited to, the following:
  - 1. Follow manufacturers' recommendations and regulatory requirements for use, storage, and disposal of chemical products and hazardous materials used in construction;
  - 2. Spill control and countermeasures, including employee spill prevention/response training;
  - 3. Avoid overtopping construction equipment fuel gas tanks;
  - 4. During routine maintenance of construction equipment, properly contain and remove grease and oils; and
  - 5. Properly dispose of discarded containers of fuels and other chemicals.
- E. The contractor shall follow the provisions of California Code of Regulations, Title 8, Sections 5163 through 5167 for General Industry Safety Orders to protect the project area from being contaminated by the accidental release of any hazardous materials and/or wastes. The local Certified Unified Program Agency (CUPA) will be contacted for any site-specific requirements regarding hazardous materials or hazardous waste containment or handling.
- F. Oil and other solvents used during maintenance of construction equipment shall be recycled or disposed of in accordance with applicable regulatory requirements. All hazardous materials shall be transported handled, and disposed of in accordance with applicable regulatory requirements.
- G. In the event of an accidental release of hazardous materials during construction, containment and clean up shall occur in accordance with applicable regulatory requirements.
- H. Contractor shall prepare, submit for review and approval, and implement a Fire Safety Plan for each of the service areas associated with the project. The Fire Safety Plan(s) will describe various potential scenarios and action plans in the event of a fire.
- I. During project construction, all staging areas, welding areas, or areas slated for development using spark-producing equipment will be cleared of dried vegetation or other material that could ignite. Any construction equipment that includes a spark arrestor shall be equipped with a spark arrestor in good working order. All vehicles and crews working at the project site(s) will have access to functional fire extinguishers at all times. In addition, construction crews will be required to have a spotter during welding activities to look out for potentially dangerous situations, including accidental sparks.

## 1.6 CULTURAL RESOURCES

- A. Inadvertent Discoveries: If discovery is made of items of historical or archaeological interest, the contractor shall immediately cease all work activities in the area (within approximately 100 feet) of discovery. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as

hammerstones and pitted stones. Historic-period materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. After cessation of excavation the contractor shall immediately contact the NBWRA and the Authority. The contractor shall not resume work until authorization is received from the Authority.

1. In the event of unanticipated discovery of archaeological indicators during construction, the Authority shall retain the services of a qualified professional archaeologist to evaluate the significance of the items prior to resuming any activities that could impact the site.
2. In the case of an unanticipated archaeological discovery, if it is determined that the find is unique under the National Historic Preservation Act (NHPA) and/or potentially eligible for listing in the National Register, and the site cannot be avoided, the Authority shall provide a research design and excavation plan, prepared by an archaeologist, outlining recovery of the resource, analysis, and reporting of the find. The research design and excavation plan shall be submitted to NBWRA and the Authority and approved by the Authority prior to construction being resumed.

- B. Discovery of Human Remains: If potential human remains are encountered, the Authority shall halt work in the vicinity of the find and contact the county coroner in accordance with Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5. If the coroner determines the remains are Native American, the coroner shall contact the Native American Heritage Commission (NAHC). As provided in Public Resources Code Section 5097.98, the NAHC shall identify the person or persons believed to be most likely descended from the deceased Native American. The most likely descendent makes recommendations for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98.

#### 1.7 EXPLOSIVES AND BLASTING:

- A. The use or storage of explosives on the Work or site will not be permitted.

#### 1.8 SANITATION

- A. The Contractor shall provide approved fixed or portable chemical toilets wherever needed for its employees. The Contractor shall establish regular intervals of collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto. The Owner's toilet facilities shall not be used by the Contractor.

END OF SECTION 015600

## SECTION 016100 - PRODUCT REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. General Conditions

#### 1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number, manufacturer name, or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

#### 1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Engineer will notify Contractor of approval or rejection of proposed comparable

product request within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Section 013300 "Contractor Submittals."
- b. Use product specified if Engineer does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Contractor Submittals." Show compliance with requirements.

#### 1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

B. To the greatest extent possible for each unit of work, the Contractor shall provide products, materials or equipment from a single source.

#### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

- D. Fabricated structural components shall be stored on supports above ground and in a manner to prevent accumulation of water and warping. Products subject to deterioration from atmospheric conditions shall be covered in a manner that will provide adequate ventilation to avoid condensation.
- E. Products, materials and equipment not stored in a manner that will insure the maintaining of a new condition will be rejected by the Engineer. Such rejected products, materials and equipment shall be immediately removed from the Work site.

## 1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  - 3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Where Specifications name a product or manufacturer as the “Basis-of-Design”, provide product(s) as listed or by the manufacturer listed. Where Specifications include a list of available products or manufacturers, followed by the phrase “or equal,” provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer subject to requirements included in General Conditions.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016100

## SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
  - 1. Section 024100 "Demolition, Salvage, and Reconstruction" for disposition of waste resulting from demolition of buildings, structures, and site improvements.
  - 2. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.
  - 3. General Conditions

#### 1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging. The Contractor shall be responsible for the disposal of his own waste. Waste shall daily be cleaned up and piled into proper containers by the Contractor.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

#### 1.3 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
  - 1. Material category.
  - 2. Generation point of waste.
  - 3. Total quantity of waste in tons.

- B. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- C. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

## 1.5 QUALITY ASSURANCE

- A. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

## 1.6 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - 1. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

## PART 2 - EXECUTION

### 2.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

2. Comply with Section 015000 "Temporary Facilities and Controls" and 015600 "Project Environmental Controls" for controlling dust and dirt, environmental protection, and noise control.

## 2.2 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Burning of waste materials is not permitted.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

## 2.3 DISPOSAL OF HAZARDOUS WASTE

- A. Hazardous waste shall be removed, handled, and properly disposed by a Contractor licensed and trained in the proper handling and disposal of each type of waste encountered on the site.
- B. While every effort has been made to identify hazardous materials ahead of time, the Contractor may encounter unanticipated hazardous materials during the course of construction or demolition. If such materials are encountered (or it is suspected that an unidentified material may be hazardous), Contractor shall immediately notify Owner and staff to discuss the appropriate course of action.

END OF SECTION 017419

## SECTION 017700 - CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Requirements:
  - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning agents (submitted by the Contractor)
- B. Contractor's List of Incomplete Items: Initial submittal by the Contractor at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal by the Contractor at Final Completion.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

#### 1.4 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. Organize list of spaces in sequential order.
  - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  - 3. Include comments from the Construction Manager, Owner and Engineer.

4. Submit list of incomplete items in the following format:
  - a. MS Excel electronic file. Engineer will return annotated copy.
  - b. PDF electronic file. Engineer will return annotated copy.
  - c. Three paper copies unless otherwise indicated. Engineer will return two copies.
  
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 14 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Engineer. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Engineer's signature for receipt of submittals.
  5. Submit test/adjust/balance records.
  6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
  
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 14 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  1. Advise Owner of pending insurance changeover requirements.
  2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  3. Complete startup and testing of systems and equipment.
  4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video as required.
  6. Advise Owner of changeover in heat and other utilities.
  7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  9. Complete final cleaning requirements, including touchup painting.

10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 14 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

## 1.5 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

## 1.6 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or

installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.
- D. Operating manuals, technical manuals and instructions. The Contractor's attention is directed to the condition that one percent (1%) of the contract price will be deducted from any monies due the Contractor as progress payments if at the seventy-five percent (75%) construction completion point the approved technical manuals have not been submitted in accordance with Section 013300 entitled, "Contractor Submittals". The aforementioned amount will be retained by the Owner as the agreed estimated value of the approved technical manuals. Any such retention of money for failure to submit the approved technical manuals on or before the seventy-five percent (75%) construction completion point shall be in addition to the retention of any payments due to the Contractor as specified in Article 4 of the Contract.
- E. Releases from all parties who are entitled to claims against the subject project, property or improvement pursuant to the provisions of law.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
  - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
  - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
  - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
  - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
  - e. Remove snow and ice to provide safe access to building.
  - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
  - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  - h. Sweep concrete floors broom clean in unoccupied spaces.
  - i. Remove labels that are not permanent.
  - j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - k. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

### 3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

## SECTION 017823 - OPERATION AND MAINTENANCE DATA

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
1. Operation and maintenance documentation directory.
  2. Emergency manuals.
  3. Operation manuals for systems, subsystems, and equipment.
  4. Product maintenance manuals.
  5. Systems and equipment maintenance manuals.

#### 1.2 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
1. Engineer will comment on whether content of operations and maintenance submittals are acceptable.
  2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Engineer.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.
  2. Four (4) paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. One set will be provided to the Engineer and three sets to the Owner.
- C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Engineer will return copy with comments.
1. Correct or revise each manual to comply with Engineer's comments. Submit copies of each corrected manual within 15 days of receipt of Engineer's comments and prior to commencing demonstration and training.

## PART 2 - PRODUCTS

### 2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- C. Title Page: Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Name and address of Owner.
  - 4. Date of submittal.
  - 5. Name and contact information for Contractor.
  - 6. Name and contact information for Construction Manager.
  - 7. Name and contact information for Engineer.
  - 8. Name and contact information for Commissioning Authority.
  - 9. Names and contact information for major consultants to the Engineer that designed the systems contained in the manuals.
  - 10. Cross-reference to related systems in other operation and maintenance manuals.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  - 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily

navigated file tree. Configure electronic manual to display bookmark panel on opening file.

- G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
  4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.2 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  2. Performance and design criteria if Contractor is delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.

2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

### 2.3 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.

3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

## PART 3 - EXECUTION

### 3.1 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
- F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

## SECTION 017839 - PROJECT RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
- B. Related Requirements:
  - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

#### 1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: The Contractor shall submit one (1) set of marked-up record prints to the Engineer.
- B. Record Specifications: The Contractor shall submit one paper copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy of each submittal to the Engineer.

### PART 2 - PRODUCTS

#### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Record data as soon as possible after obtaining it.
    - c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Engineer and Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
  2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  3. Refer instances of uncertainty to Engineer through Construction Manager for resolution.
  4. Engineer will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Engineer and Construction Manager.
    - e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as paper copy.

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as paper copy.

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as paper copy.

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Engineer's and Construction Manager's reference during normal working hours.

END OF SECTION 017839

## SECTION 020960 – TEMPORARY BYPASS PUMPING SYSTEMS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Section includes requirements for implementing a temporary pumping system for the purpose of diverting sewage and process flows around work areas as needed to accomplish the work.
- B. The Contractor shall maintain the sewage and process flows through the existing system at all times during construction. Sewage and process flows shall not be allowed to back up and surcharge within the system. To accomplish this, bypass pumping of sewage and process flows may be required by the Contractor. Section 2.3 identifies potential areas of work where temporary bypass pumping may be required. Contractor shall determine if this and any additional bypass pumping associated with the project work will be required.
- C. The Contractor shall coordinate all bypass pumping work with the Owner or Owner's Representative.
- D. If bypass pumping is required or desired, the requirements of this section shall apply.

#### 1.2 QUALITY ASSURANCE

- A. Follow national standards and as specified herein.
- B. Perform leakage and pressure tests on discharge piping using clean water, before operation. Notify Engineer 24 hours prior to testing.
- C. Maintain and inspect temporary pumping system every two hours. The Contractor shall have a responsible operator on site when pumps are operating.
- D. Keep and maintain spare parts for pumps and piping on site, as required.
- E. Maintain adequate hoisting equipment and accessories on site for each pump.

#### 1.3 SUBMITTALS

- A. Submit the following in accordance with Section 013300.
  - 1. Detailed plan and description of proposed pumping system. Indicate number, size, material, location and method of installation of suction and discharge piping, size of pipeline or conveyance system to be bypassed, staging area for pumps, site access point, and expected flow.
    - a. Size and location of manhole or access points for suction and discharge hose or piping.
    - b. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill, if buried.
    - c. Temporary pipe supports and anchoring required.

- d. Thrust and restraint block sizes and locations.
  - e. Sewer plugging method and type of plugs.
  - f. Bypass pump sizes, capacity, number of each size to be on site and power requirements.
  - g. Backup pump, power and piping equipment.
  - h. Calculations of static lift, friction losses, and flow velocity. Pump curves showing pump operating range.
  - i. Design plans and computation for access to bypass pumping locations indicated on drawings.
  - j. Calculations for selection of bypass pumping pipe size.
  - k. Method of noise control for each pump and/or generator.
  - l. Method of protecting discharge manholes or structures from erosion and damage.
  - m. Schedule for installation and maintenance of bypass pumping lines.
  - n. Procedures to monitor upstream mains for backup impacts.
  - o. Procedures for setup and breakdown of pumping operations.
  - p. Emergency plan detailing procedures to be followed in event of pump failures, sewer overflows, service backups, and sewage spillage.
  - q. List of equipment for spill containment and cleanup.
- 2. Maintain copy of emergency plan on site for duration of project.
- B. Certify bypass system will meet requirements of codes, and regulatory agencies having jurisdiction.

#### 1.4 CONTRACTORS RESPONSIBILITY

- A. FOR OVERFLOW AND SPILLS: Schedule and perform work in manner that does not cause or contribute to incidence of overflows, releases or spills of sewage from sanitary sewer system or bypass operation.
- B. Contractor is responsible to obtain air permits if diesel pumps are to be utilized.

#### 1.5 DELIVERY AND STORAGE

- A. Transport, deliver, handle, and store pipe, fittings, pumps, ancillary equipment and materials to prevent damage and following manufacturer's recommendations.
  - 1. Inspect all material and equipment for proper operation before initiating work.
- B. For material found to be defective or damaged due to manufacturer or shipment;
  - 1. When repairable: Repair as recommended by manufacturer.
  - 2. When not repairable: Replace before initiating work.
  - 3. Repair or replacement of defective or damaged material and equipment will be at no cost to the Owner.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Discharge and Suction Pipes: Approved by Engineer.

1. Discharge piping: Determined according to flow calculations and system operating calculations.
2. Suction piping: Determined according to pump size, flow calculations, and manhole/structure depth following manufacturer's specifications and recommendations.

B. Polyethylene Plastic Pipe:

1. High density solid wall and following ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-DR) based on Outside Diameter, ASTM D1248 and ASTM D3550.
2. Homogenous throughout, free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.

C. High-Density Polyethylene (HDPE).

1. Homogenous throughout, free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.
  - a. Defective areas of pipe: Cut out and joint fused as stated herein.
2. Assembled and joined at site using couplings, flanges or butt-fusion method to provide leak proof joint. Follow manufacturer's instructions and ASTM D 2657.
  - a. Threaded or solvent joints and connections are not permitted.
3. Fusing: By personnel certified as fusion technicians by manufacturer of HDPE pipe and/or fusing equipment.
4. Butt-fused joint: True alignment and uniform roll-back beads resulting from use of proper temperature and pressure.
  - a. Allow adequate cooling time before removal of pressure.
  - b. Watertight and have tensile strength equal to that of pipe.
  - c. Acceptance by Engineer before insertion.

D. Flexible Hoses and Associated Couplings and Connectors.

1. Abrasion resistant.
2. Suitable for intended service.
3. Rated for external and internal loads anticipated, including test pressure.
  - a. External loading design: Incorporate anticipated traffic loadings, including traffic impact loading.
4. When subject to traffic loading, compose system, such as traffic ramps or covers.
  - a. Install system and maintain H-20 loading requirements while in use or as directed by the Engineer.

E. Valves and Fittings: Determined according to flow calculations, pump sizes previously determined, and system operating pressures.

F. Plugs: Selected and installed according to size of line to be plugged, pipe and manhole configurations, and based on specific site.

1. Additional plugs: Available in the event a plug fails. Plugs will be inspected before use for defects which may lead to failure.

G. Aluminum "irrigation type" piping or glued PVC piping will not be permitted.

- H. Discharge hose will only be allowed in short sections when approved by Engineer.
- I. For pipelines or hoses that are above ground and/or cross roadways or other traffic areas:
  - 1. Route of above ground pipeline/hose must be approved by Engineer and operating staff.
  - 2. For any pipeline or hose that crosses a roadway above ground, contractor shall furnish suitable firehose bridge or hose/pipeline ramp across the entire intersection of the pipe with the roadway. The ramp or bridge must be minimum H-20 traffic rated, and suitable to handle all traffic that will cross the bridge for the duration of its installation. Temporary piping/hose and ramps shall be removed by the contractor when bypassing pumping operation ceases.

## 2.2 EQUIPMENT

### A. Pumps.

- 1. Fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in priming system.
- 2. Electric or diesel powered.
  - a. Diesel powered equipment shall be supplied with hospital grade mufflers for noise suppression. Equipment shall meet air quality exhaust criteria of the local Air Pollution Control District as applicable. Contractor is responsible to obtain air permit for diesel pumps.
- 3. Pumps shall be capable of variable flow to accommodate the cyclical nature of influent flows to the plant. Minimum 50% turn down of pump's max capacity is anticipated.
- 4. Constructed to allow dry running for long periods of time to accommodate cyclical nature of influent flows.

### B. Provide.

- 1. Necessary stop/start controls for each pump.
- 2. One standby pump of each size maintained on site.
  - a. On-line, isolated from primary system by a valve.
- 3. Quiet flow pumps.

## 2.3 DESIGN REQUIREMENTS

- A. The anticipated flow in areas that **will** require bypass pumping is given based on historical plant influent and/or process flows. Please note that the plant flows are not constant and vary during any given day and/or season. Bypass pumping will be required to accommodate hourly flow variations based on influent flow received at the treatment facility. Flow areas are given for the following areas where bypass pumping may occur:
  - 1. Bypass Line from Secondary Clarifier #2 Effluent Chamber to CCC Weir Box or CCC riser. **This bypass will be needed to complete the end of Phase 2 work when the 42"/24" piping is cut to accommodate connection of flow in manhole #2 to new 42" piping. If Phase #2 is not needed, this bypass pumping will not be required.**
    - a. Peak Flow = 6.0 MGD (Verify with Engineer prior to completing the bypass pumping system design to confirm head requirements).

- b. This require a temporary 18” bypass line (or the equivalent from multiple smaller lines) from the secondary clarifier #2 effluent box to the northeast portion of the CCC Weir Box or an adjacent CCC riser. This temporary bypass may be installed above ground as long as proper ramps and other procedures are followed as described above.
  - c. **This bypass will be needed to complete the end of Phase 2 work when the 42”/24” piping is cut to accommodate connection of flow in manhole #2 to new 42” piping. If Phase #2 is not needed, this bypass pumping will not be required.**
- B. Provide pipeline plugs and pumps of adequate size to handle peak flow, and temporary discharge piping to ensure total flow associated with structures can be safely diverted around structures to be constructed or modified.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Determining location of bypass pipelines.
  - 1. Minimal disturbance to existing utilities and facilities.
    - a. Field locate existing utilities in proposed bypass area including convenient points.
  - 2. Obtain Engineer’s approval of location.

#### 3.2 INSTALLATION AND REMOVAL

- A. Provisions and requirements must be reviewed by Engineer before starting construction.
- B. Construct temporary bypass pumping structures and make connections to existing and/or newly constructed structures requiring bypass pumping and as required to provide adequate suction conduit.
- C. Plugging or blocking of sewage flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance of work, remove in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.
- D. When working inside structure and manholes, exercise caution. Follow OSHA, Local, State and Federal requirements. Take required measures to protect workforce against sewer gases and/or combustible or oxygen-deficient atmosphere.
- E. Installation of Bypass Pipelines:
  - 1. Pipeline may be placed along shoulder of roads and access ways.
  - 2. If a pipeline must be placed across a roadway and/or access way provide adequate roadway maps suitable for expected traffic loads associated with normal plant operations and construction traffic.
  - 3. Following Engineer’s approval, the contractor may place bypass piping in trenches and cover with temporary pavement.
- F. During bypass pumping operation, protect existing utilities and infrastructure from damage inflicted by equipment.

- G. Upon completion of bypass pumping operations, and after the receipt of written permission from Engineer, remove piping, restore property to pre-construction condition and restore pavement.

### 3.3 MEASUREMENT AND PAYMENT

- A. Except as otherwise specified herein, providing for and complying with requirements in this Section will not be measured for payment, but cost will be considered incidental to Contract.

END SECTION 020960

## SECTION 032000 - REINFORCEMENT STEEL

### PART 1 - GENERAL

#### 1.1 THE REQUIREMENT:

- A. The Contractor shall furnish, fabricate and place all concrete and masonry reinforcement steel, including all the tie wires, clips, supports, chairs, spacers and other accessories, all as shown and specified in the Contract Documents.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Contractor Submittals. 013000
- B. Cast-In-Place Concrete. 033000
- C. Concrete Formwork. 031000
- D. Concrete Unit Masonry. 042000

#### 1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS:

##### A. Codes:

The Building Code, as referenced herein, shall be the latest California Building Code (CBC).

##### B. Commercial Standards:

|             |   |
|-------------|---|
| ACI 315     | Details and Detailing of Concrete Reinforcement.  |
| ACI 318-14  | Building Code Requirements for Reinforced Concrete.                                     |
| ACI 350-06  | Code Requirements for Environmental Engineering Concrete Structures.                    |
| WRI         | Manual of Standard Practice for Welded Wire Fabric.                                     |
| AWS D1.4-11 | Structural Welding Code - Reinforcing Steel.  |
| ASTM A 82   | Specification for Steel Wire, Plain, for (Latest Edition) Concrete Reinforcement.       |
| ASTM A 185  | Specification for Welded Steel Wire Fabric (Latest Edition) for Concrete Reinforcement. |
| ASTM A 615  | Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.      |

CRSI Manual of Standard Practice (Latest Edition)

CRSI Placing Reinforcing Bars (Latest Edition)

#### 1.4 CONTRACTOR SUBMITTALS:

- A. The Contractor shall furnish to the Engineer reinforcing steel placing drawings. These drawings shall show the number, grade, size, length, mark, location and bending diagrams for all reinforcing steel and related products, together with lists of bent and straight bars in accordance with the ACI Detailing Manual (latest edition) of the American Concrete Institute and the requirements specified herein and shown on the Contract Drawings. The Engineer may or may not review the placement drawings. Any review of the placement drawings by the Engineer will be limited to general compliance with the Contract Documents and will not be returned to the Contractor. Reinforcing steel placement will be checked in the field using the design drawings. Any discrepancies, errors or omissions from the requirements of the Contract Documents shall be corrected prior to placement of concrete and at the sole expense of the Contractor.

#### 1.5 QUALITY ASSURANCE:

- A. If requested by the Engineer, the Contractor shall provide a certified copy of the mill test report showing physical and chemical analysis for each heat of reinforcement steel delivered.

### PART 2 - PRODUCTS

#### 2.1 REINFORCEMENT STEEL:

- A. Reinforcement steel for all cast-in-place reinforced concrete construction shall conform to the following requirements:
1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement with supplementary requirement S-1, or as otherwise shown.
  2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185 and the details shown. Welded wire fabric with longitudinal wire equal to or less than 4.0 size wire shall be either furnished in flat sheets or in rolls with a core diameter or not less than 10-inches. Welded wire fabric with longitudinal wires larger than 4.0 size shall be furnished in flat sheets only.
  3. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A 82.
- B. Accessories:
1. The Contractor shall furnish and install all accessories including necessary chairs or bolsters, concrete blocks (dobies), tie wires, supports, spacers and other devices to position reinforcement during concrete placement.

2. Wire bar supports shall be made of plain cold-drawn steel wire with pre-molded, gray-colored, plastic tips to the legs of the support. The plastic shall have a thickness of 1/8-inch or greater at points of contact with formwork and extend upward on the wire a minimum of 1/2-inch. Wire sizes and geometric dimensions shall be made in accordance with Table II of the latest edition of CRSI Manual of Standard Practice.
3. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Where the concrete blocks are used on concrete surfaces exposed to view, the color and texture of the concrete blocks shall match that required for the finished surface. Wire ties shall be embedded in concrete block bar supports.
4. The wire tie shall be 16-gauge or heavier, black annealed.

## 2.2 MECHANICAL COUPLERS:

- A. Mechanical couplers shall be provided where shown and where approved by the Engineer. The couplers shall develop a tensile strength which exceeds one hundred fifty percent (150%) of the yield strength of the reinforcement bars being spliced at each splice.

## PART 3 - EXECUTION

### 3.1 GENERAL:

- A. All reinforcement steel, welded wire fabric, couplers and other appurtenances shall be fabricated and placed in accordance with the requirements of the Contract Documents, including referenced specifications, codes and standards.

### 3.2 FABRICATION:

- A. Reinforcement steel shall be accurately fabricated to the dimensions and shape shown in the Contract Documents. Fabricating details shall be prepared in accordance with ACI 315, ACI 318, and ACI 350 except as modified by the Drawings. Bends shall conform to bend dimensions defined as standard in accordance with details in the ACI Detailing Manual and/or CRSI Manual of Standard Practice, unless otherwise shown. Bars shall be bent cold and shall not be bent or straightened in a manner that will injure the material. All hooks shall conform to bend dimensions defined as ACI Standard Hooks.
- B. The Contractor shall fabricate reinforcement bars within the tolerances shown in the ACI Detailing Manual and/or CRSI Manual of Standard Practice.
- C. Reinforcing bars delivered to the field shall be tagged with durable material and marked in a legible manner with waterproof markings. Tags shall show the grade, number of pieces, size and mark or length of bars.

### 3.3 PLACING:

- A. Reinforcing steel shall be accurately positioned as shown on the Contract Documents and shall be adequately supported and wired together to prevent displacement. All reinforcement steel shall be supported or spaced off the forms by concrete or metal supports which are rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement. Concrete blocks shall not be used as spacers between mats. All concrete blocks used to space reinforcement steel off vertical formed surfaces shall be tied to the steel with wire ties which are embedded in the blocks. For reinforcement including welded wire fabric over formwork, the Contractor shall furnish concrete or metal supports with plastic covered legs for bar supports.
- B. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- C. Bars additional to those shown which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at its own expense.
- D. Placing Tolerances: Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5 or ACI 318, except where in conflict with the requirements of The Building Code.
- E. Bars may need to be moved to avoid interference with other reinforcement steel, conduits or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer. Additional bars may be necessary to prevent cracking or provide additional reinforcement in this case and shall be provided by the Contractor at its own expense.
- F. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobbies) spaced not more than three (3) feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

#### 3.4 SPACING OF BARS:

- A. The clear distance between parallel bars (except in columns and between multiple layers of bars in beams) shall be not less than the nominal diameter of the bars nor less than 1-1/3 times the maximum size of the coarse aggregate, nor less than 1-inch.
- B. Where reinforcement in beams or girders is placed in two (2) or more layers, the clear distance between layers shall be not less than 1-inch.
- C. In columns, the clear distance between longitudinal bars shall not be less than 1-1/2 times the bar diameter, more less than 1-1/2 times the maximum size of the coarse aggregate, more less than 1-1/2 inches.

#### 3.5 SPLICING:

- A. General: Reinforcement bar splices shall only be used at locations shown, unless otherwise acceptable to the Engineer. Reinforcing bar in concrete marked as continuous shall be spliced with a lap of at least 48 bar diameters and no less than 24" for building structures.
- B. Splices of Reinforcement: The length of lap for reinforcement bars, shall be in accordance with Contract Drawings for non-building structures (i.e. DAFT, Secondary Clarifiers, Equalization Basin, etc.)
- C. Laps of welded wire fabric shall be in accordance with ACI 318 and ACI 350. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each two (2) running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
- D. Bending or Straightening: Reinforcement shall not be straightened or re-bent in a manner which will injure the material. Bars with kinks or bends not shown shall not be used. All bars shall be bent cold, unless otherwise permitted by the Engineer. No bars partially embedded in concrete shall be field-bent, except as specifically permitted by the Engineer.

3.6 CLEANING AND PROTECTION:

- A. Reinforcing steel delivered to the jobsite shall be suitably stored off the ground and protected from oils, mud, concrete splatter and all conditions conducive to corrosion until embedded in concrete.
- B. The surfaces of all reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be re-inspected and, if necessary, re-cleaned.

END OF SECTION 032000

## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
  - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: Before placing any concrete, the Contractor shall submit to the Engineer, for review, the complete details of all concrete mix designs which he proposes to use including proportions and gradations of all materials for each class and type of concrete specified herein. The mix designs shall be designed by a certified testing laboratory acceptable to the Engineer. The mix design submittal shall also include test results from at least one (1) trial batch of each class and type concrete. From each trial batch six (6) 6-inch X 12-inch test cylinders shall be cast in accordance with ASTM C 31. Three (3) of these cylinders shall be compression tested in accordance with ASTM C 39 at 7-days and the other three (3) at 28-days. Test results shall include full information on each cylinder as to mix and slump in accordance with ASTM C 143. Three (3) drying shrinkage specimens shall also be cast and tested in accordance with ASTM C 157 on each type of structural concrete mix design. All costs for such mix design including mix design tests shall be borne by the Contractor.
- C. If fly ash concrete is proposed by the concrete supplier, the Contractor shall submit to the Engineer for review the design mix for fly ash concrete together with the design mix for Portland Cement (non-fly ash) concrete as specified in this Section. The Contractor shall furnish a Certificate of Compliance signed by the supplier identifying the type of fly ash and stating that the fly ash complies with ASTM C 618 and these specifications, together with all supporting test data including a certified chemical and physical analysis report prior to the use of the fly ash the sample represents. The supporting data shall also contain test results confirming that the fly ash in combination with the cement and water to be used meets all strength requirements and is compatible with air-entraining agents and other admixtures.
- D. When a water-reducing admixture is to be used, the Contractor shall furnish mix designs for concrete both with and without the admixture.
- E. Delivery Tickets: Furnish a delivery ticket for ready mixed concrete to the Engineer as each truck arrives. Provide a printed record of the weight of cement and each aggregate as batched individually on each ticket. Use the type of indicator that returns for zero punch or returns to zero after a batch is discharged. Indicate for each batch the weight of fine and coarse aggregate,

cement, fly ash, and water, moisture content of fine and coarse aggregate at time of batching, and types, brand and quantity of each admixture, the quantity of concrete delivered, the time any water is added and the amount, and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of transit mix truck.

- F. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.
- G. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
- H. Welding certificates.
- I. Material certificates.
  - 1. Certify that admixtures used in the same concrete mix are compatible with each other and the aggregates.
  - 2. Certify that the Contractor is not associated with the independent testing laboratory proposed for use by the Contractor nor does the Contractor or officers of the Contractor's organization have a beneficial interest in the laboratory.
  - 3. Certify that cement is produced by a manufacturer that does not use hazardous waste derived fuel as an energy source for its kilns.
  - 4. Certificate of conformance for concrete production facilities from the NRMCA.
- J. Material test reports.
  - 1. Aggregates: Conformance to ASTM standards, including sieve analysis, mechanical properties, deleterious substance content, and mortar bar expansion test results.
  - 2. Cement and fly ash: Conformance to ASTM standards, including chemical analysis and physical tests.
  - 3. Concrete mixes: For each formulation of concrete proposed for use, submit constituent quantities per cubic yard, water cementitious ratio, air content, concrete slump, type and manufacturer of cement and type and manufacturer of fly ash. Provide for each mix proposed.
    - a. Standard deviation data for each proposed concrete mix based on statistical records.

Provide the following for each strength data point used in the calculation of the standard deviation for determination of the minimum required average strength:

- 1) Date of sampling and name of testing laboratory.
- 2) Name of concrete batch plant.
- 3) Water cementitious ratio.
- 4) Slump of batch.
- 5) Air content of batch.

- 6) 28 day compression test results.
- 7) If available, temperature and unit weight of batch.

Provide data from projects not more strictly controlled than outlined in these specifications. Provide summary sheet showing all pertinent data and the computation of the standard deviation.

4. Concrete Mixes: shrinkage.

K. Floor surface flatness and levelness measurements.

### 1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
2. ASTM C33 - Standard Specification for Concrete Aggregates.
3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
5. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
6. ASTM C 109 - Standard Test Method for Compressive (Latest Edition) Strength of Hydraulic Cement Mortars (Using 2-inch or 50-mm Cube Specimens)
7. ASTM C138 – Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
8. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete
9. ASTM C150 - Standard Specification for Portland Cement
10. ASTM C156 - Standard Test Method for Water Retention by Liquid Membrane-Forming Curing Compound for Concrete
12. ASTM C157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
13. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete
14. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

15. ASTM C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
16. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
17. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
18. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
19. ASTM C311 - Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for use in Portland Cement Concrete.
20. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
21. ASTM C596 - Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.
22. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
23. ASTM C-827-87 Standard Test Method for Early Volume Change of Cementitious Mixtures
24. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
25. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
27. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

B. American Concrete Institute (ACI).

1. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
2. ACI 232.2R - Use of Fly Ash in Concrete.
3. ACI 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete.
4. ACI 304.2R - Placing Concrete by Pumping Methods.
5. ACI 305R - Hot Weather Concreting.
6. ACI 306R - Cold Weather Concreting.

7. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
  8. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary.
- C. National Ready Mixed Concrete Association (NRMCA)
1. Quality Control Manual, Section 3 - Certification of Ready Mixed Concrete Production Facilities.
- D. Truck Mixer Manufacturers Bureau (TMMB)
1. TMMB 100 - Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards.
- E. Corps of Engineers Specification
1. CRD-C 621-85 Corps of Engineers Specification for Non-Shrink Grout
- F. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
1. Name and address.
  2. Names and positions of principal officers and the name, position, and qualifications of the responsible registered professional engineer in charge.
  3. Listing of technical services to be provided. Indicate external technical services to be provided by other organizations.
  4. Names and qualifications of the supervising laboratory technicians.
  5. Statement of conformance provided by evaluation authority defined in ASTM C1077. Provide report prepared by evaluation authority when requested by the Engineer.
  6. Submit as required above for other organizations that will provide external technical services.

- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- F. Preinstallation Conference: Conduct conference at Project site.
- G. Mix design tests on component materials and for compressive strength and shrinkage of concrete shall be performed as specified herein. The mix shall not at any time be changed without approval of the Engineer, except that at all times the batching of fine aggregate shall be adjusted to compensate for the moisture content. Satisfactory means shall be provided at the batching plant for checking the moisture content of the fine aggregate. The details of concrete mixes submitted for approval shall include information on the correction of the batching for varying moisture contents of the fine aggregate.

To avoid unnecessary or haphazard changes in consistency, the aggregate shall be obtained from a source which will ensure a uniform quality.

- H. During the progress of construction, the Owner will have tests made to determine whether the concrete, as being produced, complies with the standards of quality specified herein. These tests will be made in accordance with ASTM C 31, ASTM C 39, ASTM 179 and ASTM C 157. The testing expense during construction, except for the trial batch or mix design testing, will be borne by the Owner. The Contractor shall take sets of field control cylinder specimens during the progress of the work in compliance with ASTM C31. The number of sets of concrete test cylinders taken of each class of concrete place each day shall comply with the requirements of the California Building Code (CBC), Section 1905, but shall not be less than one set per day, nor less than one set for each 50 cu yds of concrete nor less than one set for each 5,000 sq ft of surface area for slabs or walls.
- I. Specimens shall be formed in 6-in by 12-in long non-absorbent cylindrical molds.
  - 1. A "set" of test cylinders shall consist of five cylinders; one to be tested at seven days, one to be tested at 14 days, and two to be tested and their strengths averaged at 28 days. The fifth may be used for a special test at 3 days or to verify strength after 28 days if 28 day test results are low.
- J. Testing agency shall provide four firmly braced, insulated, heated, closed wooden curing boxes, each sized to hold ten specimens, complete with cold weather temperature and hot weather temperature control thermostat for initial curing and storage from time of fabrication until shipment to the testing lab. Protect the specimens against injury or loss through construction operations.
- K. Concrete for testing shall be supplied by the Contractor at no cost to the Owner, and the Contractor shall provide assistance to the Engineer in obtaining samples and disposal and cleanup of excess material.

L. Evaluation and Acceptance of Concrete:

1. Concrete is expected to reach a higher compressive strength than that which is indicated in Paragraph 2.9, as compressive strength. The strength level of the concrete will be considered satisfactory if the average strength of the two (2) 28-day specimens equals or exceeds the required strength and no individual specimen strength falls below the required strength by more than 500 psi. Where an individual strength test falls below the required strength by more than 500 psi, the Engineer shall have the right to ask for cores taken in accordance with ASTM C 42 and ACI 318, all at the Contractors expense.
2. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected. Any and all corrective actions shall be at no additional cost to the Owner.
3. All concrete which fails to meet the ACI requirements and these specifications, is subject to removal and replacement at the cost of the Contractor.

M. Test slump immediately prior to placing the concrete. Test shall be made in accordance with ASTM C143. When concrete is pumped, slump will be determined at point of truck discharge. If the slump is outside the specified range, the concrete will be rejected.

N. Test for air content shall be conducted on a fresh concrete sample. Air content for concrete made of ordinary aggregates having low absorption shall be made in compliance with either the pressure method complying with ASTM C231 or by the volumetric method complying with ASTM C173. If aggregates with high absorptions are used, the latter test method shall be used. When concrete is pumped, air content will be determined at point of placement.

O. Shrinkage Tests: Shrinkage tests will be made during construction to ensure continued compliance with these specifications.

P. Ready-mix concrete shall conform to the requirements of ASTM C 94.

Q. The Engineer shall have access to and have the right to inspect all batch plants, cement mills and supply facilities providing products under these specifications. Batch plants shall have current certificates that all scales have been tested and are certified within the tolerances as set forth in the National Bureau of Standards Handbook No. 44.

R. Construction Tolerances: The Contractor shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades or dimensions shown. Where tolerances are not stated in these specifications, permissible deviations will be in accordance with ACI 347. Where tolerances are not met, the concrete shall be repaired or replaced at the Contractor's expense until the tolerances are met.

The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise shown:

Structural Component

Tolerance

|  |  |
|--|--|
| Variation of the constructed linear outline from the established position in plan. | In 10-feet: 1/4-inch;<br>In 20-feet or more: 1/2-inch. |
| Variation from the level or from the grades shown.                                 | In 10-feet: 1/4-inch;<br>In 20-feet or more: 1/2-inch. |
| Variation from the plumb.  | In 10-feet: 1/4-inch;<br>In 20-feet or more: 1/2-inch. |
| Variation in the thickness of slabs and walls.                                     | Plus 1/4-inch; Plus 1/2-inch.                          |
| Variation in the locations and sizes of slab and wall openings.                    | Plus or minus 1/4-inch.                                |

## PART 2 - PRODUCTS

### 2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

### 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- D. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from galvanized-steel wire into flat sheets.
- E. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1 steel.
- F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

## 2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
1. Portland Cement: ASTM C 150, Type V, Low Alkali. Supplement with the following:
    - a. Fly Ash: ASTM C 618, Class F , including the requirements of Section 2.8 but with the Loss of Ignition (LOI) limited to 3 percent maximum and the optional physical requirements of Table 3. Test in compliance with ASTM C311 with a minimum of one sample weighing four pounds taken from each 200 tons of fly ash supplied for the project.
    - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
    - c. Portland Cement shall contain not more than 0.60 percent total alkalis. The term "alkalies" is defined as the sum sodium oxide (Na<sub>2</sub>O), potassium oxide (K<sub>2</sub>O), calculated as sodium oxide (.658 K<sub>2</sub>O). Only one (1) brand of cement shall be used for exposed concrete in any individual structure. The cement shall be suitably protected from exposure to moisture until used. Certified mill test reports for each shipment of cement to be used shall be submitted to the Engineer. Mill test reports shall include the alkali content. Do not use cement produced by a manufacturer that uses hazardous waste derived fuel as an energy source for its kilns.
    - d. Do not use air entraining cements.
- B. Normal-Weight Aggregates: ASTM C 33, graded.
1. Maximum size aggregate in foundations and mass concrete shall be 1 inch. The maximum size aggregate in slabs on grade, walls, and all concrete shall be ¾ inch.
- C. Water: ASTM C 94/C 94M and potable. Water shall be clean and free from objectionable quantities of silty organic matter, oils, chlorides, alkali, salts and other impurities. The water shall be considered potable, for the purpose of this Section only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/l TDS) shall not be used.

## 2.4 AGGREGATES

- A. All concrete aggregates shall be obtained from pits acceptable to the Engineer, shall be non-reactive, sound, uniformly graded and free of deleterious material in excess of allowable limits specified.
- B. Combined aggregates shall be well graded from coarse to fine sizes, and be uniformly graded between screen sizes to produce a concrete that has optimum workability and consolidation characteristics. Lightweight sand for fine aggregate will not be permitted. Aggregates shall conform to ASTM C 33.
1. Coarse Aggregate: Coarse aggregate shall consist of gravel, crushed gravel or crushed stone made up of clean, hard, durable particles free from calcareous coatings, organic matter or other foreign substances. Thin or elongated pieces having a length greater than four (4) times the average thickness shall not exceed fifteen percent (15%) by weight. Deleterious substances shall not be present in excess of the following percentages by

weight, and in no case shall the total of all deleterious substances exceed one and one-half percent (1.5%):

2. Fine Aggregate: Fine aggregate for concrete or mortar shall consist of clean, natural sand or a combination of natural and manufactured sands that are hard and durable. Deleterious substances shall not be present in excess of the following percentages by weight of contaminating substances. In no case shall the total exceed three percent (3%):

Fine aggregate shall not contain strong alkali nor organic matter which gives a color darker than a standard color when tested in accordance with ASTM C 40. Fine aggregate shall have a fineness modulus not less than 2.50 nor greater than 3.00. Except as otherwise specified, fine aggregate shall be graded from coarse to fine in accordance with the requirements of ASTM C 33.

3. The fine and coarse aggregates used shall not cause expansion of mortar bars greater than 0.1 percent in 16 days when tested in accordance with ASTM C1260 and using the cement proposed for the project. If aggregates proposed for use do not meet this requirement, then satisfy either a. or b. below.
  - a. Total equivalent alkali content of the cement used shall not exceed 0.6 percent as provided in the Optional Chemical Requirements of ASTM C150.
  - b. The fine and coarse aggregates used shall not cause expansion of mortar bars greater than 0.1 percent in 16 days when tested in accordance with ASTM C1260 and using the cement and fly ash proposed for the project. The proportions of the cement-fly ash mix shall be the same as those proposed for the project.

## 2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260. Proportion and mix in accordance with manufacturer's recommendations.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  1. All concrete shall contain five percent (5%), plus or minus one percent (1%) entrained air of evenly dispersed air bubbles at the time of placement. Air entrainment requirement may be modified or waived following an approval from the Engineer for concrete construction not exposed to freeze/thaw cycles. The air-entraining agent shall contain no chloride and conform to ASTM C 260, or U.S. Army Corps of Engineers Specifications CRD-C13. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement. The Engineer, or Owner and his duly authorized representatives reserve the right, at any time, to sample and test the air-entraining agent or the air content of concrete received on the job by the Contractor. Air entrainment in the concrete shall be tested by ASTM C 138, ASTM C 231 or ASTM C 173. If any sample tested does not have the specified air content, a second test shall be performed. If the second test does

not meet the specified air content, the concrete represented by the test shall be removed from the job.

2. Retain one or more chemical admixtures from three subparagraphs below.
  - a. Water-Reducing Admixture: ASTM C 494/C 494M, Type A. Proportion and mix in accordance with manufacturer's recommendations.
  - b. High-Range, Water-Reducing Admixture (Plasticizer): ASTM C 494/C 494M, Type F resulting in non-segregating plasticized concrete with little bleeding and with the physical properties of low water/cementitious ratio concrete. The treated concrete shall be capable of maintaining its plastic state in excess of 2 hours. Proportion and mix in accordance with manufacturer's recommendations.
  - c. Do not use admixtures causing retarded or accelerated setting of concrete without written approval from the Engineer. Use retarding or accelerating water reducing admixture when so approved.

## 2.6 SHEET VAPOR RETARDER

- A. Provide under building slabs and/or mat foundations. ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
  1. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils thick.
  2. Vaporblock VB10, by Raven Industries,
  3. Or Equal.

## 2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 grams per square centimeter of surface.
- D. Polyethylene sheet for use as concrete curing blanket shall be white and shall have a normal thickness of 6 mils.
- E. Water: Potable.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. The curing compound shall contain a fugitive dye so that areas of application will be readily distinguishable. Compound shall contain no wax, paraffin, or oil. Curing compound shall be non-yellowing and have a unit moisture loss no greater than 0.039 gm/cm<sup>2</sup> at 72 hours as measured by ASTM C156. Curing compound shall comply with Federal, State, and local VOC limits.

## 2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

## 2.9 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of Portland cement. The maximum amount of fly wash used shall be in accordance with ACI 318.

- 1. Class F Fly Ash

- a. Loss on ignition, maximum 1%
- b. SO<sub>3</sub> content, maximum 3%
- c. Moisture content, maximum 1%
- d.  $R = (\text{CaO} - 5\%)/(\text{Fe}_2\text{O}_3)$ , maximum 1.5

- C. Admixtures: Use admixtures according to manufacturer's written instructions.

- 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
- 2. Use water-reducing admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

- D. Proportion normal-weight concrete mixture as follows:

- 1. Minimum Compressive Strength: 5000 psi at 28 days.
- 2. Maximum Water-Cementitious Materials Ratio: 0.50
- 3. Minimum Cement W/C per cubic yard (94 lb sacks): 6.0
- 4. Slump Limit: 3 inches, plus or minus 1 inch or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
- 5. Air Content: 6 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size greater than 3/8 inch.
- 6. Air Content: 7 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size 3/8 inch or less.
- 7. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
- 8. Type of Work: Structural Concrete

- E. Proportion Lean concrete mixture as follows:

- 1. Minimum Compressive Strength: 2500 psi at 28 days.
- 2. Maximum Water-Cementitious Materials Ratio: 0.60
- 3. Minimum Cement W/C per cubic yard (94 lb sacks): 4.5

4. Slump Limit: 3 inches, plus ½ inch or minus 1 inch or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
5. Air Content: 5.0 percent, plus or minus 1 percent at point of delivery.
6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
7. Type of Work: Lean Concrete.

## 2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## 2.12 TRIAL BATCH AND LABORATORY TESTS

- A. Before placing any concrete, the Contractor shall submit the certified trial batch results of each class of concrete having a 28-day strength of 4,000 psi or higher, based on the preliminary concrete mixes submitted by the Contractor. All concrete shall conform to the requirements of this Section, whether the aggregate proportions are from the Contractors preliminary mix design, or whether the proportions have been adjusted during the trial batch process. The trial batch shall be prepared using the aggregates, cement and admixture proposed for the project. . The costs for the trial batch tests shall be borne by the Contractor.
- B. The determination of compressive strength will be made by testing 6-inch diameter by 12-inch high cylinders; made, cured and tested in accordance with ASTM C 192 and ASTM C 39. Three (3) compression test cylinders will be tested at 7-days and three (3) at 28-days. The average compressive strength for the three (3) cylinders tested at 28-days for any given trial batch shall not be less than one hundred twenty-five percent (125%) of the specified compressive strength.
- C. A standard sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements for ASTM C 136. Values shall be given for percent passing each sieve.

## 2.13 SHRINKAGE LIMITATION

- A. Drying shrinkage specimens shall be 4-inch by 4-inch by 11-inch prisms with an effective gage length of 10-inches, fabricated, cured, dried and measured in accordance with ASTM C 157 modified as follows: Specimens shall be removed from molds at an age of 23± hours after trial batching, shall be placed immediately in water at 70 degrees F. ±3 degrees F. for at least thirty

(30) minutes, and shall be measured within thirty (30) minutes thereafter to determine original length and then submerged in saturated lime water at 73 degrees F.  $\pm 3$  degrees F. Measurement to determine expansion expressed as a percentage of original length shall be made at age 7-days. This length at age 7-days shall be the base length for drying shrinkage calculations ("0" days drying age). Specimens then shall be stored immediately in a humidity control room maintained at 73 degrees F.  $\pm 3$  degrees F. and fifty percent (50%)  $\pm 4$  percent relative humidity for the remainder of the test. Measurements to determine shrinkage expressed as percentage of base length shall be made and reported separately for 7, 14, 21 and 28-days of drying after 7-days of moist curing.

The drying shrinkage deformation of each specimen shall be computed as the difference between the base length (at "0" days drying age) and the length after drying at each test age. The average drying shrinkage deformation of the specimens shall be computed to the nearest 0.0001-inch at each test age. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004-inch, the results obtained from that specimen shall be disregarded. Results of the shrinkage test shall be reported to the nearest 0.001 percent of shrinkage. Compression test specimens shall be taken in each case from the same concrete used for preparing during shrinkage specimens. These tests shall be considered a part of the normal compression tests for the project. Allowable shrinkage limitations shall be specified herein.

- B. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21-day drying age or at 28-day drying age (specified in Paragraph 2.07), shall be 0.036 percent or 0.042 percent, respectively. The Contractor shall only use a mix design for construction that has first met the trial batch shrinkage requirements.
- C. The maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than twenty-five percent (25%).
- D. If the required shrinkage limitation is not met during construction, the Contractor shall take all necessary action, at not additional cost to the Owner, for securing the specified shrinkage requirements. These actions may include changing the source of aggregates, cement and/or admixtures; reducing water content ratio; washing or aggregate to reduce fines; increasing the number of construction joints; modifying the curing requirements; or other actions designed to minimize shrinkage or the effects of shrinkage.

## 2.14 GROUT

- A. Grout shall be a mixture of one part Portland cement to 4-1/2 parts sand. Water content shall be such that the grout can be readily spread, yet not wet enough to cause trouble with surface water or laitance, or failure to stay in place after screeding. All grout mixes and mixing procedures shall be submitted in accordance with section 013300-Contractor Submittals, and shall be subject to review and approval by the Engineer prior to commencing the grouting operations.
- B. Procedures for Grout placement shall be approved by the equipment supplier, to insure that no equipment is overstressed, as well as proper placement tolerances. Equipment Supplier shall have final say on grouting procedures and final tolerances.

## PART 3 - EXECUTION

### 3.1 MIXING CONCRETE

- A. Mixing equipment shall be subject to the Engineers approval. Mixers shall be of the stationary plant or truck mixer type. Adequate equipment and facilities shall be provided for accurate measurement and control of all materials and for readily changing the proportions of the material. The mixing equipment shall be maintained in good working order and shall be capable of combining the aggregates, cement and water within the specified time into a thoroughly mixed and uniform mass and of discharging the mixture without segregation. Cement and aggregate shall be proportioned by weight.
- B. The batch plant shall be capable of controlling and delivering of all material to within one percent (1%) by weight of the individual material. If bulk cement is used, it shall be weighed on a separate visible scale which will accurately register the scale load at any stage of the weighing operation from zero to full capacity.
- C. Cement shall not come in contact with aggregate or with water until the materials are in the mixer ready for complete mixing with all mixing water. The procedure of mixing cement with sand or with sand and coarse aggregate for delivery to the jobsite for final mixing and an addition of mixing water will not be permitted. Re-tempering of concrete will not be permitted. The entire batch shall be discharged before recharging. The volume of the mixed material per batch shall not exceed the manufacturers rated capacity of the mixer.
- D. Each mixer shall be equipped with a device for accurately measuring and indicating the quantity of water entering the concrete, and the operating mechanism shall be such that leakage will not occur when the valves are closed. Each mixer shall be equipped with a device for automatically measuring, indicating and controlling the time required for mixing. This device shall be interlocked to prevent the discharge of concrete from the mixer before the expiration of the mixing period.
- E. Transit-mixed concrete shall be mixed and delivered in accordance with ASTM C 94. After the drum is once started, it shall be revolved continuously until it has completely discharged its batch. Water shall not be admitted to the mix until the drum has started revolving. The right is reserved to increase the required minimum number of revolutions allowed, if necessary, to obtain satisfactory mixing, and the Contractor will not be entitled to additional compensation because of such an increase or decrease.
- F. Mixed concrete shall be delivered to the site of the work and discharge shall be completed within one (1) hour after the addition of the cement to the aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F. or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed forty-five (45) minutes. The use of non-agitating equipment for transporting concrete will not be permitted.
- G. Truck mixers shall be equipped with counters so that the number of revolutions of the drum may be readily verified. The counter shall be of the resettable type and shall be actuated at the time of starting mixers at mixing speeds. Concrete shall be mixed in a truck mixer for not less than seventy (70) revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the

manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

- H. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If slump tests taken at approximately the  $\frac{1}{4}$  and  $\frac{3}{4}$  points of the load during discharge give slumps differing by more than one inch when the specified slump is more than 3 inches, the mixer shall not be used on the work unless the causing condition is corrected and satisfactory performance is verified by additional slump test. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.
- I. Comply with ACI 318 and ASTM C94 for all central plant and rolling stock equipment and methods.
- J. Select equipment of size and design to provide continuous flow of concrete at the delivery end. Use metal or metal-lined non-aluminum discharge chutes with slopes not exceeding one vertical to two horizontal and not less than one vertical to three horizontal. Chutes more than 20-foot long and chutes not meeting slope requirements may be used if concrete is discharged into a hopper before distribution.

### 3.2 PREPARATION OF SURFACES FOR CONCRETING

- A. Earth surfaces shall be thoroughly and uniformly wetted by sprinkling prior to the placing of any concrete. These surfaces shall be kept moist by frequent sprinkling up to the time concrete is placed thereon. The surface shall be free from standing water, mud and debris at the time of placing concrete.
- B. The surfaces of all horizontal construction joints shall be cleaned of all laitance, loose or defective concrete and foreign material. Such cleaning shall be accomplished by sandblasting followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.
- C. No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel and preparation of surfaces involved in the placing have been completed and accepted by the Engineer at least four (4) hours before placement of concrete. All reinforcement, anchor bolts, sleeves, inserts and similar items shall be set and secured in the forms where shown or by shop drawings and shall be acceptable to the Engineer before any concrete is placed. Accuracy of placement is the responsibility of the Contractor. All surfaces of embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- D. All form surfaces in contact with the concrete shall be thoroughly cleaned of all previous concrete, dirt and other surface contaminants prior to use. Damaged form surfaces shall not be used.

Wood form surfaces in contact with the concrete shall be coated with an approved release agent prior to form installation. The release agent shall be non-staining and non-toxic after thirty (30)

days. Mill scale and other ferrous deposits shall be sandblasted or otherwise removed from the contact surface of steel forms. All steel forms shall have the contact surfaces coated with an approved release agent. The release agent shall be effective in preventing discoloration of the concrete from rust and shall be non-toxic after thirty (30) days.

- E. Where concrete is to be cast against old existing concrete, the old concrete shall be thoroughly roughened to exposed, hard aggregate by sandblasting or chipping. Any additional surface preparation shall be as called for in the drawings.
- F. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or diverted out of the forms and clear of the work. No concrete shall be deposited under water or allowed to rise on any concrete until the concrete has attained its initial set. Pumping or other necessary dewatering operations for removing ground water, if required, shall be the responsibility of the Contractor and will be subject to review by the Engineer.
- G. Pipe, conduit, dowels, sleeves and other ferrous items required to be embedded in concrete construction shall be adequately positioned and supported prior to placement of concrete. There shall be a minimum of 2-inches clearance between embedded items and any of the concrete reinforcement. Securing embedments in position by wiring or welding them to the reinforcement will not be permitted.

### 3.3 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete except where grating will be installed.

### 3.4 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
- B. Do not embed piping or electrical conduits in concrete unless shown on the Drawings.
- C. Pipes and conduits embedded within a slab or wall (other than those merely passing through) shall satisfy the following, unless otherwise shown on the Drawings or approved:
  - 1. Maximum outside dimension of pipe or conduit shall not be greater than one third the overall thickness of the slab or wall.

2. Spacing of pipes or conduits shall be greater than or equal to three diameters or widths on center.
- D. Close open ends of piping, conduits, and sleeves embedded in concrete with caps or plugs prior to placing concrete.
  - E. Fabricate piping and conduit such that the cutting, bending, or relocation
  - F. Pipe, conduit, dowels, sleeves and other ferrous items required to be embedded in concrete construction shall be adequately positioned and supported prior to placement of concrete. There shall be a minimum of 2-inches clearance between embedded items and any of the concrete reinforcement. Securing embedments in position by wiring or welding them to the reinforcement will not be permitted. Embedded items shall be clean and free of rust, mud, dirt, grease, oil, ice, or other contaminants which would reduce or prevent bonding with concrete.
  - G. Coat or isolate all aluminum embedments to prevent aluminum-concrete reaction or electrolytic action between aluminum and steel.
  - H. Ensure all specified tests and inspections on embedded piping are completed and satisfactory before starting concrete placement. Ensure all mechanical or electrical tests and inspections are completed and satisfactory prior to starting concrete placement. Do not place concrete until unsatisfactory items and conditions have been corrected.

### 3.5 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
  1. Lap joints 6 inches and seal with manufacturer's recommended tape.

### 3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### 3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- E. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

### 3.8 CONCRETE PLACEMENT

- A. Placement of concrete shall conform to the requirements and recommendations of ACI 301, 304 and 318, except as modified herein.
- B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- D. Cold-Weather Placement:
1. For this Specification, "cold weather" is defined as a period when for more than three successive days, the average daily outdoor temperature drops below 40 degrees F. Calculate average daily temperature as the average of the highest and the lowest temperature during the period from midnight to midnight.
  2. Batch, deliver, place, cure and protect concrete during cold weather in compliance with the recommendations of ACI 306R and the additional requirements of this Section.
  3. Review the cold weather concreting plan at the preconstruction meeting. Include the methods and procedures for use during cold weather including the production, transportation, placement, protection, curing and temperature monitoring of the concrete and the procedures to be implemented upon abrupt changes in weather conditions or equipment failures.
  4. The minimum temperature of concrete immediately after placement and during the protection period shall be as indicated in Table 3. The temperature of the concrete in place and during the protection period shall not exceed these values by more than 20 degrees F. Prevent overheating and non-uniform heating of the concrete.

TABLE 3

Concrete Temperatures  
Minimum Dimension of Section

|                  |                   |                    |
|------------------|-------------------|--------------------|
|                  | <u>&lt; 12-in</u> | <u>12 to 36-in</u> |
| Min. conc. temp: | 55 Degree F       | 50 Degree F        |

5. Protect concrete during periods of cold weather to provide continuous warm, moist curing (with supplementary heat when required by weather conditions) for a total of at least 350 degree-days of curing.
  - a. Degree-days are defined as the total number of 24 hour periods multiplied by the weighted average daily air temperature at the surface of the concrete (e.g., 7 days at an average 50 degrees F = 350 degree-days).
  - b. To calculate the weighted average daily air temperature, sum hourly measurements of the air temperature in the shade at the surface of the concrete taking any measurement less than 50 degrees F as 0 degrees F. Divide the sum thus calculated by 24 to obtain the weighted average temperature for that day.
6. Do not use salt, manure or other chemicals for protection.
7. At the end of the protection period, allow the concrete to cool gradually to the ambient temperature. If water curing has been used, do not expose concrete to temperatures below those shown in Table 3 until at least 24 hours after water curing has been terminated and air dry concrete for at least 3 days prior to first exposure to freezing temperatures.
8. During periods not defined as cold weather, but when freezing temperatures are expected or occur, protect concrete surfaces from freezing for the first 72 hours after placing.

E. Hot-Weather Placement:

1. For this Specification, "hot weather" is defined as any combination of high air temperatures, low relative humidity and wind velocity which produces a rate of evaporation as estimated in ACI 305R, approaching or exceeding 0.2 pounds per square foot per hour (lb/sq ft/hr).
2. Batch, deliver, place, cure and protect concrete during hot weather in compliance with the recommendations of ACI 305R and the additional requirements of this Section.
  - a. Temperature of concrete being placed shall not exceed 90 degrees F. Maintain a uniform concrete mix temperature below this level. The temperature of the concrete shall not cause loss of slump, flash set or cold joints.
  - b. Promptly deliver concrete to the site and promptly place the concrete upon its arrival at the site, not exceeding the maximum time interval specified in Paragraph 3.1F Provide vibration immediately after placement.
  - c. The Engineer may direct the Contractor to immediately cover concrete with sheet curing material.

3. Review the hot weather concreting plan at the preconstruction meeting. Include the methods and procedures for use during hot weather including production, placement, and curing.
- F. No concrete shall be placed without prior inspection of the forms, reinforcing and embedded items and approval from an authorized representative of the Engineer. Verify that all formwork completely encloses concrete to be placed and is securely braced prior to concrete placement. The Contractor shall notify the Engineer at least twenty-four (24) hours in advance of any scheduled concrete placement and shall call for final inspections no later than four (4) hours in advance of the scheduled placement. The Contractor shall notify the Engineer at least two (2) hours in advance of setting the opposite side of wall forms so that the construction joint preparation, water stop installation and reinforcing steel inspections can be conducted. It is the Contractors responsibility to see that the forms are properly cleaned and oiled before being set, the construction joints properly prepared, reinforcing steel is securely and properly supported in the correct position and that all embedment items including electrical conduit is correctly installed before calling for inspections. The Engineer may at his option require the use of placement cords if deemed necessary.
- G. Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the work. Concrete which is not placed in accordance with these specifications, or which is of inferior quality, shall be removed and replaced at the expense of the Contractor.
- H. No concrete shall be placed during rain or snow storms, unless completely covered to prevent storm water from coming in contact with it. Sufficient protective covering material shall be kept on hand at all times should rain or snow storms arise during concrete placement operations.
- I. Concrete shall be deposited at or near its final position to avoid segregation caused by rehandling or flowing. Concrete shall not be deposited in large quantities in one place and worked along the forms with vibrator or other means. Concrete shall be uniformly distributed during the placing process and in no case after depositing shall any portion be displaced in the forms more than 2-feet in horizontal direction. Concrete shall be deposited in forms in horizontal layers not to exceed 24-inches in depth and shall be brought up evenly in all parts of the form. The rate of placement of concrete in forms shall not exceed 5-feet of vertical rise per hour. As the concrete is placed it shall be consolidated thoroughly and uniformly by mechanical vibration to secure a dense mass, close bond with reinforcement and other embedded items and smooth surface. The mechanical vibrator shall penetrate not only the freshly placed concrete, but also the previously placed lift to ensure the lifts become monolith. New concrete shall be placed against previously placed concrete, not away from it. When concrete is placed on a slope, placement shall begin at the lower end of the slope and progress to the upper end for the full width of the placement. Consolidation by mechanical vibration shall follow directly behind placement and the rate of placement shall never get ahead of the consolidation crew. Concrete placement shall continue without avoidable interruption, in a continuous operation until the end of the placement is reached.
- J. The drop of concrete into slab or wall forms shall be vertical. Concrete shall not be dropped through reinforced steel, but deposited in forms using a hopper with a drop chute to avoid segregation and to keep mortar from coating the reinforcement steel and forms above the in-place concrete. In no case shall the free fall of concrete exceed 4-feet below the end of the hopper or chute.

- K. If it takes more than 20-minutes to get back to place concrete over concrete previously placed, the depth of the layers being placed at one time shall be reduced, and/or placing equipment increased, until it is possible to return with the placing operation to previously placed concrete within 20-minutes. If concrete is to be placed over previously poured concrete and more than 20-minutes have elapsed, then a layer of grout not less than 1/2-inch thick shall be spread over the surface before placing the additional concrete.
- L. The placement of concrete for slabs, beams or walkways cast monolithically with walls or columns shall not commence until the concrete in the walls or columns has been allowed to set and shrink. The time allowed for shrinkage shall be not less than one (1) hour.
- M. Concrete shall be placed with the aid of approved mechanical vibrators. Vibration shall be supplemented by manual forking or spading adjacent to the forms on exposed faced in order to secure smooth dense surfaces. The concrete shall be thoroughly consolidated around reinforcement, pipes or other shapes built into the work. The vibration shall be sufficiently intense to cause the concrete to flow and settle readily into place and to visibly affect the concrete over a radius of at least 18-inches.

Sufficient vibrators shall be on hand at all times to vibrate the concrete as placed. In addition to the vibrators in actual use while concrete is being placed, the Contractor shall have on hand one (1) spare vibrator in serviceable condition. No concrete shall be placed until it has been ascertained that all vibrating equipment, including spares, is in serviceable condition.

Special care shall be taken to place the concrete solidly against the forms so as to leave no voids. Every precaution shall be taken to make all concrete solid, compact and smooth, and if for any reason the surfaces or interiors have voids or are in any way defective, such concrete shall be repaired as directed by the Engineer. No defective work shall be patched or repaired without the prior inspection and approval of the Engineer.

- N. The temperature of concrete when it is being placed shall be not more than 90 degrees F. nor less than 40 degrees F. in moderate weather, and not less than 50 degrees F. in weather during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F., the Contractor shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements.
- O. Concrete shall not be placed on a frozen subgrade or subgrade that contains frozen materials. All ice and snow shall be removed from inside forms and from reinforcing steel and embedded items. The temperature of all surfaces that the concrete will contact shall be raised above the freezing point for at least 12-hours prior to placing new concrete.

The minimum temperature of fresh concrete as mixed shall be 60 degrees F. for ambient temperature above 30 degrees F.; 65 degrees F. for ambient temperature 0 degrees F. to 30 degrees F.; and 70 degrees F. for ambient temperature below 0 degrees F. The minimum temperature of fresh concrete after placing shall be 55 degrees F. for the first 72-hours.

The use of calcium chloride shall not be permitted.

In general, the Contractor shall adhere to the recommendations as outlined in ACI Standard 306 for cold weather concreting, except as required herein.

### 3.9 REMOVAL OF FORMS

- A. Do not remove forms before the concrete has attained a strength of at least 70% of its specified design strength for beams and slabs and at least 30 percent of its specified design strength for walls and vertical surfaces, nor before reaching the following number of day-degrees of curing (whichever is the longer):

TABLE 4

| <u>Forms for</u>                       | <u>Degree Days</u> |
|--|--------------------|
| Elevated beams and elevated slabs      | 500                |
| Walls and vertical surfaces            | 100                |
| Foundation footings and slabs-on-grade | 100                |

(See definition of degree-days in Paragraph 3.8D)

- B. Do not remove shores until the concrete has attained at least 70 percent of its specified design strength and also sufficient strength to support safely its own weight and the construction live loads upon it.
- C. In cold weather, when temperature of concrete exceeds ambient air temperature by 20 Degrees F at the end of the protection period, loosen forms and leave in place for at least 24 hours to allow concrete to cool gradually to ambient air temperature.

### 3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities. Fill tie holes and depressions and bug-holes ¼ inch or larger in width or depth with mortar.
  - 1. Apply to concrete surfaces to be covered by backfill or coated with below grade waterproofing systems.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces in water channels, below water surface of basins, inside meter and valve vaults, inside cells of hydraulic splitter boxes and weirs.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Formed concrete surfaces inside buildings and machine rooms and all exposed exterior surfaces of foundations, basins, vaults, hydraulic structures and curbs.
  2. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  3. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
  4. Cork-Float Finish: Wet concrete surfaces and apply a stiff grout. Mix one part Portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
  1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture. Surface irregularities shall not exceed ¼ inch.
  1. Apply float finish to surfaces indicated and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or floor slabs to be covered with grouted tile or topping grout and slabs to be covered with built-up roofing.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces all building and machine room floors, basin floors not receiving a grout topping, channel floors, top of interior walls, top of interior curbs, steps and walkways.
  2. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to exterior walkways, curb, gutter, sidewalk and steps, top of valve or meter vaults, electrical pull boxes and catch basins. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. The schedule for finished unformed surfaces shall be as follows:

Unformed Concrete Surface Schedule

| <u>Area</u>   | <u>Finish</u>     |
|---|-------------------|
| Grade slabs and foundations to be covered with concrete or fill material.   | Scratch Finish    |
| Floor slabs to be covered with grouted tile or topping grout and slabs to be covered with built-up roofing.   | Float Finish      |
| All building and machine room floors, basin floors not receiving a grout topping, channel floors, top of interior walls, top of interior curbs, steps and walkways. | Trowel Finish     |
| Exterior walkways, curb, gutter, sidewalk and steps, top of valve or meter vaults, electrical pull boxes and catch basins.  | Fine-Broom Finish |

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  1. Moisture Curing: Keep surfaces continuously moist for not less than 14 days.
  2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped

at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

- D. Immediately following the first frost in the fall, the Contractor shall be prepared to protect all concrete against freezing.

### 3.13 CONCRETE SURFACE REPAIRS

- A. It is the intent of these Specifications to require quality work including forming, mixture and placement of concrete and curing so completed concrete surfaces will require no patching or repairs.

- B. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

- C. As soon as the forms have been stripped and the concrete surfaces exposed: Remove fins and other projections; fill recesses left by the removal of form ties; and repair surface defects which do not impair structural strength. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.

- D. Immediately after removal of forms remove tie cones and metal portions of ties. Fill holes promptly upon stripping as follows: Moisten the hole with water, roughen first if necessary for adhesion, followed by a 1/16-in brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1 to 1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of "balling"). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spider web. Trowel smooth with heavy pressure. Avoid burnishing.

- E. When filling tie cone holes and patching or repairing exposed surfaces use the same source of cement and sand as used in the parent concrete. Adjust color to match by addition of white cement. Rub lightly with a fine carborundum stone at an age of one to five days if necessary to bring the surface down with the parent concrete. Do not damage or stain the virgin skin of the surrounding parent concrete. Wash thoroughly to remove all rubbed matter.

- F. Defective concrete and honeycombed areas: Chip down square and at least 1-in deep to sound concrete with hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded in the parent concrete. If honeycomb exists around reinforcement, chip to provide a clear space at least 3/8-in wide all around the steel. For areas less than 1-1/2-in deep, the patch may be made in the same manner as described above for filling form tie holes, care being exercised to use adequately dry (non-trowelable) mixtures and to avoid sagging. Thicker repairs will require build-up in successive 1-1/2-in layers on successive days, each layer being applied (with slurry, etc.) as described above.
- G. For very heavy (generally formed) patches, the Engineer may order the addition of pea gravel to the mixture and the proportions modified as follows:

| <u>Material</u> | <u>Volumes</u> | <u>Weights</u> |
|-----------------|----------------|----------------|
| Cement          | 1.0            | 1.0            |
| Sand            | 1.0            | 1.0            |
| Pea Gravel      | 1.5            | 1.5            |

- H. The Contractor may use a pre-packaged patching compound, such as: Poly-Patch by Euclid Chemical Company; Emaco R310 by BASF Chemical Company; Sikatop 122 Plus by Sika Chemical Corporation or equal only if approved by the Engineer for use and for color match.

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of tests on such cores shall be the basis for acceptance, rejection or determining the continuation of concrete work. The right of the Engineer to take such cores shall not be construed as creating any obligation to take such cores, and not exercising this right to do so shall not relieve the Contractor from meeting the requirements of these Specifications.
- C. Cooperate in obtaining cores by allowing free access to the work and permitting the use of ladders, scaffolding and such incidental equipment as may be required. Repair all core holes with non-shrink grout as specified in Section 03600. The work of cutting, testing and repairing the cores will be at the expense of the Contractor if defective work is uncovered. If no defective work is found, such cost will be at the expense of the Owner.

3.11 FAILURE TO MEET REQUIREMENTS

- A. Should the strengths shown by the test specimens made and tested in compliance with the previous provisions fall below the values given in Section 2.8, the Engineer may require changes in proportions or materials, or both, to apply to the remainder of the work. Furthermore, the Engineer may require additional curing on those portions of the structure represented by the test specimens which fall below the values given in Section 2.8. The cost of such additional curing shall be at no additional cost to the Owner. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer may require strengthening or replacement of those portions of the structure which fail to develop the re-

quired strength. Coring and testing and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be at no additional cost to the Owner. In such cases of failure to meet strength requirements the Contractor and Owner shall confer to determine what adjustment, if any, can be made in compliance with Sections titled "Strength" and "Failure to Meet Strength Requirements" of ASTM C94. The "purchaser" referred to in C94 is the Contractor.

- B. When the tests on control specimens of concrete fall below the required strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in compliance with ASTM C42 and C39. In cases where tests of cores fall below the values given in Section 2.8, the Engineer, in addition to other recourses, may require load tests on any one of the slabs, walls, beams, and columns in which such concrete was used. Test need not be made until concrete has aged 60 days. The Engineer may require strengthening or replacement of those portions of the structure which fail to develop the required strength. All coring and testing and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be at no additional cost to the Owner.
- C. Should the strength of test cylinders fall below 60 percent of the required minimum 28 day strength, the concrete shall be immediately rejected and shall be removed and replaced at no additional cost to the Owner.

END OF SECTION 033000

## SECTION 036000 – GROUTING MORTAR

### PART 1 - GENERAL

#### 1.1 THE REQUIREMENT

- A. The Contractor shall furnish, place, finish and cure the following types of grouting mortars as called for herein and as shown in the Contract Documents
- B. Perform all sampling and furnish all testing of materials and products by an independent testing laboratory acceptable to the Engineer but engaged by and at the expense of the Contractor
  - 1. Non-Shrink Grout: This type of grout shall be used wherever grout is shown or called for in the Contract Documents, unless another type is specifically referenced.
  - 2. Topping Grout: This type of grout shall be used for grouting clarifier bottoms.
  - 3. Epoxy Grout: This type of grout shall be used for anchor bolt or reinforcing steel embedment, repairs and resurfacing.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Cast-In-Place Concrete. 033000

#### 1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Specifications, codes and standards is listed under Section 033000 entitled, "Cast-In-Place Concrete", and those additional commercial standards as follows:

|               |  |
|---------------|--|
| CRD-C 621-85  | Corps of Engineers Specification for Non-Shrink Grout  |
| ASTM C 109    | Standard Test Method for Compressive (Latest Edition) Strength of Hydraulic Cement Mortars (Using 2-inch or 50-mm Cube Specimens)                                    |
| ASTM C-827-87 | Standard Test Method for Early Volume Change of Cementitious Mixtures  |
| ASTM C150     | Standard Specification for Portland Cement   |
| ASTM C531     | Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing and Polymer Concrete. |
| ASTM C579     | Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing and Polymer Concrete.                                 |

|            |  |
|------------|--|
| ASTM C1077 | Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for use in Construction and Criteria for Laboratory Evaluation |
| ASTM C1107 | Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)   |
| ASTM D695  | Standard Test Method for Compressive Properties of Rigid Plastics  |
| ASTM E329  | Standard specification for agencies engages in the testing and/or inspection of materials used in construction                             |

- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

#### 1.4 CONTRACTOR SUBMITTALS

- A. Non-Shrink Grout: Submit manufacturer’s catalogue cuts, technical data including compressive strength and expansion data at plastic, flowable and fluid consistencies, storage requirements, product life, working time after mixing, temperature consideration, conformity to the specified ASTM standards, and Material Safety Data Sheets. Also submit manufacturer’s applications manual containing instructions and recommendations for mixing, handling, placement and appropriate uses for each type of non-shrink grout used in the work.
- B. Topping Grout: Provide certified mix design including type and brand of cement, proportions and gradations of all materials, product data on any proposed admixtures, and compressive strength test results from at least one (1) trial batch. Tests shall be performed by a certified testing laboratory. All costs for such mix design and trial batch tests shall be borne by the Contractor.
- C. Non-shrink Epoxy Grout: Submit manufacturer’s catalog cuts, technical data including strengths and application manual of instructions for mixing, handling and placing, storage requirements, product life, working time after mixing, temperature consideration, conformity to the specified ASTM standards, and Material Safety Data Sheets.

#### 1.5 QUALITY ASSURANCE

- A. Qualifications
  - 1. Grout manufacturers shall have a minimum of 10 years experience in the production and use of the type of grout proposed.
  - 2. Independent testing laboratory shall meet the requirements of ASTM E329 and ASTM C1077 and be acceptable to the Engineer. Laboratories affiliated with the Contractor or in which the Contractor or officers of the Contractor’s organization have beneficial interest are not acceptable.
- B. Pre-installation Meeting
  - 1. At least ten working days before grouting, hold a pre-installation meeting to review the requirements for surface preparation, mixing, placing and curing procedures for each product

proposed for use. Notify all parties involved with grouting, including the Engineer, of the meeting at least ten working days prior to its scheduled date.

C. Services of Manufacturer's Representative

1. Provide services of a field technician of the non-shrink grout manufacturer who has performed at least five projects of similar size and complexity during the last five years, to attend the pre-installation meeting, to be present for the initial installation of each type of non-shrink grout, and to correct installation problems.

D. Field Testing

1. All field testing and inspection services will be provided by the Owner. Assist in the sampling of materials, and cooperate by allowing free access to the work and permitting the use of ladders, scaffolding, and such incidental equipment as may be required. Methods of testing will comply with the applicable ASTM Standards.
2. Field testing of concrete grout will be as specified for concrete in Section 03300.
3. Mix design tests for topping grout shall be performed per the standards referenced herein.

E. During the progress of construction the Engineer may have tests made of each type of grout used in the work to ensure compliance with the Contract Documents. These tests will be made in accordance with the standards referenced herein. The test expense during construction, except for the mix design and trial batch tests, will be borne by the Owner. The costs of additional tests including non-destructive tests and core drilling needed to verify or investigate the quality of questionable work or material shall be borne by the Contractor.

F. Grout for testing shall be supplied by the Contractor at no cost to the Owner.

G. If any grout fails to meet the requirements of these specifications, immediate corrective action shall be taken for all subsequent batches. Grout already in place which fails to meet these requirements is subject to removal and replacement with all costs borne by the Contractor.

H. Construction tolerances shall be as specified in Section 033000 entitled, "Cast-In-Place Concrete", except as modified herein and elsewhere in the Contract Documents.

## PART 2 - PRODUCTS

### 2.1 NON-SHRINK GROUT

- A. Non-shrink grout shall be a prepackaged, inorganic, non-gasliberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged.
- B. Non-shrink grouts for use as herein specified shall conform to the Corps of Engineers specifications for Non-Shrink Grout, CRD-C621-85 and to these specifications. The grout shall have a 28-day compressive strength of 6,000 psi or greater.
- C. Non-shrink grouts shall be as manufactured by: Tremcrete Systems Incorporated, Woodland, California; Gifford-Hill & Company, Inc., Dallas, Texas; or approved equal.

## 2.2 TOPPING GROUT

- A. Cement topping grout for clarifiers or channels shall be composed of one part cement, three parts sand, and the minimum amount of water necessary to obtain the desired consistency. The minimum compressive strength at 28-days shall be 4,000 psi.
- B. Cement grout materials shall be as specified in Section 033000 entitled, "Cast-In-Place Concrete".

## 2.3 EPOXY GROUT

- A. Epoxy grout shall be a pourable, non-shrink, one-hundred percent (100%) solids system. The epoxy grout system shall have three components; resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application. Manufacturer's instructions shall be printed on each container in which the materials are packaged.
- B. The mixed epoxy grout system shall have a minimum working life of 45 minutes at 75 degrees F. The epoxy grout shall develop a minimum compressive strength of 5,000 psi in 24-hours and 10,000 psi in 7-days.

## 2.4 CURING MATERIALS

- A. Curing materials shall be as specified in Section 033000 entitled, "Cast-In-Place Concrete", for cement topping grout and as recommended by the manufacturer of non-shrink grouts.

## PART 3 - EXECUTION

### 3.1 PLACING NON-SHRINK AND EPOXY GROUT

- A. All forming, mixing, surface preparation, handling, placing and consolidated of non-shrink and epoxy grouts shall be done according to the instructions and recommendations of the manufacturer.
- B. Curing shall be as specified herein.

END OF SECTION 036000

## SECTION 221050 - HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. The Contractor shall provide high density polyethylene pipe and appurtenances, complete in place, in accordance with the Contract Documents.

#### 1.2 RELATED SECTION

- A. Section 312000 – Earth Moving

#### 1.3 REFERENCES

- A. The Materials and Work furnished shall be, as a minimum, in accordance with the latest editions of the following standards except as such Standard are modified and supplemented in this section.

|            |   |
|------------|---|
| AWWA C906  | Standard for Polyethylene (PE) Pressure Pipe & Fittings, 4 inch (100 mm) through 63 inch (1,575 mm) for Water Distribution and Transmission           |
| ASTM D1238 | Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer   |
| ASTM D1248 | Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable   |
| ASTM D1505 | Standard Test Method for Density of Plastics by the Density-Gradient Technique  |
| ASTM D2837 | Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products |
| ASTM F714  | Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter  |
| ASTM D3035 | Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter  |
| ASTM D3261 | Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing                          |
| ASTM D3350 | Standard Specification for Polyethylene Plastics Pipe and Fittings Materials  |
| ASTM D256  | Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics   |

|            |  |
|------------|--|
| ASTM D2683 | Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing        |
| ASTM F1055 | Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing |
| ASTM D2657 | Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings  |
| ASTM F2164 | Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure                 |
| ASTM F1417 | Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air                           |
| PPI TR-33  | Generic Butt Fusion Joining Procedure for Field Joining of PE Pipe   |

#### 1.4 SUBMITTALS

- A. The Contractor shall submit the following information and data. See Section 013300 – Contractor Submittals.
1. Product Data: Provide data indicating pipe, pipe accessories and fittings.
  2. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
  3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
  4. Certified Resin Test Reports covering the physical, stress, regression, thermal and impact tests of resin material to be used for the pipe. Submit this information prior to manufacturing or fabricating any pipe.
  5. Proposed butt fusion procedures including training and qualification requirements and joint repair procedures shall be submitted to the Engineer for review and approval.
  6. Qualifications of Butt Fusion Welders and Welding Operators
    - a. All butt fusion welders and welding operators shall be qualified and certified for all portions of the work specified in this section. Welder qualification requires that during the past 12 months all welders and welding operators have successfully completed certified butt-fusion joints using the pipe and welding machine proposed for this project.
    - b. Current welder and welding operator performance qualification test records shall be submitted to the Engineer for review and approval prior to commencing field operations.
    - c. Personnel that will be operating the butt fusion welder shall be certified by either 1 and 3, or 2 and 3 of the following criteria:
      - 1) Previous demonstrated experience during the past 12 months, in the use of the procedure on similar projects using the same welding machines and type of pipe proposed.
      - 2) Appropriate training and apprenticeship
      - 3) All operators shall make a specimen joint from the pipe to be used on the project. This joint shall then be subjected to the test requirements specified herein.

7. Fusion parameters including the recommended limits of all criteria recorded by the data logger.
8. Fusion report for each joint, which shall include the following information.
  - a. Pipe size and dimensions
  - b. Machine size
  - c. Operator identification
  - d. Job identification number
  - e. Weld number
  - f. Fusion, heating and drag resistance settings
  - g. Heater plate temperature
  - h. Time Stamp
  - i. Heating and curing time of weld
  - j. Curing temperature readings and time stamps of readings
  - k. Ambient air temperature and humidity
  - l. Error message and warnings for out of range temperature or pressure settings.

#### 1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for materials and installation of the Work in this Section.

#### 1.6 PROJECT CONDITIONS

- A. Coordinate the Work on existing utility lines and connections to existing utility lines with the Owner.

#### 1.7 QUALITY CONTROL

- A. Any pipe manufactured prior to review and approval of all required prefabrication submittals will be at the Contractor's own risk.
- B. Review of the Contractor's shop drawings shall not relieve the Contractor of any responsibility for accuracy of dimensions and details, nor shall mutual Agreement of dimensions or details relieve the Contractor of responsibility for Agreement and conformity of its Shop Drawings with the Contract.

#### 1.8 QUALITY ASSURANCE

- A. Fabrication, processing, testing and inspection operations affecting the pipe and associated accessories shall, at any time, be subject to quality assurance surveillance by Owner, or Engineer. Such surveillance shall be at the discretion of the Owner. Such surveillance does not relieve the Contractor from responsibility for the Work.
- B. All deviations from this specification section must be documented and referred to Engineer for resolution.
- C. The Contractor shall submit to the Engineer an affidavit from the manufacturer that the pipe, specials, fittings, and other products of material furnished under this Contract comply with all applicable provisions of AWWA C906 standards and this specification.
- D. DOCUMENTATION: The following items shall be documented and stored as part of the manufacturer's permanent records. Copies of all documentation shall be provided to the Engineer.

1. Documentation from the resin's manufacturer showing results of the following tests for resin identification:
    - a. Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer, ASTM D1238
    - b. Standard Test Method for Density of Plastics by the Density - Gradient Technique, ASTM D1505
  2. The polyethylene pipe manufacturer shall provide certification that stress regression testing has been performed on the specific polyethylene resin being utilized in the manufacture of this product. This stress regression testing shall have been done in accordance with ASTM D2837 and the manufacturer shall provide a product supplying a minimum Hydrostatic Design Basis (HDB) of 1,600 psi as determined in accordance with ASTM D2837.
  3. Production staff shall check each length of pipe produced for the items listed below. The results of all measurements shall be recorded on production sheets, which becomes part of the manufacturer's permanent records.
    - a. Pipe in process shall be checked visually, inside and out for cosmetic defects (grooves, pits, hollows, etc.)
    - b. Pipe outside diameter shall be measured using a suitable periphery tape to ensure conformance with ASTM D3035.
    - c. Pipe wall thickness shall be measured at 12 equally spaced locations around the circumference at both ends of the pipe to ensure conformance with ASTM D3035.
    - d. Pipe length shall be measured.
    - e. Pipe marking shall be examined and checked for accuracy.
    - f. Pipe ends shall be checked to ensure they are cut square and clean.
    - g. Subject inside surface to a "reverse bend test" to ensure the pipe is free of oxidation (brittleness).
    - h. Copies of all manufacturer documentation shall be submitted to the Engineer for review and approval upon completion of manufacturing.
- E. In addition to those tests specifically required, the Engineer may request additional samples of any material for testing by the Owner. The additional samples shall be furnished as a part of the Work.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS

- A. Contractor shall comply with the following minimum requirements:
1. Referenced standards for all materials, processes, methods, tests, etc to be used in completion of the Work.
  2. Delivery of all pipe and materials, all aspects of which shall be conducted in such a manner as to minimize handling, provide proper weather protection and storage, and to meet schedule requirements.
  3. Furnish and use load rated nylon-type slings for securing, lifting, and unloading pipe sections; or, the use of acceptable protective wraps to minimize damage from the alternate rigging equipment.
  4. Internal timber bracing shall be provided to maintain pipe shape and integrity throughout plant storage, transportation, and site storage operations through installation and backfill placement. Internal bracing shall not be removed until a minimum of 2 feet of compacted trench zone material is placed above the top of the pipe.

## 2.2 MANUFACTURER

- A. All HDPE pipe and HDPE fittings shall be from a single manufacturer, who is fully experienced, reputable and qualified in the manufacture of the HDPE pipe to be furnished. The pipe shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications. Qualified manufacturers shall be: PLEXCO Division of Chevron Phillips Chemical Company, DRISCOPIPE as manufactured by Chevron Phillips Co., Inc., WL Plastics or equal.

## 2.3 PIPE IDENTIFICATION

- A. The following shall be continuously indent printed on the pipe or spaced at intervals not exceeding 5-feet:
  - 1. Name and/or trademark of the pipe manufacturer.
  - 2. Nominal pipe size.
  - 3. Dimension ratio.
  - 4. The letters PE followed by the polyethylene grade in accordance with ASTM D1248 followed by the hydrostatic design basis of 1600 psi, e.g., PE 4710.
  - 6. Manufacturing standard reference, e.g., ASTM D-3035, as required.
  - 7. A production code from which the date and place of manufacture can be determined.
  - 8. Color Identification, either striped by co-extruding longitudinal identifiable color markings or shall be solid in color and as follows:
    - a. BLUE – Potable Water
    - b. GREEN – Sanitary Sewer
    - c. PURPLE – Utility Water
- B. Marking Tape: Marking tape shall be provided and installed as shown in Drawings and per Engineer approval.

## 2.4 COMPATIBILITY

- A. Contractor is responsible for compatibility between pipe materials, fittings and appurtenances.

## 2.5 WARRANTY

- A. The pipe Manufacturer shall provide a warranty against manufacturing defects of material and workmanship for a period of ten years after the final acceptance of the project by the Owner. The Manufacturer shall replace at no expense to the Owner any defective pipe/fitting material including labor within the warranty period.

## 2.6 MATERIALS

- A. Materials used for the manufacture of polyethylene pipe and fittings shall be made from a PE 4710 high density polyethylene resin compound meeting a minimum cell classification 445574C per ASTM D3350 and ASTM F714.
- B. High Density Polyethylene (HDPE) pipe shall be manufactured in accordance with AWWA C901-96 for sizes ½-inch through 3-inch diameters and to the requirements of ASTM D 3035. Pipe 4-inches and above shall be manufactured to the requirements of ASTM F714 and AWWA C906-99.

- C. Unless otherwise noted, diameters shown in the Contract Documents shall refer to Iron Pipe Size (IPS) system conforming to the requirements of AWWA C906.
- D. If rework compounds are required, only those generated in the Manufacturer's own plant from resin compounds of the same class and type from the same raw material supplier shall be used. Clean rework material of the same type grade, and cell classification generated from the manufacturers own pipe and fitting production may be used by the same manufacturer as long as the pipe, tubing and fittings produced meet all requirements of AWWA C906.
- E. Dimensions and workmanship shall be as specified by ASTM F714. HDPE fittings and transitions shall meet ASTM D3261. HDPE pipe shall have a range of density 0.956-0.964 grams per cubic centimeter. All HDPE pipe and fittings shall have a Hydrostatic Design Basis (HDB) of 1,600 psi at 73.0°F in accordance with ASTM D2837.
- F. The extruded pipe shall have impact strengths greater than 42 in-lb/in in accordance with ASTM D256 Method A, with a material thickness representative of the cross-section in which the material is to be used.
- G. Pipe and fittings used for potable water applications shall be NSF 61 certified.
- H. The pipe Manufacturer shall certify compliance with the above requirements.

## 2.7 FABRICATION

- A. Pipe shall be homogenous throughout and uniform in color, opacity, density and other properties as prescribed in the Resin Manufacturers Specifications. The inside and outside surfaces shall be semi-matte to glossy in appearance and free from sticky or tacky material. The pipe walls shall be free from cuts, cracks, holes, blisters, voids, foreign inclusions, or other defects that are visible to the naked eye that may affect wall integrity.
- B. Pipe dimensions and wall thickness variations shall be in conformance with requirements of AWWA C906.
- C. Pipe shall be finished smooth throughout all inside surfaces and true to all specified tolerances circumference and diameter such that: The difference between maximum and minimum diameters, at any cross-section along the length of the pipe does not exceed 1% of the nominal diameter.
- D. Special pipe sections, fittings, and special pieces shall be completely fabricated in the shop. All pipe fittings shall be fabricated or molded to correct dimensions throughout the entire length. Ends cuts shall be clean, squarely-made, and suitable for field welding, without drawn, ragged, gouged, or split ends.
- E. All HDPE fittings, unless noted otherwise on the drawings shall be fabricated in conformance with the requirements of AWWA C906. Molded fittings shall meet the requirements of ASTM D3261 for butt-type fittings and this specification.

## 2.8 FITTINGS

- A. All molded fittings and fabricated fittings shall be fully pressure rated to match the pipe SDR pressure rating to which they are made. All fittings shall be molded or fabricated by the manufacturer. No Contractor fabricated fittings shall be used unless approved by the Engineer.

- B. Polyethylene fittings furnished under this specification shall be manufactured using compounds complying with the requirements of HDPE pipe above and all appropriate requirements of AWWA C906. Socket fittings shall comply with ASTM D2683, Butt Fusion fittings shall comply with ASTM D3261. Electrofusion fittings shall comply with ASTM F1055. Mechanical fittings (e.g. back-up rings, etc.) shall be of stainless steel, including stainless steel hardware, as indicated in the drawings and shall be approved only after submission of appropriate test data and service histories indicating their acceptability for intended service. In all cases, the specification and requirements for the fittings supplied shall comply with the appropriate sections of AWWA C906 and must be approved by the Engineer. NO size on size wet taps shall be permitted.
- C. The manufacturer of the HDPE pipe shall supply all HDPE fittings and accessories as well as any adapters and/or specials required to perform the work as shown on the Drawings and specified herein.

## 2.9 SHIPPING, STORAGE & HANDLING

- A. All materials shall be properly loaded so that they will not bear on each other, and shall be braced to prevent damage to material during shipping. Pipe shall be stacked on level ground and per the manufacturer's recommendations to prevent pipe from becoming out of round.
- B. All loose parts shall be crated or boxed for shipping, appropriately identified and shipped with the associated pipe sections.
- C. Contractor shall protect pipeline sections stored at the site from damage, including weather and vandalism.
- D. Pipes shall be stored on level ground, preferably turf or sand, free of sharp objects, which could damage the pipe OR on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports. Stacking of the polyethylene pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature conditions. The Contractor shall abide by the required handling techniques specified by the Supplier.
- E. The handling of the pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects
- F. All piping products shall be kept free from dirt, grease, all petroleum based products, and other foreign matter.
- G. The Contractor shall provide suitable lifting equipment, slings, spreader bars, rigging etc needed to handle the pipe. In no case shall any equipment be used that is not rated to handle the intended loading or conditions of use to which it is subjected. The use of cables and chains is prohibited.
- H. The Contractor shall be responsible for the pipe until such time as it is installed and accepted by the Engineer.
- I. The Contractor shall remove any temporary attachments to special components for installation by the Supplier for transportation purposes.

## 2.10 BEDDING AND COVER MATERIALS

- A. Pipe bedding Material: As specified in Section 312000 – Earth Moving.

## PART 3 - EXECUTION

### 3.1 INSTALLATION – HDPE PIPING

- A. High Density Polyethylene (HDPE) Pipe shall be installed in accordance with the instructions of the manufacturer, as shown on the Drawings and as specified herein. A factory qualified joining technician as designated by the pipe manufacturer shall perform all heat fusion joints.
- B. Under no circumstances shall the pipe or accessories be dropped into the trench or forced through a directional bore upon “pull-back”.
- C. The maximum allowable depth of cuts, scratches or gouges on the exterior of the pipe is 5 percent of wall thickness. The interior pipe surface shall be free of cuts, gouges or scratches. Sections of pipe with cuts, scratches or gouges exceeding 5 percent of the pipe wall thickness shall be removed completely and the ends of the pipeline rejoined. Repair of damaged pipe during or after installation shall conform to the fabricator’s repair procedures or by an Engineer approved repair method.
- D. When laying pipe is not in progress, the open ends of the pipe shall be closed by fabricated plugs, or by other approved means.
- E. The interior of the pipe shall be cleaned of any foreign matter before being lowered in the trench and kept clean during placement, joint welding, bedding and backfilling operations by plugging or other approved method. Groundwater shall not be permitted to enter the pipe. The full length of each pipe section and each bend shall rest solidly on the compacted bedding material.
- F. All HDPE pipe must be at the temperature of the surrounding soil at the time of backfilling and compaction.
- G. If a defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional cost to the Owner. All pipe and fittings shall be thoroughly cleaned before installation, shall be kept clean until they are used in the work and when laid, shall conform to the lines and grades required.
- H. Contractor shall install HDPE pipe when the ambient air temperature conforms to manufacturer’s specifications. The Contractor will be responsible for verifying the temperature by maintaining a log listing dates, times, length of pipe installed and ambient temperature during installation.
- I. Trench bottoms shall be graded such that each section of pipe shall be placed to the specified depth or elevation with uniform support. When the bottom of the trench has been excavated below the specified depth or elevation it shall be brought to the specified depth or elevation by backfilling with approved pipe zone material. When material at the bottom of the trench is determined to be unsuitable by the Engineer, it shall be removed and the trench backfilled with approved subgrade material or bedding material to the specified depth of excavation.

- J. During pipe installation, the trench bottom shall be kept free of frost, frozen earth, or standing water. The Contractor shall maintain the trench in good, stable condition at all times to prevent caving.
- K. Precautions shall be taken to prevent flotation of the pipe in the trench.
- L. The pipeline may be buried as it is installed, provided all inspection, testing and backfill requirements are met.
- M. All areas disturbed by installation of the pipeline shall be restored in accordance with the specification and drawings.

### 3.2 JOINING METHOD

- A. HDPE pipe shall be joined with butt, heat fusion joints as outlined in ASTM D3261 and conform to the Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe, Technical Report TR-33, published by the Plastic Pipe Institute (PPI). All joints shall be made in strict compliance with the manufacturer's recommendations. A factory qualified joining technician as designated by pipe manufacturer or experienced, trained technician shall perform all heat fusion joints in the presence of the Inspector. The Contractor shall install the HDPE pipeline complete, including bends, couplings, valves, and other associated fittings and appurtenances as shown on the drawings or specified herein and make all necessary connections to the lines and grades shown on the Drawings and in accordance with these specifications.
- B. The Contractor shall furnish all welding equipment and all construction materials and equipment required for lugs, railings, templates, spiders or other supports and internal bracing as may be required to hold the components firmly within the specified tolerances during welding, concrete placement or backfill placement. The contractor shall also furnish and install all necessary positioning devices, ties, pedestals and supports required for installation. Details of such equipment shall be included in the proposed installation procedure to be submitted to the engineer prior to the start of work.
- C. Lengths of pipe shall be assembled into suitable installation lengths by the butt-fusion process. All pipes so joined shall be made from the same class and type of raw material made by the same raw material supplier. Pipe shall be furnished in standard laying lengths not to exceed 50 feet and no shorter than 20 feet. Installation shall be in accordance with the requirements of AWWA C906 unless otherwise noted, and the Manufacturer's instructions. Contractor shall be responsible for correct fitting of all pipeline members and components.
- D. The polyethylene flange adapters shall be used at pipe material transitions and other locations as indicated in the drawings. The adapters shall be connected together or to other flanges by using a stainless steel "back-up" ring conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. Ensure that back up rings are in place prior to joining flange adapter to piping or other components. The flange adapter assemblies shall be connected with corrosion resistant bolts and nuts of Type 316 Stainless Steel as specified in ASTM A726 and ASTM A307. All bolts shall be tightened to the manufacturer's specified torques. Bolts shall be tightened alternatively and evenly. After installation apply a non-oxide grease coating to bolts and nuts.
- E. Where indicated, sleeve couplings shall be used to make HDPE joints. When sleeve couplings are used, stainless steel (Type 316), pipe stiffeners shall be inserted inside of each HDPE pipe end as recommended by the manufacture to prevent the pipe from going out of round and to ensure a leak

free joint. Sleeve couplings shall be specifically rated for service with HDPE pipe and shall be as specified in the Contract Documents. Sleeve coupling shall only be used where indicated in the plans and in conjunction with an HDPE Pipe Anchor Block.

### 3.3 PREPARATION

- A. Butt-fusion welded joints: Refer to Manufacturers recommended procedures. All joints formed by butt fusion processes shall be completed in strict accordance with the Manufacturers specified procedures, except where specifically called out in the specifications or drawings. Minimum requirements for butt-fusion welded joints are as follows:
1. Pipe ends shall be made clean and square prior to fitting and alignment
  2. Care shall be taken to assure a clean work area, free from airborne dust, moisture, or other foreign matter which may contaminate the finished weld.
  3. All internal surfaces of the pipe shall be maintained clean following completion of a weld and prior to starting the next joint.
  4. All butt-fusion joints shall be water tight under the maximum internal pressure.

### 3.4 BACKFILL PLACEMENT

- A. Pipe zone material shall be placed in accordance with Section 312000 – Earth Moving. Care shall be taken to ensure that the material is carefully worked and compacted into the area beneath and around the pipe to provide continuous support to the pipe. Material shall be properly haunched to provide support. Care shall be taken to avoid movement of the pipe during placement and compaction of the bedding material. Pipe bedding shall be placed to the limits shown on the drawings.
- B. Trench backfill shall be placed in accordance with section 312000 – Earth Moving.
- C. No construction vehicles or ride-on mechanical compaction equipment shall be permitted to travel over the pipe until a minimum of 2 feet of trench backfill is placed above the top of the pipe.

### 3.5 CONNECTION TO EXISTING

- A. Mechanical connections of the polyethylene pipe to auxiliary equipment such as valves, pumps and tanks shall be through flanged connections which shall consists of the following:
1. A polyethylene flange adapter shall be thermally butt-fused to the stub end of the pipe.
  2. A Type 316 stainless steel back up ring shall mate with the polyethylene flange adapter.
  3. Type 316 stainless steel bolts and nuts shall be used to complete the connection.
  4. Flange connections shall be provided with a full-face neoprene gasket.
- B. All transitions from HDPE pipe to ductile iron or PVC shall be made per the approval of Engineer and per the HDPE pipe manufacturer's recommendations and specifications. A molded flange connector adapter with a back-up ring assembly shall be used for pipe type transitions. Ductile iron back-up rings shall mate with cast iron flanges per ANSI B16.1. A type 316 stainless steel back-up ring shall mate with a type 316 stainless steel flange per ANSI B16.1 and shall be used in all buried applications.
1. Transition from HDPE to ductile iron fittings and valves shall be approved by Engineer before installation.
  2. No solid sleeves couplings shall be allowed between such material transitions.
  3. The pipe supplier must certify compliance with the above requirements

- C. Prior to making connections to any existing structure or pipe, ensure that new pipe has had the time required to acclimate to the buried conditions. Make the appropriate adjustments required by the thermal expansion and contraction properties of HDPE materials before connecting to any dissimilar material or structure.

### 3.6 FIELD QUALITY CONTROL

- A. On days butt fusions are to be made, the first fusion shall be a trial fusion in the presence of the Inspector. The following shall apply:
  - 1. Heating plates shall be inspected for cuts and scrapes. The plate temperature shall be measured at various locations to ensure proper heating/melting per manufacturer's recommendations and as approved by the Inspector.
  - 2. The fusion or test section shall be cut out after cooling completely for inspection.
  - 3. The test section shall be 12" or 30 times (minimum) the wall thickness in length and 1" or 1.5 times the wall thickness in width (minimum).
  - 4. The joint shall be visually inspected as to continuity of "beads" from the melted material, and for assurance of "cold joint" prevention (i.e. – joint shall have visible molded material between walls of pipe). Joint spacing between the walls of the two ends shall be a minimum of 1/16" to a maximum 3/16".

### 3.7 TOLERANCES

- A. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-in per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed. Good alignment shall be preserved during installation. Deflection of the pipe shall occur only at those places on design drawings and as approved by the Engineer. Fittings, in addition to those shown on the Drawings, shall be used only if necessary or required by the Engineer.

### 3.8 CLEANING

- A. Do not allow dirt, grease, mud, groundwater, tools, equipment and all other foreign matter to enter the pipe at any point during construction.
- B. All pipes shall be completely flushed at a rate with water velocities no less than 4.0 feet per second for pipes up to 12 inches in diameter and 3.0 feet per second for all other pipes. For large diameter pipes, alternate methods, including pigging, of cleaning the pipe may be proposed by the Contractor, subject to the approval of the Engineer, provided proposed method will provide a clean pipe equivalent to flushing as determined by the Engineer.
- C. No debris, rubbish, dirt, rocks, or other foreign material shall be permitted to enter downstream sections of the pipeline or system.
- D. Furnish, install and permanently remove all cross-connections, piping, valving, ports, etc required to complete the cleaning process. Obtain approval of the Engineer prior to adding any components to the pipeline.

### 3.9 HYDROSTATIC PRESSURE TESTING

- A. Hydrostatic pressure testing shall be conducted per the requirements of ASTM F 2164 and these specifications.
- B. All HDPE mains shall be field-tested. Contractor shall supply all labor, equipment, material, gages, pumps, plugs, meters and incidentals required for testing. Each main shall be pressure tested upon completion of the pipe laying and backfilling operations, including placement of any required temporary roadway surfacing.
- C. Submit a plan for testing, including schedule, method for water conveyance, control, and disposal, to the Engineer for review at least 10 days before starting the test and notify the Engineer a minimum of 48 hours prior to test
- D. The maximum test pressure shall be as indicated in the Drawings but shall not exceed 150 percent of the maximum working pressure of the pipe or the design pressure of any component on the pipe, whichever is less.
- E. The test temperature of the piping and the test liquid (water) shall not exceed 73 degrees F. or the temperature related to the pressure rating of the pipe as reported by the manufacturer.
- F. Test equipment, preparations and procedures shall implicitly follow the requirements of ASTM F 2164 and the Manufacturer's recommendations.
- G. In preparing for test, fill line slowly with water. Maintain flow velocity less than 2 feet per second or less than the capacity of any air release devices use to expel trapped air, whichever is less.
- H. Expel air completely from the line during filling and again before applying test pressure. Air shall be expelled by means of taps at points of highest elevation. Any taps installed solely for the purpose of releasing trapped air shall be permanently capped at the conclusion of the test.
- I. Once all air is expelled and all testing equipment and pipeline components are adequately braced, gradually increase the pressure in the pipeline to the required maximum test pressure. Hold test pressure for four hours adding make-up water as required to maintain the noted maximum test pressure.
- J. After the four hour equalization period, reduce pressure in the pipeline by 10 psi to the test pressure and monitor the pressure for 1 hour. Do not increase the pressure or add make-up water during this time.
- K. During and after the one-hour test period, observe all components, joints, fittings, and appurtenances of the pipeline for visible signs of leakage. Any visible signs of leakage indicate a failed test, all such leaks shall be repaired and pipeline retested before pipeline will be accepted. If any visible signs of leakage in any butt-fusion joints in the pipe are noted, immediately stop the test and carefully release the test pressure. Repair the noted leaks and restart test procedure from beginning.
- L. A successful hydrostatic pressure test will be indicated by no visible signs of leakage and a steady pipeline pressure within 5 psi of the test pressure throughout the one hour test period without increasing the pressure or the addition of make-up water.

- M. Upon completion of the test, the pressure shall be bled off from a location other than the point where the pressure is monitored. The pressure drop shall be witnessed by the Engineer at the point where the pressure is being monitored and shall show on the recorded pressure read-out submitted to the Engineer.
- N. Repair and/or replace any failed pipeline sections, components, fittings, valves or other appurtenances to the satisfaction of the Engineer and at no additional expense to the Owner.

### 3.10 LOW PRESSURE AIR TESTING

- A. HDPE pipelines intended for use as air ducts shall be tested for leakage prior to placing the pipe in service. Air test shall not be used for acceptance of any HDPE pipeline except those indicated herein or in the Drawings. Furnish, install and completely remove all fittings, branches, plugs, valves and other appurtenances required to complete the testing process.
- B. Prior to beginning air test, HDPE pipeline shall be isolated from pipeline components not rated for the air pressures called for in the test.
- C. Low pressure air testing shall be completed per the requirements of ASTM F1417 as given in Section 221066 – Pipeline Testing.
- D. Pipeline shall be inspected for all visible infiltration leaks as evidenced by infiltrating groundwater. Leaks shall be located and repaired at no additional cost to the Owner and to the satisfaction of the Engineer.

### 3.11 MANDREL TESTING

- A. After successful completion of hydrostatic test, mandrel test all buried HDPE piping.
- B. Mandrel configuration: Rigid with circular cross-section with a diameter of not less than 95% of the average inside diameter of the pipeline with a length of circular proportion equal to the nominal diameter of the pipeline.
- C. Mandrel pulling method shall be by hand, rope or as directed by the Engineer.

END OF SECTION 221050

## SECTION 221066 – PIPELINE TESTING

### PART 1 - GENERAL

#### 1.1. SUMMARY

- A. The Contractor shall perform flushing and testing of all pipelines and appurtenant piping complete, including conveyance of test water from Owner-designated source to point of use and all disposal thereof, all in accordance with the requirements of the Contract Documents.
- B. Section includes provisions for following piping testing:
  - a. Testing of alignment, grade, and deflection;
  - b. Gravity flow piping testing;
  - c. Hydrostatic High Head pressure testing;
  - d. Hydrostatic Low Head pressure testing;
  - e. Low pressure air testing;
  - f. High pressure air testing.

#### 1.2. RELATED SECTIONS

- A. General Pipes and Fittings. Section 220050
- B. Ductile Iron Pipe. Section 221030
- C. Plastic Pipe. Section 221040
- D. High Density Polyethylene Pipe and Fittings. Section 221060
- E. HDPE Storm Drain Pipe. Section 221055
- F. Stainless Steel Piping and Tubing. Section 221060
- G. Steel Piping and Fabricated Steel piping. Section 221065
- H. Domestic Water Piping. Section 221116
- I. Sanitary Waste and Vent Piping. Section 221316
- J. Hydraulic Structure Testing. Section 331400

#### 1.3. SUBMITTALS

- A. Schedule and Notification of tests:
  - a. Submit a list of scheduled piping tests by noon of working day preceding the date of scheduled tests.

- b. Notification of readiness to test: Before testing notify the Engineer or Construction Manager in writing of readiness to test piping.
  - c. Have personnel, materials, and equipment required for testing in place before submitting notification of readiness.
- B. Provide a test report for each piping system tested. Include the following:
- a. Date of Test;
  - b. Description and identification of piping system tested;
  - c. Results of alignment, grade, and deflection testing;
  - d. Type of test performed;
  - e. Test fluid;
  - f. Test pressure;
  - g. Type and location of leaks detected;
  - h. Corrective action taken to repair leaks;
  - i. Results of re-testing.
- C. Submit test report in accordance with Specification Section 13300.

#### 1.4. SEQUENCE

- A. Test Piping Systems as follows:
- a. Clean piping before pressure or leak tests.
  - b. Test exposed, non-insulated piping systems upon completion of system (including supports, hangers, anchors, etc.)
  - c. Test exposed, insulated piping systems upon completion of system but prior to application of insulation.
  - d. Test concealed interior piping systems prior to concealment and, if system is insulated prior to application of insulation.
  - e. Test buried piping (insulated and non-insulated) prior to backfilling and, if insulated, prior to application of insulation.
  - f. Test buried piping before encasing piping in concrete or covering piping with slab, structure, or permanent improvement.

### PART 2 - PRODUCTS

#### 2.1. MATERIALS REQUIREMENTS

- A. All test equipment, temporary valves, bulkheads or other water control equipment and materials shall be determined and furnished by the Contractor subject to the Engineer's review.

### PART 3 - EXECUTION

#### 3.1. GENERAL

- A. Contractor shall make all necessary provisions for conveying the water from the Owner-designated source to the points of use.
- B. All pipelines shall be tested. All testing operations shall be performed in the presence of the Construction Manager.
- C. Provide air supply.
- D. Plug pipe outlets with test plugs. Brace each plug securely to prevent blowouts.
- E. Add test fluid slowly.
- F. Include regulator set to avoid over-pressurizing and damaging piping.
- G. Perform pressure testing in accordance with local, state, and federal requirements.
- H. Correct leaks or defects at no additional cost to Owner and as approved by the Engineer.
- I. Disposal or release of test water from pipelines after testing, shall be acceptable to the Engineer.

### 3.2. TESTING ALIGNMENT, GRADE, AND DEFLECTION

- A. Alignment and grade:
  - a. Visually inspect the interior of gravity piping with artificial light, reflected light, or laser beam.
  - b. Consider inspection complete when no broken or collapsed piping, no open or poorly made joints, no grade changes that affect the piping capacity, or no other defects are observed.
- B. Deflection test:
  - a. Pull a mandrel through the clean piping section under test.
  - b. Perform the test no sooner than 30 days after installation and not later than 60 days after installation or permanent surfacing.
  - c. Use a full circle, solid cylinder, or a rigid non-adjustable, odd-numbered leg (9 leg minimum) steel cylinder mandrel approved by the Engineer as to design and manufacture. The circular cross section of the mandrel shall have a diameter of at least 95 percent of the specified average inside pipe diameter of the pipe and the minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. Obstructions encountered by the mandrel shall be corrected by the Contractor.

### 3.3. TESTING OF GRAVITY FLOW PIPING

- A. Test gravity flow piping indicated with “G” in piping schedule, as follows:
  - a. Unless specified otherwise, subject gravity flow piping to the following tests:
    - i. Alignment and grade.
    - ii. For plastic piping test for deflection.

- iii. Visible leaks and pressure with maximum leakage allowance.
- b. Inspect piping for visible leaks before backfilling.
  - c. Provide temporary restraints when needed to prevent movement of piping.
  - d. Pressure test piping with maximum leakage allowance after backfilling.
  - e. With the lower end plugged, fill piping slowly with water while allowing air to escape from high points. Keep piping full under the head indicated in the piping schedule for the water at least 24 hours:
    - i. Examine piping for visible leaks. Correct any visible leaks. Consider examination complete when no visible leaks are observed.
    - ii. Maintain piping with water, or allow a new water absorption period of 24 hours for the performance of the pressure test with maximum leakage allowance.
    - iii. After successful completion of the test for visible leaks and after the piping has been restrained and backfilled, subject piping to the test pressure for minimum of 4 hours while accurately measuring the volume of water added to maintain the test pressure:
      - 1. Consider the test completed when leakage is equal or less than the following maximum leakage allowance:
        - a) For concrete piping with rubber gasket joints: 80 gallons per day per inch of diameter per mile of piping under test.
        - b) For HDPE Storm Drain Piping use manufacturer recommended leakage rates.
        - c) Test sanitary waste and vent piping in accordance with section 221316 requirements.
        - d) For other piping: 80 gallons per day per inch diameter per mile of piping under test.
- B. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
  - C. Test waste, drain and vent systems in accordance with local plumbing code and these specifications. Repair failed sections by disassembly and reinstallation.

### 3.4. HYDROSTATIC HIGH HEAD TESTING OF PIPELINES

- A. Test piping indicated "HH" in the Piping Schedule with the high head pressure test method.
- B. General:
  - a. The test pressure for yard piping shall be as shown or specified on the Piping Schedule measured at the lowest point of the pipeline section being tested. Where not indicated in the Piping Schedule, test piping systems at 150% of the operating pressure indicated, but not less than 25 psi. Observe each test section for leakage at the end of the test period. Test fails if leakage is observed or if there is any pressure drop in the system. All leaks shall be repaired in a manner acceptable to the Engineer.
  - b. Prior to hydrostatic testing, all pipelines shall be flushed or blown out as appropriate. The Contractor shall be responsible for ascertaining that all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to, or movement of, the adjacent pipe.

Care shall be taken to see that all air vents are open during filling. Provide temporary equipment for testing, including pump and gages. Test piping system before insulation is installed, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.

C. Testing Procedures:

- a. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the air valves at a reasonable velocity and all the air within the pipeline shall be properly purged. After the pipeline or section thereof has been filled it shall be allowed to stand under a slight pressure for at least 24-hours to allow the concrete or mortar lining, as applicable, to absorb what water it will and to allow the escape of air from any air pockets. During this period, bulkheads, valves and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the Engineer shall be taken.
- b. Use potable water for all potable water lines testing.
- c. Test piping for minimum 2 hours for visible leaks and minimum 2 hours for the pressure test with maximum leakage allowance.
- d. Raise pressure to the specified test pressure and inspect piping visually for leaks:
  - i. Correct any visible leaks,
  - ii. Consider visible leakage testing complete when no visible leaks are observed.

D. Pressure test with maximum leakage allowance:

- a. Leakage allowance is zero for all exposed (insulated or non-insulated) piping and all piping systems using flanged, National Pipe Thread threaded and welded joints.
- b. Pressure test piping after completion of visible leaks test.
- c. Buried piping with mechanical joints or push-on joints, piping systems shall have maximum allowable leakage of

$$L = (N \times D \times P^{1/2}) / 7,400$$

Where:

L = Leakage, gallons per hour

N = Number of joints under test

D = Nominal diameter of piping, inches

P = Average pressure during test, pounds per square inch

x = multiplication symbol.

- E. Pressure test HDPE pipe in accordance with the requirements of section 221050 "High Density Polyethylene Pipe and Fittings".
- F. Pressure test potable water piping in accordance with the requirements of section 221116 "Water Piping".
- G. Pressure test PEX piping systems in accordance with the requirements of section 238316.

- H. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
- I. Drain and dispose of test water from piping systems as directed by the Construction Manager or Engineer after testing and repair work has been completed.
- J. Test all pressure piping in accordance with ANSI B31.

### 3.5. HYDROSTATIC LOW HEAD TESTING OF PIPELINES

- A. Test piping indicated “LH” in the Piping Schedule with the low head pressure test method.
- B. General:
  - a. Test pressures shall be as noted in the pipe schedule.
  - b. During the performance of the tests, test pressure shall not vary more than plus or minus 2 pounds per square inch gauge with respect to the specified test pressure.
  - c. Test connections, blowoffs, vents closure pieces, and joints into structures including existing bell rings and other appurtenances with the piping.
  - d. Test piping for minimum 2 hours for visible leaks test and minimum 2 hours for the pressure test with maximum leakage allowance.
- C. Visible Leaks Test:
  - a. Subject piping under test to the specified pressure measured at the lowest end.
  - b. Fill piping under test slowly with water while venting air:
    - i. Use potable water for all potable waterlines.
  - c. Before pressurizing for the tests, retain water in piping under slight pressure for the water absorption period of minimum 24 hours.
  - d. Raise pressure to the specified test pressure and inspect piping visually for leaks. Correct any visible leaks. Consider testing complete when no visible leaks are observed.
- D. Pressure test with maximum leakage allowance.
  - a. Pressure test piping after completion of visible leaks test.
  - b. Accurately measure the makeup water necessary to maintain the pressure in the piping section under test during the pressure test period:
    - i. Consider the pressure test to be complete when makeup water added is less than the allowable leakage of 80 gallons per inch of nominal diameter, per mile of piping section under test and no damage to piping and appurtenances has occurred.
    - ii. Successful completion of the leakage test shall have been achieved when the observed leakage is equal or less than the allowable leakage and no damage to piping and appurtenances has occurred.

### 3.6. LOW PRESSURE AIR TESTING

- A. Perform low pressure air testing for gravity sewer and drainage piping systems where indicated “AL” in the Piping Schedule.

- B. Test pipes between adjacent manholes. Test time for air pressure to drop 1.0 psi.
- For pipes 4 in. through 36 in. diameter to comply with Table 1.
  - Pipe over 36 inch diameter shall not be tested by the low pressure air method.
- C. Preparation:
- Isolate pipe section to be tested by plugging each end with air tight plugs. Plug end of branches, laterals and wyes which are not to be included in the test section.
  - Brace plugs to prevent slippage and blowout due to internal pressure.
  - One plug shall have inlet tap or other provision for connecting air supply.
  - Air control equipment shall consist of valves and pressure gauges to control rate at which air flows into test section and gauges to monitor air pressure inside pipe.
- D. Testing:
- If pipe to be tested is submerged in water, determine height of water above spring line of pipe at each end of test section and compute average. For each foot of water above pipe's spring line, increase test pressure by 0.43 psi.
  - Add air slowly until pressure inside pipe is raised to 5.0 psi. greater than average back pressure of water that may be over pipe.
  - After pressure of 5.0 psi is obtained, control supply of air so the internal pressure is maintained between 4.5 and 5.0 psi (above average water back pressure) for minimum of 2 minutes to allow temperature of air to come into equilibrium with temperature of pipe.
  - In no case shall the test pressure exceed 9.0 psi or the maximum pressure allowed by the pipe manufacturer.
  - Determine the rate of air lost by time pressure drop method.
    - After temperature stabilized for a 2 minute period, disconnect air supply. Allow pressure to decrease to 4.6 psi. At this pressure, start stopwatch to determine time required for pressure to drop 1.0 psi. Time required for loss of 1.0 psi is then compared to Table 1.
    - If time is equal to or greater than time indicate din table, test shall be acceptable.
    - If time is less than time indicated in table, make appropriate repairs and retest.

**Table 1. Low Pressure Air Test Times for 1.0 PSIG Pressure Drop.**

| Pipe Diameter (in) | Minimum Time for 1.0 PSIG Pressure Drop (min:sec) | Pipe Length for Minimum Time (ft.) | Test Time for Pipe Length (L) in Excess of Minimum (sec.) |
|--------------------|---|------------------------------------|---|
| 4                  | 03:47   | 597                                | .380L   |
| 6                  | 05:40   | 398                                | .854L   |
| 8                  | 07:33   | 298                                | 1.520L  |
| 10                 | 09:27   | 239                                | 2.374L  |
| 12                 | 11:20   | 199                                | 3.418L  |
| 15                 | 14:10   | 159                                | 5.342L  |
| 18                 | 17:00   | 133                                | 7.692L  |
| 21                 | 19:50   | 114                                | 10.470L   |
| 24                 | 22:40   | 99                                 | 13.674L   |
| 27                 | 25:30   | 88                                 | 17.306L   |
| 30                 | 28:20   | 80                                 | 21.366L   |
| 33                 | 31:10   | 72                                 | 25.852L   |
| 36                 | 34:00   | 66                                 | 30.768L   |

- E. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

### 3.7. HIGH PRESSURE AIR TESTING

- A. Perform high pressure air testing for gravity sewer and drainage piping systems where indicated "AH" in the Piping Schedule.
- B. Perform preliminary test at not greater than 25 psi. Examine for leakage at joints with soap solution and visual detection of soap bubbles. Correct visible leaks.
- C. Perform final test at the pressure specified. Pressure in the system shall be gradually increased until the test pressure is reached. Test pressure shall be maintained for a minimum of 10 minutes and additional time conduct soap bubble test examination of each joint for leakage.
- D. Piping system shall show no evidence of leakage. If leakage is evident, make appropriate repairs and retest.

END OF SECTION 221066

## SECTION 260000 – GENERAL ELECTRICAL REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. General requirements which apply to all electrical aspects of the work.
- B. Related Sections
  - 1. The Contract Documents are a single integrated document. As such, all Divisions and Sections are applicable. The Contractor and its Subcontractors are responsible to review all parts of the Contract Documents in order to provide a complete and coordinated project.

#### 1.2 REFERENCES

- A. The installation and commissioning of the Electrical System shall conform to all applicable codes, regulations, standards and specifications, including, but not limited to those listed below. These publications are referenced to by designation but not by edition. The latest edition accepted by the Authority Having Jurisdiction in effect at the time of bid shall govern.
  - 1. State and Local Codes and Authority Having Jurisdiction (AHJ)
  - 2. National Electric Code (NEC).
  - 3. National Fire Protection Association (NFPA)
  - 4. Institute of Electrical and Electronic Engineers (IEEE)
  - 5. American National Standards Institute (ANSI)
  - 6. American Society for Testing and Materials (ASTM)
  - 7. Insulated Cable Engineers Association (ICEA)
  - 8. National Electrical Manufacturers Association (NEMA)
  - 9. Federal Occupational Safety and Health Act (OSHA)
  - 10. Underwriters Laboratories, Inc. (UL)
  - 11. International Society of Automation (ISA)

#### 1.3 DEFINITIONS

- A. Refer to the Contract Drawings sheet GE-01 for a list of abbreviations associated with the Electrical System. In addition, the following definitions are used in this section:
  - 1. AHJ – Authority Having Jurisdiction
  - 2. I&C – Instrumentation and Controls
  - 3. IS – Instrumentation Supplier
  - 4. NEC – National Electric Code
  - 5. VFD – Variable Frequency Drive
  - 6. UL - Underwriters Laboratories, Inc.

## 1.4 ELECTRICAL SYSTEMS REQUIREMENTS

- A. The Work is to provide all labor and materials necessary for erecting a complete and operational Electrical System, tested and ready for continuous use as described by the Contract Documents. The Electrical System shall be constructed in accordance with the Contract Documents, and Federal, State, and Local codes and regulations. In addition, the Work shall adhere to the following general provisions:
1. The Electrical Contractor shall obtain all necessary permits required by the AHJ. In addition, the Electrical Contractor shall ensure that all inspections required by the AHJ are coordinated, conducted and documented.
  2. All work shall be completed in a neat, workmanlike manner in accordance with the latest NEC standards of installation under competent supervision.
  3. The Electrical Contractor shall visit the job site prior to bidding to become familiar with existing conditions and other factors, which may affect the execution of the work. Include all related costs in the initial bid proposal.
  4. Coordinate work with the utilities providing services on this project. This may include but is not limited to the electric utility, telephone utility, cable TV/Internet utility. All electrical work associated with utilities shall be provided and installed per the utility requirements.
  5. All materials shall be new and of the best quality, manufactured in accordance with the requirements listed in part 1.2 of this section. The Contractor shall furnish and install the parts and pieces necessary to the installation of equipment, in accordance with the best practice of the trade, and in conformance with the requirements of these Contract Documents.
  6. Protect all electrical material and equipment that is being stored or has been installed against damage by other trades, weather conditions, or any other preventable causes. Equipment damaged during shipping, storage or construction, prior to acceptance by the engineer or the owner, will be rejected as defective.
  7. Leave the site clean. Remove all debris, empty cartons, tools, conduit, wire scraps and all miscellaneous spare equipment and materials used in the work during construction. All components shall be free of dust, grit and foreign materials, left as new before final acceptance of work. Damaged paint and finishes shall be touched up or repainted with matching color paint and finish.
  8. Electrical equipment shall be capable of operating successfully at full-rated load, without failure, at an ambient air temperature of 40 degrees C, and specifically rated for the altitude indicated on the Plans. Electrical equipment not rated for operation at that temperature shall be provided with air conditioning to meet the manufacturers' operating temperature.
  9. If any contradictions, contrasts, non-homogeneity, or inconsistency appears, the most strict criteria noted and the collective requirements in any and all of the Contract Documents shall apply.

10. The Electrical Contractor shall perform necessary saw cutting, core drilling, excavating, removal, shoring, backfilling, and other work required for the proper installation of conduits, whether inside, or outside of the buildings and structures. The Electrical Contractor shall repair and patch where demolition has taken place in a manner to match existing original structure.
- B. In order to provide a complete system, oversee and coordinate with all electrical equipment and services being provided outside of Contractor's scope.
    1. The Engineer is responsible to ensure that equipment being supplied by others related to the electrical system complies with the requirements of the Contract Documents
    2. The Electrical Contractor is responsible to coordinate the installation, commissioning and scheduling of equipment related to the I&C System that are provided by others.
  - C. Oversee and coordinate with all equipment and services being provided by the Contractor but outside of the Electrical Contractor's scope.
    1. Inform all vendors and suppliers providing equipment related to the Electrical System the requirements of Division 26.
    2. The Owner is not responsible for any additional costs incurred by requiring vendors and/or subcontractors to meet the requirements of Division 26.
    3. If a vendor or supplier is unable to meet the requirements of Division 26, the Contractor may submit in writing to the Engineer the reasons for non-compliance. The Engineer will then evaluate the reasons and determine whether a solution may be determined or if a different vendor or supplier is required.
  - D. Prepare Electrical System Submittals as required by Division 26 and Section 01 33 00 "Contractor Submittals". Coordinate with the IS and the requirements of Division 40 to ensure that all equipment being supplied by the Electrical Contractor and/or IS has been submitted.
  - E. Oversee the installation of the Electrical System.
  - F. Actively participate in loop testing as outlined in Division 40.
  - G. Actively participate in commissioning as outlined in Division 40.
  - H. Maintain record drawings.
    1. Maintain on the construction site a set of the Electrical Drawings that shall be continuously marked up during construction.
      - a. The drawings should be updated at least weekly and will be checked monthly by the Owner's representative.
      - b. Upon completion of startup, submit the marked up drawings to the Engineer for review and for drafting.
  - I. Prepare O&M manuals.
    1. Provide O&M manuals in accordance with Section 01 78 23 "Operation and Maintenance Data".

- J. Provide training on electrical equipment that has been installed.

## 1.5 ACTION SUBMITTALS

### A. General

1. Submittals for Division 26 shall meet the requirements of Section 01 33 00 "Contractor Submittals". In addition, the following requirements shall be met:
  - a. Submittals shall include bills of materials with quantities, makes, models, exact part numbers and descriptions.
  - b. Edit all submittals such that only pertinent information is submitted. Neatly cross out information that does not apply, options that are not being supplied, etc.
  - c. Show product dimensions, construction and installation details, wiring diagrams, and specifications.
  - d. If there are exceptions to the Contract Drawings and Specifications, provide a list of exceptions with detailed explanations for the exceptions. The Engineer will review the list of exceptions and determine whether a solution may be determined or if the exception(s) will not be allowed.
2. Furnish submittals required by each Section within Division 26.
3. When submitting on equipment, use the equipment and instrumentation tags depicted in the Contract Drawings.

### B. Recommended Spare Parts Submittal

1. Submit a list of spare parts for all of the equipment associated with the Electrical System. The list of spare parts shall include list pricing for each item.
2. Provide the name, address and phone number for each manufacturer and manufacturer's local sales representative.
3. Indicate whether or not the spare parts are being provided under this contract or not.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

## 1.7 QUALITY ASSURANCE

- A. All equipment supplied for this project shall meet the requirements of the NEC and shall be listed by and bearing the label of the UL.
- B. The Electrical Contractor shall be a company that has been actively involved in the installation and commissioning of Electrical Systems for a minimum period of five years.
- C. The Electrical Contractor shall have adequate facilities, manpower and technical expertise to perform the Work associated with the Electrical System and as outlined by the Contract Documents.
- D. The Electrical Contractor shall have similar project experience of at least four successfully completed projects for a similar wastewater system. The Electrical Contractor company must have performed similar work for these projects as required herein.

## PART 2 - PRODUCTS

### 2.1 MATERIALS AND METHODS

- A. Materials, equipment, and parts comprising any unit, or part thereof, specified or indicated on the Plans, shall be new and unused, of current manufacture, and of highest grade consistent with the state of the art. Damaged or dirty materials, equipment, and parts, are not considered to be new and unused, and will not be accepted.
- B. Field verification of scale dimensions on Plans is directed, since actual locations, distances, and levels will be governed by actual field conditions. The Contractor shall also review architectural, structural, yard, mechanical, and other Plans, and the accepted electrical and mechanical shop drawings, and shall adjust their work to conform to the conditions indicated therein.
- C. The fabricator of major components, such as distribution panelboards, switchgear, and motor control centers, shall also be the manufacturer of the major devices therein. Where possible, the major components shall be manufactured and supplied by the same fabricator.

### 2.2 MANUFACTURERS

- A. All equipment provided for the Electrical System shall be the most recent field-proven models marketed by their manufacturers at the time of submittal of the Shop Drawings unless otherwise required to match existing equipment.
- B. Refer to various Division sections for individual equipment manufacturers. Indicated manufacturers are subject to strict compliance with the specifications and complete project documents. The reference to a particular manufacturer does not relieve the Electrical Contractor from conforming to the specified requirements.
- C. When providing like electrical components they shall be furnished by a single manufacturer and shall be consistent throughout the project. For example, a 20A 2-way light switch in one building should match a 20A 2-way light switch in another building in both make, model and features.

### 2.3 EQUIPMENT ASSEMBLIES

- A. Equipment assemblies, such as Service Entrance Sections, Switchgear, Switchboards, Control and Distribution Panels, and other custom fabricated electrical enclosures shall bear a UL label as a complete assembly. The UL label on the individual components making up the assembly will not be considered sufficient to meet the present requirement. Whenever a generic UL label does not apply for the assembly, a serialized UL label shall be affixed to the assembly, and the serial number shall be submitted with the assembly record shop drawings.
- B. Custom fabricated electrical control panels, and enclosures shall bear a serialized UL label affixed by a local inspector, and the serial number shall be submitted with the assembly record shop drawings.

## 2.4 OPERATING CONDITIONS

- A. The Electrical System shall be designed and constructed for satisfactory operation and long, low maintenance service under the following conditions:
  - 1. Environment: Type the type of facility this is for such as "Wastewater Treatment Plant".
  - 2. Temperature Extremes: -4°F to 104 °F (Outdoors); 40°F to 104 °F (Indoors).
  - 3. Relative Humidity: 20% to 90%, non-condensing.
- B. Indoor and outdoor electrical equipment shall be suitable for operation in the ambient conditions associated with the locations designated in the Contract Documents. Heating, cooling, and dehumidifying devices shall be provided in order to maintain electrical devices 20 percent within the minimums and maximums of their rated environmental operating ranges. The Contractor shall provide power wiring for these devices. Enclosures suitable for the environment shall be furnished. Electrical equipment in hazardous areas shall be suitable for and rated for use in the particular hazardous or classified location in which it is to be installed.

## 2.5 SEISMIC RESTRAINT

- A. The construction area is classified by the International Building Code (IBC) as Seismic Class C. The Code requires that not only the structures, but also major electrical components be designed and installed in a manner which will preclude damage during a seismic event. All electrical equipment shall be securely anchored and seismic braced in accordance with regulations contained in the most recent adopted edition of the IBC, and the Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) "Guidelines for Seismic Restraints of Electrical Systems".
- B. Units mounted and secured directly to structure shall be provided with connectors of sufficient strength to meet the restraining criteria.
- C. All electrical equipment which is securely anchored (hard mounted) to the building or structure shall have supports designed to withstand lateral and vertical "G" loadings equal to or greater than IBC requirements and SMACNA guidelines.
- D. Shop drawings are required for all equipment anchors, supports and seismic restraints. Submittals shall include weights, dimensions, load/deflection data, center of gravity, standard connections, manufacturer's recommendations, and behavior problems (vibration, thermal, expansion, etc.) associated with equipment.

## 2.6 SPECIAL TOOLS

- A. The Electrical Contractor shall furnish a priced list of special tools required to maintain the electrical equipment provided. The Owner and Engineer will select which tools are to be purchased and the IS will supply them at the prices listed.
- B. Special tools shall be delivered to the Owner before startup commences.

## PART 3 - EXECUTION

### 3.1 DELIVERY, STORAGE AND HANDLING

- A. After completion of shop assembly, factory test, and approval, equipment, cabinets, panels, and consoles shall be packed in protective crates and enclosed in heavy duty polyethylene envelopes or secured sheeting to provide complete protection from damage, dust, and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving without removing protective covering. Boxed weight shall be shown on shipping tags together with instructions for unloading, transporting, storing, and handling at the Site.
- B. Special instructions for proper field handling, storage, and installation required by the manufacturer shall be securely attached to each piece of equipment prior to packaging and shipment.
- C. Each component shall be tagged to identify its location, instrument tag number, and function in the system. A permanent stainless steel or other non-corrosive material tag firmly attached and permanently and indelibly marked with the instrument tag number, as given in the tabulation, shall be provided on each piece of equipment in the PCIS. Identification shall be prominently displayed on the outside of the package.
- D. Equipment shall not be stored outdoors. Equipment shall be stored in dry permanent shelters, including in-line equipment, and shall be adequately protected against mechanical injury. If any apparatus has been damaged, such damage shall be repaired by the Contractor. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through tests as directed by the Engineer. If such tests reveal defects, the equipment shall be replaced.

### 3.2 MANUFACTURER'S SERVICES

- A. Manufacturer's services shall be furnished for the following equipment:
  - 1. Vendor supplied equipment that contain programmable controllers, operator interfaces and/or instrumentation that requires site calibration.
  - 2. Equipment that is equipped with VFD's
  - 3. Electrical generation equipment

### 3.3 INSTALLATION

- A. The Electrical System indicated throughout the design is diagrammatic and therefore locations of equipment are approximate. The exact locations and routing of wiring and cables shall be governed by structural conditions and physical interferences and by the location of electrical terminations on equipment. Equipment shall be located and installed so that it will be readily accessible for operation and maintenance. Installation of systems and equipment is subject to clarification as indicated in reviewed shop drawings and field coordination. Where job conditions require reasonable changes in approximated locations and arrangements, or when the Owner exercises the right to require changes in location of equipment which do not impact material quantities or cause material rework, the Contractor shall make such changes without additional cost to the Owner.

- B. Discrepancies indicated on different Plans, between Plans and actual field conditions, or between Plans and Contract Documents shall be promptly brought to the attention of the Engineer for clarification, prior to purchasing and installing equipment.
- C. The alignment of equipment and conduit shall be adjusted to accommodate architectural changes, or to avoid work of other trades, without extra expense to the Owner.
- D. Items not specifically mentioned in these Contract Documents, or noted on the Plans, or indicated on reviewed shop drawings, but which are obviously necessary to make a complete working installation, shall be deemed to be included herein.
- E. The Electrical Contractor shall layout and install electrical work prior to placing floors and walls. Furnish and install sleeves and openings through floors and walls, required for installation of conduits. Sleeves shall be rigidly supported and suitably packed, or sealed, to prevent ingress of wet concrete. Spacers shall be installed in order to prevent conduit movement. Dimensions indicated for electrical equipment and their installation are restrictive dimensions.
- F. The Electrical Contractor shall furnish and install inserts and hangers required to support conduits and other electrical equipment. If the inserts, hangers, sleeves, or other mounting hardware are improperly placed, or installed, the Contractor shall do necessary work, at their own expense, to rectify the errors.
- G. The Electrical System is integrally connected to I&C, mechanical and structural systems. Coordinate with these other disciplines the installation of these related components.
- H. Electrical equipment shall be anchored by methods that comply with seismic requirements applicable to the Site.
- I. The Contract Documents show necessary conduit and instruments required to make a complete instrumentation system. The Contractor shall be responsible for providing any additional or different type connections as required by the instruments and specific installation requirements. Such additions and such changes, including the proposed method of installation, shall be submitted to the Engineer for approval prior to commencing that Work. Such changes shall not be a basis of claims for extra Work or delay.
- J. Instrumentation, control panels, wiring and all other I&C equipment shall be properly tagged and/or labeled per the requirements of Section 26 05 53 "Identification for Electrical Systems".
- K. Installation of the I&C System shall be according to the finalized Loop Drawings

### 3.4 MOTOR CONTROL TEST (MCT)

- A. The MCT shall consist of a test of all networked power and motor control devices (MCC's, VFD's, etc.) in the factory environment. The MCT shall be conducted at a facility within 200 driving miles of the project site.
- B. The Contractor shall assemble at the test site, for this test, the following:
  1. All networked VFD's and associated switches.
  2. All networked MCC's and associated switches.

3. All PLC's which are to communicate with the devices above.
  4. Any other networked devices.
- C. Provide electric power, networking, and provisions for the Owner's Programmer to connect a temporary SCADA server to the networked devices.
- D. The test can be combined with the FAT's specified in Section 409000, or run independently. If need be for construction sequencing or schedule considerations, the PLC's for the MCT may consist of control panel backpanels including the PLC's, and the control panel enclosures can be shipped to the site.
- E. In advance of the MCT, each manufacturer shall provide a complete list of available registers/signal interfaces and recommended means of effecting basic monitoring and control. Coordinate among vendors, with the IS, and with the Owner's Programmer, and cooperate in configuring all devices prior to testing.
- F. As a formal submittal prior to the MCT, submit details of the location, the intended interconnection. Provide test procedures/checkoffs which will demonstrate that all networked interfaces function as intended.
- G. Allow the following for the MCT.
1. Contractor setup: As required.
  2. Programmer advance setup connection: 1 day.
  3. MCT: 3 days.
  4. Corrections: As required.

### 3.5 FACTORY ACCEPTANCE TESTING (FAT)

- A. The IS shall arrange for the manufacturers of the equipment and fabricators of panels and cabinets supplied under this Section to allow the Engineer and Owner to inspect and witness the testing of the equipment at the site of fabrication. Equipment shall include the cabinets, special control systems, and other pertinent systems and devices. A minimum of 10 days notification shall be furnished to the Engineer prior to testing. No shipments shall be made without the Engineer's approval.
- B. For each FAT, the IS shall develop and submit a FAT Plan and Procedure Document within 10 days of the FAT. The FAT Plan and Procedure shall as a minimum shall have the following:
1. Descriptions of test methods to be performed during the FAT.
  2. FAT Schedule and Procedure
  3. FAT Checklists that allow for sign-off and comments for each test method and procedure.
- C. Control Panel Completion Test Methods: The following test methods should be performed during the FAT for each control panel:
1. Completed Shop Drawings: Demonstrate that the control panel has been built according to the shop drawings and that the shop drawings are accurate.
  2. Panel Layout: Demonstrate that the control panel has been laid out as designed and as required by Division 40.
  3. Power Distribution: Demonstrate all power distribution circuits, including but not limited to AC power circuits, UPS operation, signals and circuits and DC circuits.

4. Control Circuits: Demonstrate the correct installation of each control circuit. Using a signal generator or multi-meter, show the correct operation of each input, output, relay, barrier, buttons, switches, or any other control device. Demonstrate the proper functionality of any hard-wired interlocks that may be associated with each control circuit.
  5. Panel Networking/Communications: If any form of communications is associated with the control panel, verify the proper operation of each communication port and link.
- D. Control Loop Test Methods: In order to demonstrate that the control panel will provide its function as intended, provide the following control loop test methods. If programming for the control panel is provided by others, coordinate with the programmer to have all programming completed and tested prior to the FAT. If needed, coordinate to have the programmer present for the FAT.
1. Alarm Functions: Verify and/or simulate each alarm condition associated with each control loop.
  2. Local Manual and Auto Functions: Verify and/or simulate each Local Manual and/or Auto function associated with each control loop.
  3. SCADA Manual and Auto Functions: Verify and/or simulate each SCADA Manual and/or Auto function associated with each control loop.
  4. Control Loop Interlocks: Demonstrate the functionality of any software interlocks that may be associated with each control loop.
- E. If the FAT does not pass and needs to be repeated, the IS shall be responsible for additional per diem costs incurred by the Engineer and Owner.
- F. All changes and/or corrections made during the FAT shall be noted on the checklists.
- G. Following completion and approval of all FAT, provide the finalized checklists to the Engineer and as part of the equipment shop drawings.

### 3.6 FIELD QUALITY CONTROL

- A. Allow for inspections by the Engineer and/or Owner of the I&C System at any time during the construction. Inspections shall be conducted to verify that the installation is per the requirements of the Contract Documents.

### 3.7 CALIBRATION

- A. As specified in Section 40 80 00 "Commissioning of Process Systems".

### 3.8 LOOP TESTING

- A. As specified in Section 40 80 00 "Commissioning of Process Systems".

### 3.9 COMMISSIONING

- A. As specified in Section 40 80 00 "Commissioning of Process Systems".

### 3.10 TRAINING

- A. Provide training in accordance with Section 26 00 00 “General Electrical Requirements”.
- B. Develop a Training Plan for the training requirements of Division 40 and submit it to the Engineer for approval. Coordinate with the Engineer and Owner the time and locations of each training session. Schedule the trainings for after the equipment has been pre-commissioned.
- C. As part of the Training Plan, submit a résumé for each individual to be providing training. Training shall be performed by qualified representatives of the equipment manufacturers and shall be specific to each piece of equipment.
- D. Each training session shall include a written agenda.
- E. The Contractor shall train the Owner’s personnel on the maintenance, calibration and repair of instruments provided.
- F. Within 10 days after the completion of each session, the Contractor shall submit the following:
  - 1. A list of Owner personnel who attended the training.
  - 2. A copy of the training materials used during the session with notes, diagrams and comments.

END OF SECTION 26 00 00

## SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 CONDUCTORS AND CABLES

- A. All conductors, conductor insulation and multiconductor cables shall comply with NEMA WC 70.
- B. Wire sizes shall be American Wire Gauge (AWG) sizes with Class B stranded construction Number 2 AWG and smaller shall be factory color coded with a separate color for each phase and neutral, which shall be used consistently throughout the system. Larger cables shall be coded by the use of colored tape. Conductors #6 AWG or smaller shall be THWN-2 or XHHW-2. Number 4 and larger shall be XHHW-2.
- C. Individual or multiple conductor cables for power, control, and alarm circuits of 480 volts or less shall be insulated for not less than 600V.

- D. Where wire size is not indicated, they shall be of the size required by the NEC, except that no wire external to panels and motor control centers shall be less than #12 AWG, unless specifically noted on the Plans. Control wires shall be allowed to be #14 so long as there is appropriate protection (fuse or circuit breaker sized at 15A or less).
- E. Multi-conductor tray cables shall be rated 600 volts, listed by UL as Type TC cable or ITC for instrumentation cable only per Article 340 of the NEC. The individual conductors shall be UL listed as Type XHHW, with a sunlight-resistant overall jacket. Conductor sizes shall be the same as for power and lighting wire and control wire above. Connectors/Terminators shall be water tight and manufactured of the same material as the cabling system referenced elsewhere in division 26.
- F. Multi-conductor tray cables to be installed in classified areas shall be armored, rated 600 volts, listed by UL as Type MC-HL cable per Article 340 of the NEC. The individual conductors shall be UL listed as Type XHHW, with a sunlight-resistant overall jacket. Conductor sizes shall be the same as for power and lighting wire and control wire above. Connectors/terminators shall be rated for classified areas and submitted upon accordingly.
- G. All wiring shall be as indicated on the Plans. Wires shall be new and shall be soft drawn copper with not less than 97 percent conductivity. The wire and cable shall have size, grade of insulation, voltage, and manufacturer's name permanently marked on the outer covering at not more than 2-foot intervals. All wires shall conform to the latest Standards of the ASTM, and ICEA, and shall be tested for their full length by these Standards. Insulation thickness shall be not less than that specified by the National Electrical Code.
- H. VFD Cable:
  - 1. Comply with UL 1277, UL 1685, and NFPA 70 for Type TC-ER cable.
  - 2. Type TC-ER with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire, and sunlight- and oil-resistant outer PVC jacket.
  - 3. Comply with UL requirements for cables in direct burial or Classes I and II, Division 2 hazardous location applications.
- I. The following table describes the conductor color code that shall be followed:

|                  | <b>120/208VAC</b> | <b>480VAC</b> | <b>12VDC</b> | <b>24VDC</b> | <b>24VAC</b> |
|------------------|-------------------|---------------|--------------|--------------|--------------|
| Phase 1          | Black             | Brown         |              |              |              |
| Phase 2          | Red               | Orange        |              |              |              |
| Phase 3          | Blue              | Yellow        |              |              |              |
| Neutrals/Commons | White             | White         | Orange/White | Blue/White   | Yellow/White |
| Ground           | Green             | Green         | Green        | Green        | Green        |
| Control          | Red               |               | Orange       | Blue         | Yellow       |

- J. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. American Insulated Wire Corporation
  - 2. Cablec Corporation

3. Okonite Company
4. Southwire Company
5. Or Approved Equal

## 2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
- B. Connectors and splices shall be rated at not less than 600 volts. Splicing shall join conductors mechanically and electrically to provide a complete circuit prior to installation of insulation.
- C. Splices in wires No. 10 AWG and smaller shall be made with an insulated, solderless, pressure type connector, Type I, Class 1, Grade B, Style G, or Type II, Class 1 of FS W-S-610 and conforming to the applicable requirements of UL 486A.
- D. Splices in wires No. 8 AWG and larger shall be made with non-insulated, solderless, pressure type connector, Type II, Class 2 of FS W-S-610, conforming to the applicable requirements of UL 486A and UL 486B. They shall then be covered with an insulation and jacket material equivalent to the conductor insulation and jacket.
- E. Insulated conductor splices below grade or in wet locations shall be sealed type conforming to ANSI C119.1 or shall be waterproofed by a sealant-filled, thick wall, heat shrinkable, thermosetting tubing or by pouring a thermosetting resin into a mold that surrounds the joined conductors.
- F. Bare conductor splices in wet locations or below grade shall be of the exothermic type.
- G. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Hubbell Power Systems, Inc.
  2. O-Z/Gedney; EGS Electrical Group LLC.
  3. 3M; Electrical Products Division.
  4. Or Approved Equal

## 2.3 PULLING LUBRICANT

- A. All cables shall be properly coated with a water-based (wax-based is not acceptable) pulling compound before being pulled into conduits so as to prevent mechanical damage to the cables during installation. Lubricants shall be approved by the cable manufacturer for use with the cable being installed.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Polywater
  2. Ideal Aqua-Gel
  3. Or Approved Equal

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Stranded for all sizes.
- B. Branch Circuits: Copper. Stranded for all sizes.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW-2, single conductors in raceway
- B. Exposed Feeders and Branch Circuits: Type THWN-2 or XHHW-2 based on wire size requirements described in Part 2, single conductors in raceway. Multiconductor Tray Cable type TC shall be used where runs are to be in cable trays as shown on the drawings.
- C. Feeders and Branch Circuits Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THWN-2 or XHHW-2 based on wire size requirements described in Part 2, single conductors in raceway. Metal-clad cable, Type MC shall be allowed in ceilings that are considered dry and non-corrosive areas.
- D. Feeders and Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THWN-2 or XHHW-2 based on wire size requirements described in Part 2, single conductors in raceway.
- E. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- F. Class 1 Control Circuits: Type THWN-2, in raceway. Multiconductor Tray Cable type TC shall be used where runs are to be in cable trays as shown on the drawings.
- G. Class 2 Control Circuits: Type THWN-2, in raceway. Power-limited tray cable shall be used where runs are to be in cable tray as shown on the drawings.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. As far as practical, all circuits shall be continuous from origin to termination without splices in intermediate pull boxes. Sufficient slack shall be left at the termination to make proper connections. In no case shall a splice be pulled into the conduit. Conductor splicing shall not be permitted without the Engineer's approval. Conductor splices shall not be made in underground junction boxes or manholes unless specifically noted on the plans.
- C. Each feeder and branch circuit shall be installed in its own individual conduit unless combining feeder and branch circuits is permitted as defined in the following:
  - 1. As specifically indicated on the Plans.

2. For lighting, multiple branch circuits may be installed in a conduit as allowed by the NEC and with the wire ampacity de-rated in accordance with the requirements of the NEC. Conduit fill shall not exceed the limits established by the NEC.
  3. When field conditions dictate and written permission is obtained from the Engineer.
- D. Use manufacturer-approved pulling compound or lubricant when pulling conductors; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
  - E. Feeder and branch circuits shall be isolated from each other and from all instrumentation and control circuits.
  - F. Control circuits shall be isolated from all other feeder, branch and instrumentation circuits, except as noted above. 12VDC, 24VDC and 48VDC control circuits may be combined into one conduit. 120/208/240VAC control circuits shall be isolated from all DC control circuits. 277/480VAC circuits shall be isolated from all other voltages.
  - G. Single conductor cable in cable trays shall be No. 1/0 or larger and shall be of a type listed and marked for use in cable trays. Tray cable smaller than 1/0 shall be multi-conductor, with outer jacket.
  - H. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
  - I. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
  - J. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems".
  - K. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems".
  - L. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
  - M. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
  - N. Wiring at Outlets and Switches: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.
- 3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS
- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling".

### 3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping".

### 3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
    - a. All conductors with voltages at 277V or higher and corresponding neutrals and grounds.
    - b. All conductors #8 and larger.
    - c. All motor leads and corresponding grounds.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
    - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- C. Test Reports: Prepare a written report to record the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26051

## SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Grounding systems and equipment.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### PART 2 - PRODUCTS

#### 2.1 CONDUCTORS

- A. Insulated Conductors: Tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Stranded Conductors: ASTM B 8.
  - 2. Tinned Conductors: ASTM B 33.
  - 3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  - 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
  - 6. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

## 2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
  - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

## 2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad; 3/4 inch in diameter and 10 feet long.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install stranded conductors all conductor sizes.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 4/0 AWG minimum. Bury at least 24 inches below grade.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded or approved compression connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

### 3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.

4. Single-phase motor and appliance branch circuits.
  5. Three-phase motor and appliance branch circuits.
  6. Flexible raceway runs.
  7. Armored and metal-clad cable runs.
  8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
  9. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
  10. X-Ray Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying x-ray equipment.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- D. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
  2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
  3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- E. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

### 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems", and shall be at least 12 inches deep, with cover.
1. Test Wells: Install at least two test wells for each service unless otherwise indicated. Install at the ground rods electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
  2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
  3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

### 3.4 LABELING

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer.
1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
  - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
  - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.
  
- B. Report measured ground resistances that exceed the following values:
  - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
  - 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
  - 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
  - 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
  
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

## SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. Supports, anchors, sleeves, and seals, are indicated on the Contract Drawings, schedules, and specified in other sections of these Contract Documents.
- B. Types of supports, anchors, sleeves and seals specified in this section include the following:
  - 1. One-hole Conduit Straps
  - 2. One-Hole Conduit Straps with Clamp Backs
  - 3. Two-Hole Conduit Straps
  - 4. Conduit Hangers
  - 5. I-beam Clamps
  - 6. Channel Clamps
  - 7. Round Steel Rods
  - 8. Drop-in Anchors
  - 9. Wedge Type Anchor Bolts
  - 10. Lead Expansion Anchors
  - 11. Toggle Bolts
  - 12. Wall and Floor Seals
  - 13. Cable Supports
  - 14. U-Channel Strut System
  - 15. Sleeves

#### 1.2 SUBMITTALS

- A. Products shall be submitted in accordance with Section 26000, and elsewhere in the Contract Documents, prior to installation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  - 1. Abbeon Cal Inc.
  - 2. Ackerman Johnson Fastening Systems Inc.
  - 3. Elcen Metal Products Co.
  - 4. Ideal Industries, Inc.
  - 5. Joslyn Mfg and Supply Co.
  - 6. McGraw Edison Co.
  - 7. Rawlplug Co. Inc.

8. Star Expansion Co.
9. U.S. Expansion Bolt Co.
10. Allied Tube and Conduit Corp.
11. B-Line Systems, Inc.
12. Greenfield Mfg Co., Inc.
13. Midland-Ross Corp.
14. O-Z/Gedney Div; General Signal Corp.
15. Power-Strut Div.; Van Huffel Tube Corp.
16. and Unistrut Div; GTE Products Corp.
17. Robroy Industries.

## 2.2 GENERAL

- A. Provide supporting devices that comply with manufacturer standard materials, design, and construction, in accordance with published product information, and as required for complete installations, and as specified herein.

## 2.3 SUPPORTS

- A. Provide supporting devices of types, sizes, and materials indicated, and having the following construction features:
  1. One-Hole Conduit Straps: For supporting electrical metallic tubing, and liquid tight flexible conduit; zinc plated steel, stainless steel or galvanized steel; snap-on, heavy duty.
  2. One-Hole Conduit Straps with Clamp Backs: For supporting rigid metal conduit, and intermediate metal conduit; cast galvanized steel.
  3. Two-Hole Conduit Straps: For supporting electrical metallic tubing, rigid metal conduit, and intermediate metal conduit; zinc plated steel, stainless steel or galvanized steel.
  4. Conduit Hangers: For supporting electrical metallic tubing, rigid metal conduit, and intermediate metal conduit; zinc plated steel, stainless steel or galvanized steel.
  5. I-Beam Clamps: Electroplated zinc or hot dipped galvanized malleable iron.
  6. Channel Clamps: Electroplated zinc or hot dipped galvanized steel.
  7. Round Steel Rod: National coarse thread, electroplated.

## 2.4 ANCHORS

- A. Provide anchors of types, sizes, and materials indicated, with the following construction features:
  1. Lead Expansion Anchors: For CMU walls, ¼ inch - 20 threads, set tool required.
  2. Toggle Bolts: Electroplated steel, size as required.
  3. Drop-in Anchors: Stainless steel, size as required.
  4. Anchor Bolts: Stainless steel, size as required.
  5. Lag Bolts: Stainless steel, size as required.
  6. Half-round head, non-removable anchor bolts shall not be used.
  7. Self-Tapping screws shall not be used.

## 2.5 SEALS

- A. Provide seals of types, sizes and materials indicated; with the following construction features:
1. Wall and Floor Seals: Provide factory-assembled watertight wall and floor seals, of types and sized indicated; suitable for sealing around conduit, pipe, or tubing passing through concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.
  2. Conduit sealing bushings shall be manufactured by O-Z/Gedney, Model CSMI, or approved equal.
  3. The conductor sealing bushings shall be manufactured by O-Z/Gedney, Model CSBG, or approved equal.

## 2.6 CONDUIT CABLE SUPPORTS

- A. Provide cable supports with insulating wedging plug for non-armored type electrical cables in risers; construct 2 inch rigid metal conduit; 3-wires, type wire as indicated; construct body of malleable-iron casting with hot-dip galvanized finish.

## 2.7 U-CHANNEL STRUT SYSTEM

- A. Provide U-channel strut system for supporting electrical equipment, 12-gage hot-dip galvanized steel, of types and sizes indicated; construct with 9/16 inch dia. holes, 8 inch o.c. on top surface, with the following fittings that mate and match with U-Channel.
1. Fixture hangers
  2. Channel hangers
  3. End caps
  4. Beam clamps
  5. Wiring stud
  6. Thinwall conduit clamps
  7. Rigid conduit clamps
  8. Post Bases
  9. U-bolts
- B. Approved for use with the following types of conduit:
1. EMT
  2. IMT
  3. GRS
  4. PVC (where above conduits are approved for the same location.)

## 2.8 PIPE SLEEVES

- A. Provide pipe sleeves from the following:
1. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.

## 2.9 PVC COATED U-CHANNEL STRUT SYSTEM

- A. Provide PVC Coated U-channel strut system for supporting electrical equipment, 20 mil PVC coated steel, of types and sizes indicated; construct with 9/16" dia. holes, 8" o.c. on top surface, with all Stainless Steel hardware, and the following fittings that mate and match with PVC Coated U-Channel:
  - 1. PVC Coated Strut nut
  - 2. PVC Coated Pipe straps
  - 3. Touch up compound (Gray)
- B. Approved for use with the following types of conduit:
  - 1. PVC Coated GRS
  - 2. Aluminum
  - 3. PVC

## 2.10 STAINLESS STEEL U-CHANNEL STRUT SYSTEM

- A. Provide Stainless Steel U-channel strut system for supporting electrical equipment, of types and sizes indicated; construct with 9/16 inch dia. holes, 8 inch o.c. on top surface, with all stainless steel hardware, and the following stainless steel fittings that mate and match with Stainless Steel U-Channel:
  - 1. Fixture hangers
  - 2. Channel hangers
  - 3. End caps
  - 4. Beam clamps
  - 5. Wiring stud
  - 6. Post bases
  - 7. Rigid conduit clamps
  - 8. U-bolts
- B. Approved for use with the following types of conduit:
  - 1. PVC Coated GRS
  - 2. PVC

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA and NEC for installation of supporting devices
- B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

- C. Install hangers, supports, clamps and attachments to support piping properly from building structure. Arrange for grouping of 2 or more parallel runs of conduits to be supported together on channel type hangers where possible. Install supports with spacing indicated and in compliance with NEC requirements.
- D. Torque sleeve seal nuts, complying with manufacturer recommended values. Ensure that sealing grommets expand to form watertight seal.
- E. Comply with manufacturer's recommendations for touch up of field cut ends or damaged PVC coated U-channel and fittings.
- F. Remove burrs and apply a cold zinc galvanizing paint to field cut galvanized U-channel strut prior to installation.
- G. Provide a minimum of two anchors per piece of u-channel. Maximum spacing of anchors shall be 12 inch o.c.

END OF SECTION 260529

## SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. Furnish and install conduits as required, and as shown on the Plans. Materials employed shall be as shown on the Plans.

#### 1.2 SUBMITTALS

- A. Submit product literature including manufacturer part number, model number, material, size, and specifications. Material shall not be installed until the Engineer has reviewed the submittal data.
- B. If changes from the Plan are proposed, shop drawings shall be submitted for review and acceptance showing routing, conduit size, and number and size of wires in each conduit before installation of conduit and any related work.
- C. Proposed routing of conduits buried under floor slabs-on-grade.
- D. Identify conduit by tag number of equipment served or by circuit schedule number.
- E. Proposed routing and details of construction including conduit and rebar embedded in floor slabs, columns, etc.
- F. Proposed location and details of construction for openings in slabs and walls for raceway runs.
- G. Refer to Section 26000 "General Electrical Requirements" for further submittal requirements.

#### 1.3 REFERENCES

- A. American National Standards Institute (ANSI): C80.1, Rigid Steel Conduit - Zinc-Coated.
- B. National Electric Manufacturers Association (NEMA): RN-1, Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit.
- C. Underwriters Laboratories Inc. (UL):
  - 1. 1, Flexible Metal Conduit.
  - 2. 6, Rigid Metal Conduit.
  - 3. 360, Liquid-Tight Flexible Steel Conduit.
  - 4. 467, Grounding and Bonding Equipment.
  - 5. 514, Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers.
  - 6. 651, Schedule 40 and 80 Rigid PVC Conduit.
  - 7. 870, Wireways, Auxiliary Gutters, and Associated Fittings.
  - 8. 884, Underfloor Raceways and Fittings.

9. 886, Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

PART 2 - PRODUCTS

2.1 RACEWAYS

- A. Exposed conduits in an unclassified or non-hazardous area shall be Stainless Steel unless specifically indicated otherwise on the Plans. Conduits in corrosive, hazardous, or damp areas shall be Stainless Steel unless otherwise indicated. Underground and/or concrete encased conduits shall be PVC, unless otherwise indicated. All conduits concealed in block walls or steel framing shall be EMT with compression fittings unless otherwise indicated. Set screw type fittings in EMT conduit will not be accepted. All wiring, except as otherwise noted, shall be in conduit. Conduit size shall not be less than the National Electrical Code (NEC) size required for the conductors therein and shall not be smaller than 3/4-inch. No underground conduit shall be less than one inch.
- B. Condulets type fittings shall be Crouse-Hinds, Appleton, or equal with wedge nut covers. All condulets located outdoors, damp or wet locations shall be weather tight.
- C. In unclassified areas, flexible conduit shall be grounding type, weatherproof, corrosion resistant, and watertight.
- D. Couplings, connectors, and fittings shall be standard types specifically designed and manufactured for the purpose. They shall be installed to provide a firm mechanical assembly and electrical conductivity throughout. Conduit systems shall be water tight.
- E. Expansion fittings shall be OZ type AX with jumper for exposed locations and type DX at structural expansion joints, Spring City, or equal. Conduits shall have expansion fittings in accordance with NEC.
- F. The conduits and fittings shall be supported per NEC requirements as a minimum.
- G. Sealing fittings shall be provided for classified areas per the NEC requirements in hazardous or corrosive areas. Fittings shall be poured after the final walk-thru unless otherwise directed in writing by the engineer.

2.2 GALVANIZED RIGID STEEL (GRS)

- A. Conduits and couplings shall be hot-dipped galvanized with zinc coated threads and outer coating of zinc bichromate, in accordance with ANSI C80.1 standards, as manufactured by Jones & Laughlin Steel Corporation, Allied Tube & Conduit Corporation, Triangle PWC, or equal.
- B. Steel conduit shall not be buried in earth without concrete encasement and additional corrosion protection. A half-lapped rapping of 20 mil PVC based corrosion protection tape shall be used.

## 2.3 PVC COATED GALVANIZED RIGID STEEL (PVC-GRS)

- A. PVC coated GRS conduit shall be installed where shown on the Plans or elsewhere specified and shall conform to NEMA RN-1 and ANSI C80.1 standards.
- B. The zinc surface of the conduit shall remain intact and undisturbed on both the inside and the outside of the conduit throughout the preparation and application processing. A Polyvinyl Chloride (PVC) coating shall be bonded to the galvanized outer surface of the conduit. The bond between the PVC coating and the conduit surface shall be greater than the tensile strength of the plastic. The thickness of the PVC coating shall be a minimum of 0.040-inch (40 mil).
- C. A loose coupling shall be furnished with each length of conduit. A PVC coating shall be bonded to the outer surface of the coupling and a PVC sleeve equal to the outside diameter of the uncoated conduit shall extend beyond both ends of the coupling approximately one pipe diameter or 1-1/2 inches, whichever is smaller. The wall thickness of the coating on the coupling and the sleeve shall be a minimum of 0.055-inch (55 mil).
- D. A PVC coating shall be bonded to the inner and outer surface of all conduit bodies and fittings and a PVC sleeve shall extend from all hubs. The wall thickness of the coating on conduit bodies and fittings and the sleeve walls shall be identical to those on couplings in length and thickness. The covers on all conduit bodies shall be coated on both sides and shall be designed to be completely interchangeable. The inside of conduit bodies shall remain undisturbed in the processing.
- E. Type 304 stainless steel screws shall be furnished and used to attach the cover to the conduit body. All coated material shall be installed and patched according to the manufacturer's recommended installation and patching instructions.
- F. Conduit straps shall be PVC coated or stainless steel.
- G. PVC coated conduits and fittings shall be as manufactured by Kor Kap Corporation, Occidental Coating Company, Rob-Roy, or equal.
- H. PVC coated flexible conduits shall be liquid and vapor-tight and manufactured in accordance with UL 360 standards.

## 2.4 RIGID NONMETALLIC – PVC

- A. Where specifically indicated on the Plans, or elsewhere specified, conduit may be high density Schedule 40, 90 degrees C, heavy-duty PVC. The conduit shall be manufactured from virgin polyvinyl chloride compound which meets ASTM D1784, NEMA TC-2, ANSI C33.91, and UL 651 standards. Smoke emissions shall be limited to less than 6 grams per 100 grams of material tested.
- B. Where conduit concrete encasement is indicated on the Plans, conduit supports shall be installed at five-foot intervals. PVC conduit shall be manufactured by Carlon, Triangle Conduit & Cable, or equal.

## 2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Liquidtight flexible metal conduit shall be liquid and vapor-tight, oil and ultraviolet ray resistant and manufactured in accordance with UL 360 standards. Liquidtight flexible metal conduit shall be formed of a continuous, spiral wound, galvanized steel core with an extruded PVC jacket. The PVC jacket shall be rated for high ambient heat applications, 90 degrees Celsius.
- B. For corrosive locations, liquidtight flexible metal conduit shall be formed of a continuous, spiral wound, aluminum core with an extruded PVC jacket. The PVC jacket shall be impervious to corrosive liquids and vapors.
- C. An external bonding conductor shall be required for flexible conduit connections containing circuits rated at 60 amps or greater and for sizes 1 1/2 " or larger. Flexible conduits and connectors for 1 1/4 " and smaller shall be listed for grounding.
- D. Connectors for liquidtight flexible conduit shall be galvanized, furnished with a sealing ring and locknut, and suitable for wet locations.

## 2.6 ELECTRICAL METALLIC TUBING (EMT)

- A. Per UL Standard for Electrical Metallic Tubing No. 797. Galvanized mild steel with interior coat of enamel.
- B. Fittings shall be steel set-screw type. Cast type, indenter type or compression steel fittings are not acceptable.
- C. Approved for plan specified locations only. Approved for conduits concealed in block walls and concealed in steel framed walls. Not approved for process areas where wash down or high humidity conditions exist.

## 2.7 ALUMINUM CONDUIT

- A. Aluminum conduit is approved for wet and corrosive areas only. Prior approval from the engineer must be obtained when substituting for PVC coated.
- B. Aluminum hardware and conduit shall be isolated from all dissimilar materials as appropriate.
  - 1. Isolation from dissimilar metals in channel or support by a single layer of scotch #33+ or approved equal.
  - 2. Isolation from concrete shall be by neoprene gaskets.
  - 3. Aluminum shall not be used for concrete penetrations.
- C. Aluminum conduit shall contain less than 0.4% copper.

## 2.8 STAINLESS STEEL CONDUIT

- A. Stainless Steel Conduit conduit is approved for all exposed conduit locations.
- B. Stainless Steel conduit and all fittings and support hardware shall be 316 SS.

## 2.9 CABLE TRAY SYSTEM

- A. Provide cable tray systems composed of straight sections, fittings, and accessories as defined in the latest NEMA Standards publication VE-1 - Ventilated Cable Tray.
1. Provide cable trays and fittings shall constructed of materials suited for the area classification as noted below.
  2. Provide cable trays shall be of the ladder type with availability of 6, 9, and 12-inch spacing.
  3. Provide tray sizes with a 3, 4, 5, or 6-inch minimum usable load depth, as indicated on the drawings.
  4. Provide loading capacities that meet the NEMA weight classification with a safety factor of 1.5.
  5. In corrosive, damp, or Hazardous locations, provide cable trays manufactured of aluminum.
  6. In non-classified areas provide cable trays manufactured of Hot Dipped galvanized materials. All cuts and welds shall be touched up with cold galvanizing spray per the raceway specification.
  7. Separate power, control, signal and communications cables by grounded metallic dividers or run in separate trays.
  8. Manufacturer, or Approved Equal
    - a. Husky
    - b. B-Line
    - c. T.J. Cope

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Conduit runs are schematic only, and shall be modified as required to suit field conditions, subject to review and acceptance by the Engineer.
- B. Conduit shall run continuously between outlets and shall be provided with junction boxes where connections are made. Couplings, connectors, and fittings shall be acceptable types designed and manufactured for the purpose, and shall provide a firm mechanical assembly, and electrical conductivity throughout.
- C. Conduit runs shall be straight and true. Elbows, offsets, and bends shall be uniform and symmetrical. Changes in direction shall be made with long radius bends, or with fittings of the conduit type.
- D. Conduit runs in buildings and structures shall be concealed where possible except as specifically noted, or accepted by the Engineer.
- E. Conduit runs shall not interfere with the proper and safe operation of equipment, and shall not block or interfere with ingress or egress, including equipment removal hatches.

- F. Exposed conduits shall be securely fastened with clamps, or straps, intended for conduit use. All exposed conduit shall be run on the walls and ceiling only and shall be parallel to the planes of the walls or ceiling. No diagonal runs will be permitted. Flexible conduit shall be used only for short lengths required to facilitate connections between rigid conduit to vibrating equipment such as motors, fans, and transformers. The maximum length of flexible conduit shall be 3 feet, unless approved in writing by engineer. Flexible conduit shall not be used for electrician's convenience where rigid conduit could be used.
- G. Conduit runs on water-bearing walls shall be supported one inch away from the wall on an accepted channel. When channel galvanizing, or other coating, is cut or otherwise damaged, it shall be field coated to original condition. No conduit shall be run in water-bearing walls, unless specifically designated otherwise.
- H. Conduit shall be thoroughly reamed to remove burrs. IMC or GRS shall be reamed during the threading process, and Rigid Nonmetallic PVC shall be reamed before applying fittings. A zinc rich cold galvanizing shall be used to restore corrosion protection on field cut threads.
- I. Bushings and lock nuts or hubs shall be used at conduit terminations. Conduit, bushings, locknuts, and enclosures shall be fastened to the conduit system prior to pulling wire. Splitting the bushings for installation will not be accepted. Hubs shall be used in all process areas outside of electrical rooms unless otherwise specified. The total number of bends in any run between pull points shall not exceed 360 degrees. Junction boxes and pull boxes shall be installed at points acceptable to the Engineer. Conduit ends shall be plugged to prevent the entrance of moisture or debris during construction. All spare conduits shall be adequately capped and shall contain a suitable pull string. Splices shall be made in junction boxes only. Splices in conduit bodies will not be accepted.
- J. Joints shall be set up tight. Hangers and fastenings shall be secure, and of a type appropriate in design, and dimensions, for the particular application.
- K. Conduit runs shall be cleaned and internally sized (obstruction tested) so that no foreign objects, or obstructions remain in the conduit prior to pulling in conductors.
- L. After installation of complete conduit runs 2 inches and larger, conduits shall be snaked with a conduit cleaner equipped with a cylindrical mandrel of a diameter not less than 85 percent of the nominal diameter of the conduit. Conduits through which the mandrel will not pass shall not be used. Test results should be submitted to the engineer.
- M. Expansion fittings shall be installed across all expansion joints and at other locations where necessary to compensate for thermal expansion and contraction.
- N. Provide trenching, backfill, and compaction for conduits installed underground.
- O. Raceways running parallel to hot water or steam piping shall maintain a distance of 6 inches from the piping.
- P. Raceways crossing steam or liquid filling piping shall cross above the piping.
- Q. In slab conduits, shall be covered by a minimum of 2 inches of concrete.

- R. Conduits of the same duty (480V Power, 120V Power, 120V Controls and signals) shall have a minimum separation of 2 inches between conduits.
- S. Conduits and raceways carrying signal wiring shall have a minimum separation of 12 inches from 480V power raceways, 6 inches from 120V power raceways, and 4 inches from 120V control raceways.
- T. Raceways with 120V Control shall maintain a distance of 12 inches from 480V power raceways, 6 inches from 120V power raceways.
- U. Raceways with 120V power shall maintain a distance of 6 inches from 480V power raceways.

### 3.2 CABLE TRAYS

- A. Provide cable trays in strict accordance with the manufacturer's printed instructions.
- B. Allowable cable fill areas shall meet NEC Article 392 - Cable Trays requirements.
- C. Verify cable tray fills prior to installation based on cables and trays actually provided.
- D. Maintain continuous grounding of cable trays including bonding jumpers in accordance with the requirements of NEC Article 392.
- E. Install cable trays using hangers and supports on 8-foot centers, maximum.
- F. Install cable trays to walls as the primary method of support where possible.
- G. If support from the ceiling is the only alternative, use hangers and supports on 6-foot centers, maximum.
- H. Ensure that proper separation between duties as detailed in 3.1.

END OF SECTION 260533

## SECTION 260534 – ENCLOSURES

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. This specification includes enclosures to house electrical controls, instruments, terminal blocks, and serve as junction boxes where shown on the Drawings.

#### 1.2 RELATED SECTIONS

- A. For Raceways and Boxes for Electrical Systems see Section 260533 “Raceways and Boxes for Electrical Systems”.

#### 1.3 SUBMITTALS

- A. Products shall be submitted in accordance with Section 26000 “General Electrical Requirements”, and elsewhere in the Contract Documents, prior to installation.

#### 1.4 MANUFACTURERS

- A. Enclosures shall be manufactured by Hoffman, Rittal, or equal.

### PART 2 - PRODUCTS

#### 2.1 STEEL

- A. Enclosures shall be fabricated from 14 gauge steel with seams that are continuously welded. Doors shall have full length piano hinges with the door removable by pulling the hinge pin.
- B. A rolled lip shall be provided around three sides of the door and around all sides of the enclosure opening. The gasket shall be attached with oil-resistant adhesive and held in place with steel retaining strips. Exterior hardware, such as clamps, screws, and hinge pins, shall be of stainless steel for outdoor installations. A hasp and staple shall be provided for padlocking. Each enclosure shall have a print pocket. All wires entering or leaving the enclosure shall terminate on terminal strips. All wires and terminals shall be clearly identified as specified elsewhere in these specifications.
- C. Finish shall be white enamel interior, light gray enamel, ANSI 61 exterior, over phosphatized surfaces. Special finishes and colors shall be furnished for wet locations. Plans should be checked for special conditions.

#### 2.2 NEMA RATING

- A. Unless otherwise indicated on the Plans, enclosures shall be NEMA 12 for indoors, NEMA 4X for corrosive areas, and NEMA 4 for outdoor installations. NEMA 4X

enclosures shall be stainless steel, unless noted otherwise. NEMA 4X enclosures shall also be used in wet, or wash down areas.

- B. All enclosures used in classified areas shall be NEMA 7.
- C. In Waste Water facilities, all enclosures in process areas shall be NEMA 4X stainless steel. Enclosures in electrical rooms, meeting rooms, offices and shops shall be NEMA 12 unless otherwise specified.
- D. Areas not specified in Water Treatment, Wastewater, or other water related facilities shall be approved by the engineer for NEMA type prior to installation.

### 2.3 FIBERGLASS

- A. Enclosures shall be heavy-duty, compression molded, fiberglass reinforced polyester, high impact, heat resistant, NEMA 4X.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Enclosures shall be installed as indicated on the Plans, and according to manufacturer's instructions.
- B. Enclosures shall be properly grounded, and shall include ground straps connected to hinged doors and accessories.

END OF SECTION 260534

## **SECTION 260543 – UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

##### **A. Section Includes:**

1. Conduit, ducts, and duct accessories for concrete-encased duct banks.
2. Handholes and boxes.
3. Manholes.

##### **B. Related Requirements:**

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 ACTION SUBMITTALS**

##### **A. Product Data:** For accessories for handholes and boxes.

##### **B. Shop Drawings for Factory-Fabricated Handholes and Boxes:** Include dimensioned plans, sections, elevations, and fabrication and installation details, including the following:

1. Duct entry provisions, including locations and duct sizes.
2. Cover design.
3. Grounding details.
4. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

#### **1.3 INFORMATIONAL SUBMITTALS**

##### **A. Field quality-control test reports.**

#### **1.4 QUALITY ASSURANCE**

##### **A. Comply with ANSI C2.**

##### **B. Comply with NFPA 70.**

## PART 2 - PRODUCTS

### 2.1 CONDUIT

- A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

### 2.2 NONMETALLIC DUCTS AND DUCT ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ARNCO Corp.
  - 2. Beck Manufacturing.
  - 3. Cantex, Inc.
  - 4. CertainTeed Corp.; Pipe & Plastics Group.
  - 5. Condux International, Inc.
  - 6. ElecSys, Inc.
  - 7. Electri-Flex Company.
  - 8. IPEX Inc.
  - 9. Lamson & Sessions; Carlon Electrical Products.
  - 10. Manhattan/CDT; a division of Cable Design Technologies.
  - 11. Spiraduct/AFC Cable Systems, Inc.
- B. Underground Plastic Utilities Duct: NEMA TC 6 & 8, Type EB-20-PVC, ASTM F 512, UL 651A, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.
- C. Duct Accessories:
  - 1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
  - 2. Warning Tape: Underground-line warning tape specified in Section 260553 "Identification for Electrical Systems."
  - 3. Concrete Warning Planks: Nominal 12 by 24 by 3 inches (300 by 600 by 76 mm) in size, manufactured from 6000-psi (41-MPa) concrete.
    - a. Color: Red dye added to concrete during batching.
    - b. Mark each plank with "ELECTRIC" in 2-inch- (50-mm-) high, 3/8-inch- (10-mm-) deep letters.

### 2.3 HANDHOLES AND BOXES

- A. Description: Comply with SCTE 77.

1. Color: Gray or Green, depending on location.
  2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
  3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
  4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
  5. Cover Legend: Molded lettering, "ELECTRIC."
  6. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.
- B. Fiberglass Handholes and Boxes with Polymer Concrete Frame and Cover: Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.
1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    - a. Armorcast Products Company.
    - b. Carson Industries LLC.
    - c. Christy Concrete Products.
    - d. Synertech Moulded Products, Inc.; a division of Oldcastle Precast.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavation and Backfill: Comply with Section 312000 "General Earthwork," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore-vegetation and include necessary top-soiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 329200 "Turf and Grasses" and Section 329300 "Plants and Planting."
- D. Cut and patch existing pavement in the path of underground ducts and utility structures.

### 3.2 DUCT INSTALLATION

- A. Slope: Pitch ducts a minimum slope of 1:300 down toward handholes and away from buildings and equipment.
- B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations, unless otherwise indicated.

- C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
- D. Duct Entrances to Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches (250 mm) o.c. for 5-inch (125-mm) ducts, and vary proportionately for other duct sizes.
1. Begin change from regular spacing to end-bell spacing 10 feet (3 m) from the end bell without reducing duct line slope and without forming a trap in the line.
  2. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to handhole.
  3. Grout end bells into structure walls from both sides to provide watertight entrances.
- E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet (3 m) outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- F. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.
- G. Pulling Cord: Install 100-lbf- (445-N-) test nylon cord in ducts, including spares.
- H. Concrete-Encased Ducts: Support ducts on duct separators.
1. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, with not less than 5 spacers per 20 feet (6 m) of duct. Secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches (150 mm) between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
  2. Concreting Sequence: Pour each run of envelope between terminations in one continuous operation.
    - a. Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations, or use other specific measures to prevent expansion-contraction damage.
    - b. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch (19-mm) reinforcing rod dowels extending 18 inches (450 mm) into concrete on both sides of joint near corners of envelope.
  3. Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.

4. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
5. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
6. Minimum Space between Ducts: 3 inches between ducts and exterior envelope wall, 3 inches between ducts for like services, and 6 inches between power and signal ducts.
7. Depth: Install top of duct bank at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 24 inches below finished grade in deliberate traffic paths for vehicles, unless otherwise indicated.
8. Stub-Ups: Use manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Extend concrete encasement throughout the length of the elbow.
9. Stub-Ups: Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
  - b. Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.
10. Warning Tape: Bury warning tape approximately 12 inches above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches of the centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

I. Direct-Buried Duct Banks:

1. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
2. Space separators close enough to prevent sagging and deforming of ducts, with not less than 5 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
3. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Section 312000 "General Earthwork" for pipes less than 6 inches in nominal diameter.
4. Install backfill as specified in Section 312000 "General Earthwork."
5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Section 312000 "General Earthwork."
6. Install ducts with a minimum of 3 inches between ducts for like services and 6 inches between power and signal ducts.

7. Depth: Install top of duct bank at least 24 inches below finished grade, unless otherwise indicated.
8. Set elevation of bottom of duct bank below the frost line.
9. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
10. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
  - b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
11. Warning Planks: Bury warning planks approximately 12 inches above direct-buried ducts and duct banks, placing them 24 inches o.c. Align planks along the width and along the centerline of duct bank. Provide an additional plank for each 12-inch increment of ductbank width over a nominal 18 inches. Space additional planks 12 inches apart, horizontally.

### 3.3 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.7-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas and trafficways, set so cover surface will be flush with finished grade. Set covers of other handholes 1 inch (25 mm) above finished grade.
- D. Install handholes and boxes with bottom below the frost line.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- F. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

### 3.4 GROUNDING

- A. Ground underground ducts and utility structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
  - 2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
  - 3. Test handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Correct deficiencies and retest as specified above to demonstrate compliance.

### 3.6 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

END OF SECTION 260543

## **SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

##### **A. Section Includes:**

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

##### **B. Related Requirements:**

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

#### **1.2 ACTION SUBMITTALS**

##### **A. Product Data:** For each type of product.

##### **B. LEED Submittals:**

1. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

### **PART 2 - PRODUCTS**

#### **2.1 SLEEVES**

##### **A. Wall Sleeves:**

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. Sleeves for Rectangular Openings:
  - 1. Material: Galvanized sheet steel.
  - 2. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
    - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

## 2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. Advance Products & Systems, Inc.
    - b. CALPICO, Inc.
    - c. Metraflex Company (The).
    - d. Pipeline Seal and Insulator, Inc.
    - e. Proco Products, Inc.
  - 3. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  - 4. Pressure Plates: Stainless steel.
  - 5. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

## 2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

- a. Presealed Systems.

## 2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

## 2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
  - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
  - 2. Sealant shall have VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 3. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

## PART 3 - EXECUTION

### 3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
  - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
    - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."

- b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
  - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
  - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
  - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
  - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using **steel** pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

### 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

## SECTION 260548 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
1. Channel support systems.
  2. Restraint cables.
  3. Hanger rod stiffeners.
  4. Anchorage bushings and washers.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
1. Site class, building code and Design Spectral Response Acceleration as defined on the Contract Drawings.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
  2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
    - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
    - b. Annotate to indicate application of each product submitted and compliance with requirements.
  3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.
- B. Delegated-Design Submittal: For seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
    - a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other electrical Sections for equipment mounted outdoors.

2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
3. Field-fabricated supports.
4. Seismic-Restraint Details:
  - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
  - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events.
  - c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Field quality-control test reports.

#### 1.5 QUALITY ASSURANCE

- A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- D. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Amber/Booth Company, Inc.

2. California Dynamics Corporation.
  3. Cooper B-Line, Inc.; a division of Cooper Industries.
  4. Hilti Inc.
  5. Loos & Co.; Seismic Earthquake Division.
  6. Mason Industries.
  7. TOLCO Incorporated; a brand of NIBCO INC.
  8. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- D. Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod. Do not weld stiffeners to rods.
- E. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.
- F. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.
- G. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- H. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
- I. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

### 3.2 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment and Hanger Restraints:
  - 1. Install restrained isolators on electrical equipment.
  - 2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).
  - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- D. Drilled-in Anchors:
  - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
  - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
  - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
  - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
  - 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
  - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

### 3.3 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

### 3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  - 1. Obtain Engineer's approval before transmitting test loads to structure. Provide temporary load-spreading members.
  - 2. Test at least four of each type and size of installed anchors and fasteners selected by Engineer.
  - 3. Test to 90 percent of rated proof load of device.
  - 4. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- B. Remove and replace malfunctioning units and retest as specified above.
- C. Prepare test and inspection reports.

### 3.5 ADJUSTING

- A. Adjust isolators after isolated equipment is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 260548

## SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples of each color, lettering style and other graphic representation required for each identification material or system.
- C. Table or list of equipment, panel and disconnect switch labels.

#### 1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

### PART 2 - PRODUCTS

#### 2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

- B. Colors for Raceways Carrying Circuits at 600 V or Less:
  1. Black letters on an orange field.
  2. Legend: Indicate voltage and system or service type.
- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Write-On Tags shall not be allowed.

## 2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less:
  1. Black letters on an orange field.
  2. Legend: Indicate voltage and system or service type.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

## 2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label. Heat shrink tubing, or sleeve type wire markers are also acceptable.
- A. Write-On Tags shall not be allowed.
- B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

- C. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

## 2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label. Heat shrink tubing, or sleeve type wire markers are also acceptable.
- C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- D. Write-On Tags shall not be allowed.

## 2.5 FLOOR MARKING TAPE

- A. 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

## 2.6 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
  - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
  - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
  - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
  - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
  - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
  - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.
- C. Tag: Type I:
  - 1. Pigmented polyolefin, bright-colored, compounded for direct-burial service.
  - 2. Thickness: 4 mils.
  - 3. Weight: 18.5 lb/1000 sq. ft.
  - 4. 3-Inch Tensile According to ASTM D 882: 30 lbf, and 2500 psi.
- D. Tag: Type ID:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, compounded for direct-burial service.
2. Overall Thickness: 5 mils.
3. Foil Core Thickness: 0.35 mil.
4. Weight: 28 lb/1000 sq. ft.
5. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

## 2.7 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
  1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
  2. 1/4-inch grommets in corners for mounting.
  3. Nominal size, 7 by 10 inches.
- D. Metal-Backed, Butyrate Warning Signs:
  1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
  2. 1/4-inch grommets in corners for mounting.
  3. Nominal size, 10 by 14 inches.
- E. Warning label and sign shall include, but are not limited to, the following legends:
  1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
  2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

## 2.8 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
  1. Engraved legend with black letters on white face.
  2. Punched or drilled for mechanical fasteners.
  3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

## 2.9 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
- B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

## 2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

# PART 3 - EXECUTION

## 3.1 CONDUCTOR LABELING SCHEME

- A. All control and instrumentation conductors shall be labeled with a “To/From” labeling scheme. Each conductor label shall have two lines of text. The first line of text shall indicate the enclosure and terminal where the wire is to terminate on the other end. The second line of text shall indicate the enclosure and terminal where the wire is to terminate on this end. The following example illustrates the “To/From” labeling scheme:
  - 1. A wire is connected between a VFD and an LCP. The VFD equipment tag is VFD-100 and the LCP equipment tag is LCP-100. The connecting terminal at the VFD enclosure is terminal “5”. The connecting terminal at the LCP is terminal “7”. This wire would have the following labels:
    - a. The wire label at the VFD end:
      - Top Line: “LCP-100 : 7”
      - Bottom Line: “VFD-100 : 5”
    - b. The wire label at the LCP end:
      - Top Line: “VFD-100 : 5”
      - Bottom Line: “LCP-100 : 7”

### 3.2 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
- G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

### 3.3 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Install labels at 10-foot maximum intervals.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
  - 1. Emergency Power.
  - 2. Power.
  - 3. UPS.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
  - 1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
    - a. Colors for 208/120-V Circuits:
      - 1) Phase A: Black.
      - 2) Phase B: Red.

- 3) Phase C: Blue.
  - b. Colors for 480/277-V Circuits:
    - 1) Phase A: Brown.
    - 2) Phase B: Orange.
    - 3) Phase C: Yellow.
  - c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
  1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
  2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
  3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
  1. Limit use of underground-line warning tape to direct-buried cables.
  2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
  1. Comply with 29 CFR 1910.145.
  2. Identify system voltage with black letters on an orange background.
  3. Apply to exterior of door, cover, or other access.
  4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    - a. Power transfer switches.
    - b. Controls with external control power connections.

- J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
  - 1. Labeling Instructions:
    - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
    - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 260553

## SECTION 312000 - EARTH MOVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Base Course for concrete walks, pavements, and roadway areas.
2. Structural/Engineered fill for building pads, concrete structures and auxiliary structures.
3. Bedding course for pipe and utility trenches.
4. Drainage course.
5. Crusher fines for gravel pathway/walkway applications.
6. Controlled Low Strength Material (CLSM) for structural fill applications.
7. Accessories.
8. Clearing and Grubbing.
9. Excavation for rough grading the site.
10. Excavation for structures.
11. Excavation for piping and utility trenches.
12. Installation and compaction requirements.

#### 1.2 RELATED SECTIONS

- A. 033000 "Cast-in-Place Concrete" for sheet vapor retarder requirements.
- B. 319000 "Geotechnical Report" for additional information regarding existing soils and recommendations.
- C. 312319 "Dewatering" for dewatering requirements during excavation and construction activity.

#### 1.3 DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.
  1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  2. Final Backfill: Backfill placed over initial backfill to fill a trench.
  3. Structural Backfill: Backfill placed below building pads, foundations, concrete structures and other areas where specified.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

- E. Drainage Course: Aggregate layer supporting the slab-on-grade and building slabs that also minimizes upward capillary flow of pore water.
- F. Crusher Fines: Consist of small particles of crushed rock, typically left from rock crushing operations or ground specifically for trail grading purposes.
- G. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
  - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- H. Fill: Soil materials used to raise existing grades.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below base, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### 1.4 QUALITY ASSURANCE

- A. Contractor shall notify the Engineer and Owner of excavation plans a minimum of 48 hours in advance. The plan shall include a description of the location and extents of excavation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Material test reports.

#### 1.6 PROJECT CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: On-site soils (following clearing and grubbing) are suitable for use as compacted general fill, utility trench and structural backfill in accordance with the Geotechnical Report. Borrow materials (Imported Fill Materials) shall be similar to onsite soils or non-expansive, granular soil meeting USCS classifications of SM, SP-SM, or SW-SM with a maximum rock size of 2 inches. All imported fill soil sources and material gradations shall be approved by the Engineer prior to the material being hauled to the site.
- C. For clarification, the results of the Miller Pacific report (see Section 319000) regarding stockpile material onsite have been reviewed with the Geotechnical engineer. Per the report, material from areas where composite samples #2 and #3 were taken are reasonably close to requirements for certain type of site backfill material. Accordingly, stockpile material from areas near these sample locations may be used for the following applications:
  - 1. Backfill beneath and adjacent to caisson-pier foundation structures (e.g. anoxic/aeration basins, electrical building, and UV building).
  - 2. Subgrade for roadways (excluding the 12" of road base required directly beneath the paved surface).
  - 3. Raising grade on site that is not otherwise beneath roadways, structures, or other improvements.
  - 4. In any application, the material must still meet the minimum density, moisture content, and compaction requirements as noted in this section for each application and its installation is subject to the same inspection and approval as required for any material.

This stockpile material is **not** approved for the following applications:

- 1. Structural backfill beneath structures/slabs that are not on caisson/pier foundation structures (e.g. slabs on grades, shallow foundations, etc.).
- 2. Road base beneath pavement.

Note that stockpile material from the area near composite sample 1 (refer to report in Section 319000) has a much higher plasticity index (49%) and may only be used to raise grade on site that is not beneath structures, roadways, or other improvements. In addition, this material should only be utilized if other sources of available backfill material have already been utilized (e.g. over excavation material, crushed rock, other stockpile material, etc.). This higher plasticity material appears to represent roughly 1/3 of the stockpile material.

- D. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
  2. Review Geotechnical Report included in section 319000 for additional information regarding unsuitable soils present on site including anticipated “bay mud” from excavation activities.
- E. Base Course: Base Course shall conform to CALTRANS Class 2AB material requirements (3/4 inch maximum size).
- F. Structural/Engineered Fill: On-site soils or Imported fill material meeting the satisfactory soils requirements. Imported structural fill materials shall be subject to Engineer’s approval prior to being hauled to the site.

The contractor may elect to utilize excavated bedrock, crushed rock from landscaping/process basins, and crushed concrete to be demolished as backfill material. In order for this material to be used for structural backfill, it must meet the requirements for structural fill and be sufficiently compactible as required in the design drawings and per the recommendations in the Geotechnical report. Engineer and Owner must approve all onsite material.

Examples of suitable structural fill include:

1. Select Backfill: Suitable material that can be readily compacted and meets the requirements of AASHTO M145 classification A-1-a, non-plastic, well graded with a maximum particle size of 2-inches (in any direction).

| <u>Sieve Size</u> | <u>Percentage Passing</u> |
|-------------------|---------------------------|
| 2-inch            | 100                       |
| No. 10            | 30-50                     |
| No. 40            | 15-30                     |
| No. 200           | 0-10                      |

2. Crushed Rock: Manufactured angular, crushed rock, non-plastic, meeting the following gradation requirements:

| <u>Sieve Size</u> | <u>Percentage Passing</u> |
|-------------------|---------------------------|
| 3/8-inch          | 100                       |
| No. 4             | 30-50                     |
| No. 200           | 0-5                       |

3. Sand Backfill: Sand, non-plastic, **only to be used where indicated in the design drawings (e.g. for vapor barriers, etc...)** meeting the following gradation requirements:

| <u>Sieve Size</u> | <u>Percentage Passing</u> |
|-------------------|---------------------------|
| 3/4-inch          | 100                       |
| No. 4             | 80-100                    |
| No. 10            | 30-50                     |
| No. 40            | 10-30                     |
| No. 200           | 7-15                      |

4. Granular Backfill: Crushed rock and sand well graded and readily compacted, non-plastic, meeting the following gradation requirements.

| <u>Sieve Size</u> | <u>Percentage Passing</u> |
|-------------------|---------------------------|
| 1-inch            | 100                       |
| No. 40            | 15-60                     |
| No. 200           | 0-15                      |

5. Base Course: CALTRANS Class 2AB, used for road grading may also be used for structural/engineered feel.

G. Bedding Course:

1. Pipe bedding material shall be a graded granular material.

| <u>Sieve Size</u> | <u>Percentage Passing</u> |
|-------------------|---------------------------|
| 3/8-inch          | 100                       |
| No. 4             | 90-100                    |
| No. 50            | 10-40                     |
| No. 100           | 3-20                      |
| No. 200           | 0-15                      |

2. Clean Concrete Sand (Sand Equivalent SE > 30)

H. Drainage Course:

1. For drainage course under building slabs and slabs on grade use 4-inch thick layer of clean concrete sand with 90-100% passing the #4 sieve.
2. In all other locations use a narrowly graded mixture of washed crushed stone, or crushed gravel; the gradation shall have the following gradation requirements:

| <u>Sieve Size</u> | <u>Percentage Passing</u> |
|-------------------|---------------------------|
| 1-1/2-inch        | 100                       |
| 3/4-inch          | 90-100                    |
| 3/8-inch          | 40-100                    |
| No. 4             | 5-40                      |
| No. 8             | 0-5                       |

I. Crusher Fines:

1. For use on pathways, trails, walkways, and other pedestrian-only areas for trail grading with a maximum particle size of 3/8". Minimum thickness is 6" unless noted otherwise in the design drawings. The gradation shall have the following requirements:

| <u>Sieve Size</u> | <u>Percentage Passing</u> |
|-------------------|---------------------------|
| 3/8-inch          | 100                       |
| No. 4             | 90-100                    |
| No. 8             | 55-80                     |
| No. 16            | 40-70                     |
| No. 30            | 25-50                     |
| No. 200           | 6-15                      |

## 2.2 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

- A. Where indicated in the drawings and when approved by the Engineer, Controlled Low Strength Material (CLSM) may be used as trench backfill, structural backfill, pipe bedding, or pipe backfill. CLSM shall consist of Portland cement, aggregates, water and fly ash. Chemical admixtures and other mineral admixtures may be used when approved by the Engineer.
- B. The actual mix proportions and flow characteristics shall be determined by the producer of the CLSM to meet jobsite conditions and shall be approved by the Engineer. The mixture shall be workable and non-segregating.
- C. The minimum compressive strength, unless noted otherwise shall be 1,200 psi.

## 2.3 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations. Prepare for storm water pollution prevention per the plan and local requirements (reference SWPPP).
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 3.2 CLEARING AND GRUBBING

- A. All surface improvements, debris and/or vegetation including grass, trees, and weeds on the site should be removed from the construction area. Root balls shall be completely excavated. Organic stripping shall be hauled off from the site and shall not be used as fill. Any trash, construction debris, concrete slabs, old pavement, landfill, and buried obstructions such as old foundations and utility lines exposed should be traced to the limits of the foreign materials and removed. Any excavations resulting from site clearing and grubbing should be dish-shaped to the lowest depth of disturbance and backfilled with structural fill.

### 3.3 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials

### 3.4 EXCAVATION FOR STRUCTURES

- A. Excavations shall include the removal of all materials that would interfere with the proper execution of the Work. The removal of said materials shall conform to the lines and grades shown on the plans or ordered by the Engineer. The Contractor shall furnish, place and maintain all supports and shoring that may be required for safety of excavations and protection of adjacent structures and all pumping, ditching or other measures necessary for the removal or exclusion of water, including taking care of storm water, groundwater and wastewater reaching the site of the Work from any source so as to prevent damage to the Work or adjoining property. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable State, Federal or local requirements.

#### 1. EXCAVATION FOR CONCRETE STRUCTURES

- a. Structures with foundations not in bedrock and areas with minimal anticipated compaction from underlying bay mud:

The existing surface soil within the structure pad areas should be removed to at least 24 inches below the lowest foundation grade and replaced with structural fill. The exposed sub-grade should be scarified to a depth of 8 inches, uniformly moisture conditioned to +/-2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density. Recompact scarified material in lifts no greater than 6-inches thick. Place backfill and fill materials above the scarified sub-grade in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers. Provide structural backfill back to bottom of foundation/structure, compacted to at least 90% of ASTM D1557 maximum density and moisture conditioned to +/-2% of optimum moisture.

- b. For concrete structures not otherwise specified above:

Concrete Structure Preparation (for structures less than 10 feet deep below existing grade) not otherwise specified above – The existing surface soil within the structure pad areas should be removed to 24 inches below the lowest foundation grade. The exposed sub-grade should be scarified to a depth of 8 inches, uniformly moisture conditioned to +/-2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

Concrete Structure Preparation (for structures deeper than 10 feet deep below existing grade) – The existing surface soil within the structure pad areas should be

removed to the lowest foundation grade. The exposed sub-grade should be scarified to a depth of 18 inches, uniformly moisture conditioned to +/-2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

- c. In areas where excavation encounters soft bay mud, the subgrade shall be stabilized. The stabilization shall be implemented by a minimum 18" over excavation and placement of a layer of biaxial Tensar geogrid over filter fabric. The over excavated area should then be backfilled with 18" Caltrans Class 2.
  
- B. Over-excavations ordered by the Engineer that are not shown or specified and the resulting backfill will be paid for under a separate unit price bid item if such bid item has been established, otherwise payment will be made in accordance with a negotiated price. After the required excavation or over-excavation has been completed the exposed surface shall be scarified to a depth of 8 inches, brought to optimum moisture content and compacted in accordance with the requirements for the specific structure.
  
- C. The Contractor shall keep separate and stockpile from required excavations all topsoil consisting of the top 8-inches of native material. The Contractor shall place and grade this topsoil material as the top 6-inches on areas requiring landscaping, if applicable, to the extent it remains available.
  
- D. The Contractor shall notify the Engineer of the completion of any structural excavation and shall allow the Engineer at least 24-hours review period before the exposed foundation is scarified and compacted or is covered with any structural backfill materials.
  
- E. The Contractor shall remove and dispose of all unsatisfactory native material and all satisfactory native excess material excavated. At Owner's discretion, remaining suitable overex material may be placed permanently on site rather than disposed of offsite.
  
- F. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

### 3.5 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.6 EXCAVATION FOR UTILITY TRENCHES

- A. All trench excavations should conform to CalOSHA requirements for Type C soil. The contractor is solely responsible for the safety of workers entering trenches. Temporary excavations with depths of 4 feet or less may be cut nearly vertical for short duration.

Temporary shall be no steeper than 1.5:1 (H:V). Sandy soil slopes should be kept moist, but not saturated, to reduce the potential of raveling or sloughing.

- B. Trench excavations deeper than 4 feet will require shoring or slope inclinations in conformance with CalOSHA regulations for Type C soil. Surcharge loads of stockpiled soil or construction materials should be set back from the top of the slope a minimum distance equal to the height of the slope. All permanent slopes should not be steeper than 3:1 to reduce wind and rain erosion. Protected slopes with ground cover may be as steep as 2:1. However, maintenance with motorized equipment may not be possible at this inclination.
- C. Unless otherwise shown or ordered, excavation for pipelines and utilities shall be open-cut trenches. The bottom of the trench shall have a minimum width equal to the outside diameter of the pipe plus 24-inches. Trenches for pipelines smaller than 4 inches shall be excavated uniformly to the grade of the bottom of the pipe. Trenches for pipelines 4 inches and larger, unless otherwise ordered by the Engineer, shall be excavated uniformly to the grade 6-inches below the grade of the outside bottom of the pipe. The over-excavation shall be replaced with gravel bedding material as specified herein for the particular type of pipe being installed. The pipe bedding shall be compacted by mechanical means suitable to the Engineer to ninety percent (90%) of relative density. The trench bottom shall be uniformly graded so that each pipe section when first laid will be continually in contact with the bedding along the entire length of the pipe. Where granular backfill under footings encases an underdrain piping system or has a thickness of 18-inches or greater or where shown on the Drawings, a layer of soil stabilization fabric shall be placed under the first horizontal layer of granular backfill. Soil stabilizer fabric shall be Mirafi 500 or equal. The sloping or vertical side slopes shall receive a layer of Mirafi 140 NL or equal.
- D. The maximum amount of open trench permitted in any one location shall be the length necessary to accommodate the amount of pipe installed and backfilled in a single day. The Contractor shall make every reasonable effort to backfill all trenches at the end of each day. When this is not possible, barricades with warning lights meeting OSHA requirements shall be provided, set and maintained.
- E. All pipeline and utility trench excavations shall be kept reasonably free from excess water during excavation, fine grading, pipe laying, and backfilling operations. Ground water shall be lowered to the extent necessary to keep the trench free from water and the trench bottom stable when the work within the trench is in progress. The Contractor shall provide and maintain at all times during construction ample means and equipment with which to properly and promptly remove and dispose of all water entering the excavation or other parts of the Work whether the water be surface water or underground water. The Contractor shall dispose of the water from the Work site in a suitable manner without damage to adjacent property.
- F. When ordered by the Engineer, whether indicated on the Drawings or not, trenches shall be over-excavated beyond the depth shown or specified. Such over-excavation shall be to the depth ordered. The trench shall then be backfilled to the grade required. When the over-excavation ordered by the Engineer is 4-inches or greater below the limits shown, additional payment will be made to the Contractor for that portion of the Work which is located below said 4-inch distance. Said additional payment will be made under separate unit price bid items for over-excavation and bedding if such bid items have been established, otherwise payment will be made in accordance with a negotiated price.
- G. The Contractor shall remove and dispose of all excess excavated material off-site.

- H. Excavate trenches to indicated gradients, lines, depths, and elevations.

### 3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings with 1,200 psi CLSM.
  - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

### 3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
  - 2. Several portions of this project require or highly recommend surcharging (e.g. the UV Building and segments of the new roadway). Accordingly, it is anticipated that stockpiles will be placed in these areas as either surcharge loads (or permanent backfill placed in advance to allow for settling) as they become available. Refer to the areas and elevations indicated in the design drawings and the Geotech report for additional details.

### 3.9 PIPE AND UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of water, mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Encase all piping that passes under footings with concrete, as detailed in the drawings. Where the depth from the bottom of the footing to the top of the encasement is less than the required depth of drainage course, the area shall be filled with concrete. Where the depth from the bottom of the footing to the top of the encasement is greater than the required depth of drainage course, the area shall be filled with structural fill and drainage course as required herein.
- D. Place and compact initial backfill as required in the Specifications.
  - 1. Backfill material shall not be dropped directly on the pipe or utility conduit.
  - 2. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Place and compact final backfill as required in the Specifications to final subgrade elevation.

- F. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- G. Pipe-zone and utility trench backfill material shall be spread and compacted in layers not to exceed 6-inches in thickness. Compaction shall be achieved using mechanical equipment. Flooding, ponding or jetting shall not be used for compaction unless otherwise approved by the Engineer. Pipe zone backfill material shall be manually spread around the pipe so that when compacted the pipe zone backfill will provide uniform bearing and side support. Piping shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfill operations. Trench zone backfill material shall be uniformly spread and mechanically compacted in layers not to exceed 12-inches in thickness. Moisture content shall be uniformly adjusted by wetting or drying as necessary.
- H. Pipe zone including bedding compaction requirements shall be ninety-five percent (95%) of maximum density (ASTM D 1557).
- I. Trench zone backfill using required excavated material shall be not less than eighty-five (85%) of maximum density except under paved areas, sidewalks, pipelines, utilities and structures which shall not be less than ninety-five percent (95%) of maximum density.
- J. Aggregate base course materials shall be placed and compacted to not less than ninety-five percent (95%) of maximum density.

### 3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations using satisfactory native material or approved imported fill material.

### 3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to moisture content indicated in the Geotechnical report.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content and is too wet to compact to specified dry unit weight.

### 3.12 COMPACTION OF SOIL BACKFILLS AND FILLS UNDER STRUCTURES

- A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers. **If meeting required compaction is an issue during verification of compaction, the Engineer may require placement of lifts in heights of 8 inches or 6 inches to ensure proper placement.**

- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the percentages of maximum dry unit weight shown in section 3.4 and according to ASTM D 1557 and in accordance with Geotechnical report requirements and recommendations.
- D. Backfill shall not be dropped directly on or against any structure. Backfill shall not be placed around or upon any structure until the concrete has attained the required strength to support the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested for leaks and the structures are full of water while the backfill is being placed.
- E. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the depth of the fill at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations or may cause damage to the structure.

### 3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
  - 2. Walks: Plus or minus 1 inch.
  - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

### 3.14 BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place base course under pavements and walks as follows:
  - 1. Shape base course to required crown elevations and cross-slope grades.
  - 2. Place base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - 3. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

### 3.15 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE AND BUILDING SLABS

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.

- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
  - 1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - 2. Compact each layer of drainage course by rolling it multiple times with a vibratory compactor. Final compaction to be inspected by the engineer prior to commencement of work.
- C. A sheet vapor retarder shall be installed at mid height of the drainage course.

### 3.16 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

### 3.17 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property at the Contractor's expense.

### 3.19 DEWATERING

- A. Prevent surface water and subsurface or ground water from flowing into trenches and excavations and from flooding project site and surrounding area.
  - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well point, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
  - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

END OF SECTION 312000

## SECTION 312319 - DEWATERING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes construction dewatering.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. The Contractor shall provide all labor, materials, and equipment necessary to dewater site excavations, in accordance with the requirement of the Contract Documents.
- B. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.
  - 1. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
  - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
  - 3. Accomplish dewatering without damaging existing buildings adjacent to excavation.
  - 4. Remove dewatering system if no longer needed.
- C. To complete this Work, the Contractor shall secure any required Permits for Construction Dewatering and Hydrostatic Testing prior to commencing any dewatering work.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

#### 1.5 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.
- B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.
  - 1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
  - 2. The geotechnical report is included elsewhere in section 319000.

- C. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
  - 1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Engineer if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

## PART 2 - PRODUCTS – (NOT USED)

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
  - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
  - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

### 3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
  - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
  - 1. Maintain free water level below bottom of excavation during construction.

- E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- F. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
  - 1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

END OF SECTION

## SECTION 319000 – GEOTECHNICAL REPORT

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes three (3) reports summarizing different geotechnical investigations that were conducted at the site. The three reports are:
1. Main geotechnical investigation by DAC Associates, Inc. including design recommendations and criteria for this project (see attached 74-page report).
  2. Geotechnical study of the stockpile material stored adjacent to Miller Creek conducted by Miller Pacific Engineering Group (MPEG) – see attached 25 page report.
  3. Geotechnical study of the sludge/fill material in the sludge storage ponds that is to be removed to facilitate installation of the new anoxic/aeration basins. This report was also conducted by Miller Pacific Engineering Group (MPEG) – see attached 22 page report.



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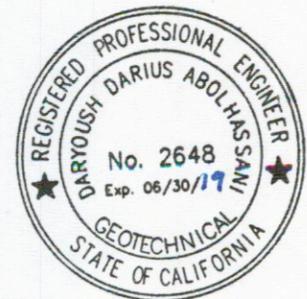
Updated Geotechnical Investigation Report  
Secondary Treatment Upgrades Project  
Las Gallinas Valley Sanitary District (LGVSD)  
300 Smith Ranch Road, San Rafael, CA 94903

**DAC Project No. 887-0715G**

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- Figure 2 — Site Plan
- Figure 3 — Regional Geologic Map
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- Appendix A — Boring Logs, This Investigation
- Appendix B — Laboratory Test Results, This Investigation
- Appendix C — Rock Exposure Observations
- Appendix D — Boring Logs, DAC Associates (2011)
- Appendix E — Boring Logs, DAC Associates (2015)
- Appendix F — Strength-based Analysis of Drilled Pier Capacity



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## **INTRODUCTION**

As requested, we have performed a geotechnical investigation and developed geotechnical design parameters for the proposed secondary treatment upgrades project at the wastewater treatment facility belonging to Las Gallinas Valley Sanitary District. This document is the updated version of our October 11, 2017, geotechnical investigation report. Since then, the overall project layout has been modified and some components have been eliminated and some new ones introduced. In addition, locations of the proposed aeration and anoxic basins have been changed and, therefore, we performed supplemental exploratory borings in the proximity of the sludge ponds located to the southeast of the plant. This report presents the results from our review of available pertinent geologic and seismic hazard information and from our field investigation and engineering analysis. The soil and foundation conditions are discussed, and recommendations for the soil and foundation engineering aspects of the project are presented. Conclusions and recommendations contained herein are based on applicable standards of our profession at the time this report was prepared. Copies of this report are furnished only to provide the factual data that were gathered and summarized.

### **Site Location and Description**

The Las Gallinas Valley wastewater treatment facility is located at 300 Smith Ranch Road, San Rafael, California. The facility is located in an area of Marin County, California, about 1 mile east of U.S. Route 101 and about 1 mile west of San Pablo Bay. The vicinity map in Figure 1 shows the location relative to these and other features.

The site of the upgrades project includes three areas of the facility: the main central facility area, the equalization basins, and the scrapyard. The coordinates of the project site are latitude 38.0244 to 38.0255 north and longitude -122.5175 to -122.5186 west. This area is irregularly shaped and measures roughly 650 ft across. It is bounded by Smith Ranch Road on the north, Miller Creek on the east, and land owned by others on the south and west.

### **Project Description**

According to a drawing for the project titled *General Grading Plan*, dated April 20, 2018, (Figure 2), prepared by Aqua Engineering, the primary elements requiring geotechnical



input are (1) aeration and anoxic basins, (2) a primary pump station, (3) an electrical building, (4) two secondary clarifiers, (5) a mechanical thickeners unit, (6) a recycled water distribution pump structure, (7) a dechlorination dosing facility, (8) a UV building (alternative bid), (9) a water storage meter vault (alternative bid), and (10) raising of grade by placement of about up to 5 ft of fill. The pump station will have floor elevations of approximately -2.5 and 2.5 ft relative to mean sea level (msl), the anoxic and aeration basins will have floor elevations of approximately 4 to 9.5 ft amsl, the other structures will probably be built at grade, and the roadway grading will raise grade from about 10 ft to about 12–17 ft amsl. Figure 2, site plan, shows the locations of proposed facilities and our exploratory borings.

### **Purpose and Scope of Work**

The purpose of our geotechnical investigation was to estimate overall characteristics of the soils underlying the site and to provide geotechnical recommendations for the proposed secondary treatment upgrade project. Our scope of work was as follows:

1. Locating underground utilities at the locations of the borings (task 4, below), which was based on a review of existing information provided by LGVSD and the services of a private underground utility locator. In addition, USA (Underground Service Alert) was notified regarding our proposed drilling locations.
2. Obtaining drilling permits from the Marin County Department of Environmental Health Services. As part of this process, an inspector from the department visited the site and observed our drilling and backfilling operation (task 4, below).
3. Reviewing published and unpublished geologic/geotechnical literature relevant to the site and project, which included several older geotechnical borings near certain elements of the project.
4. Drilling, logging, and sampling ten 6-inch-diameter exploratory borings to depths of 5½ to 50½ ft below the ground surface (bgs). All borings extended into bedrock. The borings were backfilled with grout or bentonite depending on the depth and presence of groundwater. These borings are designated BG-4 through BG-13; their locations are shown in Figure 2, and their logs are presented in Appendix A.



5. Collecting samples at 5-ft intervals in the borings by driving a split-spoon sampler or a modified California sampler. The former was generally used to collect disturbed samples of the surficial fill (granular soil) and bedrock, which were placed in Ziploc baggies. The latter was generally used to collect relatively undisturbed samples of the native soil (bay mud and colluvium) in stainless-steel tubes. HQ rock coring was performed in the rock in Boring BG-11. The samples were transported to our laboratory for classification and analysis of selected representative samples.
6. Characterization of the bedrock (e.g., rock type, structural features, hardness) primarily based on cut exposures at the site and secondarily based on samples retrieved from the bottoms of the borings. These observations were used to develop conclusions regarding conditions that will be encountered during excavation for certain project components.
7. Laboratory analysis of selected representative samples obtained from the borings. These included tests for moisture and density, percent passing the #200 sieve, unconfined compression, and consolidation. The results are presented on the boring logs in Appendix A and on the data sheets in Appendix B.
8. Geotechnical engineering analysis and evaluation of the field and laboratory test data; include contouring of the top of bedrock across the site.
9. Develop geotechnical conclusions and recommendations, including those for earthwork, foundations, walkways, pavements, and seismic design.

This report has been prepared in accordance with generally accepted geotechnical engineering practices, and with our agreement with Aqua Engineering for the exclusive use of their consultants for specific application to the secondary treatment upgrades project. In the event there are any changes in the ownership, nature, design or location of the proposed project, the conclusions and recommendations contained in this report shall not be considered valid unless (1) the project changes are reviewed by our office and (2) the conclusions and recommendations presented in this report are modified or verified in writing.

Reliance on this report by others must be at their own risk unless we are consulted on its use or limitations. This study is purely a geotechnical investigation and it does not include any environmental examination or evaluation of the surface and/or subsurface conditions.



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We cannot be responsible for impacts of any changes in engineering and environmental standards, practices, or regulations subsequent to performance of services without our further consultation. We can neither vouch for the accuracy of information supplied by others nor accept consequences for unconsulted use of segregated portions of this report.

## **PREVIOUS WORK**

In 2011, DAC Associates performed an investigation for an earlier recycled water facility project. A very short distance northeast of the site of the present project, three borings were drilled, logged, and sampled to depths of 12½ to 29 ft bgs. The boring locations are shown in Figure 2, and the logs are included in Appendix D.

In 2015, DAC Associates presented an investigation for improvements to the reclamation parking lot and roadway approach. Two borings were drilled, logged, and sampled to depths of 30½ and 31½ ft bgs a short distance northeast of the site of the present project. The logs are included in Appendix E.

The subsurface data from this previous work have been incorporated in the Findings, below, although priority and emphasis are given to the 2016 and 2018 findings from the present investigation.

## **FINDINGS**

### **Surface Conditions**

During the drilling on June 22 and 23, 2016, and March 26 and 27, 2018, we performed reconnaissance of the project site to observe general site conditions.

The site is generally level, with elevations ranging from approximately 10 to 11½ ft above mean sea level (amsl). There are unpaved and paved surfaces. There is a hill on the west side of the site. Its lower 20 ft exposes bedrock, evidently due to cutting as part of the original grading for the treatment facility several decades ago. The location of the proposed anoxic and aeration basins is presently an equalization basin that was created by a ring embankment. The basin consists of two shallow ponds, and the embankment supports a dense growth of trees and brush. The floor of the basin is at an elevation of about 3 ft amsl, and the crest of the ring embankment is at about elev. 10 ft amsl.



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## **Subsurface Materials**

Subsurface materials at the site, listed in downward succession, consist of fill, bay mud, colluvium, and bedrock. Due to cutting for the treatment facility several decades ago, bay mud and colluvium were not encountered in a few of the borings, whereas fill and bedrock were encountered in all the borings.

We encountered fill in all the borings to depths of 1½ ft bgs to 13 ft bgs. This layer is generally thicker nearer the bay and thinner nearer the hill to the west. The fill generally consists of a brownish-gray, damp to moist clayey sand with gravel that ranges from loose to very dense.

In Borings BG-1 through BG-3, BG-7, and BG-10, located nearest the bay, we encountered bay mud to depths of 9 to 29 ft bgs. This bay mud generally consists of dark gray, wet, soft to very soft, silty clay. Certain zones contain a few percent organic matter primarily in the form of fine plant fragments and give off an odor of H<sub>2</sub>S.

In ten of the thirteen borings, we encountered a 1½- to 6-ft-thick layer of colluvium underlying the bay mud and overlying the bedrock. This colluvium generally consists of brown, moist to wet, stiff to hard, gravelly clay to clayey gravel. Colluvium is soil that typically mantles bedrock slopes and forms from weathering, creep, and slopewash. The colluvium in Borings BG-1 through BG-3, BG-7, BG-10, and BG-11 represents native slope material on the order of 8,000 years old that was buried by the bay mud as postglacial sea levels rose. The colluvium in Borings BG-4, BG-9, BG-12, and BG-13 represents native slope material that was buried under fill during the grading for the original construction of the wastewater treatment facility several decades ago. Colluvium is absent at the three remaining borings, Borings BG-5, BG-6, and BG-8, due to cutting during the original grading for the sewage treatment plant.

We encountered bedrock in all the borings at depths ranging from 1½ to 34 ft bgs. This bedrock generally consists of sandstone and shale that is generally gray, dry, very soft to moderately hard, and very intensely fractured. Drilling or sampler refusal (or both) was experienced in the majority of the borings after penetrating ½ to a few feet into bedrock. Based on a published geologic map of the area by Rice et al. (2002), the bedrock below the site belongs to mélangé of the Franciscan Complex, which is of Cretaceous to Jurassic age. Figure 3 shows the relevant portion of this geologic map.



Bedrock is exposed at the ground surface in two locations: (1) in the lower portion of the cut slope on the west side of the site and (2) at Boring BG-6. This rock generally consists of sandstone and shale consistent with the rock encountered in the bottoms of the borings. A substantial fraction, roughly half, of the exposed rock is hard and only moderately to slightly fractured. Appendix C presents our rock exposure observations in detail.

The rock encountered in the borings varies greatly in terms of its fabric/discontinuities. For example, in Boring BG-12, the rock is intensely sheared to yield a flaky, friable rock that could be logged as dense to very dense sandy/gravelly soil; it includes scattered rock blocks a few inches across. Less sheared, more rock-like, closely fractured, moderately soft to hard rock was encountered in Borings BG-7 and BG-13. The rock in Boring BG-11 was more intact such that coring was useful for obtaining several feet of penetration. The 7½ ft of coring from 43 to 50½ ft bgs yielded RQDs of 60% to 100% and intact pieces of rock up to 9½ in. long; rock that was of lower quality or was highly weathered to soil was encountered in Boring BG-11 between 34 and 43 ft bgs.

The variation in rock quality from one location to the next is typical of the Franciscan Complex. The intensely sheared material is typical of what geologists often map as a shear zone subunit of the Franciscan Complex.

## **Groundwater**

The method of drilling and the timing and sealing of the borings did not allow for measurement of true, equilibrated levels of groundwater in the borings. However, conclusions can be drawn from the following observations. Groundwater was measured at depths of 8 and 4½ ft bgs in Borings BG-1 and BG-3. Boring BG-4, which extended to a depth of 13½ ft bgs, was left open for 24 hours, during which no free groundwater accumulated. Borings BG-5, BG-6, BG-8, which extended no deeper than 7 ft bgs, encountered no wet material or groundwater. Borings BG-7 and BG-10 did not accumulate free groundwater at the time of drilling, but the soil below depths of 8 and 10 ft bgs, respectively, was logged as wet, i.e., saturated. In Boring BG-9, free groundwater was measured at a depth of 6½ ft bgs immediately after drilling; this level is a few feet shallower than might be expected, which might be due to the unusual sand lens present between depths of 4½ and 6 ft bgs. These findings and general conditions in the vicinity of the site suggest that groundwater may be assumed to be at approximately sea level.



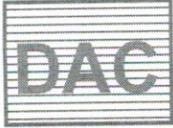
Fluctuations and deviations in groundwater elevations will occur locally and on seasonal and multi-year time scales due to variations in rainfall and surface and subsurface conditions.

### **Bedrock Surface Contours and Outcrop Pattern**

We contoured the top of bedrock across the site, as shown in Figure 4. This contouring is based on the findings from the ten borings from this investigation and the five earlier borings by DAC Associates (2011, 2015), on the topography of the hill west of the site, on the rock exposure observations, and on interpolation and judgment. The elevations shown in Figure 4 are expressed in feet relative to sea level.

The hill west of the site is elongated northeast–southwest. Its rounded ridgecrest plunges to the northeast in the immediate vicinity. The subsurface data indicate that the bedrock contours where below sea level, i.e., buried under bay mud, are consistent with the exposed topography of the hill. The ridgecrest originally trended northeast through the footprint of the existing secondary biofilter and lies buried below fill and bay mud below the scrapyard. Southeast of this line, the top of bedrock slopes to the east, and northwest of the line, it slopes to the north and northwest. Due to cutting as part of grading for the site several decades ago, bedrock lies essentially at the ground surface south and west of a curve that passes through the existing primary and secondary biofilters, secondary clarifier #1, and fixed-film reactor, as shown in Figure 4.

Relatively hard and widely fractured sandstone was observed in Exposures 2, 4, and 5, and very high blow counts were noted in Borings BG-5, BG-6, and BG-8, which lie in the vicinity. Bedding that strikes northeast and dips southwest was measured in Exposure 3 and possibly in Exposure 2. Based on these findings, a southwest-dipping slab of resistant bedrock may pass northeastward through the site. The trace of this slab straddles the ridgecrest; in fact, the resistant bedrock is likely responsible for the presence and orientation of the ridgecrest. Several caveats should be kept in mind, however: The Franciscan Complex is notoriously contorted and variable, hence the *Complex* part of its name. The resistant rock slab itself is variable in that it contains soft shale beds, and the surrounding rock contains hard sand zones, both where they were identified in borings and potentially elsewhere.



## **Seismicity**

The Rodgers Creek fault is located 6.5 miles northeast of the site, and the San Andreas fault is located 12 miles southwest of the site. Both of these faults are active and pose a high risk of strong ground shaking at the site. Figure 5 shows the locations of these and other faults relative to the project site. It should be assumed the site will probably be subjected to at least one moderate to severe earthquake that will cause strong ground shaking during the design life of the facilities.

## **CONCLUSIONS AND RECOMMENDATIONS**

Based on the results of our geotechnical study, it is our opinion that the proposed project is feasible from a geotechnical engineering standpoint. However, the conclusions and recommendations presented in this report should be incorporated in the design of the project to help minimize potential future soil and/or foundation related problems.

The three primary geotechnical considerations to take into account in designing the proposed project are as follows:

- Compressible bay mud, which may potentially lead to total and differential settlements and potentially affect proposed facilities supported by fill and/or bay mud (e.g., the proposed raising of surface grades and roadway construction) and underground utilities under the site.
- Variable rock excavatability.
- Potential high ground accelerations during seismic events on the Hayward-Rodgers Creek fault system, San Andreas fault, and other active regional faults.

Geotechnical recommendations that incorporate these important considerations and other design considerations are provided in detail below.

Based on the results of our geotechnical investigation, the proposed project area within the overall site parcel is underlain by up to 25 feet of soft, compressible bay mud. The proposed new surface grades will be raised up to about 5 feet above the existing elevations. Based on the information from the District (Figure 6), a surcharge program has been implemented in 1982 to consolidate the bay mud and reduce future settlements due to the site development.



However, the surcharge typically consisted of a 3-foot layer of fill over the peripheral access road starting from the entrance to the treatment facility and ending just southeast of the overflow parking area. In addition, surcharging was performed within the area currently accommodating the filtered water storage facility. No surcharging was documented to the south, where the proposed new secondary clarifiers #1, #2, as well as where the aeration and anoxic basins will be constructed.

Therefore, we anticipate considerable total and differential settlements as a result of raising grades by about 5 feet, especially south of the 1982 surcharge program. The anticipated magnitude of bay mud settlement under 5 feet of fill ranges from 6 to 18 inches.

The soils we encountered below the site generally have a low potential for liquefaction during strong seismic ground shaking. Native subsurface materials within the saturated zone generally consist of soils with a high clay content or bedrock, neither of which is potentially liquefiable. The surficial fill lies above the saturated zone and consists of medium dense gravel and clay, and consequently is also not potentially liquefiable. The sand encountered in the depth interval of 4½ to 6 ft bgs in Boring BG-9 appears to be potentially liquefiable if it were saturated; however, it appears to be very limited in lateral extent.

### **Settlement, Construction Phasing, and Related Considerations**

Based on findings from our outermost borings (BG-10 and BG-11) and the amount of proposed design fill, we estimate an average of 1 foot of future total settlement across the proposed roadways in those outer areas. On addition, an overall differential settlement of about 6 inches should be considered within a radius of about 50 feet, in areas underlain by deep bay mud deposits.

Therefore, we recommend placing the grading engineered fill early in the construction of the project and performing periodical settlement monitoring. After a certain amount of settlement has been observed, the foundation piers (next section) should be installed and **the basins constructed.**

The new fill will lower the factor of safety against slope instability along the east side of the proposed fill and roadway. The possibility of pavement cracking there will need to be assumed, particularly during seismic events along active faults in the region.



## **Earthwork and Fill Placement**

Earthwork operation should be observed by the geotechnical engineer. In addition, any structural fill should be examined and approved by the geotechnical engineer in writing before application.

Before new design fill is placed, the uppermost 18 inches (minimum) of soil should be overexcavated and recompacted. The overexcavated material should be placed in lifts no more than 6 inches thick and recompacted to a minimum of 90% relative compaction.

If the new design fill consists of future dredging spoils, these materials will have a very high moisture content and will need to be spread and dried to a (lower) moisture content at which they may be used as fill. The moisture content may need to fall from roughly 120% to 20%, which may require several weeks to months, depending on the spread thickness and the weather.

Design fill should be placed in lifts no more than 12 inches thick and compacted to a minimum of 90% relative compaction at a few percent over optimum moisture.

Relative compaction refers to the in-place dry density of soil expressed as a percentage of maximum dry density of the same soil, as determined by ASTM Test Method D1557, latest version.

## **Surcharging**

We recommend surcharging the southern portion of the plant, which was not included in 1982 surcharge program. This is especially important because raising finish grades in the subject area would potentially lead to large total and differential settlements. Such magnitudes of settlements could be detrimental to the structures supported on shallow foundations, buried structures, and utility lines.

Surcharging consists of subjecting compressible soils to loads larger than those intended for design of foundations or due to raising grades. The surcharge materials usually consist partially of soil that can be left in place after the surcharge period is complete and that part of the surcharge load that is removed. The final grades would then be underlain by less-compressible materials.



We recommend surcharging the area where the proposed UV/Bioassay building will be located. In addition, if feasible, we recommend surcharging the southern half of the east segment of the proposed new access road. This area starts from the limits of the 1982 surcharge program illustrated in Figure 6 of this report.

In order to reduce consolidation settlements below the proposed UV/Bioassay building, we recommend a surcharge program with a maximum surcharge load equivalent to a 15-foot layer of fill for a period of about 8 to 12 months. Even after performing such a surcharge program, we anticipate total and differential settlements of about 6 and 3 inches respectively to occur below the UV/Bioassay building.

The surcharge load should be added incrementally over an area 30 feet beyond the perimeter footprint of the building. Monitoring of settlement and porewater pressure should be performed in order to evaluate the rate of consolidation of bay mud and to evaluate allowable bearing capacity below the surcharge area. We recommend a monitoring program with frequent measurements beginning in the week following surcharge placement. The frequency of monitoring could be reduced as the rate of settlement decreases.

The surcharging program should be coordinated with the geotechnical engineer to determine the magnitude of consolidation settlement, type of material to be used for surcharging, method of placement and compaction, and to minimize potential bearing capacity failure due to surcharging activity.

### **Lightweight Fill**

Where the bay mud is thick, partial excavation of the existing material and backfilling with lightweight material will help to balance the total imposed load. The amount of excavation depends on the unit weight of the material to be excavated and the unit weight of the lightweight fill to be used. The lighter the material, the less excavation would be required. Sometimes it is not possible to use lightweight fill to completely offset an additional imposed loads, however, it can reduce the additional load to a tolerable amount.

Lightweight fill materials commonly used by Caltrans are

- Expanded polystyrene (EPS), or Geofoam
- Cellular concrete (foamed concrete)
- Natural (volcanic) lightweight materials



- Expanded shale, wood fiber (saw dust), and shredded tires.

Use of shredded tires has been encouraged by the California Department of Resources Recycling and Recovery in their effort to reduce stockpiles of disposed tires. FHWA issued an interim guideline limiting the maximum thickness of shredded tire fill to 10 feet. Consider the following when selecting a lightweight fill:

- Availability of fill material
- Its engineering properties
- The durability, water absorption potential, corrosion potential, and other unique characteristics
- Design and construction considerations
- Cost for using lightweight fill versus conventional construction

The engineering properties of granular lightweight fill material to evaluate should include its density, the angle of shearing resistance, and cohesion. The properties of EPS and cellular concrete to evaluate should include its density and compressive strength. Table 1 provides a list of various lightweight materials and their ranges of densities and specific gravities.

**Table 1** Lightweight materials and selected properties

| Lightweight fill type       | Range of densities (pcf) | Range of specific gravities |
|-----------------------------|--------------------------|-----------------------------|
| Natural (volcanic) material | 50 to 75                 | 0.80 to 1.2                 |
| Expanded polystyrene (EPS)  | 0.8 to 2                 | 0.01 to 0.03                |
| Cellular (foamed) concrete  | 20 to 61                 | 0.3 to 0.8                  |
| Wood fiber (sawdust)        | 34 to 60                 | 0.6 to 1.0                  |
| Shredded tires              | 37 to 56                 | 0.6 to 0.9                  |
| Expanded shale              | 37 to 65                 | 0.6 to 1.0                  |
| Fly ash                     | 70 to 90                 | 1.1 to 1.4                  |
| Boiler slag                 | 62 to 109                | 1.0 to 1.8                  |
| Air-cooled slag             | 69 to 94                 | 1.1 to 1.5                  |



For more information regarding design parameters (density, angle of shear resistance, permeability and compressibility), environmental considerations, design consideration and construction consideration of granular lightweight fill such as wood fiber, air-cooled blast furnace, fly ash, boiler slag, expanded shale and shredded tires, refer to Tables 2 through 7 of FHWA NHI-06-019, dated August 2006.

### **Rock Excavatability**

Some of the sandstone bedrock is hard and widely fractured and therefore may be relatively difficult to excavate. This relatively hard rock may be more prevalent in a band passing northeast through the existing secondary biofilter, but undoubtedly additional zones of hard rock are present due to the chaotic, difficult-to-predict nature of the Franciscan Complex bedrock. Before selecting excavation equipment, contractors should directly examine all the existing rock exposures at the site, including the locations shown in Appendix C, to develop their own assessments of rock excavatability. Contractors should also note that additional rock exposures and data regarding rock conditions will likely come to light after certain structures at the site are demolished as part of the project.

### **Shoring and Dewatering**

Construction of facilities that require deep excavation, such as the pump station, would need to have proper shoring. The excavation shoring should be designed by an experienced professional engineer and reviewed by the project geotechnical engineer.

In addition, due to presence of relatively high groundwater (between 4 to 8 feet below existing ground surface), excavations to certain depths will experience groundwater inflow. The contractor should therefore incorporate provisions for general site dewatering in the construction procedures. However, dewatering may lead to some consolidation settlement of the bay mud, which in turn may result in settlement of existing foundations in the vicinity of the excavation area. It is therefore prudent to actively involve the geotechnical engineer in the process of excavation shoring and dewatering for the project.

The contractor shall bear the full responsibility of the design and construction of all excavation shoring and dewatering throughout the project.



## **Foundations and Retaining Walls**

### *Shallow Foundation*

Structures that will bear on competent bedrock, or on engineered fill over competent bedrock, should be designed with allowable bearing pressures of 2,000 pounds per square foot (psf) for dead loads, 3,000 psf for dead plus live loads, and 4,000 psf for all loads including wind and seismic. Resistance to lateral loads may be developed from friction between the bottoms of foundations and competent bedrock based on a friction coefficient of 0.35 and from passive resistance in competent bedrock equivalent to a fluid pressure of 450 pounds per cubic foot (pcf) acting against the vertical faces of foundations.

Structures that will have finished floors at approximately the ground surface, and are located within the limits of 1982 surcharge program or, where the depth to bedrock is less than 10 feet, may be supported on a mat foundation on prepared subgrade. The subgrade preparation should consist of overexcavating the existing underlying soil to a minimum depth of 24 inches and backfilling with Caltrans Class 2 aggregate base. Allowable bearing pressures in designing these mat foundations should be 500 psf for dead (sustained) loads, 750 for dead plus live loads, and 1,000 psf for all loads including wind and seismic. A friction coefficient of 0.3 should be used between the bottom of the foundation and subgrade soils for lateral load resistance. If additional resistance to lateral loads is required, a passive pressure, below 12 inches from ground surface, equivalent to a fluid pressure of 300 pcf acting against vertical face of foundations could also be considered. The estimated long-term total settlement of the mat foundation described above, under these recommended loads, is estimated at about 1 to 3 inches with ½ inch to 1½ inches of differential settlement across the building.

Facilities that will not be able to tolerate considerable settlement and whose finished floors would be underlain partly by bedrock and partly by soil, may be supported by a shallow foundation provided that the soil is removed and replaced with controlled low-strength material (CDF) and that some of the bedrock below design subgrade elevation is also overexcavated and replaced with CDF material. This material should conform to the requirements in Section 19 of the Caltrans Standard Specifications. The overexcavation of bedrock should extend to a minimum depth of 2 feet below subgrade elevation. The geotechnical design parameters for the foundations bearing on this material can be those recommended for competent bedrock given at the beginning of this section.



Passive pressure in the upper 1 ft of soil where the footings are not confined by a slab or pavement should be neglected. Foundation excavation bottoms should be kept moist until placement of concrete. Water should not be allowed to stand in construction excavations.

### *Drilled Pier/Caisson Foundation*

Facilities that will not be able to tolerate considerable settlement and whose finished floors would be underlain entirely by soil, such as aeration and anoxic basins as well as the electrical building, should be provided with a foundation consisting of drilled piers/caissons. The drilled piers should derive their load-bearing capacity from skin friction and end bearing in competent bedrock.

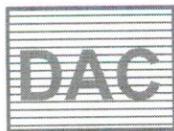
The drilled piers should have a minimum diameter of 18 inches. In developing the design, an allowable skin friction of 1,000 psf in compression and 800 psf in tension should be used, and allowable end-bearing pressures of 2,000 psf for dead loads, 3,000 psf for dead plus live loads, and 4,000 psf for all loads including wind and seismic may also be included.

In designing the lateral load resistance, a passive pressure equivalent to 450 pcf in competent bedrock, applied to two pier diameters, should be used. If additional lateral load resistance is required, a passive soil pressure of 300 pcf, below 12 inches from ground surface, could be used to act against vertical faces of pile caps or grade beams, provided the top 24 inches of the surface soils adjoining the grade beams are reworked and compacted with a minimum 95 percent relative compaction.

We performed an alternative strength-based analysis for development of ultimate capacities of drilled pier foundation system for the aeration and anoxic basins, also applicable to the electrical building. This analysis was based on Geotechnical Axial Design Methodology For Colorado Drilled Shafts Socketed in Weak Rocks, and is presented in Appendix F of this report.

### *Retaining Structures*

An active pressure equivalent to a fluid pressure of 45 pcf should be used in designing all retaining structures, assuming level backfill. This active pressure should be increased by 1 pcf for every two degrees of backfill slope. For restrained retaining structures, the above active pressure should be increased to an at-rest pressure by adding a uniform pressure of  $11H$ , where  $H$  is the height of backfill above the top of wall footing.



Buried structures should also be designed to resist full hydrostatic pressure (assuming groundwater level at surface grade about elevation +12.5') in addition to the above active earth pressures. Above-ground retaining walls should be fully backdrained or otherwise designed to resist the additional hydrostatic pressure.

In addition, pressure due to equipment used for backfill operation or other surcharge loads should also be considered in design of the retaining structures.

For retaining walls that will support more than 6 ft of backfill, a seismic load (PE) per unit length of the wall should be also be included in calculating the lateral load. This seismic load, which should be applied at 0.6 of the height (0.6H) above the base of the wall, should be calculated using the equation  $PE = (3/8)\gamma H^2 k_h$ , where PE is the lateral load due to seismic forces applied at 0.6H above base of the wall (lb),  $\gamma$  is the unit weight of the soil, which is 110 pcf, H is the height of the retained soil (ft), and  $k_h = PGAM/g = 0.504$  which was obtained from ASCE 7-10, Figure 22-7 and Equation 11.8-1.

For determination of lateral load resistance of buried structures, a soil passive pressure equivalent to a fluid pressure of 300 pcf could be used acting against the vertical face of below grade retaining walls. In evaluation of passive resistance, the top one foot of soil should be ignored unless it is covered with a continuous slab or pavement. If the bottom of a buried structure is located on bedrock (or engineered fill underlain by bedrock), a friction coefficient of 0.3 could also be used between the bottom of the foundation and subgrade soils for lateral load resistance.

### **Concrete Walkways**

Concrete walkways should be supported directly on the properly prepared and compacted engineered fill. Subgrade soil should be compacted to at least 90% relative compaction at a few percent above optimum moisture content to provide a smooth, unyielding surface. Subgrade soil should be maintained in a moist and compacted condition until covered with the concrete walkway section.

### **Pavement Sections**

The following recommendations for preliminary asphalt concrete pavement sections are intended as a conceptual guide for planning only. Pavement analyses are based upon an



assumed resistance (R) value of 5, which we expect to be representative of final pavement subgrade materials, the Caltrans "Design Method for Flexible Pavement," and traffic indices (TIs), which are indications of load frequency and intensity. We assumed that assigned TIs will include provisions for heavy truck traffic related to construction activities. The table below presents our recommended preliminary pavement sections.

**Table 2.** Preliminary recommended A.C. pavement sections.

| Traffic index | Thickness (inches)       |                         |
|---------------|--------------------------|-------------------------|
|               | Asphalt concrete, Type B | Aggregate base, Class 2 |
| 4.0           | 2.5                      | 8.0                     |
| 4.5           | 2.5                      | 10.0                    |
| 5.0           | 2.5                      | 11.0                    |
| 5.5           | 3.0                      | 12.0                    |
| 6.0           | 3.0                      | 14.0                    |
| 6.5           | 3.5                      | 15.0                    |
| 7.0           | 4.0                      | 16.0                    |

Class 2 aggregate base should conform to the requirements in Section 26 of Caltrans "Standard Specifications" (July 2002). The aggregate base should be placed in thin lifts in a manner to prevent segregation, uniformly moisture conditioned, and compacted to at least 95 percent relative compaction to provide a smooth, **unyielding** surface. (Relative compaction refers to the in-place dry density of soil expressed as a percentage of maximum dry density of the same soil, as determined by ASTM Test Method D1557-00.)

### Seismic Design Parameters

We have developed site-specific spectral seismic design parameters based on Standard ASCE 7-10, which is based on U.S. Geological Survey hazard data available in 2008. These design parameters are for use by the structural engineer when addressing potential seismic shaking in designing the new buildings.



Because of the variations in subsurface conditions across the site and the various finished floor elevations of the proposed structures, the applicable site classes vary among Site Classes C, D, and E. The site classes may be thought of as being distributed in three concentric zones progressing outward from Classes C through E across the treatment plant site. A wide inner zone of Site Class C is present where the top of bedrock is exposed or is a few feet below the ground surface. A narrow (about 50 ft wide) band of Site Class D wraps around the Class C zone. A wide outer zone of Site Class E is present nearest to the bay, where bedrock is deepest. However, the site class can vary at a specific location depending on the proposed finished floor elevation: excavating below grade for a structure brings bedrock higher relative to the finished floor elevation and thereby tends to affect the site class accordingly. Table 3, below, presents our findings and recommendations.

**Table 3.** Recommended seismic design parameters

| Structure                 | Site characteristics |           |            | Seismic design parameters |                 |                 |                 |
|---------------------------|----------------------|-----------|------------|---------------------------|-----------------|-----------------|-----------------|
|                           | Latitude             | Longitude | Site class | S <sub>MS</sub>           | S <sub>M1</sub> | S <sub>DS</sub> | S <sub>D1</sub> |
| Dechlor dosing facility   | 38.0252              | -122.5178 | D          | 1.500                     | 0.900           | 1.000           | 0.600           |
| Secondary clarifier #2    | 38.0250              | -122.5184 | C          | 1.500                     | 0.780           | 1.000           | 0.520           |
| Electrical building       | 38.0249              | -122.5176 | E          | 1.350                     | 1.440           | 0.900           | 0.960           |
| Secondary clarifier #1    | 38.0246              | -122.5185 | C          | 1.500                     | 0.780           | 1.000           | 0.520           |
| Primary pump station      | 38.0248              | -122.5182 | C          | 1.500                     | 0.780           | 1.000           | 0.520           |
| Anoxic and aerobic basins | 38.0242              | -122.5180 | E          | 1.350                     | 1.440           | 0.900           | 0.960           |
| RWTF distribution pumps   | 38.0237              | -122.5187 | D          | 1.500                     | 0.900           | 1.000           | 0.600           |

### Additional Services

Additional geotechnical engineering services will be needed for design and construction of the project. These include plan review, and responses to plan-check comments, and construction observation by DAC Associates, Inc.

Our firm should be accorded the opportunity to review the final plans and specifications to determine if the recommendations of this report and our applicable earlier reports have been implemented in those documents. Results of the review should be summarized in writing.



**DAC Associates, Inc.**

*Updated Geotechnical Investigation Report  
LGVSD Secondary Treatment Upgrades  
300 Smith Ranch Road, San Rafael, CA*

To a great degree, the performance of the site grading and improvement depend on construction procedures and quality. Therefore, we should provide on-site soil observations of the contractor's procedures and the exposed soil, together with field and laboratory testing during excavating for foundations, preparation of subgrade under walkway slabs, placement of foundations, and placement and compaction of fill. These observations will allow us to check the contractor's work for conformance with the intent of our recommendations and to observe any unanticipated soil conditions that could require modification of our recommendations. In addition, we would appreciate the opportunity to meet with the contractor before the start of grading to discuss the procedures and methods of construction. This can facilitate the performance of the construction operation and reduce possible misunderstandings and construction delays.



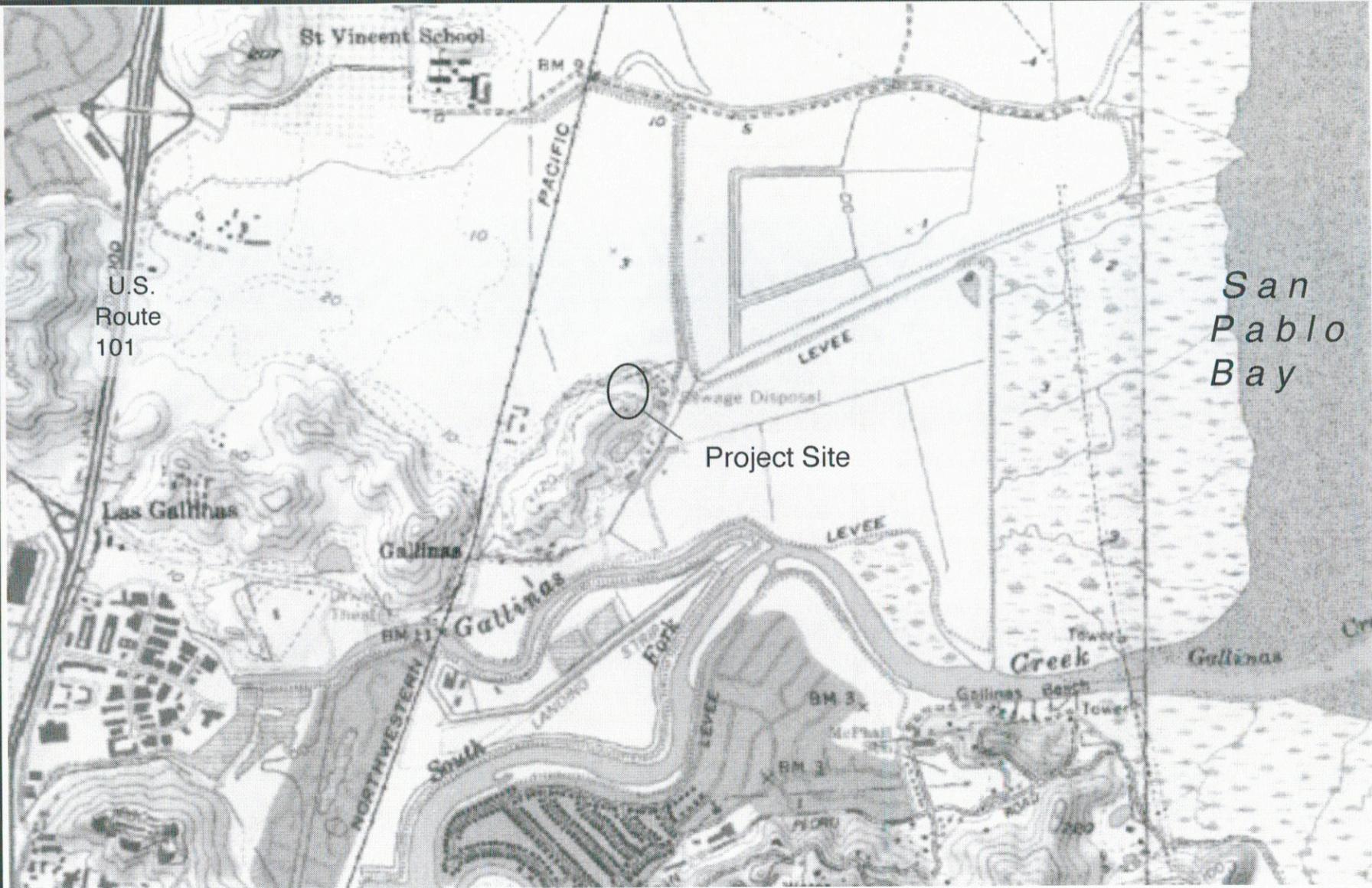
**DAC Associates**  
*Updated Geotechnical Investigation Report  
LGVSD Secondary Treatment Upgrades  
300 Smith Ranch Road, San Rafael, CA*

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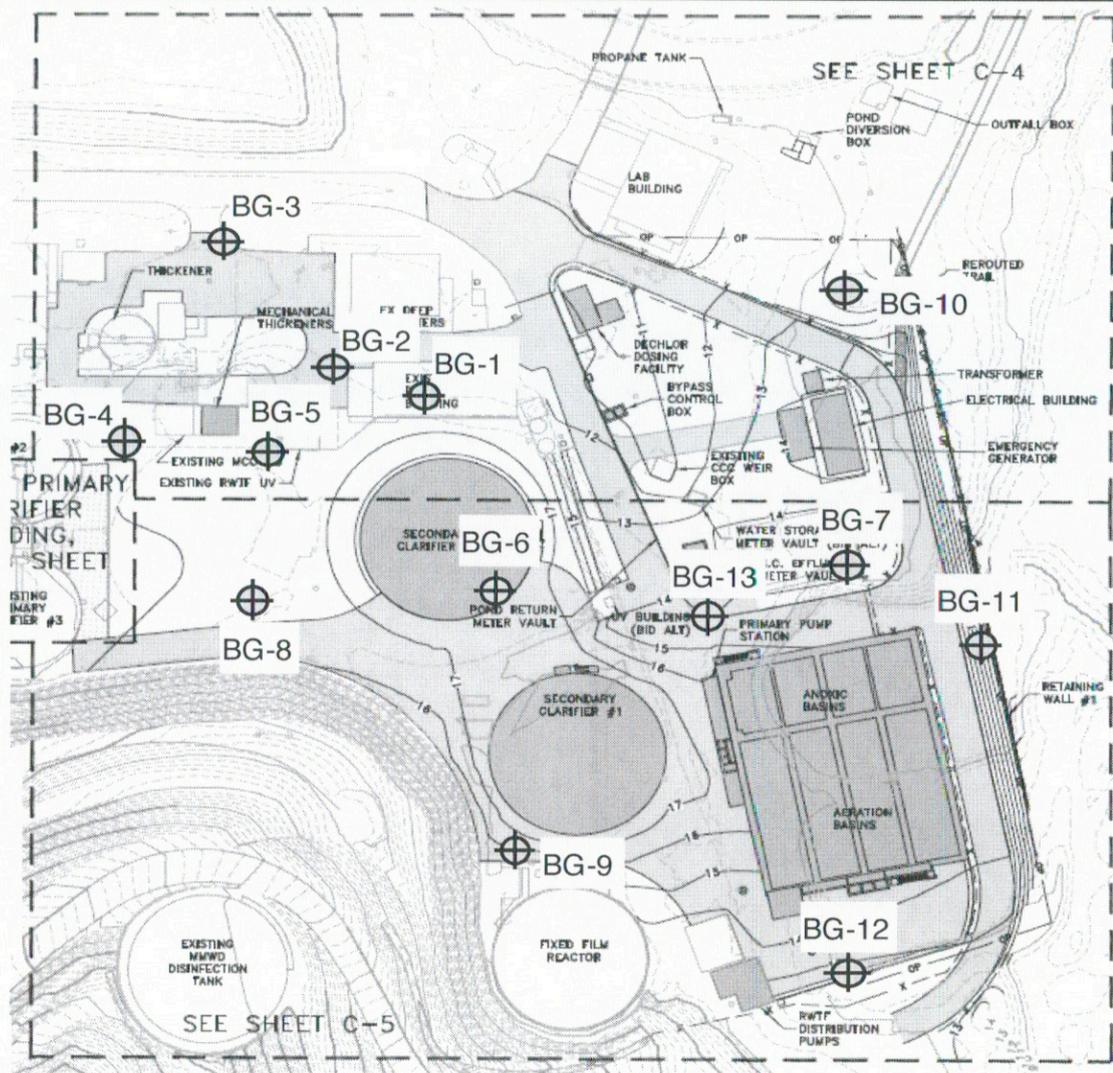
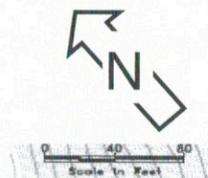
DAC101-2003



**Vicinity Map**  
**LGVSD Facility**  
**300 Smith Ranch Road**  
**San Rafael, CA**

|                |           |
|----------------|-----------|
| Report Date:   | July 2018 |
| Reviewed By:   | DA        |
| Proj. Manager: | DA        |
| Job No.:       | 887-0715G |

Figure 1



**Key**

BG-13 Boring location

Borings BG-4 through 13 from this investigation.  
 Borings BG-1 through 3 from DAC Associates

Project 887

Base: General Grading Plan by Aqua Engineering, dated April 20, 2018

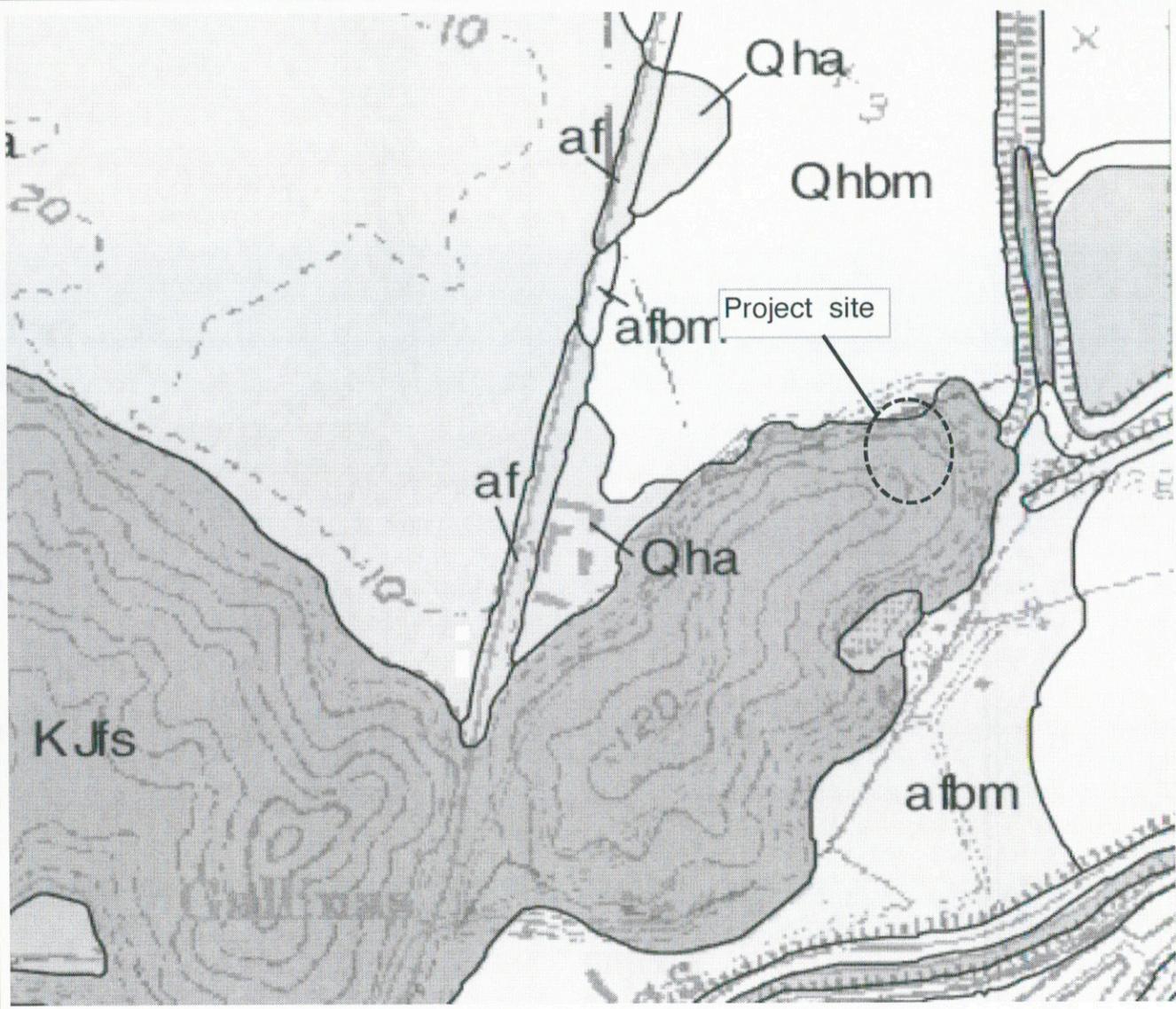
DAC101-2003



**Site Plan**  
**LGVSD Facility**  
**300 Smith Ranch Road**  
**San Rafael, CA**

|                |           |
|----------------|-----------|
| Report Date:   | July 2018 |
| Reviewed By:   | DA        |
| Proj. Manager: | DA        |
| Job No.:       | 887-0715G |

Figure 2



- afbm** artificial fill placed over bay mud
- Qhbm** estuarine deposits (bay mud)
- Qha** alluvium
- KJfs** Franciscan Complex sandstone and shale

Base: Rice et al. (2002)

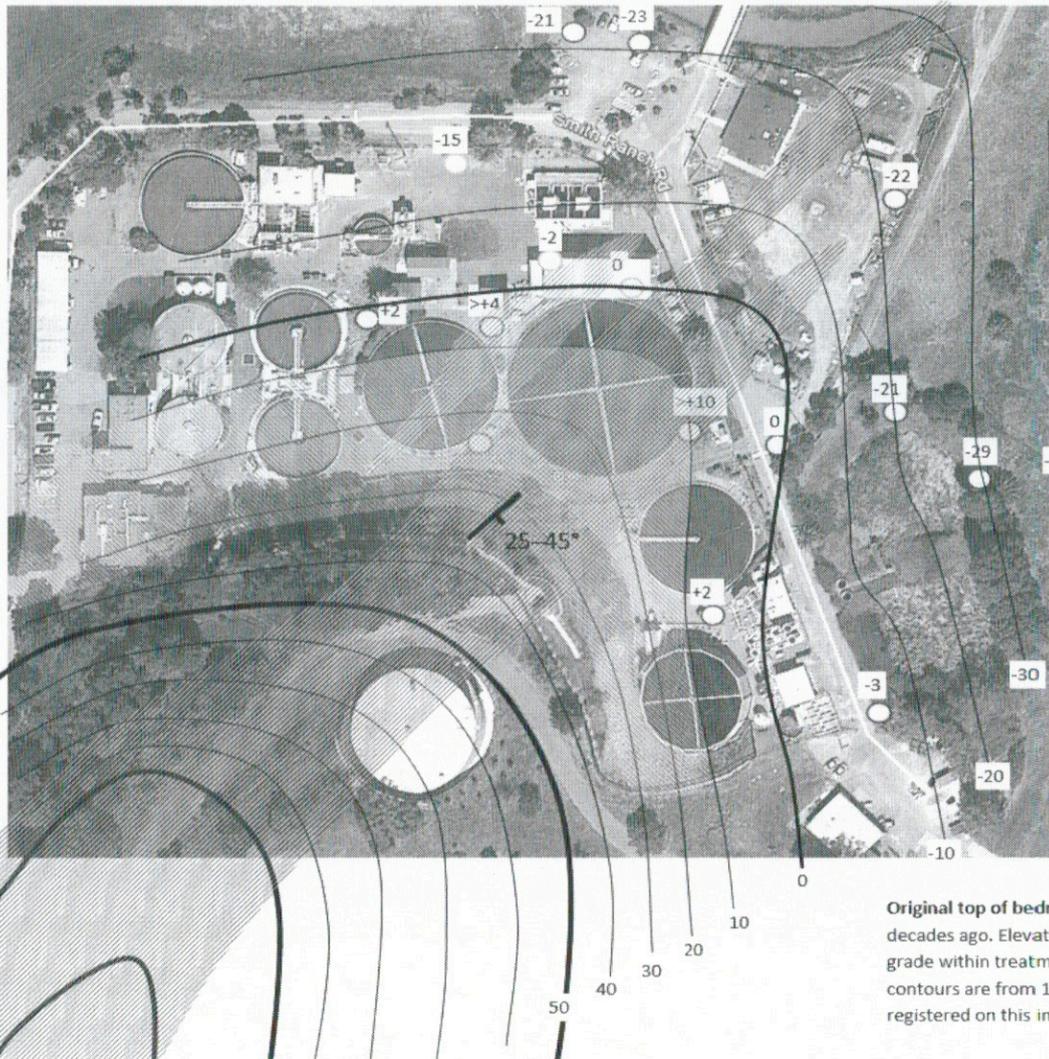
DAC101-2003



**Regional Geologic Map**  
**LGVSD Facility**  
**300 Smith Ranch Road**  
**San Rafael, CA**

|                |           |
|----------------|-----------|
| Report Date:   | July 2018 |
| Reviewed By:   | DA        |
| Proj. Manager: | DA        |
| Job No.:       | 887-0715G |

Figure 3



- Top-of-bedrock elev. at boring
- 22 This investigation
- 23 DAC Associates, 2015
- 15 DAC Associates, 2011
- Conjectured resistant bed composed of hard sandstone with minor intercalated shale; location schematic, very approximate; additional similar zones likely present
- Zone of cut from grading for treatment plant — rock essentially at ground surface
- Bedding attitude 25-45°

Original top of bedrock, before mass grading for treatment plant several decades ago. Elevations are feet relative to mean sea level. Assumed grade within treatment facility is +10. The 50-, 100-, and 150-ft elevation contours are from 1942 U.S. Geological Survey topography crudely registered on this image.

Base: Google Earth image dated 4/1/2015

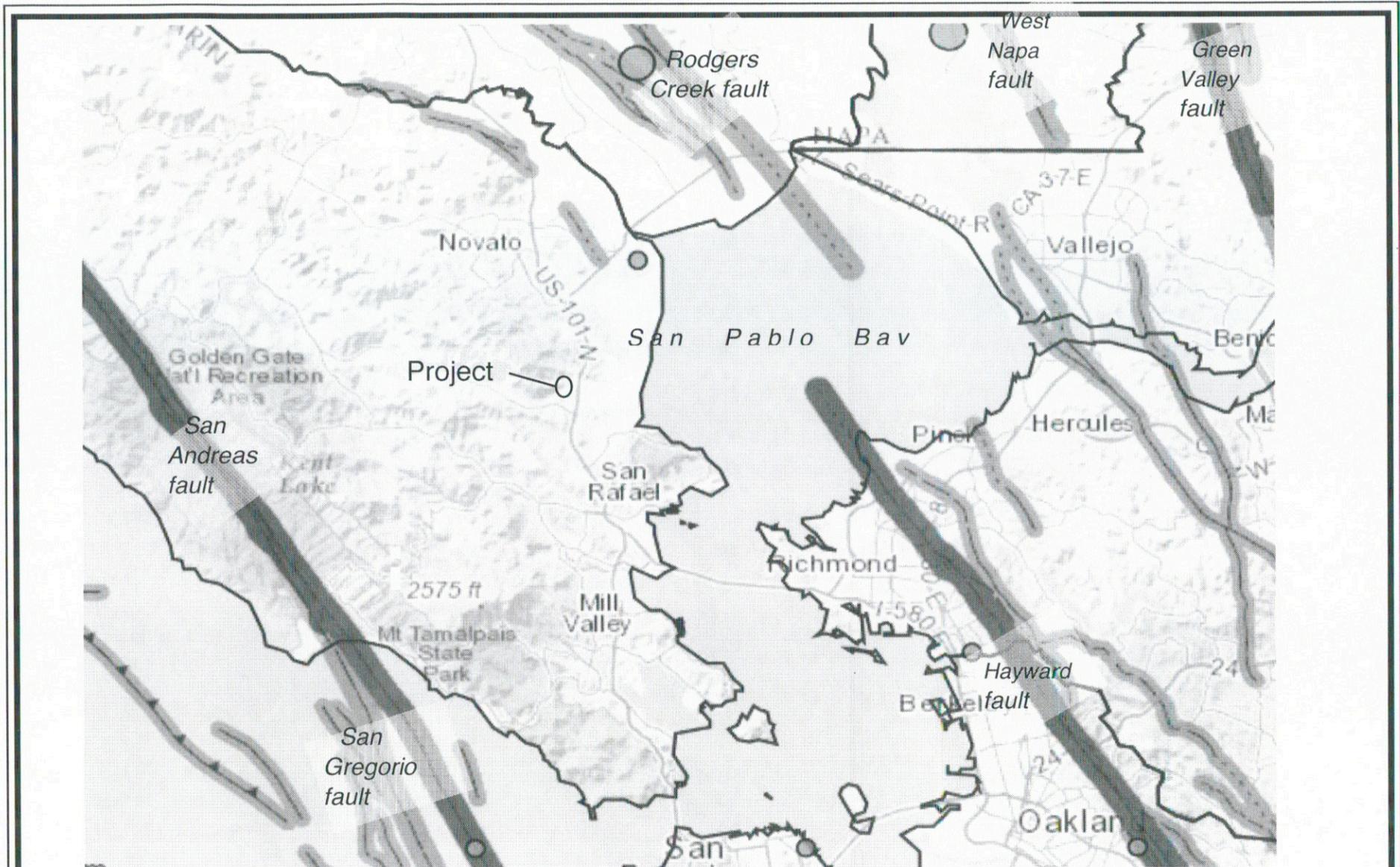
DAC101-2003



**Bedrock Contours**  
**LGVSD Facility**  
**300 Smith Ranch Road**  
**San Rafael, CA**

|                |           |
|----------------|-----------|
| Report Date:   | July 2018 |
| Reviewed By:   | DA        |
| Proj. Manager: | DA        |
| Job No.:       | 887-0715G |

Figure 4



Source: California Geological Survey, <http://maps.conservation.ca.gov/cgs/historicearthquakes/>, accessed 2016

DAC101-2003



**Regional Seismicity**

**LGVSD Facility**  
**300 Smith Ranch Road**  
**San Rafael, CA**

|                |           |
|----------------|-----------|
| Report Date:   | July 2018 |
| Reviewed By:   | DA        |
| Proj. Manager: | DA        |
| Job No.:       | 887-0715G |

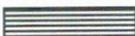
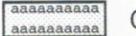
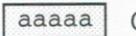
Figure 5



# **Appendix A**

## Boring Logs

## Material Symbols

|   |   |
|---|---|
|  Topsoil<br> Fill<br> Asphalt<br> High-Plasticity Clay (CH)<br> Low-Plasticity Clay (CL)<br> Silt |  Loose Sand<br> Dense Sand<br> Gravel<br> Cobbles<br> Rock / Concrete<br> Colluvium |
|---|---|

## Sample Types

|  |  |
|--|--|
|  Standard Penetration Test (SPT)<br> Modified California Sample (MC) |  Bulk Sample (Bag)<br> Shelby Tube Sample (Push) |
|--|--|

## Grain Sizes

|                 |                            |        |        |        |                             |        |         |
|-----------------|----------------------------|--------|--------|--------|-----------------------------|--------|---------|
|                 | U.S. Standard Series Sieve |        |        |        | Clear Square Sieve Openings |        |         |
|                 | 200                        | 40     | 10     | 4      | 3/4"                        | 3"     | 12"     |
| Silts and Clays | Sand                       |        |        | Gravel |                             | Cobble | Boulder |
|                 | Fine                       | Medium | Coarse | Fine   | Coarse                      |        |         |

### Relative Density

| Sands and Gravels | Blows/ Foot* |
|-------------------|--------------|
| Very Loose        | 0-4          |
| Loose             | 4-10         |
| Medium Dense      | 10-30        |
| Dense             | 30-50        |
| Very Dense        | Over 50      |

### Consistency

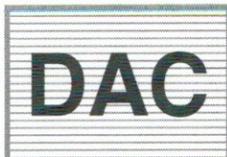
| Silts and Clays | Blows/Foot | Strength (tsf)** |
|-----------------|------------|------------------|
| Very Soft       | 0-2        | 0-1/4            |
| Soft            | 2-4        | 1/4-1/2          |
| Firm            | 4-8        | 1/2-1            |
| Stiff           | 8-16       | 1-2              |
| Very Stiff      | 16-32      | 2-4              |
| Hard            | Over 32    | Over 4           |

\* Number of blows for a 140-pound hammer falling 30 inches, driving a 2-inch O.D. (1-3/8" I.D.) split spoon sampler 12 inches into soil.

\*\* Unconfined compressive strength.

## Terminology & Abbreviations

|   |                     |  |
|---|---------------------|--|
| W <sub>n</sub> Natural Moisture Content | LL Liquid Limit     | pp Pocket Penetrometer                         |
| γ <sub>d</sub> Dry Density              | PL Plastic Limit    | C <sub>u</sub> Undrained Shear Strength        |
| O <sub>c</sub> Organic Content          | PI Plasticity Index | U <sub>c</sub> Unconfined Compressive Strength |



### Key to Boring Log

**LGVSD Secondary Treatment Upgrades**  
 300 Smith Ranch Road,  
 San Rafael, CA

|                       |           |
|-----------------------|-----------|
| <u>Report Date:</u>   | July 2018 |
| <u>Reviewed By:</u>   | DA        |
| <u>Proj. Manager:</u> | DA        |
| Job No. 887-0715G     |           |

## Figure A-0

|                                     |  |                   |                   |                       |
|-------------------------------------|--|-------------------|-------------------|-----------------------|
| Project 887-0715G                   | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: June 22, 2016                 | Drill Rig: CME 75                                | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater: no free gw accumulated | <b>Boring Log BG-4</b>                           |                   |                   | Logged by FJG         |

| Sample type | Blow count | Test results           | Graphic log | Material descriptions   | Depth (ft) |
|-------------|------------|------------------------|-------------|---|------------|
|             |            |                        |             | <b>CLAYEY SAND W GRAVEL (SC)</b> — fill: grayish brown, damp, very dense, 35% fines, 15% gravel up to 1 in. diam. | 1          |
|             |            |                        |             |   | 2          |
|             |            |                        |             |   | 3          |
|             |            |                        |             |   | 4          |
| SPT         | 5          |                        |             |   | 5          |
|             | 5          | w <sub>n</sub> = 12.5% |             | <b>SANDY CLAY (CL)</b> — colluvium: brownish gray, moist, stiff, 40% sand and angular gravel up to 1½ in. diam.   | 6          |
|             | 7          |                        |             |   | 7          |
|             |            |                        |             |   | 8          |
|             |            |                        |             |   | 9          |
| SPT         | 9          |                        |             | <b>SHALE and SANDSTONE</b> — KJfs: gray, moist, soft, sheared, weathered to clay, calcite nodules                 | 10         |
|             | 19         |                        |             |   | 11         |
|             | 18         |                        |             |   | 12         |
|             |            |                        |             | difficult drilling at 12 ft   | 12         |
| SPT         | 27         |                        |             |   | 13         |
|             | 23         |                        |             |   | 14         |
|             | 27         |                        |             |   | 15         |
|             |            |                        |             | Boring left open for 24 hrs and then backfilled with bentonite pellets.   | 16         |
|             |            |                        |             |   | 17         |
|             |            |                        |             |   | 18         |
|             |            |                        |             |   | 19         |

DAI.132-E007

|   |   |                |                  |                                |
|---|---|----------------|------------------|--------------------------------|
|  | <b>LGVS D Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-1</b> |
|   |   | Reviewed By:   | <b>DA</b>        |                                |
|   |   | Proj. Manager: | <b>DA</b>        |                                |
|   |   | Project No.:   | <b>887-0715G</b> |                                |

|                                     |  |                   |                   |                       |
|-------------------------------------|--|-------------------|-------------------|-----------------------|
| Project 887-0715G                   | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: June 22, 2016                 | Drill Rig: CME 75                                | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater: no free gw accumulated | <b>Boring Log BG-5</b>                           |                   |                   | Logged by FJG         |

|    | Sample type | Blow count    | Test results          | Graphic log | Material descriptions   | Depth (ft)   |
|----|-------------|---------------|-----------------------|-------------|---|--|
| 1  |             |               |                       |             | <b>P.G. GRAVEL W SILT AND SAND (GP-GM) — fill:</b> brownish gray, dry, very dense, gravel is angular sandstone up to 1½ in. diam., 10% silt, 20% sand | 1  |
| 2  |             |               |                       |             |   | 2  |
| 3  |             |               |                       |             |   | 3  |
| 4  |             |               |                       |             |   | 4  |
| 5  | SPT         | 7<br>30<br>39 | w <sub>n</sub> = 1.8% |             | difficult drilling at 6 ft  | 5  |
| 6  |             |               |                       |             | <b>SANDSTONE — KJfs:</b> brownish gray, damp, moderately soft, core-in-matrix texture, faint relict bedding and shearing, yellowish brown staining    | 6  |
| 7  | SPT         | 50/4"         |                       |             |   | Boring backfilled with bentonite pellets immediately after drilling. |
| 8  |             |               |                       |             |   | 8  |
| 9  |             |               |                       |             |   | 9  |
| 10 |             |               |                       |             |   | 10   |
| 11 |             |               |                       |             |   | 11   |
| 12 |             |               |                       |             |   | 12   |
| 13 |             |               |                       |             |   | 13   |
| 14 |             |               |                       |             |   | 14   |
| 15 |             |               |                       |             |   | 15   |
| 16 |             |               |                       |             |   | 16   |
| 17 |             |               |                       |             |   | 17   |
| 18 |             |               |                       |             |   | 18   |
| 19 |             |               |                       |             |   | 19   |

DAC132-2007

|   |  |                |           |                                |
|---|--|----------------|-----------|--------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | July 2018 | <b>Sheet</b><br><br><b>A-2</b> |
|   |  | Reviewed By:   | DA        |                                |
|   |  | Proj. Manager: | DA        |                                |
|   |  | Project No.:   | 887-0715G |                                |

|                                     |  |                   |                   |                       |
|-------------------------------------|--|-------------------|-------------------|-----------------------|
| Project 887-0715G                   | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: June 22, 2016                 | Drill Rig: CME 75                                | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater: no free gw accumulated | <b>Boring Log BG-6</b>                           |                   |                   | Logged by FJG         |

|    | Sample type | Blow count | Test results | Graphic log             | Material descriptions  | Depth (ft) |
|----|-------------|------------|--------------|-------------------------|--|------------|
| 1  |             |            |              |                         | <b>P.G. GRAVEL W SILT AND SAND (GP-GM) — fill: brownish gray, damp, very dense, gravel is angular sandstone up to 1½ in. diam., 10% silt, 20% sand</b> | 1          |
| 2  | SPT         | 7          |              | [Cross-hatched pattern] | <b>SANDSTONE — KJfs: yellowish brown to gray, damp, very soft</b>  | 2          |
| 3  |             | 8          |              |                         |  | 3          |
| 4  |             | 13         |              |                         |  | 4          |
| 5  | SPT         | 25         |              | [Cross-hatched pattern] | yellowish brown  | 5          |
| 6  |             | 45         |              |                         |  | 6          |
| 6  |             | 50/5½      |              |                         | Boring backfilled with bentonite pellets immediately after drilling.   | 6          |
| 7  |             |            |              |                         |  | 7          |
| 8  |             |            |              |                         |  | 8          |
| 9  |             |            |              |                         |  | 9          |
| 10 |             |            |              |                         |  | 10         |
| 11 |             |            |              |                         |  | 11         |
| 12 |             |            |              |                         |  | 12         |
| 13 |             |            |              |                         |  | 13         |
| 14 |             |            |              |                         |  | 14         |
| 15 |             |            |              |                         |  | 15         |
| 16 |             |            |              |                         |  | 16         |
| 17 |             |            |              |                         |  | 17         |
| 18 |             |            |              |                         |  | 18         |
| 19 |             |            |              |                         |  | 19         |

DAC 132-2017

|   |  |                |                  |                                |
|---|--|----------------|------------------|--------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-3</b> |
|   |  | Reviewed By:   | <b>DA</b>        |                                |
|   |  | Proj. Manager: | <b>DA</b>        |                                |
|   |  | Project No.:   | <b>887-0715G</b> |                                |

|                                     |  |                   |                      |
|-------------------------------------|--|-------------------|----------------------|
| Project 887-0715G                   | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   | Driller: Clear Heart |
| Date: June 23, 2016                 | Drill Rig: CME 75                                | Hollow-stem auger | Hammer: 140 pound    |
| Groundwater: no free gw accumulated | <b>Boring Log BG-7</b>                           |                   | Logged by FJG        |

| Sample type | Blow count | Test results           | Graphic log | Material descriptions   | Depth (ft) |
|-------------|------------|------------------------|-------------|---|------------|
|             |            |                        |             | <b>P.G. GRAVEL W SILT AND SAND (GP-GM)</b> -- fill: brownish gray, damp, medium dense   | 1          |
|             |            |                        |             | alternating with layers of  |            |
|             |            |                        |             | <b>SANDY CLAY (CL)</b> -- fill: mottled, moist, stiff   | 2          |
|             |            |                        |             |   | 3          |
|             |            |                        |             |   | 4          |
| SPT         | 7          |                        |             |   | 5          |
|             | 6          |                        |             |   | 6          |
|             | 6          |                        |             |   | 6          |
|             |            |                        |             |   | 7          |
|             |            |                        |             |   | 8          |
|             |            |                        |             | <b>CLAYEY GRAVEL (GC)</b> -- bay mud, possible fill: bluish and dark gray, very moist to wet, very soft, ~50% clay                          | 8          |
|             |            |                        |             |   | 9          |
| MC          | 2          | $w_c = 12.2\%$         |             |   | 10         |
|             | 4          | $\gamma_d = 119.7$ pcf |             |   | 10         |
|             | 4          | $U_c = 0.35$ ksf       |             |   | 11         |
|             |            |                        |             | <b>ORGANIC FAT CLAY (CH/OH)</b> -- bay mud: dark gray and brownish gray, silty, wet, soft, few plant fragments, faint H <sub>2</sub> S odor | 12         |
|             |            |                        |             |   | 13         |
|             |            |                        |             |   | 14         |
| MC          | 2          | $O_c = 12.5\%$         |             |   | 15         |
|             | 2          | $w_c = 106.1\%$        |             |   | 15         |
|             | 2          | $\gamma_d = 42.4$ pcf  |             |   | 16         |
|             |            | $U_c = 0.52$ ksf       |             |   | 16         |
|             |            |                        |             |   | 17         |
|             |            |                        |             |   | 18         |
|             |            |                        |             | grades stiffer, sandy, gravelly, with 1/4- to 1/2-in. fragments of sandstone  | 18         |
| MC          | 8          |                        |             | with lenses of clayey gravel (angular, to 1 1/2 in. diam.), calcite filaments, visible plant fragments                                      | 19         |

DAC132-2007

|   |  |                |           |                                |
|---|--|----------------|-----------|--------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road, San Rafael, CA</b> | Report Date:   | July 2018 | <b>Sheet</b><br><br><b>A-4</b> |
|   |  | Reviewed By:   | DA        |                                |
|   |  | Proj. Manager: | DA        |                                |
|   |  | Project No.:   | 887-0715G |                                |

|                                     |  |                   |                   |                       |
|-------------------------------------|--|-------------------|-------------------|-----------------------|
| Project 887-0715G                   | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: June 23, 2016                 | Drill Rig: CME 75                                | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater: no free gw accumulated | <b>Boring Log BG-7 cont.</b>                     |                   |                   | Logged by FJG         |

| Depth (ft) | Sample type | Blow count     | Test results | Graphic log | Material descriptions   | Depth (ft) |
|------------|-------------|----------------|--------------|-------------|---|------------|
| 21         | MC          | 8<br>11        |              |             | <b>ORGANIC FAT CLAY (CH/OH) — bay mud: continued</b>  | 21         |
| 22         |             |                |              |             |   | 22         |
| 23         |             |                |              |             |   | 23         |
| 24         |             |                |              |             | <b>CLAYEY GRAVEL (GC) — colluvium: mottled, very moist, dense, angular shale and sandstone fragments up to 1½ in. diam.</b> | 24         |
| 25         | SPT         | 10<br>20<br>20 |              |             |   | 25         |
| 26         |             |                |              |             |   | 26         |
| 27         | SPT         | 50/4"          |              |             | <b>SANDSTONE — KJfs: gray, moist, moderately soft</b>   | 27         |
| 28         |             |                |              |             | Boring backfilled with grout immediately after drilling.  | 28         |
| 29         |             |                |              |             |   | 29         |
| 30         |             |                |              |             |   | 30         |
| 31         |             |                |              |             |   | 31         |
| 32         |             |                |              |             |   | 32         |
| 33         |             |                |              |             |   | 33         |
| 34         |             |                |              |             |   | 34         |
| 35         |             |                |              |             |   | 35         |
| 36         |             |                |              |             |   | 36         |
| 37         |             |                |              |             |   | 37         |
| 38         |             |                |              |             |   | 38         |
| 39         |             |                |              |             |   | 39         |

DAC132-2007

|  |  |                |                  |                                |
|--|--|----------------|------------------|--------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-5</b> |
|  |  | Reviewed By:   | <b>DA</b>        |                                |
|  |  | Proj. Manager: | <b>DA</b>        |                                |
|  |  | Project No.:   | <b>887-0715G</b> |                                |

|                                     |  |                   |                   |                       |
|-------------------------------------|--|-------------------|-------------------|-----------------------|
| Project 887-0715G                   | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: June 22, 2016                 | Drill Rig: CME 75                                | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater: no free gw accumulated | <b>Boring Log BG-8</b>                           |                   |                   | Logged by FJG         |

|    | Sample type | Blow count  | Test results | Graphic log | Material descriptions  | Depth (ft) |
|----|-------------|-------------|--------------|-------------|--|------------|
|    |             |             |              |             | <b>A.C.</b>  |            |
| 1  |             |             |              |             | <b>P.G. GRAVEL W SILT AND SAND (GP-GM) — fill: brownish gray, damp, very dense</b> | 1          |
| 2  |             |             |              |             | <b>SHALE — KJfs: gray, dry, soft</b>   | 2          |
| 3  |             |             |              |             |  | 3          |
| 4  |             |             |              |             |  | 4          |
| 5  | SPT         | 40<br>50/4" |              |             |  | 5          |
| 6  |             |             |              |             | Boring backfilled with bentonite pellets immediately after drilling.               | 6          |
| 7  |             |             |              |             |  | 7          |
| 8  |             |             |              |             |  | 8          |
| 9  |             |             |              |             |  | 9          |
| 10 |             |             |              |             |  | 10         |
| 11 |             |             |              |             |  | 11         |
| 12 |             |             |              |             |  | 12         |
| 13 |             |             |              |             |  | 13         |
| 14 |             |             |              |             |  | 14         |
| 15 |             |             |              |             |  | 15         |
| 16 |             |             |              |             |  | 16         |
| 17 |             |             |              |             |  | 17         |
| 18 |             |             |              |             |  | 18         |
| 19 |             |             |              |             |  | 19         |

DAC132-2007

|   |  |                |                  |                                |
|---|--|----------------|------------------|--------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-6</b> |
|   |  | Reviewed By:   | <b>DA</b>        |                                |
|   |  | Proj. Manager: | <b>DA</b>        |                                |
|   |  | Project No.:   | <b>887-0715G</b> |                                |

|  |  |                   |                   |                       |
|--|--|-------------------|-------------------|-----------------------|
| Project 887-0715G                              | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: June 22, 2016                            | Drill Rig: CME 75                                | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater at 6½ ft bgs immed. after drilling | <b>Boring Log BG-9</b>                           |                   |                   | Logged by FJG         |

|    | Sample type | Blow count | Test results                        | Graphic log | Material descriptions   | Depth (ft)  |
|----|-------------|------------|-------------------------------------|-------------|---|---|
|    |             |            |                                     |             | A.C.  |   |
| 1  |             |            |                                     |             | <b>CLAYEY GRAVEL (GC) — fill:</b> brownish gray, damp, very dense                               | 1   |
| 2  |             |            |                                     |             |   | 2   |
| 3  |             |            |                                     |             |   | 3   |
| 4  |             |            |                                     |             |   | 4   |
| 5  | SPT         | 2          | w <sub>n</sub> = 5.0%<br><#200 = 2% |             | <b>P.G. SAND (SP) — tidal channel sand:</b> brown, moist, very loose, with clam shell fragments | 5   |
| 6  |             | 2          |                                     |             |   | 6   |
| 7  |             | 2          |                                     | ▽           |   | <b>CLAYEY GRAVEL (GC) — colluvium:</b> dark brown, wet, medium dense<br>free groundwater measured at 6½ ft bgs immediately after drilling |
| 8  |             |            |                                     |             |   | 8   |
| 9  |             |            |                                     |             | <b>SHALE — KJfs:</b> dark gray, wet, very soft rock/stiff soil, highly sheared, inte            | 9   |
| 10 | SPT         | 5          |                                     |             |   | 10  |
| 11 |             | 8          |                                     |             |   | 11  |
| 12 |             | 7          |                                     |             |   | 12  |
| 13 |             |            |                                     |             | more-difficult drilling at 13 ft  | 13  |
| 14 | SPT         | 17         |                                     |             |   | 14  |
| 15 |             | 20         |                                     |             |   | 15  |
| 16 |             | 21         |                                     |             | Boring backfilled with grout immediately after drilling.  | 16  |
| 17 |             |            |                                     |             |   | 17  |
| 18 |             |            |                                     |             |   | 18  |
| 19 |             |            |                                     |             |   | 19  |

DAC 132-200

|   |  |                |                  |                                |
|---|--|----------------|------------------|--------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-7</b> |
|   |  | Reviewed By:   | <b>DA</b>        |                                |
|   |  | Proj. Manager: | <b>DA</b>        |                                |
|   |  | Project No.:   | <b>887-0715G</b> |                                |

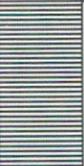
|                                     |  |                   |                   |                       |
|-------------------------------------|--|-------------------|-------------------|-----------------------|
| Project 887-0715G                   | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: June 23, 2016                 | Drill Rig: CME 75                                | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater: no free gw accumulated | <b>Boring Log BG-10</b>                          |                   |                   | Logged by FJG         |

|    | Sample type | Blow counts | Test results   | Graphic log | Material descriptions  | Depth (ft) |
|----|-------------|-------------|--|-------------|--|------------|
| 1  |             |             |  |             | <b>P.G. GRAVEL W SILT AND SAND (GP-GM) — fill: grayish brown, damp, very dense, 15% silt, 20% sand</b>                                   | 1          |
| 2  |             |             |  |             |  | 2          |
| 3  |             |             |  |             |  | 3          |
| 4  |             |             |  |             |  | 4          |
| 5  | SPT         | 2           | $w_n = 67.5\%$<br>$O_c = 9.8\%$                              |             | <b>ORGANIC FAT CLAY (CH/OH) — bay mud: dark gray, very moist, very soft to soft, abundant plant fragments, faint H<sub>2</sub>S odor</b> | 5          |
| 6  |             | 2           |  |             |  | 6          |
| 7  |             | 2           |  |             |  | 7          |
| 8  |             |             |  |             | very soft, peaty (OH)  | 8          |
| 9  |             |             |  |             |  | 9          |
| 10 | MC          | 2           | $w_c = 152.8\%$<br>$\gamma_d = 29.9$ pcf<br>$U_c = 0.81$ ksf |             | wet  | 10         |
| 11 |             | 2           |  |             |  | 11         |
| 12 |             | 2           |  |             |  | 12         |
| 13 |             |             |  |             |  | 13         |
| 14 |             |             |  |             | less peat, strong H <sub>2</sub> S odor  | 14         |
| 15 | MC          | 1           |  |             |  | 15         |
| 16 |             | 2           |  |             |  | 16         |
| 17 |             | 1           |  |             |  | 17         |
| 18 |             |             |  |             |  | 18         |
| 19 |             |             |  |             | firm   | 19         |
|    | MC          | 1           |  |             |  |            |

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|   |  |                |                  |                                |
|---|--|----------------|------------------|--------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-8</b> |
|   |  | Reviewed By:   | <b>DA</b>        |                                |
|   |  | Proj. Manager: | <b>DA</b>        |                                |
|   |  | Project No.:   | <b>887-0715G</b> |                                |

|                                     |  |                   |                      |
|-------------------------------------|--|-------------------|----------------------|
| Project 887-0715G                   | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   | Driller: Clear Heart |
| Date: June 23, 2016                 | Drill Rig: CME 75                                | Hollow-stem auger | Hammer: 140 pound    |
| Groundwater: no free gw accumulated | <b>Boring Log BG-10 cont.</b>                    |                   | Logged by FJG        |

|    | Sample type | Blow count     | Test results   | Graphic log   | Material descriptions  | Depth (ft) |
|----|-------------|----------------|--|---|--|------------|
| 21 | MC          | 2<br>5         | w <sub>c</sub> = 74.5%<br>γ <sub>d</sub> = 49.0 pcf<br>U <sub>c</sub> = 1.05 ksf |  | <b>ORGANIC FAT CLAY (CH/OH) -- bay mud:</b> continued<br>at 21 ft, abundant gravel and sand (gray angular sandstone up to 2 in. diam.)<br>grades stiffer at 22 | 21<br>22   |
| 24 |             |                |  |  |  | 24         |
| 25 | SPT         | 16<br>15<br>20 |  |  | <b>GRAVELLY FAT CLAY (CH) -- colluvium:</b> greenish gray, very moist, hard, 40% angular sand and gravel up to 1 in. diam.                                     | 25         |
| 26 |             |                |  |  |  | 26         |
| 27 | SPT         | 50/4"          |  |  | <b>SANDSTONE -- KJfs:</b> gray, dry, moderately hard   | 27         |
| 27 |             |                |  |   | Boring backfilled with grout immediately after drilling.   | 27         |
| 28 |             |                |  |   |  | 28         |
| 29 |             |                |  |   |  | 29         |
| 30 |             |                |  |   |  | 30         |
| 31 |             |                |  |   |  | 31         |
| 32 |             |                |  |   |  | 32         |
| 33 |             |                |  |   |  | 33         |
| 34 |             |                |  |   |  | 34         |
| 35 |             |                |  |   |  | 35         |
| 36 |             |                |  |   |  | 36         |
| 37 |             |                |  |   |  | 37         |
| 38 |             |                |  |   |  | 38         |
| 39 |             |                |  |   |  | 39         |

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|   |  |                |                  |                                |
|---|--|----------------|------------------|--------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-9</b> |
|   |  | Reviewed By:   | <b>DA</b>        |                                |
|   |  | Proj. Manager: | <b>DA</b>        |                                |
|   |  | Project No.:   | <b>887-0715G</b> |                                |

| Project 887-0715G        |            | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                | Page 1 of 3  | Driller: Gregg        |
|--------------------------|------------|--|----------------|--|-----------------------|
| Date: March 26, 2018     |            | Drill Rig: CME 850                               | Mud-rotary rig | Hammer: 140 pound  | Borehole diam.: 6 in. |
| Groundwater not measured |            | <b>Boring Log BG-11</b>                          |                |  | Logged by FJG         |
| Sample type              | Blow count | Test results                                     | Graphic log    | Material descriptions  | Depth (ft)            |
|                          |            |  |                | <b>CLAYEY GRAVEL (GC) -- fill: greenish brown, wet, loose, 25% fines, very angular hard gravel up to 1 in. diam.</b> |                       |
| 1                        |            |  |                |  | 1                     |
| 2                        |            |  |                |  | 2                     |
| 3                        |            |  |                |  | 3                     |
| 4                        |            |  |                |  | 4                     |
| 5                        |            |  |                |  | 5                     |
| 6                        | SPT        | 3  |                |  | 6                     |
| 7                        |            | 4  |                |  | 7                     |
| 8                        |            | 5  |                |  | 8                     |
| 9                        |            |  |                | medium dense   | 9                     |
| 10                       |            |  |                |  | 10                    |
| 11                       | SPT        | 1  |                |  | 11                    |
| 12                       |            | 1  |                |  | 12                    |
| 13                       |            | 4  |                |  | 13                    |
| 14                       |            |  |                | <b>CLAY (CH) -- bay mud: gray, wet, very soft, H<sub>2</sub>S odor</b>   | 14                    |
| 15                       |            |  |                | hole caving and obstructed by cobbles, casing installed 0 to 15 ft   | 15                    |
| 16                       | MC         | 2  |                |  | 16                    |
| 17                       |            | 1  |                | only gravelly slough in MC sampler, false blow counts  | 17                    |
| 18                       | SPT        | 2  |                |  | 18                    |
| 19                       |            | 0  |                | SPT sampler driven only by weight of tools, zero blows   | 19                    |
|                          |            | 0  |                | soft, with minor brown peaty lamina  | 19                    |

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|   |  |                |           |                                 |
|---|--|----------------|-----------|---------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | July 2018 | <b>Sheet</b><br><br><b>A-10</b> |
|   |  | Reviewed By:   | DA        |                                 |
|   |  | Proj. Manager: | DA        |                                 |
|   |  | Project No.:   | 887-0715G |                                 |

| Project 887-0715G        |             | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                |                   | Page 2 of 3  | Driller: Gregg |
|--------------------------|-------------|--|----------------|-------------------|--|----------------|
| Date: March 26, 2018     |             | Drill Rig: CME 850                               | Mud-rotary rig | Hammer: 140 pound | Borehole diam.: 6 in.  |                |
| Groundwater not measured |             | <b>Boring Log BG-11</b>                          |                |                   |  | Logged by FJG  |
|                          | Sample type | Blow count                                       | Test results   | Graphic log       | Material descriptions  | Depth (ft)     |
| 21                       | MC          | 1<br>2<br>2                                      |                |                   | <b>CLAY (CH) -- bay mud:</b> gray, wet, soft, H <sub>2</sub> S odor, minor brown peaty lamina  | 21             |
| 22                       |             |  |                |                   |  | 22             |
| 23                       |             |  |                |                   |  | 23             |
| 24                       |             |  |                |                   | dark and light gray mottling, few percent sand   | 24             |
| 25                       | MC          | 0<br>2<br>3                                      |                |                   |  | 25             |
| 26                       |             |  |                |                   |  | 26             |
| 27                       |             |  |                |                   |  | 27             |
| 28                       |             |  |                |                   |  | 28             |
| 29                       |             |  |                |                   | <b>CLAY (CL) -- colluvium:</b> yellowish brown with multicolored specks, moist, very stiff, 15% sand and fine gravel as fragments of weathered and fresh local bedrock up to ¼ in. diam. | 29             |
| 30                       | MC          | 9<br>14<br>22                                    |                |                   |  | 30             |
| 31                       |             |  |                |                   |  | 31             |
| 32                       |             |  |                |                   |  | 32             |
| 33                       |             |  |                |                   |  | 33             |
| 34                       |             |  |                |                   | <b>CLAY (CL) -- highly weath. KJfs:</b> brownish gray, moist, hard, 20% sand and subrounded gravel up to ½ in. diam., vaguely sheared convoluted fabric                                  | 34             |
| 35                       | SPT         | 9<br>15<br>19                                    |                |                   |  | 35             |
| 36                       |             |  |                |                   |  | 36             |
| 37                       |             |  |                |                   |  | 37             |
| 38                       |             |  |                |                   |  | 38             |
| 39                       |             |  |                |                   | markedly greater drilling resistance at 39 ft<br><b>SHALE and GRAYWACKE -- KJfs:</b> dark gray, hard, white calcite veins making up 3% of rock, bedding 25-50°                           | 39             |

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|   |  |                |           |                                 |
|---|--|----------------|-----------|---------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | July 2018 | <b>Sheet</b><br><br><b>A-11</b> |
|   |  | Reviewed By:   | DA        |                                 |
|   |  | Proj. Manager: | DA        |                                 |
|   |  | Project No.:   | 887-0715G |                                 |

| Project 887-0715G        |             | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                |                   | Page 3 of 3  | Driller: Gregg |
|--------------------------|-------------|--|----------------|-------------------|--|----------------|
| Date: March 26, 2018     |             | Drill Rig: CME 850                               | Mud-rotary rig | Hammer: 140 pound | Borehole diam.: 6 in.  |                |
| Groundwater not measured |             | <b>Boring Log BG-11</b>                          |                |                   |  | Logged by FJG  |
|                          | Sample type | Blow count                                       | Test results   | Graphic log       | Material descriptions  | Depth (ft)     |
| 41                       |             |  |                | [Graphic Log]     | <b>SHALE and GRAYWACKE</b> — — <b>KJfss:</b> dark gray, hard, white calcite veins making up 3% of rock, bedding 25-50 changed to HQ3 coring tools at 40 ft | 41             |
| 42                       |             |  |                |                   | Run 40-43 ft: no recovery, hard gray sandstone stuck in inner barrel ground through material   | 42             |
| 43                       |             |  |                |                   |  | 43             |
| 44                       |             |  |                |                   |  | 44             |
| 45                       |             |  |                |                   | Run 43-45½ ft: 60% recovery, RQD=0, pieces ½ to 3 in., NR probably is smaller pieces washed away   | 45             |
| 46                       |             |  |                |                   |  | 46             |
| 47                       |             |  |                |                   | Run 45½-47½ ft: 100% recovery, RQD=77%, includes pieces 4, 5, and 9½ in. long  | 47             |
| 48                       |             |  |                |                   |  | 48             |
| 49                       |             |  |                |                   | Run 47½-50½ ft: 100% recovery, RQD=51%, includes pieces 9 and 9½ in. long  | 49             |
| 50                       |             |  |                |                   |  | 50             |
| 51                       |             |  |                |                   | Bottom of boring at 50½ ft.  | 51             |
| 52                       |             |  |                |                   |  | 52             |
| 53                       |             |  |                |                   |  | 53             |
| 54                       |             |  |                |                   |  | 54             |
| 55                       |             |  |                |                   |  | 55             |
| 56                       |             |  |                |                   |  | 56             |
| 57                       |             |  |                |                   |  | 57             |
| 58                       |             |  |                |                   |  | 58             |
| 59                       |             |  |                |                   |  | 59             |

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|   |  |                |           |                                 |
|---|--|----------------|-----------|---------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br>300 Smith Ranch Road,<br>San Rafael, CA | Report Date:   | July 2018 | <b>Sheet</b><br><br><b>A-12</b> |
|   |  | Reviewed By:   | DA        |                                 |
|   |  | Proj. Manager: | DA        |                                 |
|   |  | Project No.:   | 887-0715G |                                 |

| Project 887-0715G        |            | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                |   | Page 1 of 2           | Driller: Gregg |  |
|--------------------------|------------|--|----------------|---|-----------------------|----------------|--|
| Date: March 26, 2018     |            | Drill Rig: CME 850                               | Mud-rotary rig | Hammer: 140 pound   | Borehole diam.: 6 in. |                |  |
| Groundwater not measured |            | <b>Boring Log BG-12</b>                          |                |   |                       | Logged by FJG  |  |
| Sample type              | Blow count | Test results                                     | Graphic log    | Material descriptions   | Depth (ft)            |                |  |
|                          |            |  |                | <b>CLAYEY GRAVEL (GC) -- fill: brownish gray, wet, loose, very angular gravel</b>   | 1                     |                |  |
|                          |            |  |                |   | 2                     |                |  |
|                          |            |  |                |   | 3                     |                |  |
|                          |            |  |                |   | 4                     |                |  |
|                          |            |  |                |   | 5                     |                |  |
| SPT                      | 3          |  |                |   | 6                     |                |  |
|                          | 6          |  |                |   | 7                     |                |  |
|                          | 7          |  |                |   | 8                     |                |  |
|                          |            |  |                |   | 9                     |                |  |
|                          |            |  |                | medium dense  | 10                    |                |  |
| SPT                      | 10         |  |                |   | 11                    |                |  |
|                          | 13         |  |                |   | 12                    |                |  |
|                          | 15         |  |                |   | 13                    |                |  |
|                          |            |  |                |   | 14                    |                |  |
|                          |            |  |                | <b>SHALE and GRAYWACKE -- KJfss: dark gray, wet, intensely sheared to friable rock or dense (clayey gravel) soil, clasts up to 2 (4?) in. diam.</b>         | 15                    |                |  |
|                          |            |  |                | Generally drills smoothly and easily (1 ft/min) using tricone bit, except in (4-in.?) blocks at 1- to 2-ft intervals, where drilling is about 1/3 the speed | 16                    |                |  |
| MC                       | 28         |  |                |   | 17                    |                |  |
|                          | 28         |  |                |   | 18                    |                |  |
|                          | 36         |  |                |   | 19                    |                |  |
|                          |            |  |                |   | 18                    |                |  |
|                          |            |  |                |   | 19                    |                |  |

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|   |  |                |                  |                                 |
|---|--|----------------|------------------|---------------------------------|
|  | <b>LGVS Secondary Treatment Upgrades</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-13</b> |
|   | 300 Smith Ranch Road,                    | Reviewed By:   | <b>DA</b>        |                                 |
|   | San Rafael, CA                           | Proj. Manager: | <b>DA</b>        |                                 |
|   |  | Project No.:   | <b>887-0715G</b> |                                 |

| Project 887-0715G        |                       | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                                |   | Page 2 of 2                                | Driller: Gregg |
|--------------------------|-----------------------|--|--------------------------------|---|--|----------------|
| Date: March 26, 2018     |                       | Drill Rig: CME 850                               | Mud-rotary rig                 | Hammer: 140 pound   | Borehole diam.: 6 in.                      |                |
| Groundwater not measured |                       | <b>Boring Log BG-12</b>                          |                                |   |  | Logged by FJG  |
| Sample type              | Blow count            | Test results                                     | Graphic log                    | Material descriptions   | Depth (ft)                                 |                |
| 21                       | SPT<br>38<br>21<br>27 |  | [Graphic Log: Hatched Pattern] | <b>SHALE and GRAYWACKE</b> -- KJfss: dark gray, wet, intensely sheared to friable rock or dense (clayey gravel) soil, clasts up to 2 (4?) in. diam. | 21   |                |
| 22                       |                       |  |                                |   | 22   |                |
| 23                       |                       |  |                                |   |  | 23             |
| 24                       |                       |  |                                |   |  | 24             |
| 25                       | SPT<br>26<br>35<br>36 |  |                                |   | very dense if material were logged as soil | 25             |
| 26                       |                       |  |                                |   |  | 26             |
| 27                       |                       |  |                                |   |  | 27             |
| 28                       |                       |  |                                |   |  | 28             |
| 29                       |                       |  |                                |   |  | 29             |
| 30                       | SPT<br>50/3"          |  |                                |   |  | 30             |
| 31                       |                       |  |                                | Bottom of boring at 30½ ft.   | 31   |                |
| 32                       |                       |  |                                |   | 32   |                |
| 33                       |                       |  |                                |   | 33   |                |
| 34                       |                       |  |                                |   | 34   |                |
| 35                       |                       |  |                                |   | 35   |                |
| 36                       |                       |  |                                |   | 36   |                |
| 37                       |                       |  |                                |   | 37   |                |
| 38                       |                       |  |                                |   | 38   |                |
| 39                       |                       |  |                                |   | 39   |                |

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|   |   |                |                  |                                 |
|---|---|----------------|------------------|---------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-14</b> |
|   | 300 Smith Ranch Road,                     | Reviewed By:   | <b>DA</b>        |                                 |
|   | San Rafael, CA                            | Proj. Manager: | <b>DA</b>        |                                 |
|   |   | Project No.:   | <b>887-0715G</b> |                                 |

| Project 887-0715G       |            | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                    |   | page 1 of 1           | Driller: Gregg |  |
|-------------------------|------------|--|--------------------|---|-----------------------|----------------|--|
| Date: March 26, 2018    |            | Drill Rig: CME 850                               | Hollow-stem augers | Hammer: 140 pound   | Borehole diam.: 6 in. |                |  |
| No groundwater observed |            | <b>Boring Log BG-13</b>                          |                    |   |                       | Logged by FJG  |  |
| Sample type             | Blow count | Test results                                     | Graphic log        | Material descriptions   | Depth (ft)            |                |  |
|                         |            |  |                    | <b>CLAYEY GRAVEL (GC) -- fill: brown, damp</b>  | 1                     | 1              |  |
|                         |            |  |                    |   | 2                     | 2              |  |
|                         |            |  |                    |   | 3                     | 3              |  |
|                         |            |  |                    |   | 4                     | 4              |  |
|                         |            |  |                    | <b>SANDY CLAY (CL) to CLAYEY GRAVEL (GC) -- colluvium: mottled yellowish brown and gray (native-looking mottling), moist, medium dense, variable angular local rock fragments up to 1 in. diam.</b> | 5                     | 5              |  |
| SPT                     | 5          |  |                    |   | 6                     | 6              |  |
|                         | 7          |  |                    |   | 7                     | 7              |  |
|                         | 9          |  |                    |   | 8                     | 8              |  |
|                         |            |  |                    |   | 9                     | 9              |  |
| SPT                     | 40         |  |                    | <b>SHALE and GRAYWACKE -- KJfss: dbrown and gray, dry to damp, closely fractured, moderately hard</b>   | 10                    | 10             |  |
|                         | 43         |  |                    | <b>slow, noisy drilling 10-13 ft</b>  | 11                    | 11             |  |
|                         | 40/3"      |  |                    |   | 12                    | 12             |  |
|                         |            |  |                    |   | 13                    | 13             |  |
| SPT                     | 30/3"      |  |                    | <b>Bottom of boring at 13 ft.</b>   | 14                    | 14             |  |
|                         |            |  |                    |   | 15                    | 15             |  |
|                         |            |  |                    |   | 16                    | 16             |  |
|                         |            |  |                    |   | 17                    | 17             |  |
|                         |            |  |                    |   | 18                    | 18             |  |
|                         |            |  |                    |   | 19                    | 19             |  |

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|   |  |                |                  |                                 |
|---|--|----------------|------------------|---------------------------------|
|  | <b>LGVSD Secondary Treatment Upgrades</b><br><b>300 Smith Ranch Road,</b><br><b>San Rafael, CA</b> | Report Date:   | <b>July 2018</b> | <b>Sheet</b><br><br><b>A-15</b> |
|   |  | Reviewed By:   | <b>DA</b>        |                                 |
|   |  | Proj. Manager: | <b>DA</b>        |                                 |
|   |  | Project No.:   | <b>887-0715G</b> |                                 |

# **Appendix B**

## Laboratory Test Results

**Soil Mechanics Lab**

**Organic Matter  
ASTM D 2974 - 87 Meth 'C' - 440°C**

|                              |                         |         |       |  |  |
|------------------------------|-------------------------|---------|-------|--|--|
| Sample No.                   |                         | BG-7    | BG-10 |  |  |
| Depth                        | ft                      | 15-15.5 | 5-5.5 |  |  |
| Crucible No.                 |                         | 7       | 20    |  |  |
| Soil & Crucible (oven dry) g |                         | 22.95   | 21.57 |  |  |
| Soil & Crucible 440°C 1 g    |                         | 21.85   | 20.75 |  |  |
| 440°C 2 g                    |                         | 21.63   | 20.50 |  |  |
| 440°C 3 g                    |                         | 21.62   | 20.50 |  |  |
| 440°C 4 g                    |                         | —       | —     |  |  |
| Crucible g                   |                         | 12.34   | 10.61 |  |  |
| Organic Matter %             |                         | 12.5    | 9.8   |  |  |
| Notes/Remarks:               | -----<br>-----<br>----- |         |       |  |  |

Project 887

DAC101-2003

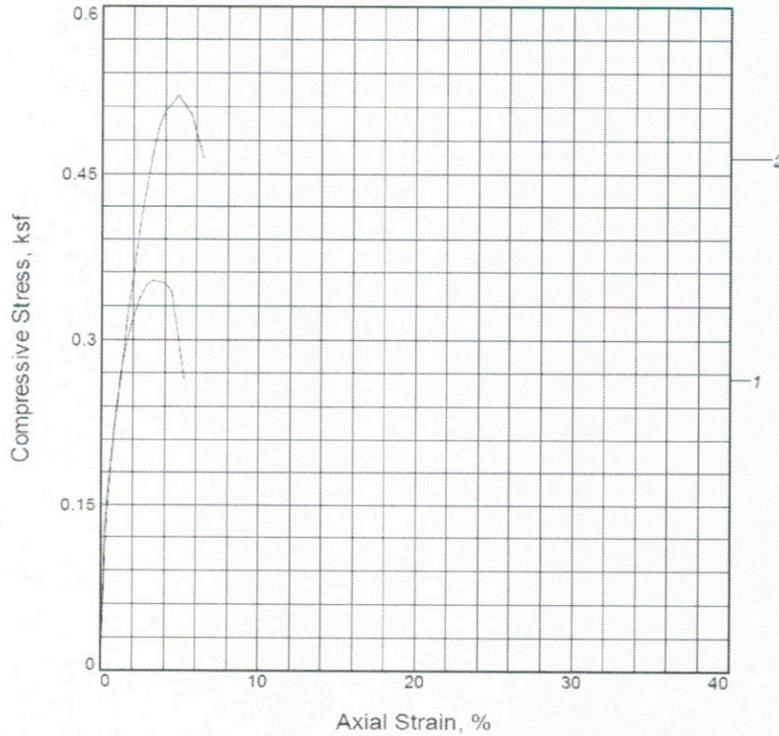


**Laboratory Test Results**  
  
**LGVSD Secondary Treatment Upgrades**  
**300 Smith Ranch Road, San Rafael, CA**

|                |           |
|----------------|-----------|
| Report Date:   | July 2018 |
| Reviewed By:   | DA        |
| Proj. Manager: | DA        |
| Job No.:       | 887-0715G |

B-1

## UNCONFINED COMPRESSION TEST



|                               |        |        |  |
|-------------------------------|--------|--------|--|
| Sample No.                    | 1      | 2      |  |
| Unconfined strength, ksf      | 0.35   | 0.52   |  |
| Undrained shear strength, ksf | 0.17   | 0.26   |  |
| Failure strain, %             | 2.8    | 4.8    |  |
| Strain rate, %/min.           | 0.08   | 0.08   |  |
| Water content, %              | 12.2   | 106.1  |  |
| Wet density, pcf              | 134.4  | 87.4   |  |
| Dry density, pcf              | 119.7  | 42.4   |  |
| Saturation, %                 | 80.9   | 96.2   |  |
| Void ratio                    | 0.4079 | 2.9758 |  |
| Specimen diameter, in.        | 2.42   | 2.42   |  |
| Specimen height, in.          | 4.95   | 4.95   |  |
| Height/diameter ratio         | 2.05   | 2.05   |  |

**Description:** See remarks

**LL =**      **PL =**      **PI =**      **Assumed GS= 2.70**      **Type: Mod.Cal.**

**Project No.:** 887-0715G

**Date Sampled:**

**Remarks:**

#1/ 10-10.5': Soft, dark gray clayey

GRAVEL(GC).

#2/ Soft, black FAT CLAY(CH/OH)w/  
organics.

**Plate** \_\_\_\_\_

**Client:** DAC Associates

**Project:** 300 Smith Ranch Road

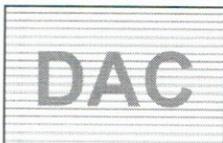
**Location:** B-7

**Depth:** 15-15.5'

UNCONFINED COMPRESSION TEST

Soil Mechanics Lab

Oakland, California



### Lab Test Results

**LGVSD Secondary  
Treatment Upgrades  
300 Smith Ranch Road,  
San Rafael, CA**

**Report Date:** July 2018

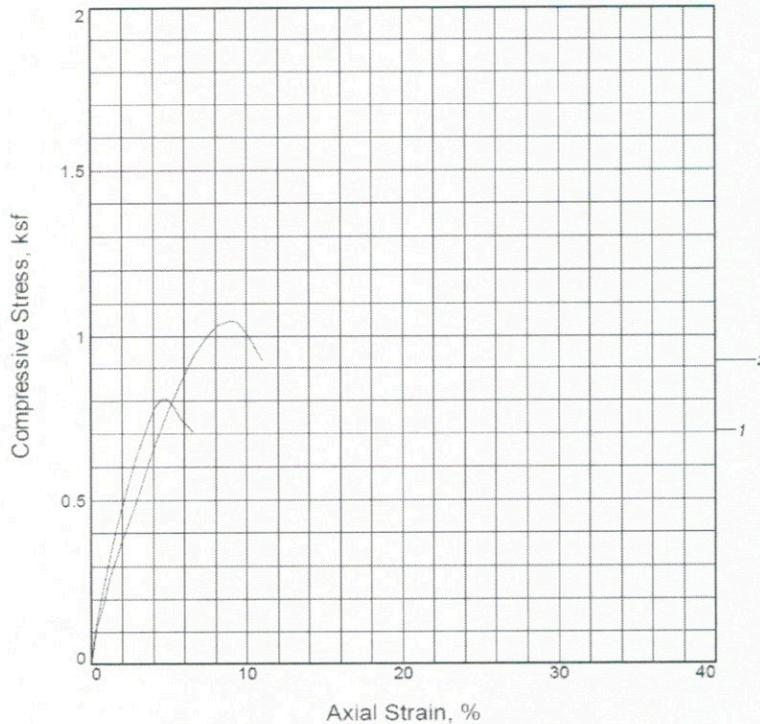
**Reviewed By:** DA

**Proj. Manager:** DA

**Job No. 887-0715G**

**B-2**

## UNCONFINED COMPRESSION TEST



|                               |        |        |  |
|-------------------------------|--------|--------|--|
| Sample No.                    | 1      | 2      |  |
| Unconfined strength, ksf      | 0.81   | 1.05   |  |
| Undrained shear strength, ksf | 0.40   | 0.52   |  |
| Failure strain, %             | 4.9    | 9.0    |  |
| Strain rate, %/min.           | 0.08   | 0.08   |  |
| Water content, %              | 152.8  | 74.5   |  |
| Wet density, pcf              | 75.7   | 85.5   |  |
| Dry density, pcf              | 29.9   | 49.0   |  |
| Saturation, %                 | 90.7   | 85.2   |  |
| Void ratio                    | 4.2110 | 2.1846 |  |
| Specimen diameter, in.        | 2.42   | 2.42   |  |
| Specimen height, in.          | 4.90   | 4.90   |  |
| Height/diameter ratio         | 2.03   | 2.03   |  |

**Description:** See remarks

**LL =**      **PL =**      **PI =**      **Assumed GS= 2.50**      **Type: Mod.Cal.**

**Project No.:** 887-0715G

**Date Sampled:**

**Remarks:**

#1/ Med.black FAT CLAY(CH/OH)w/  
organics.

#2/ Med.black FAT CLAY(CH/OH)w/  
organics.

**Plate** \_\_\_\_\_

**Client:** DAC Associates

**Project:** 300 Smith Ranch Road

**Location:** B-10

UNCONFINED COMPRESSION TEST  
Soil Mechanics Lab  
Oakland, California



### Lab Test Results

**LGVSD Secondary  
Treatment Upgrades  
300 Smith Ranch Road,  
San Rafael, CA**

Report Date:

July 2018

Reviewed By:

DA

Proj. Manager

DA

Job No. 887-0715G

**B-3**

# **Appendix C**

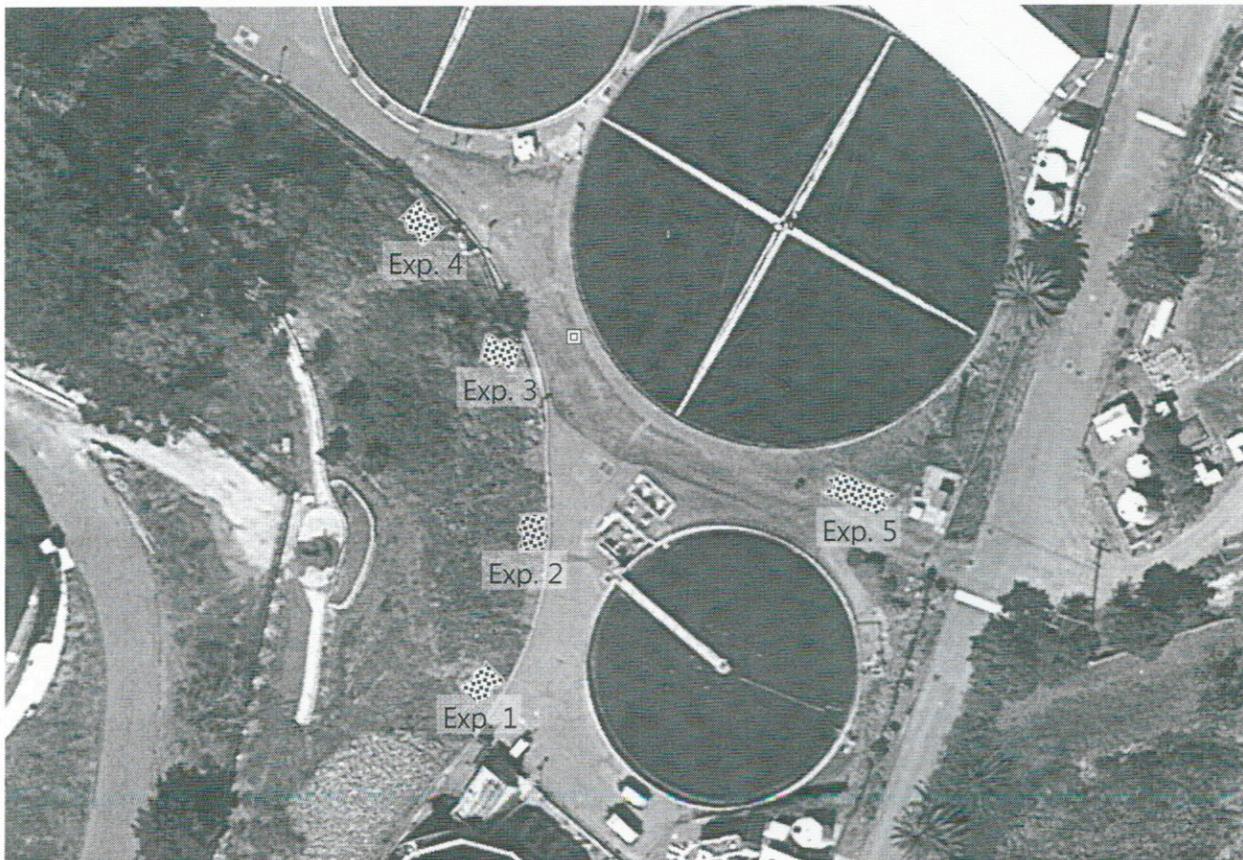
## Rock Exposure Observations



## Appendix C

### Rock Exposure Observations

On June 23, 2016, we recorded observations of five rock exposures at the site. Their locations are shown on the map below. Structural attitudes are presented in dip-vector style, i.e., degrees azimuth, degrees of plunge. Descriptions of terms used to describe the hardness/strength and fracture density are presented in two tables on page C-4.



**Figure C-1.** Locations of five rock exposure observations.



### Exposure 1



Sandstone  
Moderately hard to hard,  
fracture spacing ~1 in. average,  
orientations random, not laterally continuous more  
than a few ft, undulatory

### Exposure 2



Sandstone  
Hard, fracture spacing 2 in. to 2 ft,  
prominent joint sets 135°, 26° (bedding?);  
315°, 66°; 45°, 66°

### Exposure 3



Siltstone  
Bed 1½ ft thick, soft,  
fracture spacing ⅛ to ½ in.,  
thickly laminated, bedding 150°, 40°



### Exposure 4



Sandstone  
Hard, fracture spacing 1 in. to 1½ ft

### Exposure 5



Bedrock exposed here below  
0 to 2 in. of loose gravel

Sandstone  
Moderately hard, faintly thickly  
laminated, fracture spacing ½ to 3 in.



**Table C-1** Rock hardness/strength

| Term            | Description  |
|-----------------|--|
| Extremely hard  | Core, fragment, or exposure cannot be scratched with knife or sharp pick. Can only be chipped with repeated heavy hammer blows.  |
| Very hard       | Specimen cannot be scratched with knife or sharp pick. Core or fragment breaks with repeated heavy hammer blows.   |
| Hard            | Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.  |
| Moderately hard | Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.  |
| Moderately soft | Can be grooved 2 mm ( <sup>1</sup> / <sub>16</sub> in.) deep by knife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure. |
| Soft            | Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.                 |
| Very soft       | Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.   |

-----  
 Source: California Department of Transportation, Office of Structural Foundations

**Table C-2** Rock fracture density

| Term                     | Spacing (U.S. customary) | Spacing (metric) |
|--------------------------|--------------------------|------------------|
| Very intensely fractured | Chips < 0.1 ft           | Chips < 3 cm     |
| Intensely fractured      | 0.1–0.3 ft               | 3–10 cm          |
| Moderately fractured     | 0.3–1 ft                 | 10–30 cm         |
| Slightly fractured       | 1–3 ft                   | 30 cm to 1 m     |
| Very slightly fractured  | > 3 ft                   | > 1 m            |
| Unfractured              | No fractures             | No fractures     |

-----  
 Source: California Department of Transportation, Office of Structural Foundations

# **Appendix D**

Boring Logs, DAC Associates (2011)

|                             |  |  |         |                  |
|-----------------------------|--|--|---------|------------------|
| Project # 568-1011G         | LGVWT Facility, 300 Smith Ranch Road, San Rafael |  |         | Driller: Ofiario |
| Date: April 4, 2011         | Drill Rig: SIMCO                                 |  | Hammer: | 140 pound        |
| Groundwater depth:<br>8 ft. | <b>Boring Log BG-1</b>                           |  |         | Drilled by: DA   |

| Depth (ft) | Sample type | Blow counts | Test results | Graphic log   | Material descriptions   | Depth (ft) |
|------------|-------------|-------------|--------------|---|---|------------|
| 1          |             |             |              |    | pavement: 2 in. asphaltic concrete over 6 in. aggregate base rock   | 1          |
| 2          |             |             |              |    | <b>CLAYEY GRAVEL (GC)</b> -- fill: dark brown, damp<br>high drilling resistance<br>refusal on boulder(?), boring location shifted slightly west | 2          |
| 3          |             |             |              |    |   | 3          |
| 4          |             |             |              |    |   | 4          |
| 5          |             |             |              |    | cuttings are dark grayish brown, moist, clayey, some gravel   | 5          |
| 6          |             |             |              |    | <b>CLAY (CH)</b> -- bay mud: dark gray  | 6          |
| 7          | MC          | 3           |              |    | sampler initially returned empty, redeployed with catcher   | 7          |
| 8          |             | 4           |              |    | groundwater encountered at 8 ft.  | 8          |
| 9          |             | 4           |              |    |   | 9          |
| 10         |             |             |              |   | <b>CLAYEY SAND (SC) to SANDY CLAY (CL)</b> -- residual soil: dark brown, moist  | 10         |
| 11         |             |             |              |  | <b>SANDSTONE</b> -- bedrock: brown, sandy, damp to dry, highly weathered, trace clay<br>high drilling resistance                                | 11         |
| 12         | SPT         | 50          |              |  |   | 12         |
| 13         |             |             |              |   |   | 13         |
| 14         |             |             |              |   |   | 14         |
| 15         |             |             |              |   |   | 15         |
| 16         |             |             |              |   |   | 16         |
| 17         |             |             |              |   |   | 17         |
| 18         |             |             |              |   |   | 18         |
| 19         |             |             |              |   |   | 19         |

Bottom of boring at 12.5 feet.

Project: 568-1011G DAC132-2007

|   |  |                |            |                                |
|---|--|----------------|------------|--------------------------------|
|  | <b>LGVWT Facility</b><br><b>300 Smith Ranch Rd,</b><br><b>San Rafael, CA</b> | Report Date:   | April 2011 | <b>Sheet</b><br><br><b>A-1</b> |
|   |  | Reviewed By:   | DA         |                                |
|   |  | Proj. Manager: | DA         |                                |
|   |  | Project No.:   | 568-1011G  |                                |

|                               |  |  |                   |                          |
|-------------------------------|--|--|-------------------|--------------------------|
| Project # 568-1011G           | LGWWT Facility, 300 Smith Ranch Road, San Rafael |  |                   | Driller: Ofiaro          |
| Date: April 4, 2011           | Drill Rig: SIMCO                                 |  | Hammer: 140 pound | Borehole diam.: 4 inches |
| Groundwater depth:<br>___ ft. | <h1>Boring Log BG-2</h1>                         |  |                   | Drilled by: DA           |

| Depth (ft) | Sample type | Blow counts  | Test results | Graphic log | Material descriptions   | Depth (ft) |
|------------|-------------|--------------|--------------|-------------|---|------------|
| 1          |             |              |              |             | pavement: 2 in. asphaltic concrete over 6 in. aggregate base rock   | 1          |
| 2          |             |              |              |             | <b>GRAVELLY CLAY (CL)</b> -- fill: brown, damp to dry, rock fragments are sandstone   | 2          |
| 3          |             |              |              |             | drill cuttings exhibit greater clay content<br>moisture content increases with depth  | 3          |
| 4          |             |              |              |             |   | 4          |
| 5          |             |              |              |             |   | 5          |
| 6          |             |              |              |             | at 5 ft: brown, silty, fat clay, moist, firm to stiff   | 6          |
| 7          | MC          | 1            |              |             | <b>SILTY CLAY (CH)</b> -- bay mud: dark gray, firm to stiff, with fine sand, high plasticity, black and green rootlets, some organics | 7          |
| 8          |             | 2            |              |             |   | 8          |
| 9          |             | 2            |              |             |   | 9          |
| 10         |             |              |              |             |   | 10         |
| 11         |             |              |              |             | <b>SANDY CLAY (CL)</b> -- residual soil: dark grayish brown, moist  | 11         |
| 12         |             |              |              |             |   | 12         |
| 13         |             |              |              |             | <b>SANDSTONE</b> -- bedrock: light brown, highly weathered, friable, silty, fine sand, damp to dry                                    | 13         |
| 14         |             |              |              |             |   | 14         |
| 15         | SPT         | 50 for 2 in. |              |             |   | 15         |
| 16         |             |              |              |             |   | 16         |
| 17         |             |              |              |             |   | 17         |
| 18         |             |              |              |             |   | 18         |
| 19         |             |              |              |             |   | 19         |

Bottom of boring at 15 feet.

|   |  |                                |                                |
|---|--|--------------------------------|--------------------------------|
|  | <b>LGWWT Facility 300</b><br><b>Smith Ranch Rd,</b><br><b>San Rafael, CA</b> | Report Date: <b>April 2011</b> | <b>Sheet</b><br><br><b>A-2</b> |
|   |  | Reviewed By: <b>DA</b>         |                                |
|   |  | Proj. Manager: <b>DA</b>       |                                |
|   |  | Project No.: <b>568-1011G</b>  |                                |

|                               |  |  |                   |                          |
|-------------------------------|--|--|-------------------|--------------------------|
| Project # 568-1011G           | LGVWT Facility, 300 Smith Ranch Road, San Rafael |  |                   | Driller: Ofiaro          |
| Date: April 4, 2011           | Drill Rig: SIMCO                                 |  | Hammer: 140 pound | Borehole diam.: 4 inches |
| Groundwater depth:<br>4.5 ft. | <b>Boring Log BG-3</b>                           |  |                   | Drilled by: DA           |

| Depth (ft) | Sample type | Blow counts | Test results | Graphic log | Material descriptions  | Depth (ft) |
|------------|-------------|-------------|--------------|-------------|--|------------|
| 1          |             |             |              |             | pavement: 2 in. asphaltic concrete over 8 in. aggregate base rock  | 1          |
| 2          |             |             |              |             | <b>CLAYEY GRAVEL (GC) — fill: grayish brown, damp to dry</b>   | 2          |
| 3          |             |             |              |             | grades darker gray and more moist  | 3          |
| 4          |             |             |              |             | groundwater at 4.5 ft.   | 4          |
| 4          | MC          | 6           |              |             |  |            |
| 5          |             | 4           |              |             |  | 5          |
| 5          |             | 3           |              |             |  | 5          |
| 6          |             |             |              |             | <b>SILTY CLAY (CH) — bay mud: brown to dark gray, wet, black pockets</b>   | 6          |
| 6          | SPT         | 4           |              |             |  | 6          |
| 7          |             | 3           |              |             |  | 7          |
| 7          |             | 4           |              |             |  | 7          |
| 8          |             |             |              |             | gray, sandy  | 8          |
| 9          |             |             |              |             |  | 9          |
| 10         |             |             |              |             | at 10 ft switched to hollow-stem drill to minimize hole collapse potential   | 10         |
| 11         |             |             |              |             | at 10.5 ft peaty material evident  | 11         |
| 12         |             |             |              |             | <b>PEATY SILTY CLAY (OH) — bay mud : gray to dark gray, wet, very soft, strong organic odor, visible plant matter</b>                                  | 12         |
| 12         | MC          | 1           |              |             |  | 12         |
| 13         |             | 1           |              |             |  | 13         |
| 13         |             | 1           |              |             |  | 13         |
| 14         |             |             |              |             |  | 14         |
| 15         |             |             |              |             |  | 15         |
| 15         | MC          | 1           |              |             |  | 15         |
| 16         |             | 1           |              |             |  | 16         |
| 16         |             | 2           |              |             |  | 16         |
| 17         |             |             |              |             |  | 17         |
| 18         |             |             |              |             | organic content grades less  | 18         |
| 19         |             |             |              |             | <b>FAT CLAY (CH) — colluvium: gray to bluish gray, damp to moist, stiff to very stiff, pockets of weathered rock fragments, trace organic material</b> | 19         |

see Sheet A-4 for continuation

|  |  |                |            |                                   |
|--|--|----------------|------------|-----------------------------------|
|  | <b>LGVWT Facility 300</b><br><b>Smith Ranch Rd,</b><br><b>San Rafael, CA</b> | Report Date:   | April 2011 | <b>Sheet</b><br><br><b>A-3(a)</b> |
|  |  | Reviewed By:   | DA         |                                   |
|  |  | Proj. Manager: | DA         |                                   |
|  |  | Project No.:   | 568-1011G  |                                   |
|  |  |                |            |                                   |

|                               |  |  |                   |                          |
|-------------------------------|--|--|-------------------|--------------------------|
| Project # 568-1011G           | LGVWT Facility, 300 Smith Ranch Road, San Rafael |  |                   | Driller: Ofiaro          |
| Date: April 4, 2011           | Drill Rig: SIMCO                                 |  | Hammer: 140 pound | Borehole diam.: 4 inches |
| Groundwater depth:<br>___ ft. | <b>Boring Log BG-3</b>                           |  |                   | Drilled by: DA           |

| Depth (ft) | Sample type | Blow counts   | Test results | Graphic log   | Material descriptions  | Depth (ft) |
|------------|-------------|---------------|--------------|---|--|------------|
| 21         | MC          | 6<br>10<br>18 |              |  | continued from above   | 21         |
| 22         |             |               |              |  |  | 22         |
| 23         |             |               |              |  |  | 23         |
| 24         |             |               |              |  | dark gray  | 24         |
| 25         |             |               |              |  | <b>BASALT</b> -- bedrock: dark greenish gray, weak angular fragments | 25         |
| 26         |             |               |              |  |  | 26         |
| 27         |             |               |              |  |  | 27         |
| 28         |             |               |              |  |  | 28         |
| 29         | MC          | 29 for 2 in.  |              |  | drilling refusal at 29 ft 2 in.                                      | 29         |
| 30         |             |               |              |   |  | 30         |
| 31         |             |               |              |   |  | 31         |
| 32         |             |               |              |   |  | 32         |
| 33         |             |               |              |   |  | 33         |
| 34         |             |               |              |   |  | 34         |
| 35         |             |               |              |   |  | 35         |
| 36         |             |               |              |   |  | 36         |
| 37         |             |               |              |   |  | 37         |
| 38         |             |               |              |   |  | 38         |
| 39         |             |               |              |   |  | 39         |

Bottom of boring at 29 feet.

|   |   |                                |                                    |
|---|---|--------------------------------|------------------------------------|
|  | <b>LGVSD Facility</b><br><b>300 Smith Ranch Rd</b><br><b>San Rafael, CA</b> | Report Date: <b>April 2011</b> | <b>Sheet</b><br><br><b>A-3 (b)</b> |
|   |   | Reviewed By: <b>DA</b>         |                                    |
|   |   | Proj. Manager: <b>DA</b>       |                                    |
|   |   | Project No.: <b>568-1011G</b>  |                                    |

# **Appendix E**

Boring Logs, DAC Associates (2015)

|                          |  |                   |                   |                       |
|--------------------------|--|-------------------|-------------------|-----------------------|
| Project # 859-7714G      | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: Nov. 21, 2014      | Drill Rig: Hino DR5K                             | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater depth: 8½ ft | <b>Boring Log BG-1</b>                           |                   |                   | Logged by FJG         |

| Sample type | Blow counts | Test results              | Graphic log | Material descriptions  | Depth (ft) |
|-------------|-------------|---------------------------|-------------|--|------------|
|             |             |                           |             | <b>CLAYEY SAND W GRAVEL (SC)</b> — fill: brownish gray, damp, medium dense, 35% fines  | 1          |
|             |             |                           |             |  | 2          |
|             |             |                           |             |  | 3          |
|             |             |                           |             |  | 4          |
|             |             |                           |             | moist to wet   | 5          |
| SPT         | 9           | 35.5% <#200               |             |  | 6          |
|             | 7           |                           |             |  | 7          |
|             | 11          |                           |             |  | 8          |
|             |             |                           |             |  | 9          |
|             |             |                           |             | <b>FAT/ORGANIC CLAY (CH/OH)</b> — bay mud : dark gray, wet, soft, trace sand, with plant fragments, H <sub>2</sub> S odor. GW at 8½ ft. based on water on center plug. | 10         |
| MC          | 2           | C <sub>u</sub> = 0.34 ksf |             |  | 11         |
|             | 2           | w <sub>n</sub> = 42.7%    |             |  | 12         |
|             | 2           | γ <sub>d</sub> = 78.6 pcf |             |  | 13         |
|             |             |                           |             |  | 14         |
| MC          | 2           | C <sub>u</sub> = 0.38 ksf |             |  | 15         |
|             | 2           | w <sub>n</sub> = 121.3%   |             |  | 16         |
|             | 3           | γ <sub>d</sub> = 36.0 pcf |             |  | 17         |
|             |             |                           |             |  | 18         |
|             |             |                           |             |  | 19         |
|             |             |                           |             | sandy lens (35% fine sand) 19½(?) — 20½ ft   |            |

|   |  |                |                    |                      |
|---|--|----------------|--------------------|----------------------|
|  | <b>LGVSD Parking Lot<br/>Reclamation<br/>300 Smith Ranch Rd<br/>San Rafael, CA</b> | Report Date:   | <b>April, 2015</b> | <b>Sheet<br/>A-1</b> |
|   |  | Reviewed By:   | <b>DA</b>          |                      |
|   |  | Proj. Manager: | <b>DA</b>          |                      |
|   |  | Project No.:   | <b>859-7714G</b>   |                      |

|                          |  |                   |                   |                       |
|--------------------------|--|-------------------|-------------------|-----------------------|
| Project # 859-7714G      | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: Nov. 21, 2014      | Drill Rig: Hino DR5K                             | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater depth: 8½ ft | <b>Boring Log BG-1 cont.</b>                     |                   |                   | Logged by FJG         |

|    | Sample type | Blow counts | Test results  | Graphic log  | Material descriptions  | Depth (ft) |
|----|-------------|-------------|---|--|--|------------|
| 21 | MC          | 1<br>2<br>2 | $w_n = 80.7\%$<br>$\gamma_d = 54.6 \text{ pcf}$                             |   | <b>FAT/ORGANIC CLAY (CH/OH)</b> — bay mud: dark gray, wet, soft, trace sand, with plant fragments, H <sub>2</sub> S odor.                  | -21        |
| 22 |             |             |   |  |  | -22        |
| 23 |             |             |   |  |  | -23        |
| 24 |             |             |   |  | very dark gray   | -24        |
| 25 |             |             |   |  | with ½-in. green sandy specks (weathered sandstone clasts)   | -25        |
| 26 | MC          | 1<br>3<br>5 | $C_u = 0.33 \text{ ksf}$<br>$w_n = 27.9\%$<br>$\gamma_d = 97.4 \text{ pcf}$ |   | firm   | -26        |
| 27 |             |             |   |  | slow drilling starting at 28 ft  | -27        |
| 28 |             |             |   |   | <b>GRAVELLY CLAY (CL)</b> — colluvium: brown, moist, stiff, angular gravel up to 1 in. diam.   | -28        |
| 29 |             |             |   |  |  | -29        |
| 30 | SPT         | 50/4"       |   |  | <b>SANDSTONE</b> — KJf: green grading down to yellowish brown, damp, very soft to soft (rock terminology), faint relict fracture structure | -30        |
| 31 |             |             |   |  | Bottom of boring at 30½ ft. Less than 1 ft of water in bottom of hole. Hole grouted immediately after drilling.                            | -31        |
| 32 |             |             |   |  |  | -32        |
| 33 |             |             |   |  |  | -33        |
| 34 |             |             |   |  |  | -34        |
| 35 |             |             |   |  |  | -35        |
| 36 |             |             |   |  |  | -36        |
| 37 |             |             |   |  |  | -37        |
| 38 |             |             |   |  |  | -38        |
| 39 |             |             |   |  |  | -39        |

|   |                                      |  |                |                    |              |
|---|--------------------------------------|--|----------------|--------------------|--------------|
|  | <b>LGVSD Parking Lot Reclamation</b> |  | Report Date:   | <b>April, 2015</b> | <b>Sheet</b> |
|   | 300 Smith Ranch Rd                   |  | Reviewed By:   | DA                 |              |
|   | San Rafael, CA                       |  | Proj. Manager: | DA                 |              |
|   |                                      |  | Project No.:   | 859-7714G          |              |
|   |                                      |  |                | <b>A-2</b>         |              |

|                     |  |                   |                   |                       |
|---------------------|--|-------------------|-------------------|-----------------------|
| Project # 859-7714G | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: Nov. 21, 2014 | Drill Rig: Hino DR5K                             | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater depth:  | <b>Boring Log BG-2</b>                           |                   |                   | Logged by FJG         |

|    | Sample type | Blow counts | Test results  | Graphic log | Material descriptions   | Depth (ft) |
|----|-------------|-------------|---|-------------|---|------------|
| 1  |             |             |   |             | CLAYEY SAND W GRAVEL (SC) — fill: brownish gray, damp, medium dense, 35% fines  | 1          |
| 2  |             |             | 2   |             |   |            |
| 3  |             |             | 3   |             |   |            |
| 4  |             |             | 4   |             |   |            |
| 5  |             |             | 3   |             |   |            |
| 6  | SPT         | 3           | 6.6% >#200  |             | FAT/ORGANIC CLAY (CH) — bay mud: dark gray, wet, firm, trace sand, with plant fragments, H <sub>2</sub> S odor.<br><br>soft | 6          |
| 7  |             | 3           |   |             |   | 7          |
| 8  |             | 4           |   |             |   | 8          |
| 9  |             |             |   |             |   | 9          |
| 10 |             |             | C <sub>u</sub> = 0.45 ksf<br>mc = 149%<br>dd = 37.6 pcf |             |   | 10         |
| 11 | MC          | 2           |   |             |   | 11         |
| 12 |             | 2           |   |             |   | 12         |
| 13 |             |             |   |             |   | 13         |
| 14 |             |             |   |             |   | 14         |
| 15 |             |             |   |             |   | 15         |
| 16 | MC          | 1           |   |             |   | 16         |
| 17 |             | 2           |   |             |   | 17         |
| 18 |             | 2           |   |             |   | 18         |
| 19 |             |             |   |             |   | 19         |

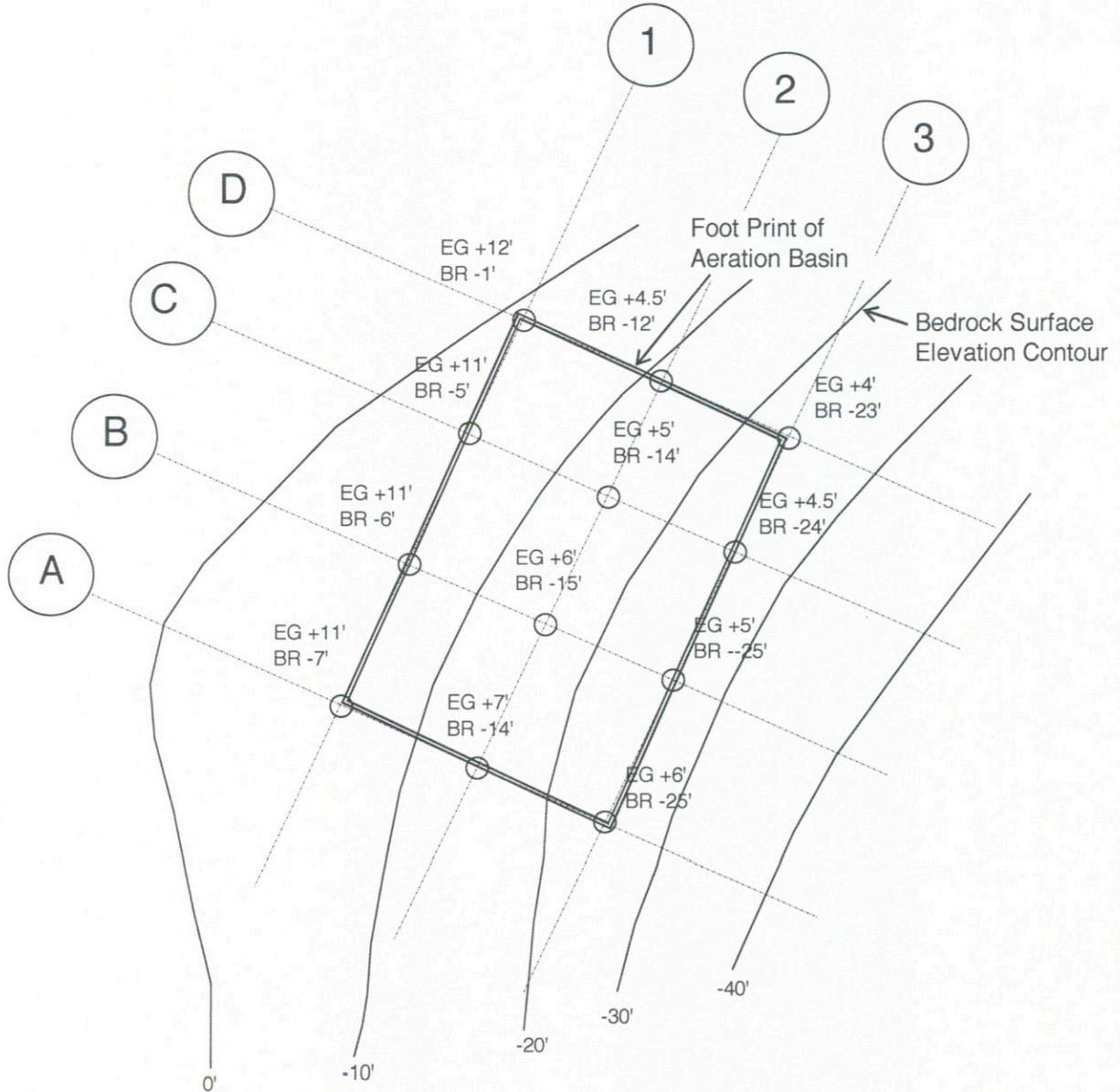
|  |   |                |             |                  |
|--|---|----------------|-------------|------------------|
|  | LGVSD Parking Lot Reclamation<br>300 Smith Ranch Rd<br>San Rafael, CA | Report Date:   | April, 2015 | Sheet<br><br>A-3 |
|  |   | Reviewed By:   | DA          |                  |
|  |   | Proj. Manager: | DA          |                  |
|  |   | Project No.:   | 859-7714G   |                  |

|                     |  |                   |                   |                       |
|---------------------|--|-------------------|-------------------|-----------------------|
| Project # 859-7714G | LGVWT Facility, 300 Smith Ranch Road, San Rafael |                   |                   | Driller: Clear Heart  |
| Date: Nov. 21, 2014 | Drill Rig: Hino DR5K                             | Hollow-stem auger | Hammer: 140 pound | Borehole diam.: 6 in. |
| Groundwater depth:  | Boring Log BG-2 cont.                            |                   |                   | Logged by FJG         |

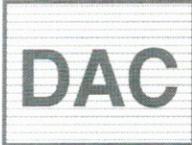
|    | Sample type | Blow counts    | Test results   | Graphic log | Material descriptions   | Depth (ft) |
|----|-------------|----------------|--|-------------|---|------------|
| 21 | MC          | 1<br>2<br>2    | $C_u = 0.52$ ksf<br><br>wn = 104.6%<br>yd = 47.5 pcf |             | <b>FAT/ORGANIC CLAY (CH)</b> — bay mud: dark gray, wet, soft, trace sand, with plant fragments, H <sub>2</sub> S odor.                | -21        |
| 22 |             |                |  |             |   | -22        |
| 23 |             |                |  |             |   | -23        |
| 24 |             |                |  |             |   | -24        |
| 25 | MC          | 2<br>5<br>12   | $C_u = 1.13$ ksf<br><br>wn = 20.2%<br>yd = 107.7 pcf |             | stiff   | -25        |
| 26 |             |                |  |             |   | -26        |
| 27 |             |                |  |             |   | -27        |
| 28 |             |                |  |             | slow drilling starting at 28 ft; possible colluvium or weathered bedrock  | -28        |
| 29 |             |                |  |             |   | -29        |
| 30 | SPT         | 25<br>32<br>50 |  |             | <b>SHALE</b> — KJf: brownish gray, damp, soft to very soft (rock terminology), sheared, clayey, has appearance of shear-zone material | -30        |
| 31 |             |                |  |             |   | -31        |
| 32 |             |                |  |             | Bottom of boring at 31½ ft. Less than 1 ft of water in bottom of hole. Hole grouted immediately after drilling.                       | -32        |
| 33 |             |                |  |             |   | -33        |
| 34 |             |                |  |             |   | -34        |
| 35 |             |                |  |             |   | -35        |
| 36 |             |                |  |             |   | -36        |
| 37 |             |                |  |             |   | -37        |
| 38 |             |                |  |             |   | -38        |
| 39 |             |                |  |             |   | -39        |

|   |  |                |             |                                |
|---|--|----------------|-------------|--------------------------------|
|  | <b>LGVSD Parking Lot Reclamation</b><br>300 Smith Ranch Rd<br>San Rafael, CA | Report Date:   | April. 2015 | <b>Sheet</b><br><br><b>A-4</b> |
|   |  | Reviewed By:   | DA          |                                |
|   |  | Proj. Manager: | DA          |                                |
|   |  | Project No.:   | 859-7714G   |                                |

Appendix F  
Strength-Based Analysis  
of Drilled Pier Capacity



New Proposed Location of Aeration Basin  
*NTS*



Calculation Sheet

Subject: Engineering Calculations

Project Name: LGVSD Secondary Treatment and RWTF Upgrade

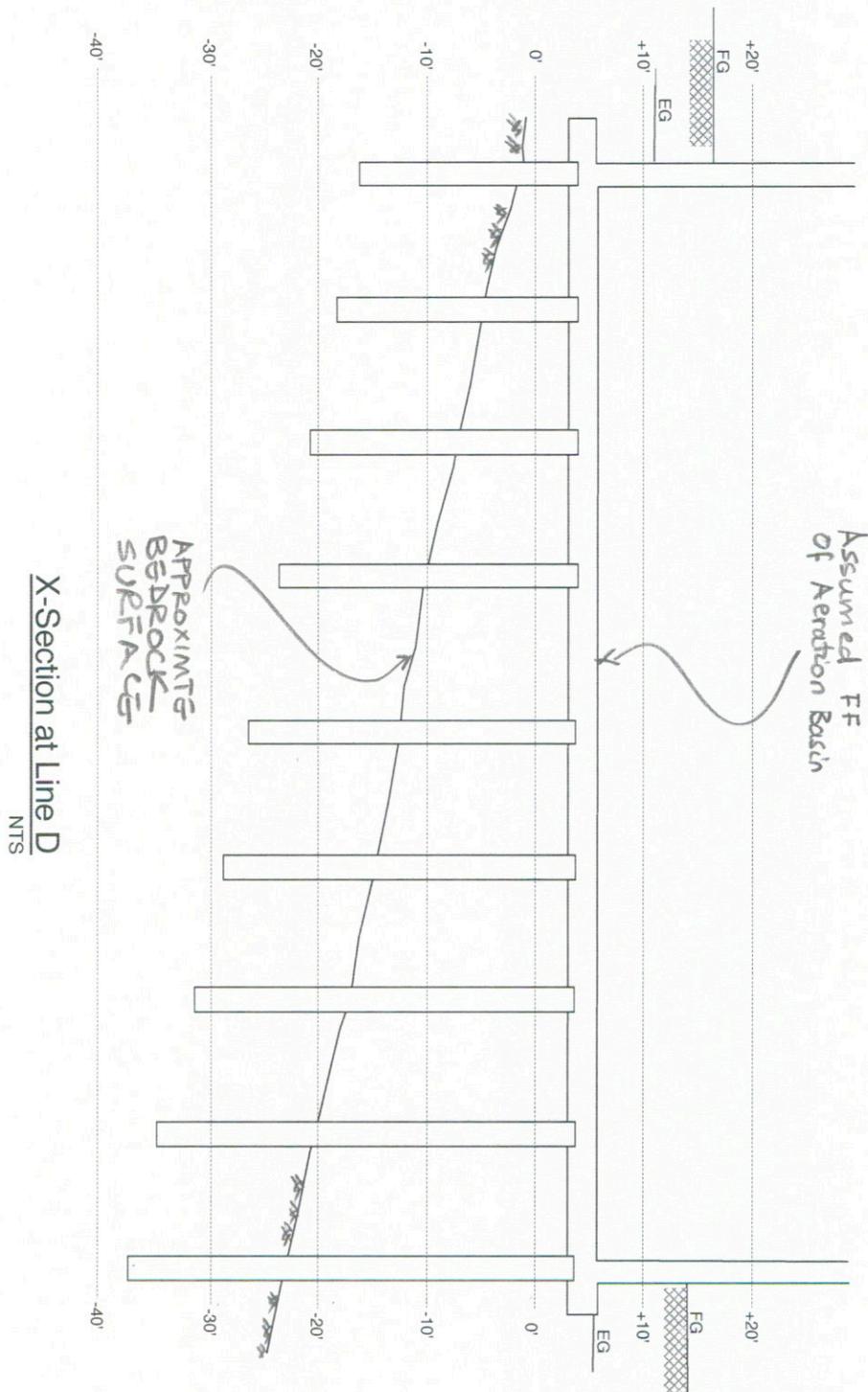
Project Location: 300 Smith Ranch Road, San Rafael, CA

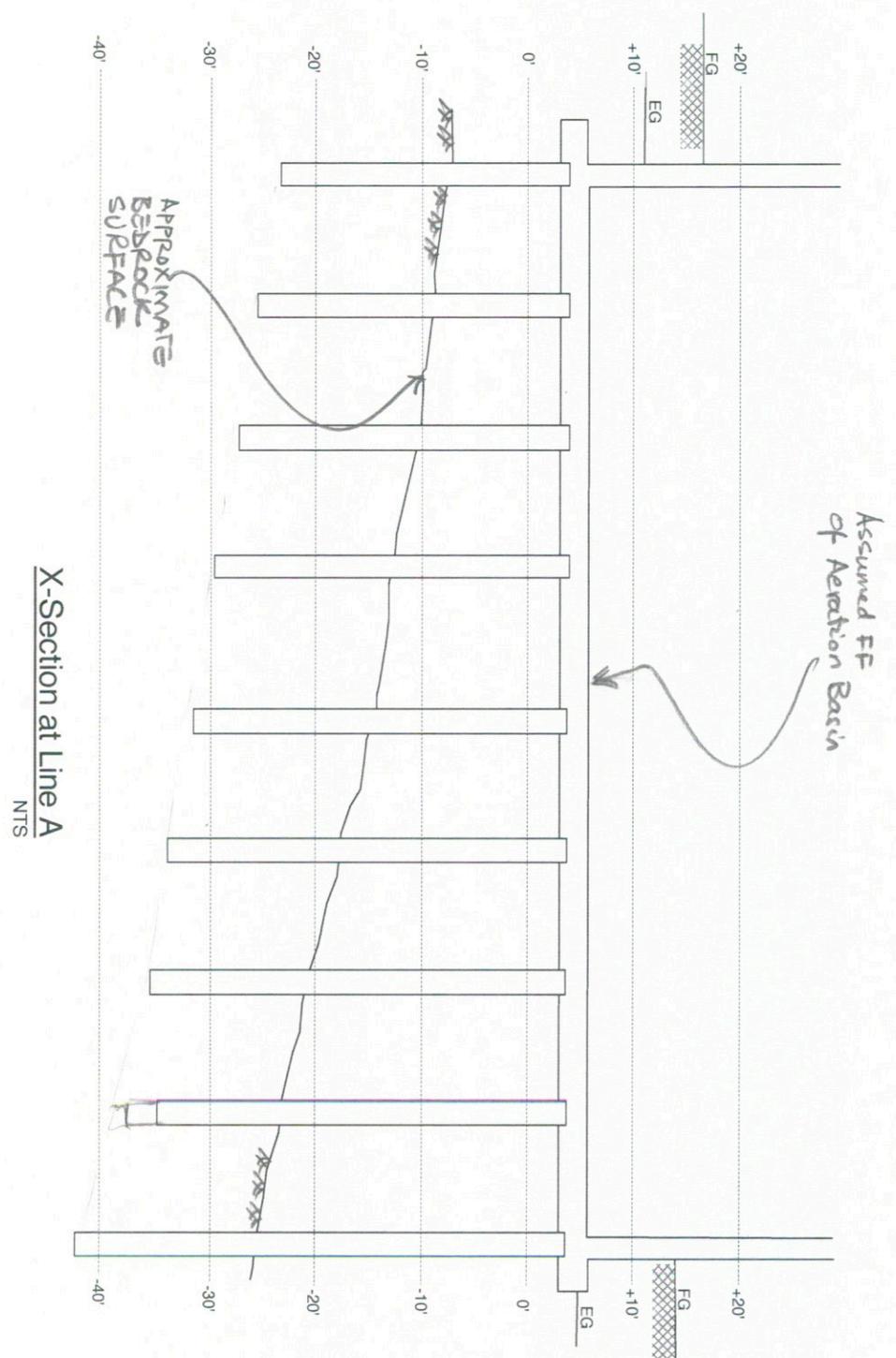
Project No.: 887-0715G

By: DA Checked By: DA

Page 2 of 8

Date: April 3, 2018







**From: Improvement of the Geotechnical Axial Design Methodology..... (July 2003)**

**Table 5.3. Test Data Obtained within or around the Bedrock Socket for all Test Shafts**

| Site        | Rock Type                  | O-Cell Load Test       |                        |                      | UC Test               | PM Test              | SPT-N    |
|-------------|----------------------------|------------------------|------------------------|----------------------|-----------------------|----------------------|----------|
|             |                            | f <sub>max</sub> (ksf) | f <sub>all</sub> (ksf) | f <sub>d</sub> (ksf) | q <sub>ui</sub> (ksf) | E <sub>m</sub> (ksf) | (bpf)    |
| I-225       | Soil-Like Claystone        | 2.6                    | 1.3                    | 1.8                  | 8.3                   | 970                  | 32       |
|             |                            | 3.6                    | 1.8                    | 2.8                  | 12.3                  | 2550                 | 55       |
|             |                            | 3.1                    | 1.6                    | 2.3                  | 10                    | 1513                 | 41       |
| County line |                            | 3.4                    | 1.7                    | 3.0                  | 10.4                  | 1800                 | 38       |
| Franklin    | Very Hard Sandy Claystone  | 19                     | 8.5                    | 19                   | 64                    | 11050                | 50/4"    |
| Broadway    | Very Hard Clayey Sandstone | 17                     | 8.5                    | 15.9                 | 97                    | 8900                 | 50/3"    |
|             |                            | 35.1                   | 17.5                   | 32.8                 | 210                   | 23448                | *50/2"   |
|             |                            | 24                     | 12                     | 22.4                 | 145                   | 15025                | *50/2.5" |

\* Roughly estimated data based on the results of Table 5.2.

Based on the results of our supplemental exploratory borings, the bedrock should be considered as hard to very hard sandstone & shale. Material is defined as SPT-N > 80 bpf.



**From: Improvement of the Geotechnical Axial Design Methodology..... (July 2003)**

**Table 5.5. Best-Fit Design Equations for Drilled Shafts Based on the Results of Load Tests, and SPT, UC, and PM Tests**

| Description  | Soil-Like Claystone (I-25@ I-225 and County Line)  | Very Hard Sandy Claystone (I-25@ Franklin)   | Very Hard Clayey Sandstone (I-25@ Broadway)                                     |
|--|--|--|---|
| Note: Units are ksf for all strength, resistance, and stiffness values, bpf for SPT- N values, ft for D, and ft <sup>2</sup> for A <sub>s</sub> and A <sub>b</sub> |  |  |   |
| SPT- Based Design Method for Side Resistance   | $f_{max} = 0.075 N$ , $f_{all} = 0.037 N$ , $f_d = 0.06 N$   | N/A. Future research should investigate design methods based on SPT N values for the very hard claystone and sandstone bedrock, (see Chapter 6). |   |
| SPT- Based Method for Base Resistance  | $q_{max} = 0.92 N$ ;<br>$q_{all} = 0.46 N$ , $q_d = 0.42 N$  |  |   |
| Strength- Based Design Method for Side Resistance  | $f_{max} = 0.30 q_{ui}$ , $f_{all} = 0.15 q_{ui}$  | $f_d = f_{max} = 0.3 q_{ui}$   | $f_{max} = f_d = 0.17 q_{ui}$ ;<br>$f_{all} = 0.09 q_{ui}$                      |
|  | $f_d = 0.24 q_{ui}$  |  |   |
| Strength- Based Design Method for Base Resistance  | $q_{max} = 3.8 q_{ui}$ ;<br>$q_{all} = 1.9 q_{ui}$ ; $q_d = 1.7 q_{ui}$  |  | $q_{max} = 1.45 q_{ui}$ ;<br>$q_{all} = 0.73 q_{ui}$ ;<br>$q_d = 0.32 q_{ui}$ ; |
| Stiffness- Based Design Equations  | $f_d = 0.0019 E_m$   | $f_d = f_{max} = 0.0017 E_m$   |   |
|  | $f_d = 0.0018 E_m$   |  |   |
| Very Approximate Load-Settlement Curve for Rigid Shafts as a function of $q_{ui}$ and SPT-N values. *  | Three points: (0,0), ( $Q_d$ , 0.01D), ( $Q_{max}$ , 0.05D)<br>$Q_d$ (ksf) = $A_s f_d + A_b q_d$ ;<br>$Q_{max}$ (ksf) = $A_s f_{max} + A_b q_{max}$<br>The relations for $f_{max}$ , $f_d$ , $q_{max}$ , $q_d$ as a function of N and $q_{ui}$ are listed above; D is the shaft diameter; $A_b$ and $A_s$ are, respectively, the base and side areas of the rock socket. |  |   |

\* Follow the procedure in Chapter 3 to account for the compressibility of high-capacity shafts embedded in very hard claystone and sandstone. No correction is needed for the low-capacity shafts embedded in soil-like claystone.



## Allowable Skin Friction Resistance in Bedrock

Use Best-Fit Design Equations Table 5.5  
(Report No. CDOT-DTD-R-2003-6: Improvement of the Geotechnical Axial Design Methodology For Colorado's Drilled Shafts Socketed in Weak Rocks)

Consider v. hard sandy claystone  $N > 80$

Strength-Based Design for side Resistance:

$$f_{max} = 0.30 q_{ui} \quad f_{all} = 0.15 q_{ui}$$

$$f_d = f_{max} = 0.30 q_{ui}$$

Based on Table 5.3 for Very Hard Sandy Claystone

$$q_{ui} = 64 \text{ ksf with an SPT-} 'N' \text{ value of } 50/4''$$

$$\therefore f_{max} = 0.30 q_{ui}$$

$$= 64 \times 0.3 = 19.2 \text{ ksf}$$

$$f_{all} = \frac{19.2}{2.0} = 9.6 \text{ ksf}$$

$$f_d = 19.2 \text{ ksf for a}$$

Settlement  $\approx 0.01 D$

$$\Delta_s = 0.01 \times 24'' = 0.24''$$



## Allowable End Bearing Resistance in Bedrock

Again using the best fit design equation Table 5.5

$$q_{max} = 3.8 q_{ui} = 243.2 \text{ ksf}$$

$$q_{all} = 1.9 q_{ui} = 121.6 \text{ ksf}$$

$$q_d = 1.7 q_{ui} = 108.8 \text{ ksf}$$

The above capacities would apply to areas where bedrock consisted of hard sandstone - shale material.

Assume a minimum embedment of 10-ft into competent bedrock:

$$R_{SF} = \pi D \times 10 \times 9.6 = 603 \text{ kip}$$

$$Q_{EB} = \pi D^2 / 4 \times 108.8 = 342 \text{ kip}$$

$$Q_{TOTAL} = 603 + 342 = 945 \text{ kips}$$



## Negative skin Friction

NAVFAC DM 7.2-211

$$f_n = \beta P_o$$

unit negative skin friction      Effective vertical stress

$\beta = 0.2$  To  $0.25$  for clays  
 $0.25$  to  $0.35$  " Silts  
 $0.35$  to  $0.50$  " Sands

Assume 15' of compacted granular fill &  
 " 20' of soft Bay Mud.

$$\gamma_{fill} = 110 \text{ pcf}$$

$$\text{Average } P'_{o_{fill}} = \frac{15 \times 110}{2} = 825 \text{ pcf}$$

$$\gamma_{BM} = 98 \text{ pcf}$$

$$\text{Average } P'_{o_{BM}} = \frac{20 \times (98 - 62)}{2} + 825 = 1185 \text{ pcf}$$

$$F_{DD} = \left\{ (\beta_1 \times P'_{o_{fill}}) \times 15 + (\beta_2 \times P'_{o_{BM}}) \times 20 \right\} \pi D$$

$$= \left\{ 0.45 \times 825 \times 15 + 0.25 \times 1185 \times 20 \right\} 3.14 \times 2$$

$$= \left\{ 5569 + 5925 \right\} \times 2\pi = 72,217 \#$$

$$= 72.2 \text{ Kip}$$

## NET ALLOWABLE COMPRESSION LOAD

$$Q_{allow} = Q_{TOTAL} - F_{DD} = 945 - 72 = 872 \text{ Kip}$$

$$Q'_{allowable} = \frac{Q_{allow}}{FS} = \frac{872}{2.5} = 348.8 \text{ SAY } 350 \text{ Kip}$$



July 17, 2018  
 File: 1009.093altr.doc

Las Gallinas Valley Sanitary District  
 300 Smith Ranch Road  
 San Rafael, California 94903

Attn: Irene Huang, PE

Re: Results of Laboratory Testing  
 Secondary Treatment Plant and Recycled Water Expansion  
 San Rafael, California

Introduction

This letter presents the results of our laboratory testing for the Las Gallinas Valley Sanitary District's Secondary Treatment Plant Upgrade and Recycled Water Expansion project. The project site is located at the District's treatment plant at 300 Smith Ranch Road in San Rafael, California. The planned upgrades will include grading to raise the existing treatment plant access road. Potential fill sources for the planned grading include an existing stockpile containing dredged materials from Lower Miller Creek, as well as material obtained from the existing biofilters.

We understand the District would prefer to use the dredge spoils and biofilter materials as subbase for the access road grading and, as such, the materials will be required to conform to Caltrans criteria for aggregate subbase. The required gradation and minimum sand equivalent and R-value for various classes of aggregate subbase are included in Section 25 of the Caltrans Standard Specifications and are summarized in Tables 1 and 2 below. The purpose of our services is to perform laboratory testing of the various materials to evaluate whether the materials meet Caltrans criteria for aggregate subbase.

**Table 1 – Aggregate Gradation for Aggregate Subbase**

| Sieve Size | Percentage Passing |                     |                 |                     |                 |                     |
|------------|--------------------|---------------------|-----------------|---------------------|-----------------|---------------------|
|            | Class 1            |                     | Class 2         |                     | Class 3         |                     |
|            | Operating Range    | Contract Compliance | Operating Range | Contract Compliance | Operating Range | Contract Compliance |
| 3"         | 100                | 100                 | 100             | 100                 | 100             | 100                 |
| 2.5"       | 90 – 100           | 87 – 100            | 90 – 100        | 87 – 100            | 90 – 100        | 87 – 100            |
| No. 4      | 35 – 70            | 30 – 75             | 40 – 90         | 35 – 95             | 50 – 100        | 45 – 100            |
| No. 200    | 0 – 20             | 0 - 23              | 0 – 25          | 0 - 29              | 0 - 30          | 0 – 34              |

**Table 2 – Aggregate Quality Characteristics for Aggregate Subbase**

| Quality Characteristic | Requirement     |                     |                 |                     |                 |                     |
|------------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|
|                        | Class 1         |                     | Class 2         |                     | Class 3         |                     |
|                        | Operating Range | Contract Compliance | Operating Range | Contract Compliance | Operating Range | Contract Compliance |
| Sand Equivalent        | 21              | 18                  | 21              | 18                  | 21              | 18                  |
| Resistance, (R-Value)  | --              | 60                  | --              | 50                  | --              | 40                  |

Sampling and Handling

We visited the site on June 13, 2018 to collect samples from the existing biofilters and stockpile of dredged materials. The location of the biofilters and stockpile area are shown on Figure 1. The biofilter material generally consists of subangular to subrounded, gravel- to cobble-sized fragments of rock. While the source of the material is not known, the rock appears to be derived from predominantly sandstone which classifies as “hard” to “very hard” per the USBR Field Manual<sup>(1)</sup>.

We collected bulk samples of the biofilter material at various locations around the perimeter of the primary and secondary biofilters. We understand the biofilter material will be crushed during construction to reduce the particle size, and the material will be stockpiled onsite for reuse as fill. Therefore, in preparing the samples we crushed the rock with a hammer and allowed the material to air dry to simulate the anticipated field conditions during construction. The crushed samples from each biofilter were mixed to create a single composite sample and were transported to Analytical Sciences of Petaluma, California for environmental laboratory testing.

A total of ten bulk samples of the dredge spoils were also obtained from the stockpile located approximately a quarter-mile north of the treatment plant. The bulk samples were collected by excavating hand-dug test pits to depths of about two feet below the surface of the stockpile at the approximate locations shown on Figure 2. A series of three test pits were dug at each sample location with one located near the top, middle and base of the stockpile in general accordance with Caltrans Test Method 125<sup>(2)</sup>. The samples were sealed to prevent moisture loss and were transported to our laboratory. The bulk samples were visually classified and similar soil types were thoroughly mixed to create three composite samples for geotechnical laboratory testing. From our visual examination, samples 7, 9 and 10 included relatively higher percentages of Bay Mud and were mixed to create composite sample CS-1.

<sup>1</sup> US Department of the Interior, Bureau of Reclamation, “Engineering Geology Field Manual, Second Edition”, 1998.

<sup>2</sup> Caltrans, “Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections (California Test 125), May 2014.

Geotechnical Laboratory Testing

Geotechnical laboratory tests were performed on the composite samples of dredge spoils to further classify the soils and estimate engineering properties. The following laboratory tests were conducted in general accordance with the test method cited:

- Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index, ASTM D4318
- Standard Test Method for Particle-Size Analysis of Soils, ASTM D422
- Sand Equivalent, California Test 217
- Resistance “R” Value by the Stabilometer, California Test 301

Testing for particle size, liquid limit, plastic limit and plasticity index was completed by Miller Pacific, whereas testing for R-value and sand equivalent was completed by Environmental Testing Services of Petaluma, California. The results of the geotechnical laboratory testing of dredge spoils are presented in Appendix A and are summarized in Table 3.

**Table 3 – Summary of Dredge Spoils Laboratory Test Results**

| Composite Sample ID | Sample Locations <sup>(1)</sup> | Particle Size |            |          | Plasticity Index | Sand Equivalent | R-Value |
|---------------------|---------------------------------|---------------|------------|----------|------------------|-----------------|---------|
|                     |                                 | Fines (%)     | Gravel (%) | Sand (%) |                  |                 |         |
| CS-1                | 7, 9, 10                        | 45.8          | 6.9        | 47.3     | 49               | 10              | 42      |
| CS-2                | 1, 2, 6                         | 39.1          | 15.8       | 45.1     | 17               | 8               | 49      |
| CS-3                | 3, 4, 5, 8                      | 43.8          | 15.8       | 40.4     | 15               | 7               | 47      |

Environmental Laboratory Testing

The composite sample of the biofilter material was tested to provide preliminary information pertaining to potential contamination. The analyses of the composite sample included the following tests:

- Volatile Hydrocarbons by GC/MS (EPA 8260B)
- Total Petroleum Hydrocarbons, Gasoline (EPA 8015B)
- Total Petroleum Hydrocarbons, Diesel & Motor Oil (EPA 8015B)
- CAM 17 Metals (EPA 6010B)
- Semi-Volatile Organics (SW8270C)

The results of the environmental laboratory testing are presented in Appendix B.

### Conclusions

Based on the results of our geotechnical laboratory testing of the dredge spoils, composite sample CS-1 is classified as clayey sand per the Unified Soil Classification System, whereas composite samples CS-2 and CS-3 classify as clayey sand with gravel. The USCS group symbol for these soil types is "SC".

The testing indicates the dredge spoils do not meet the Caltrans criteria for aggregate subbase due to the relatively low sand equivalent values. Additionally, the materials are classified as "unsatisfactory soils" per Section 312000 of the project specifications since the USCS soil group classification is "SC". Therefore, the dredge spoil materials also do not appear to be acceptable for use as structural fill per the current specifications. We note that the criteria for structural fill in the specifications is relatively restrictive based on our experience with similar projects. The District should consult with the project Geotechnical Engineer to review the dredge spoils laboratory test results and determine whether there are specific applications for which the fill would be suitable (e.g. trench backfill, select fill for roadway construction, etc.)

Considering the biofilter material consists of relatively hard rock, we anticipate the material could be reused for aggregate subbase or structural fill provided it is crushed and processed to meet the respective gradation requirements. Alternatively, the crushed biofilter material could potentially be blended with the dredge spoils and graded to provide a more gravelly material which could be suitable for subbase and/or structural fill. Additional gradation testing of the crushed biofilter material should be performed during construction to confirm the material meets the appropriate gradation requirements.

Hazardous waste disposal is regulated at the Federal level by the Resource Conservation and Recovery Act and at the State level by Title 22 of the California Administrative Manual and the California Department of Toxic Substance Control. Additional regulations are locally imposed by the San Francisco Bay Area Regional Water Quality Control Board. The results of the environmental laboratory testing indicate the biofilter material is generally not considered hazardous toxic waste in accordance with federal and state regulations. While a number of the CAM 17 metals were detected, the test results indicate the levels are below the Title 22 specified total threshold limit concentration. Additionally, while a relatively low level of motor oil was detected in the composite sample, the level is below the San Francisco Bay Area Regional Water Quality Control Board's<sup>3</sup> "Tier 1" Environmental Screening Levels for soil.

---

<sup>3</sup> San Francisco Bay Regional Water Quality Control Board, "Environmental Screening Levels, Rev 3" ([www.waterboards.ca.gov](http://www.waterboards.ca.gov)), February 2016.

Las Gallinas Valley Sanitary District  
Page 5

July 17, 2018

We trust that this letter contains the information you require at this time. Please do not hesitate to contact us should there be any questions or should you wish to discuss the results of our testing.

Very truly yours,  
MILLER PACIFIC ENGINEERING GROUP

REVIEWED BY



Rusty Arend  
Geotechnical Engineer No. 3031  
(Expires 6/30/19)

Scott Stephens  
Geotechnical Engineer No. 2398  
(Expires 6/30/19)

Attachments: Figure 1, Appendices A and B



APPROX. LOCATION OF STOCKPILE

LEVEE ACCESS ROAD

ST. VINCENT ACCESS ROAD

MILLER CREEK

SECONDARY BIO-FILTER

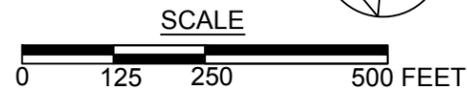
PRIMARY BIO-FILTER

SMITH RANCH ROAD

**LEGEND:**



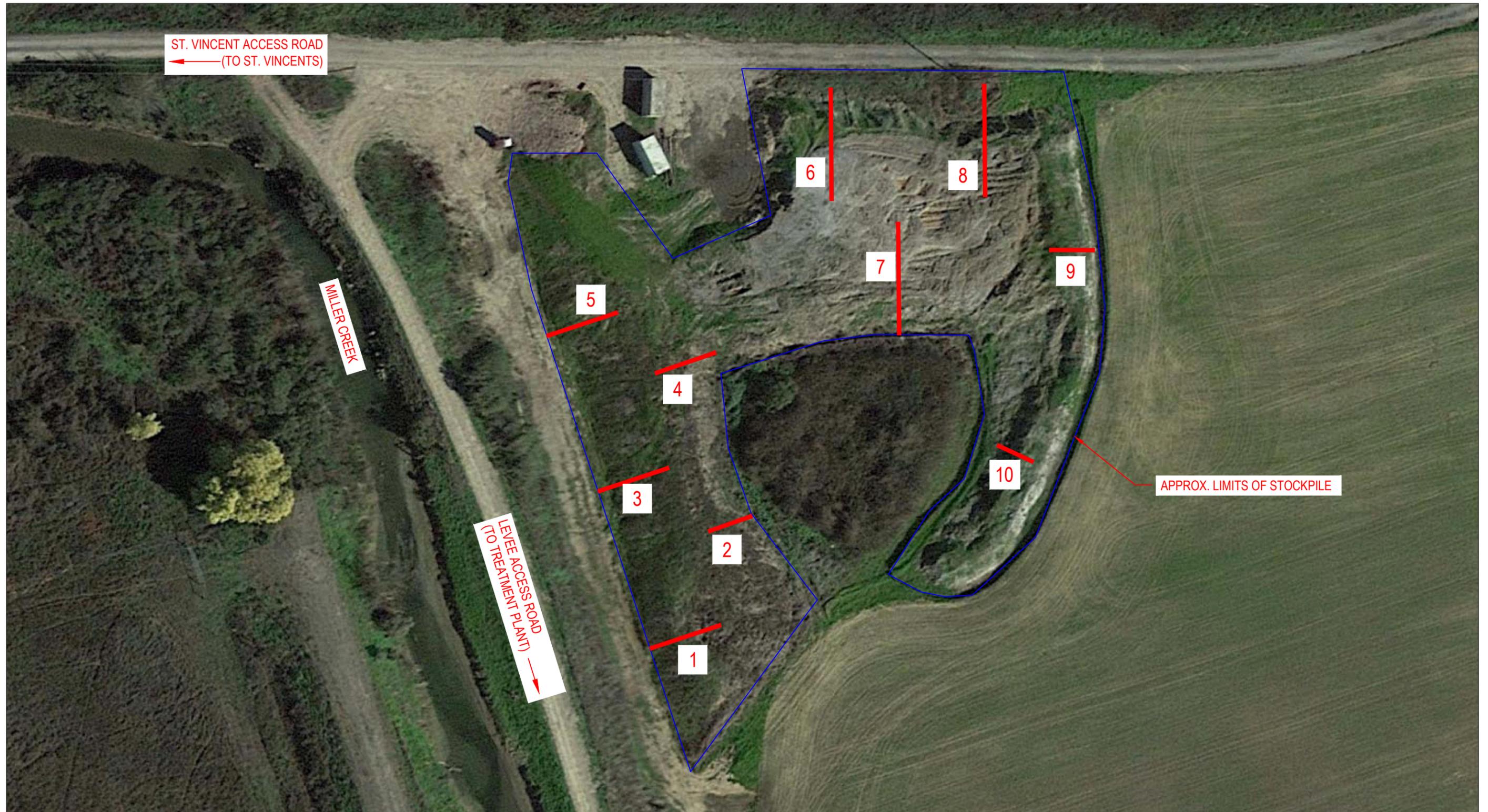
APPROX. LOCATION OF BULK SAMPLE



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 FILE: 1009.093 Figures.dwg

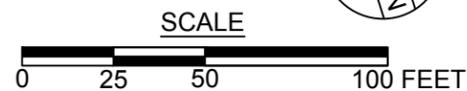
504 Redwood Blvd.  
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 Novato, CA 94947  
 T 415 / 382-3444  
 F 415 / 382-3450  
 www.millerpac.com

|  |                    |
|--|--------------------|
| <b>STOCKPILE &amp; BIOFILTER LOCATIONS</b>                         |                    |
| LGVSD Secondary Treatment Plant Upgrades<br>San Rafael, California |                    |
| Project No. 1009.093   | Date: 7/13/2018    |
| Drawn: RCA   | <b>1</b><br>FIGURE |
| Checked: SAS   |                    |
| Page 560 of 658  |                    |



**LEGEND:**

 APPROX. LOCATION OF BULK SAMPLE



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 FILE: 1009.093 Sampling Locations.dwg

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 F 415 / 382-3450  
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**STOCKPILE SAMPLING LOCATIONS**

LGVSD Secondary Treatment  
 Plant Upgrades  
 San Rafael, California

Project No. 1009.093 Date: 7/13/2018

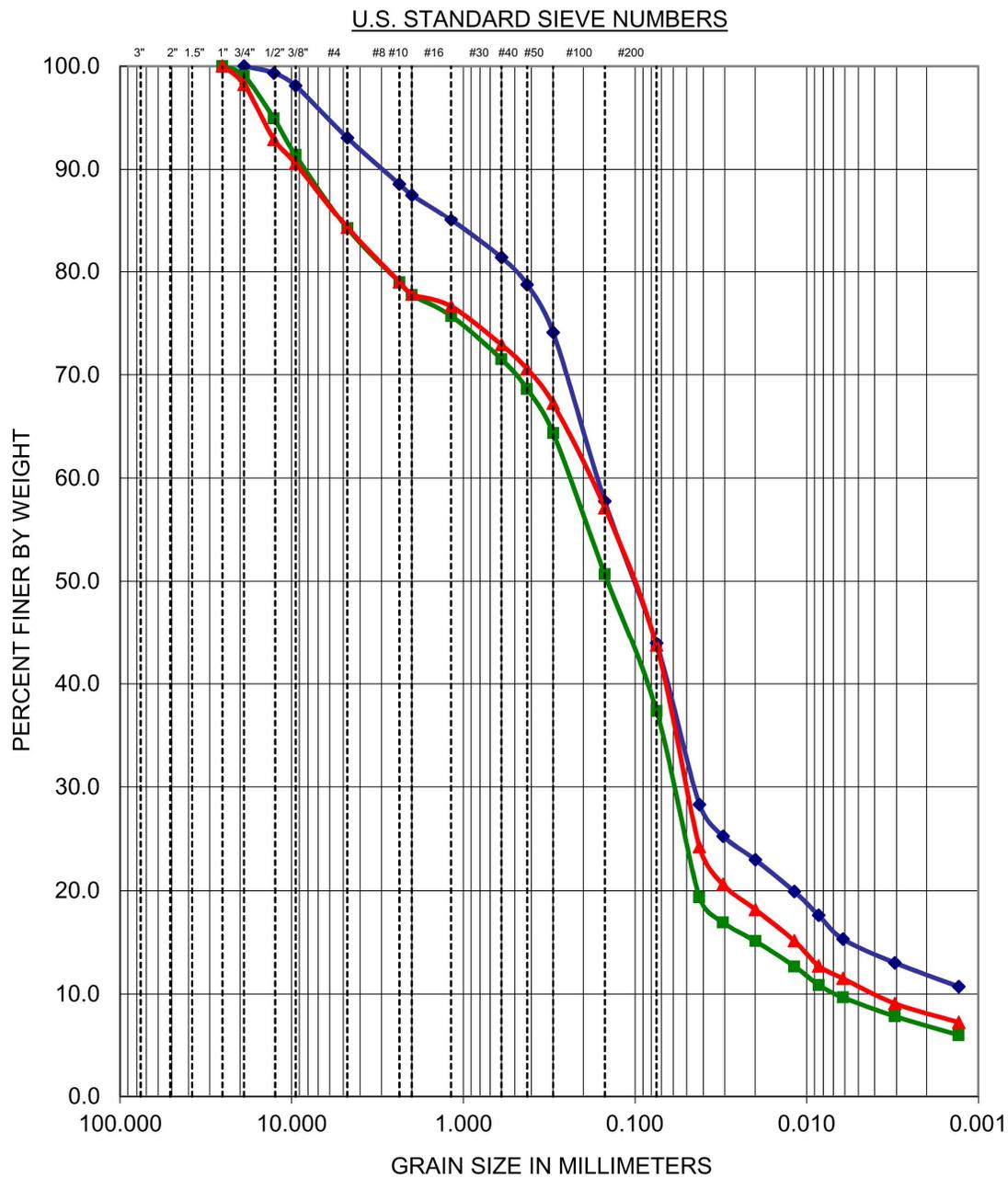
Drawn: RCA  
 Checked: SAS

**2**

FIGURE  
 Page 501 of 558



**APPENDIX A**  
**GEOTECHNICAL LABORATORY TEST RESULTS**



| SYMBOL | SAMPLE SOURCE                  | CLASSIFICATION               |
|--------|--------------------------------|------------------------------|
| —◆—    | CS-1 (Bulk Samples 7, 9, & 10) | Clayey SAND (SC)             |
| —■—    | CS-2 (Samples 1, 2, & 6)       | Clayey SAND with Gravel (SC) |
| —▲—    | CS-3 (Samples 3, 4, 5, & 8)    | Clayey SAND with Gravel (SC) |

Test: ASTM D-422



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SIEVE ANALYSES

LGVSD Secondary Treatment  
 Plant Upgrades  
 San Rafael, California

Project No. 1009.093 Date: 7/13/2016

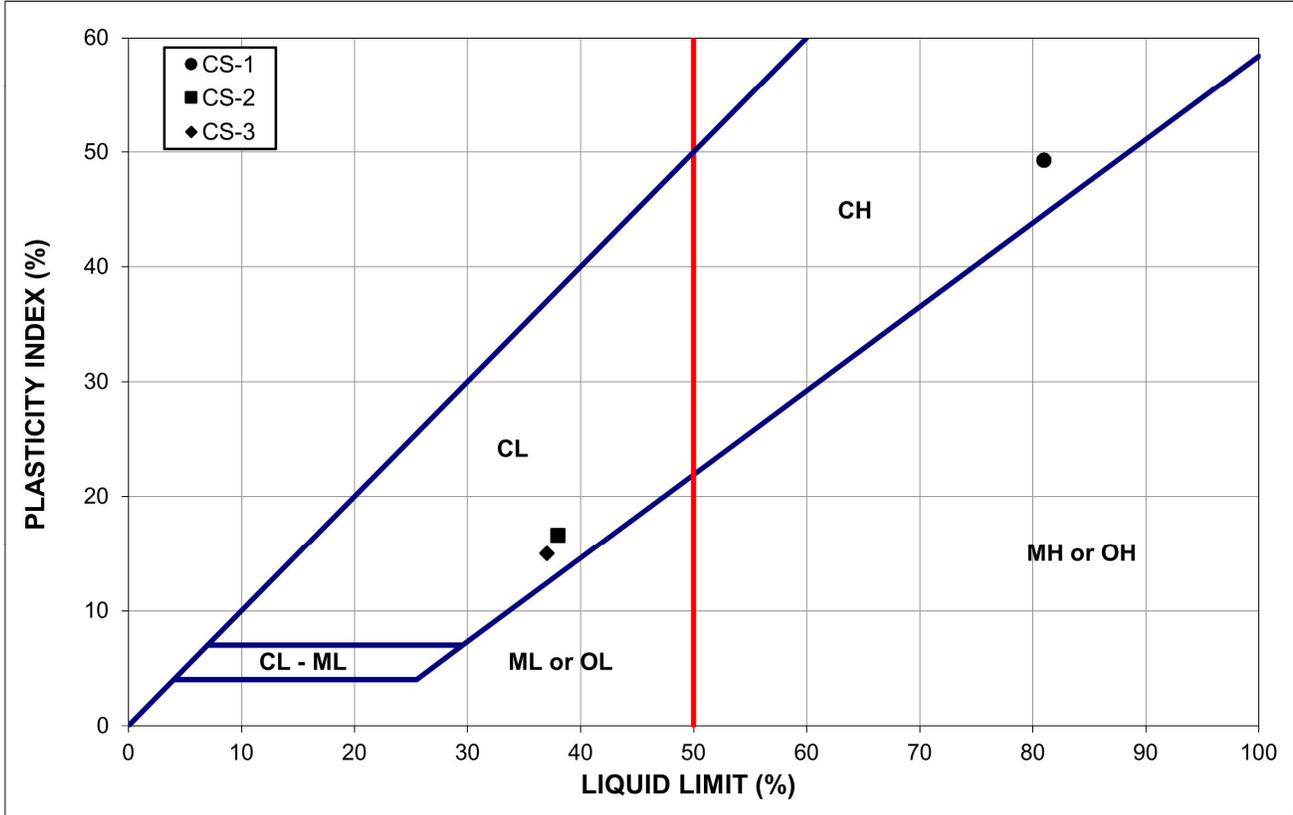
Drawn RCA  
 Checked

**A-1**

FIGURE  
 Page 533 of 658

# MILLER PACIFIC ENGINEERING GROUP

## ATTERBERG LIMITS TEST (ASTM D 4318)



| Sample | Classification                              | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) |
|--------|---|------------------|-------------------|----------------------|
| CS-1   | Clayey SAND (SC)<br>brown                   | 81               | 32                | 49                   |
| CS-2   | Clayey SAND with Gravel (SC)<br>light brown | 38               | 21                | 17                   |
| CS-3   | Clayey SAND with Gravel (SC)<br>light brown | 37               | 22                | 15                   |

PI = 0-3: Non-Plastic  
 PI = 3-15: Slightly Plastic  
 PI = 15-30: Medium Plasticity  
 PI = >30: High Plasticity



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### ATTERBERG LIMITS

LGVSD Secondary Treatment  
 Plant Upgrades  
 San Rafael, California

Project No. 1009.093 Date: 7/13/2016

Drawn RCA  
 Checked

# A-2

FIGURE  
 Page 524 of 658



# ETS

## Environmental Technical Services

-Soil, Water & Air Testing & Monitoring  
-Analytical Labs  
-Technical Support

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Petaluma, CA 94954  
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**Serving people and the environment  
so that both benefit.**

## DURABILITY, SAND EQUIVALENT and R-VALUE REPORT

**To:** Rusty Arend  
Miller Pacific Engin. Group  
504 Redwood Blvd., Suite 220  
Novato, CA 94947

**Date:** July 10, 2018

**Lab #:** 07808-1 thru 078087-3

**Received:** June 22, 2018

**Sample Proc:** S, Santos

**Samples of:** Silty Clays (w  
some sand & gravel)

**Job Supervisor:** D. Jacobson

**Job Director:** G.S. Conrad, Ph.D.

**Job No.:** 1009.093

**Sample ID(s):** CS-1, CS-1, and CS-3

**Site Location:** Las Gallinas Valley Sanitary Dist, 300 Smith Ranch Rd, San Rafael, Calif.

### RESULTS

| SAMPLE<br>ID | SAND<br>EQUIVLAENT | DURABILITY TEST RESULTS                                |                      |                     | R-Value    |
|--------------|--------------------|--|----------------------|---------------------|------------|
|              |                    | FINES<br>DURABILITY                                    | COARSE<br>DURABILITY | DURABILITY<br>INDEX |            |
| CS-1         | <b>10</b>          | --   | --                   | --                  | <b>42</b>  |
|              | 8.7, 9.6, 9.4      | Expansion Pressure (@ 300 psi Exud. Pres. @ 300 psf) → |                      |                     | <b>345</b> |
| CS-2         | <b>8</b>           | --   | --                   | --                  | <b>49</b>  |
|              | 8.0, 7.9, 8.1      | Expansion Pressure (@ 300 psi Exud. Pres. @ 300 psf) → |                      |                     | <b>140</b> |
| CS-3         | <b>7</b>           | --   | --                   | --                  | <b>47</b>  |
|              | 6.9, 6.6, 7.1      | Expansion Pressure (@ 300 psi Exud. Pres. @ 300 psf) → |                      |                     | <b>97</b>  |

### COMMENTS

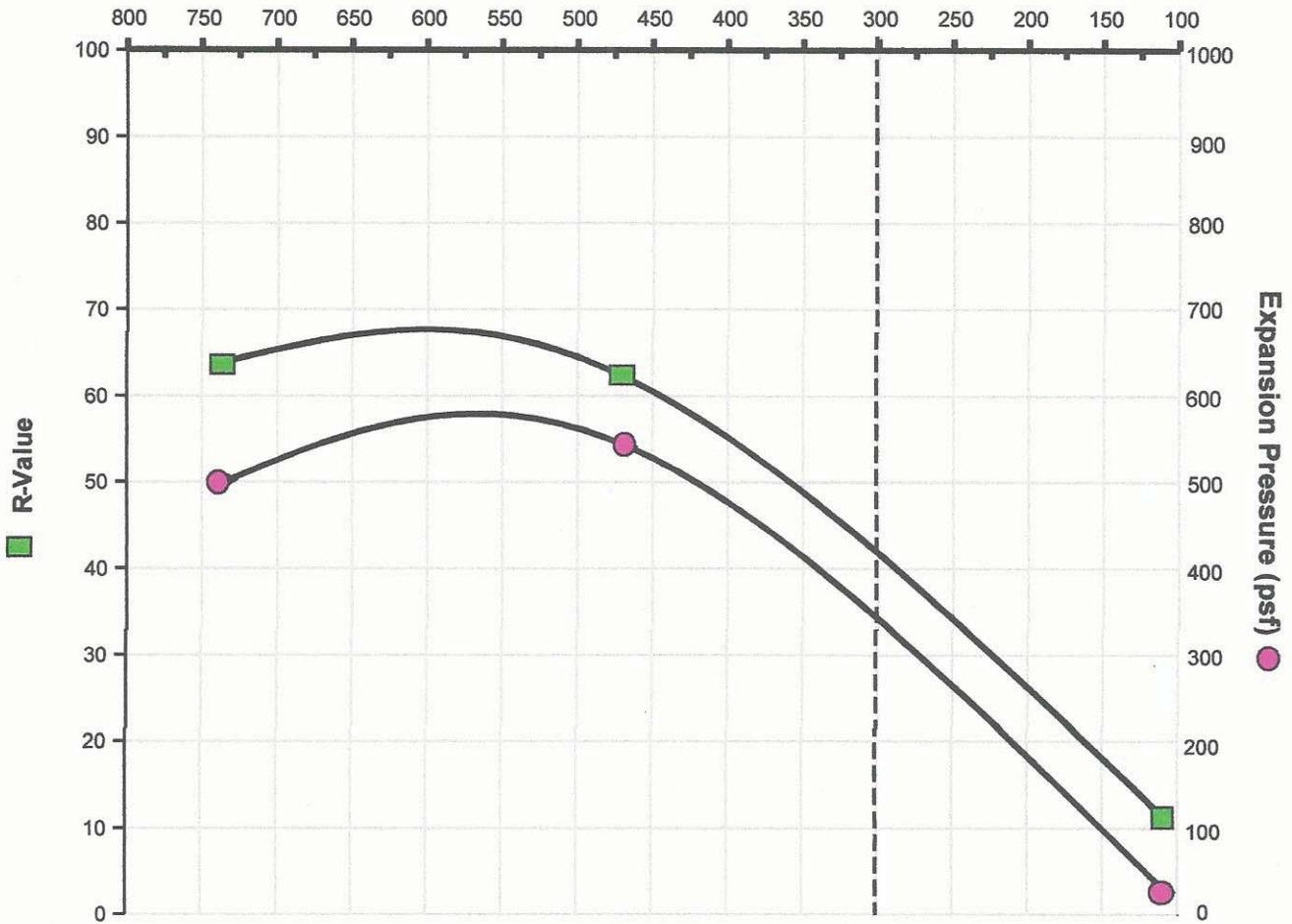
These procedures determine degree of hardness, granularity and strength of submitted materials. These materials all have fairly low SE values being at 10 or less. They do possess some sand and even gravel, but appear to be mostly comprised of silts and clays. While silts probably dominate proportionally, clays may dominate in terms of their physio-mechanical properties. The R-Values of the these native soil materials are all in the moderate range of 40-50, and they exhibit high to very high exudation pressures.

#### NOTES:

Tests are done in accordance with Cal Trans methodologies as follows: Coarse & Fines Durability/Durability Index - Cal Test 229; Sand Equivalent (three trials average) - Cal Test 217; R-Value - Cal Test 301 (=ASTM D2844).

# R-VALUE TEST REPORT

Exudation Pressure (psi)

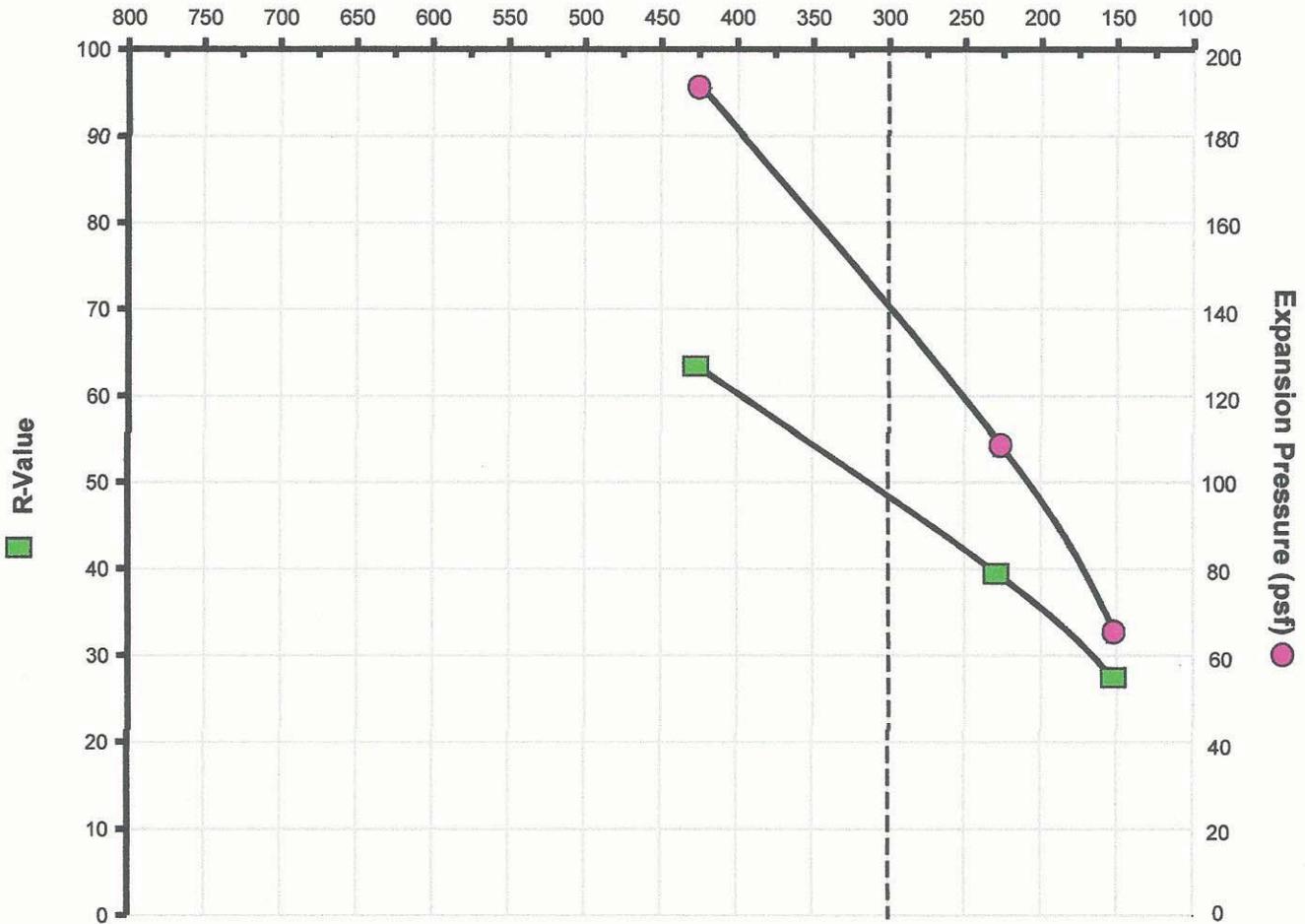


| Test Data & Conditions for Each Point |            | Wet Weight, gm: 544.6, 499.6, 563.1  |                |                           | Total Weight, gm: 3148.0, 3149.0, 3179.0 |                            |                    |                                    |                     |            |
|---------------------------------------|------------|--------------------------------------|----------------|---------------------------|--|----------------------------|--------------------|------------------------------------|---------------------|------------|
|                                       |            | Dry Weight, gm: 440.7, 438.1, 497.6  |                |                           | Mold Weight, gm: 2182.0, 2181.0, 2165.0  |                            |                    |                                    |                     |            |
|                                       |            | Tare Weight, gm: 115.3, 116.0, 115.4 |                |                           | Exudate Load (lbs.): 1340, 5850, 9200    |                            |                    |                                    |                     |            |
| Test Point                            | Moisture % | Density pcf                          | Sample Ht. in. | Lateral Press. @ 2000 lbs | Compaction Pressure                      | Expansion Pressures        | Exudation Pressure | R Value                            | R-Value (corrected) |            |
| 1                                     | 31.9       | 88.4                                 | 2.51           | 132                       | 105 psi                                  | 26 psf                     | 107 psi            | 11                                 | 11                  |            |
| 2                                     | 19.1       | 105.3                                | 2.34           | 40                        | 320 psi                                  | 541 psf                    | 466 psi            | 67                                 | 62                  |            |
| 3                                     | 17.1       | 108.0                                | 2.43           | 41                        | 320 psi                                  | 502 psf                    | 732 psi            | 67                                 | 64                  |            |
| Sample No.:                           |            | 07808-1                              |                | Sample Description:       |  | Lt. Olive Brown Silty Clay |                    | Exp. Pres. @ 300 psi               |                     | <b>345</b> |
|                                       |            |                                      |                |                           |  |                            |                    | R Value @ 300 psi Exudate Pressure |                     | <b>42</b>  |

|   |   |  |                  |                |                          |
|---|---|--|------------------|----------------|--------------------------|
| <b>Environmental<br/>Technical<br/>Services</b> | <b>R-VALUE TEST</b>                               |  |                  | Sample Source: | <b>Plate:<br/><br/>1</b> |
|   | Client: Miller Pacific Engineering Group          |  |                  | native soil    |                          |
|   | Location/Job: 504 Redwood Blvd., #220, Novato, CA |  |                  | Sample ID:     |                          |
|   | Project No.: 1009.093                             |  | Date: 07/10/2018 | CS-1           |                          |

# R-VALUE TEST REPORT

Exudation Pressure (psi)

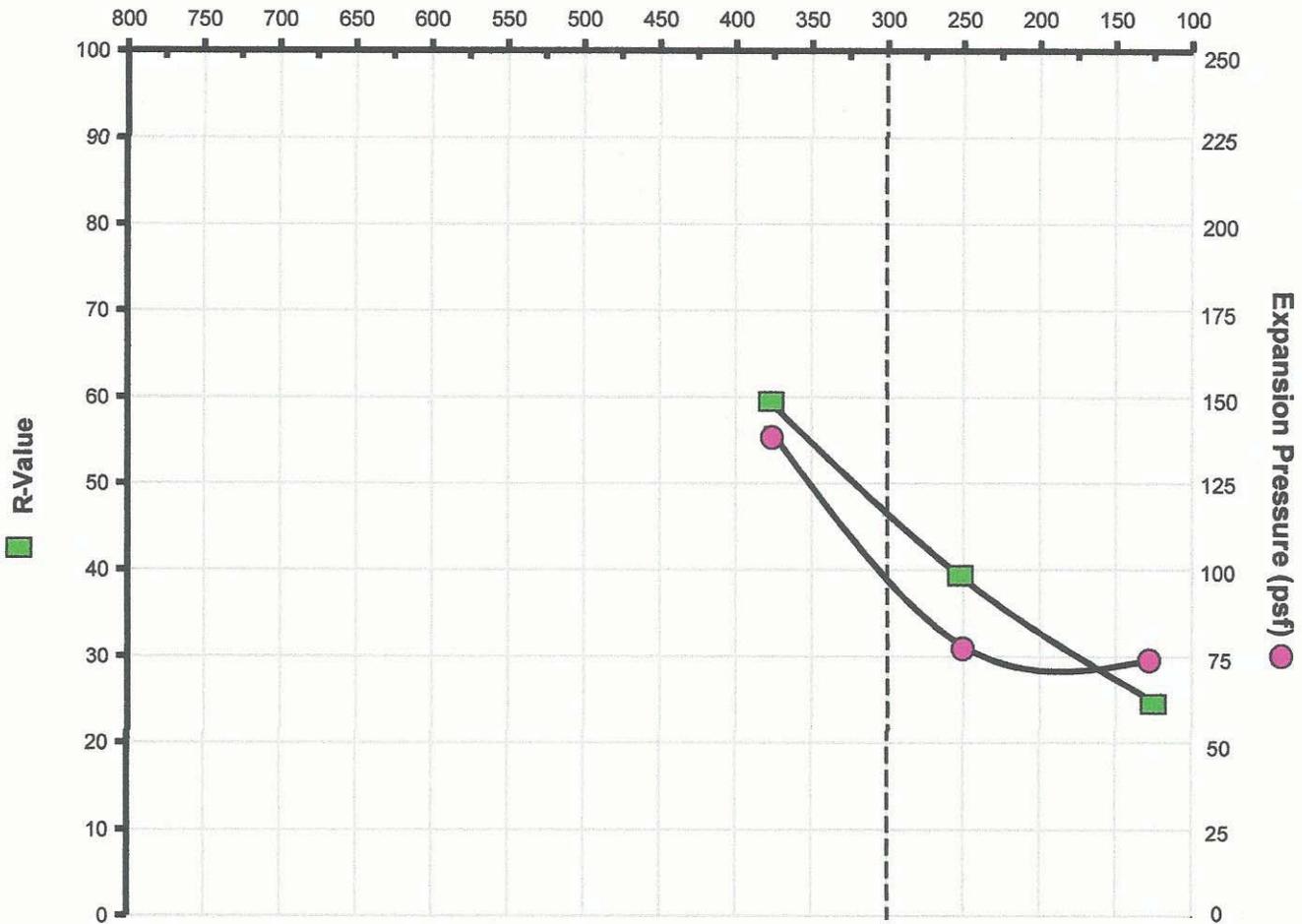


| Test Data & Conditions for Each Point |            | Wet Weight, gm: 683.8, 652.0, 390.7  |                |                           | Total Weight, gm: 3216.0, 3200.0, 3294.0 |                                |                    |                                    |                     |
|---------------------------------------|------------|--------------------------------------|----------------|---------------------------|--|--------------------------------|--------------------|------------------------------------|---------------------|
|                                       |            | Dry Weight, gm: 621.0, 586.0, 621.9  |                |                           | Mold Weight, gm: 2151.0, 2083.0, 2186.0  |                                |                    |                                    |                     |
|                                       |            | Tare Weight, gm: 193.7, 191.3, 188.5 |                |                           | Exudate Load (lbs.): 5320, 1900, 2830    |                                |                    |                                    |                     |
| Test Point                            | Moisture % | Density pcf                          | Sample Ht. in. | Lateral Press. @ 2000 lbs | Compaction Pressure                      | Expansion Pressures            | Exudation Pressure | R Value                            | R-Value (corrected) |
| 1                                     | 14.7       | 116.3                                | 2.42           | 37                        | 300 psi                                  | 191 psf                        | 423 psi            | 66                                 | 63                  |
| 2                                     | 16.7       | 111.2                                | 2.61           | 100                       | 175 psi                                  | 65 psf                         | 151 psi            | 25                                 | 27                  |
| 3                                     | 15.9       | 112.8                                | 2.57           | 75                        | 300 psi                                  | 108 psf                        | 225 psi            | 37                                 | 39                  |
| Sample No.:                           |            | 07808-2                              |                | Sample Description:       |  | Lt. Yellowish Brown Silty Clay |                    | Exp.Pres. @ 300 psi                | 140                 |
|                                       |            |                                      |                |                           |  |                                |                    | R Value @ 300 psi Exudate Pressure | 49                  |

|   |   |                  |              |                          |
|---|---|------------------|--------------|--------------------------|
| <b>Environmental<br/>Technical<br/>Services</b> | <b>R-VALUE TEST</b>                               |                  | Sample Type: | <b>Plate:<br/><br/>2</b> |
|   | Client: Miller Pacific Engineering Group          |                  | native soil  |                          |
|   | Location/Job: 504 Redwood Blvd., #220, Novato, CA |                  | Sample ID:   |                          |
|   | Project No.: 1009.093                             | Date: 07/10/2018 | CS-2         |                          |

# R-VALUE TEST REPORT

Exudation Pressure (psi)



| Test Data & Conditions for Each Point |            | Wet Weight, gm: 680.6, 715.8, 648.2  |                |                           | Total Weight, gm: 3166.0, 3256.0, 3241.0 |                            |                    |                                    |                     |           |
|---------------------------------------|------------|--------------------------------------|----------------|---------------------------|--|----------------------------|--------------------|------------------------------------|---------------------|-----------|
|                                       |            | Dry Weight, gm: 623.2, 644.9, 594.2  |                |                           | Mold Weight, gm: 2083.0, 2188.0, 2183.0  |                            |                    |                                    |                     |           |
|                                       |            | Tare Weight, gm: 197.0, 197.1, 191.0 |                |                           | Exudate Load (lbs.): 3140, 1590, 4710    |                            |                    |                                    |                     |           |
| Test Point                            | Moisture % | Density pcf                          | Sample Ht. in. | Lateral Press. @ 2000 lbs | Compaction Pressure                      | Expansion Pressures        | Exudation Pressure | R Value                            | R-Value (corrected) |           |
| 1                                     | 13.5       | 117.2                                | 2.47           | 78                        | 275 psi                                  | 74 psf                     | 250 psi            | 39                                 | 39                  |           |
| 2                                     | 15.8       | 112.3                                | 2.49           | 102                       | 195 psi                                  | 78 psf                     | 127 psi            | 25                                 | 25                  |           |
| 3                                     | 13.4       | 118.4                                | 2.39           | 44                        | 320 psi                                  | 139 psf                    | 375 psi            | 62                                 | 59                  |           |
| Sample No.:                           |            | 07808-3                              |                | Sample Description:       |  | Lt. Olive Brown Silty Clay |                    | Exp.Pres. @ 300 psi                |                     | <b>97</b> |
|                                       |            |                                      |                |                           |  |                            |                    | R Value @ 300 psi Exudate Pressure |                     | <b>47</b> |

|   |   |                  |  |                    |                          |
|---|---|------------------|--|--------------------|--------------------------|
| <b>Environmental<br/>Technical<br/>Services</b> | <b>R-VALUE TEST</b>   |                  |  | Sample Type:       | <b>Plate:<br/><br/>3</b> |
|   | Client: Miller Pacific Engineering Group<br>504 Redwood Blvd., #220, Novato, CA |                  |  | native soil        |                          |
|   | Location/Job: Las Gallinas Valley Sanitary Dist.<br>Project No.: 1009.093       |                  |  | Sample ID:<br>CS-3 |                          |
|   |   | Date: 07/10/2018 |  |                    |                          |



**APPENDIX B**  
**ENVIRONMENTAL LABORATORY TEST RESULTS**



Report Date: July 12, 2018

## Laboratory Report

Rusty Arend  
Miller Pacific Engineering - Novato  
504 Redwood Blvd., Suite 220  
Novato, CA 94947

Project Name: **LBUSD** **1009.093 - Biofilter Testing**  
Lab Project Number: **8070903**

This 13 page report of analytical data has been reviewed and approved for release.

---

Michele Peters  
Laboratory Director



## Volatile Hydrocarbons by GC/MS

| Lab#       | Sample ID | Compound Name                     | Result (µg/kg) |     | RDL (µg/kg) |
|------------|-----------|-----------------------------------|----------------|-----|-------------|
| 8070903-01 | BF - 1/2  | Dichlorodifluoromethane (F-12)    | ND             | HT2 | 2.0         |
|            |           | Chloromethane                     | ND             |     | 2.0         |
|            |           | Vinyl chloride                    | ND             |     | 2.0         |
|            |           | Chloroethane (CE)                 | ND             |     | 2.0         |
|            |           | Bromomethane                      | ND             |     | 2.0         |
|            |           | Trichlorofluoromethane (F-11)     | ND             |     | 2.0         |
|            |           | Trichlorotrifluoroethane (F-113)  | ND             |     | 2.0         |
|            |           | 1,1-Dichloroethene (1,1-DCE)      | ND             |     | 2.0         |
|            |           | Methylene chloride                | ND             |     | 2.0         |
|            |           | trans-1,2-Dichloroethene          | ND             |     | 2.0         |
|            |           | 1,1-Dichloroethane (1,1-DCA)      | ND             |     | 2.0         |
|            |           | cis-1,2-Dichloroethene (c1,2-DCE) | ND             |     | 2.0         |
|            |           | 2,2-Dichloropropane               | ND             |     | 2.0         |
|            |           | Chloroform (THM1)                 | ND             |     | 2.0         |
|            |           | Bromochloromethane                | ND             |     | 2.0         |
|            |           | 1,1,1-Trichloroethane (TCA)       | ND             |     | 2.0         |
|            |           | 1,2-Dichloroethane (EDC)          | ND             |     | 2.0         |
|            |           | 1,1-Dichloropropene               | ND             |     | 2.0         |
|            |           | Carbon tetrachloride              | ND             |     | 2.0         |
|            |           | Benzene                           | ND             |     | 2.0         |
|            |           | Trichloroethene (TCE)             | ND             |     | 2.0         |
|            |           | 1,2-Dichloropropane (DCP)         | ND             |     | 2.0         |
|            |           | Dibromomethane                    | ND             |     | 2.0         |
|            |           | Bromodichloromethane (THM2)       | ND             |     | 2.0         |
|            |           | cis-1,3-Dichloropropene           | ND             |     | 2.0         |
|            |           | Toluene                           | ND             |     | 2.0         |
|            |           | 1,1,2-Trichloroethane             | ND             |     | 2.0         |
|            |           | 1,3-Dichloropropane               | ND             |     | 2.0         |
|            |           | Dibromochloromethane (THM3)       | ND             |     | 2.0         |
|            |           | Tetrachloroethene (PCE)           | ND             |     | 2.0         |
|            |           | 1,2-Dibromoethane (EDB)           | ND             |     | 2.0         |
|            |           | Chlorobenzene                     | ND             |     | 2.0         |
|            |           | 1,1,1,2-Tetrachloroethane         | ND             |     | 2.0         |
|            |           | Ethylbenzene                      | ND             |     | 2.0         |
|            |           | m,p-Xylene                        | ND             |     | 2.0         |
|            |           | Styrene                           | ND             |     | 2.0         |
|            |           | o-Xylene                          | ND             |     | 2.0         |
|            |           | Bromoform (THM4)                  | ND             |     | 2.0         |
|            |           | 1,1,2,2-Tetrachloroethane         | ND             |     | 2.0         |
|            |           | Isopropylbenzene                  | ND             |     | 2.0         |
|            |           | 1,2,3-Trichloropropane            | ND             |     | 2.0         |
|            |           | Bromobenzene                      | ND             |     | 2.0         |
|            |           | n-Propyl Benzene                  | ND             |     | 2.0         |
|            |           | 2-Chlorotoluene                   | ND             |     | 2.0         |
|            |           | 4-Chlorotoluene                   | ND             |     | 2.0         |
|            |           | 1,3,5-Trimethylbenzene            | ND             |     | 2.0         |
|            |           | tert-Butylbenzene                 | ND             |     | 2.0         |
|            |           | 1,2,4-Trimethylbenzene            | ND             |     | 2.0         |
|            |           | sec-Butylbenzene                  | ND             |     | 2.0         |



### Volatile Hydrocarbons by GC/MS

| Lab#       | Sample ID | Compound Name                  | Result (µg/kg) | RDL (µg/kg)          |        |
|------------|-----------|--------------------------------|----------------|----------------------|--------|
| 8070903-01 | BF - 1/2  | 1,3-Dichlorobenzene            | ND             | 2.0                  |        |
|            |           | 1,4-Dichlorobenzene            | ND             | 2.0                  |        |
|            |           | 1,2-Dichlorobenzene            | ND             | 2.0                  |        |
|            |           | p-Isopropyltoluene             | ND             | 2.0                  |        |
|            |           | n-Butylbenzene                 | ND             | 2.0                  |        |
|            |           | 1,2-Dibromo-3-chloropropane    | ND             | 2.0                  |        |
|            |           | 1,2,4-Trichlorobenzene         | ND             | 2.0                  |        |
|            |           | Naphthalene                    | ND             | 2.0                  |        |
|            |           | Hexachlorobutadiene            | ND             | 2.0                  |        |
|            |           | 1,2,3-Trichlorobenzene         | ND             | 2.0                  |        |
|            |           | Tertiary Butyl Alcohol (TBA)   | ND             | 25                   |        |
|            |           | Methyl tert-Butyl Ether (MTBE) | ND             | 2.0                  |        |
|            |           | Di-isopropyl Ether (DIPE)      | ND             | 2.0                  |        |
|            |           | Ethyl tert-Butyl Ether (ETBE)  | ND             | 2.0                  |        |
|            |           | Tert-Amyl Methyl Ether (TAME)  | ND             | 2.0                  |        |
| Surrogates |           | Result (µg/kg)                 | % Recovery     | Acceptance Range (%) |        |
|            |           | Dibromofluoromethane           | 42.8           | 89                   | 70-130 |
|            |           | Toluene-d8                     | 47.4           | 98                   | 70-130 |
|            |           | 4-Bromofluorobenzene           | 50.8           | 105                  | 70-130 |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 06/13/18 | Date Analyzed: | 07/09/18  | QC Batch: | B017838 |
| Date Received: | 07/09/18 | Method:        | EPA 8260B |           |         |

### TPH Gasoline

| Lab#       | Sample ID | Compound Name | Result (mg/kg) | RDL (mg/kg) |
|------------|-----------|---------------|----------------|-------------|
| 8070903-01 | BF - 1/2  | Gasoline      | ND HT2         | 1.0         |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 06/13/18 | Date Analyzed: | 07/09/18  | QC Batch: | B017836 |
| Date Received: | 07/09/18 | Method:        | EPA 8015B |           |         |



### TPH Diesel & Motor Oil

| Lab#       | Sample ID | Compound Name | Result (mg/kg) |     | RDL (mg/kg) |
|------------|-----------|---------------|----------------|-----|-------------|
| 8070903-01 | BF - 1/2  | Diesel        | ND             | HT2 | 5.0         |
|            |           | Motor Oil     | 76             |     | 50          |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 06/13/18 | Date Analyzed: | 07/10/18  | QC Batch: | B017842 |
| Date Received: | 07/09/18 | Method:        | EPA 8015B |           |         |

### CAM Metals

| Lab#       | Sample ID | Compound Name   | Result (mg/kg) |  | RDL (mg/kg) |
|------------|-----------|-----------------|----------------|--|-------------|
| 8070903-01 | BF - 1/2  | Antimony (Sb)   | ND             |  | 5.0         |
|            |           | Arsenic (As)    | 2.0            |  | 1.5         |
|            |           | Barium (Ba)     | 33             |  | 2.0         |
|            |           | Beryllium (Be)  | ND             |  | 0.50        |
|            |           | Cadmium (Cd)    | ND             |  | 0.50        |
|            |           | Chromium (Cr)   | 24             |  | 1.5         |
|            |           | Cobalt (Co)     | 7.1            |  | 1.5         |
|            |           | Copper (Cu)     | 40             |  | 2.0         |
|            |           | Lead (Pb)       | 3.6            |  | 3.0         |
|            |           | Molybdenum (Mo) | ND             |  | 1.0         |
|            |           | Nickel (Ni)     | 29             |  | 2.0         |
|            |           | Selenium (Se)   | ND             |  | 5.0         |
|            |           | Silver (Ag)     | ND             |  | 1.0         |
|            |           | Thallium (Tl)   | ND             |  | 5.0         |
|            |           | Vanadium (V)    | 18             |  | 2.0         |
|            |           | Zinc (Zn)       | 38             |  | 5.0         |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 06/13/18 | Date Analyzed: | 07/11/18  | QC Batch: | B017830 |
| Date Received: | 07/09/18 | Method:        | EPA 6010B |           |         |

### Mercury

| Lab#       | Sample ID | Compound Name | Result (mg/kg) |     | RDL (mg/kg) |
|------------|-----------|---------------|----------------|-----|-------------|
| 8070903-01 | BF - 1/2  | Mercury (Hg)  | ND             | HT2 | 0.10        |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 06/13/18 | Date Analyzed: | 07/11/18  | QC Batch: | B017785 |
| Date Received: | 07/09/18 | Method:        | EPA 7471A |           |         |



## Notes and Definitions

---

|     |  |
|-----|--|
| HT2 | The sample was received and therefore analyzed after the recommended holding time. |
| RDL | Reporting Detection Limit  |
| ND  | Analyte NOT DETECTED at or above the reporting detection limit (RDL)               |
| RPD | Relative Percent Difference  |
| NR  | Not Reported   |



## Glossary of Terms & Qualifier Definitions

**Client:** Analytical Sciences  
**Project:** 8070903; Biofilter Testing  
**WorkOrder:** 1807338

### Glossary Abbreviation

|              |  |
|--------------|--|
| %D           | Serial Dilution Percent Difference   |
| 95% Interval | 95% Confident Interval   |
| DF           | Dilution Factor  |
| DI WET       | (DISTLC) Waste Extraction Test using DI water  |
| DISS         | Dissolved (direct analysis of 0.45 µm filtered and acidified water sample)               |
| DLT          | Dilution Test (Serial Dilution)  |
| DUP          | Duplicate  |
| EDL          | Estimated Detection Limit  |
| ERS          | External reference sample. Second source calibration verification.                       |
| ITEF         | International Toxicity Equivalence Factor  |
| LCS          | Laboratory Control Sample  |
| MB           | Method Blank   |
| MB % Rec     | % Recovery of Surrogate in Method Blank, if applicable                                   |
| MDL          | Method Detection Limit   |
| ML           | Minimum Level of Quantitation  |
| MS           | Matrix Spike   |
| MSD          | Matrix Spike Duplicate   |
| N/A          | Not Applicable   |
| ND           | Not detected at or above the indicated MDL or RL   |
| NR           | Data Not Reported due to matrix interference or insufficient sample amount.              |
| PDS          | Post Digestion Spike   |
| PDSD         | Post Digestion Spike Duplicate   |
| PF           | Prep Factor  |
| RD           | Relative Difference  |
| RL           | Reporting Limit (The RL is the lowest calibration standard in a multipoint calibration.) |
| RPD          | Relative Percent Deviation   |
| RRT          | Relative Retention Time  |
| SPK Val      | Spike Value  |
| SPKRef Val   | Spike Reference Value  |
| SPLP         | Synthetic Precipitation Leachate Procedure   |
| ST           | Sorbent Tube   |
| TCLP         | Toxicity Characteristic Leachate Procedure   |
| TEQ          | Toxicity Equivalents   |
| WET (STLC)   | Waste Extraction Test (Soluble Threshold Limit Concentration)                            |



## Glossary of Terms & Qualifier Definitions

**Client:** Analytical Sciences  
**Project:** 8070903; Biofilter Testing  
**WorkOrder:** 1807338

### Analytical Qualifiers

H Samples were analyzed out of holding time.  
a4 Reporting limits raised due to the sample's matrix prohibiting a full volume extraction.

### Quality Control Qualifiers

F2 LCS/LCSD recovery and/or RPD is out of acceptance criteria.



## Analytical Report

**Client:** Analytical Sciences  
**Date Received:** 7/10/18 11:00  
**Date Prepared:** 7/10/18  
**Project:** 8070903; Biofilter Testing

**WorkOrder:** 1807338  
**Extraction Method:** SW3550B  
**Analytical Method:** SW8270C  
**Unit:** mg/Kg

### Semi-Volatile Organics

| Client ID                     | Lab ID       | Matrix     | Date Collected   | Instrument      | Batch ID         |
|-------------------------------|--------------|------------|------------------|-----------------|------------------|
| BF-½                          | 1807338-001A | Soil       | 06/13/2018 11:00 | GC21 07101837.D | 161168           |
| Analytes                      | Result       | Qualifiers | RL               | DF              | Date Analyzed    |
| Acenaphthene                  | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Acenaphthylene                | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Acetochlor                    | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Anthracene                    | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Benzidine                     | ND           | H          | 10               | 1               | 07/11/2018 01:56 |
| Benzo (a) anthracene          | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Benzo (a) pyrene              | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Benzo (b) fluoranthene        | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Benzo (g,h,i) perylene        | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Benzo (k) fluoranthene        | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Benzyl Alcohol                | ND           | H          | 10               | 1               | 07/11/2018 01:56 |
| 1,1-Biphenyl                  | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Bis (2-chloroethoxy) Methane  | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Bis (2-chloroethyl) Ether     | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Bis (2-chloroisopropyl) Ether | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Bis (2-ethylhexyl) Adipate    | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Bis (2-ethylhexyl) Phthalate  | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 4-Bromophenyl Phenyl Ether    | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Butylbenzyl Phthalate         | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 4-Chloroaniline               | ND           | H          | 4.0              | 1               | 07/11/2018 01:56 |
| 4-Chloro-3-methylphenol       | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2-Chloronaphthalene           | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2-Chlorophenol                | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 4-Chlorophenyl Phenyl Ether   | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Chrysene                      | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Dibenzo (a,h) anthracene      | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Dibenzofuran                  | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Di-n-butyl Phthalate          | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 1,2-Dichlorobenzene           | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 1,3-Dichlorobenzene           | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 1,4-Dichlorobenzene           | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 3,3-Dichlorobenzidine         | ND           | H          | 4.0              | 1               | 07/11/2018 01:56 |
| 2,4-Dichlorophenol            | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Diethyl Phthalate             | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2,4-Dimethylphenol            | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Dimethyl Phthalate            | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 4,6-Dinitro-2-methylphenol    | ND           | H          | 10               | 1               | 07/11/2018 01:56 |

(Cont.)



## Analytical Report

**Client:** Analytical Sciences  
**Date Received:** 7/10/18 11:00  
**Date Prepared:** 7/10/18  
**Project:** 8070903; Biofilter Testing

**WorkOrder:** 1807338  
**Extraction Method:** SW3550B  
**Analytical Method:** SW8270C  
**Unit:** mg/Kg

### Semi-Volatile Organics

| Client ID                       | Lab ID       | Matrix     | Date Collected   | Instrument      | Batch ID         |
|---------------------------------|--------------|------------|------------------|-----------------|------------------|
| BF-½                            | 1807338-001A | Soil       | 06/13/2018 11:00 | GC21 07101837.D | 161168           |
| Analytes                        | Result       | Qualifiers | RL               | DF              | Date Analyzed    |
| 2,4-Dinitrophenol               | ND           | H          | 50               | 1               | 07/11/2018 01:56 |
| 2,4-Dinitrotoluene              | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2,6-Dinitrotoluene              | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Di-n-octyl Phthalate            | ND           | H          | 4.0              | 1               | 07/11/2018 01:56 |
| 1,2-Diphenylhydrazine           | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Fluoranthene                    | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Fluorene                        | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Hexachlorobenzene               | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Hexachlorobutadiene             | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Hexachlorocyclopentadiene       | ND           | H          | 10               | 1               | 07/11/2018 01:56 |
| Hexachloroethane                | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Indeno (1,2,3-cd) pyrene        | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Isophorone                      | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2-Methylnaphthalene             | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2-Methylphenol (o-Cresol)       | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 3 & 4-Methylphenol (m,p-Cresol) | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Naphthalene                     | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2-Nitroaniline                  | ND           | H          | 10               | 1               | 07/11/2018 01:56 |
| 3-Nitroaniline                  | ND           | H          | 10               | 1               | 07/11/2018 01:56 |
| 4-Nitroaniline                  | ND           | H          | 10               | 1               | 07/11/2018 01:56 |
| Nitrobenzene                    | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2-Nitrophenol                   | ND           | H          | 10               | 1               | 07/11/2018 01:56 |
| 4-Nitrophenol                   | ND           | H          | 10               | 1               | 07/11/2018 01:56 |
| N-Nitrosodiphenylamine          | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| N-Nitrosodi-n-propylamine       | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Pentachlorophenol               | ND           | H          | 10               | 1               | 07/11/2018 01:56 |
| Phenanthrene                    | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Phenol                          | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Pyrene                          | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| Pyridine                        | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 1,2,4-Trichlorobenzene          | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2,4,5-Trichlorophenol           | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |
| 2,4,6-Trichlorophenol           | ND           | H          | 2.0              | 1               | 07/11/2018 01:56 |

(Cont.)



## Analytical Report

**Client:** Analytical Sciences  
**Date Received:** 7/10/18 11:00  
**Date Prepared:** 7/10/18  
**Project:** 8070903; Biofilter Testing

**WorkOrder:** 1807338  
**Extraction Method:** SW3550B  
**Analytical Method:** SW8270C  
**Unit:** mg/Kg

### Semi-Volatile Organics

| Client ID | Lab ID       | Matrix | Date Collected   | Instrument      | Batch ID |
|-----------|--------------|--------|------------------|-----------------|----------|
| BF-½      | 1807338-001A | Soil   | 06/13/2018 11:00 | GC21 07101837.D | 161168   |

| Analytes             | Result         | Qualifiers        | RL            | DF | Date Analyzed    |
|----------------------|----------------|-------------------|---------------|----|------------------|
| <b>Surrogates</b>    | <b>REC (%)</b> | <b>Qualifiers</b> | <b>Limits</b> |    |                  |
| 2-Fluorophenol       | 115            | H                 | 30-130        |    | 07/11/2018 01:56 |
| Phenol-d5            | 97             | H                 | 30-130        |    | 07/11/2018 01:56 |
| Nitrobenzene-d5      | 102            | H                 | 30-130        |    | 07/11/2018 01:56 |
| 2-Fluorobiphenyl     | 80             | H                 | 30-130        |    | 07/11/2018 01:56 |
| 2,4,6-Tribromophenol | 103            | H                 | 16-130        |    | 07/11/2018 01:56 |
| 4-Terphenyl-d14      | 81             | H                 | 30-130        |    | 07/11/2018 01:56 |

**Analyst(s):** REB

**Analytical Comments:** a4



July 17, 2018  
File: 1009.094altr.doc

Las Gallinas Valley Sanitary District  
300 Smith Ranch Road  
San Rafael, California 94903

Attn: Irene Huang, PE

Re: Results of Laboratory Testing  
Sludge Pond Sampling and Testing for  
Secondary Treatment Plant Upgrade and Recycled Water Expansion  
San Rafael, California

### Introduction

This letter presents the results of laboratory testing performed on soil samples that were collected from the two existing sludge ponds within the Las Gallinas Valley Sanitary District's treatment plant at 300 Smith Ranch Road in San Rafael, California. The two ponds encompass an approximately 0.7-acre area located near the southeast end of the treatment plant, as shown on Figure 1. We understand future upgrades to the treatment plant will include removing the existing sludge ponds to facilitate construction of a new anoxic and aeration basin in roughly the same location. Site grading for the new basin structure is expected to include excavation to lower grades within the existing pond areas. The purpose of our services is to perform environmental laboratory testing on samples collected from within the existing ponds to screen the soils for potential contamination.

### Environmental Laboratory Testing

We visited the site on July 6, 2018 to observe excavation of a test pit at each pond location. The test pits were excavated to depths of about five to six feet using a small excavator and the soil conditions encountered at each pit location are summarized below. At the time of our visit, the sludge ponds contained about two to three feet of water and logging of the test pit side walls was not possible. Therefore, the interpreted soil conditions within the pit are based upon bulk samples that were obtained from the backhoe bucket.

#### *Test Pit 1 (Northern Sludge Pond)*

- 0 to 1 ft: Organics/Sludge – black, saturated, very soft, omits strong organic odor
- 1 to 2 ft: Charcoal filter material
- 2 to 5 ft: Bay Mud – light gray, wet to saturated, very soft to soft, high plasticity

#### *Test Pit 2 (Southern Sludge Pond)*

- 0 to 0.5 ft: Organics/Sludge – black, saturated, very soft, omits strong organic odor
- 0.5 to 6 ft: Bay Mud – light gray, wet, very soft to medium stiff, high plasticity

We collected bulk samples of the materials at various depths at each test pit location. The bulk samples were visually classified and samples from the upper three to four feet were thoroughly mixed to create one composite sample for each test pit location. The composite samples were sealed to prevent moisture loss, placed in a cooler on ice and were transported to Analytical Sciences of Petaluma, California for environmental laboratory testing. The composite samples were tested to provide preliminary information pertaining to potential contamination. The analyses of the composite sample included the following tests:

- Volatile Hydrocarbons by GC/MS (EPA 8260B)
- Total Petroleum Hydrocarbons, Gasoline (EPA 8015B)
- Total Petroleum Hydrocarbons, Diesel & Motor Oil (EPA 8015B)
- CAM 17 Metals (EPA 6010B)
- Semi-Volatile Organics (SW8270C)

The results of the environmental laboratory testing are presented in Appendix B.

### Conclusions

Hazardous waste disposal is regulated at the Federal level by the Resource Conservation and Recovery Act and at the State level by Title 22 of the California Administrative Manual and the California Department of Toxic Substance Control. Additional regulations are locally imposed by the San Francisco Bay Area Regional Water Quality Control Board. The results of the environmental laboratory testing indicate the soils obtained from the test pits are generally not considered hazardous toxic waste in accordance with federal and state regulations. While a number of the CAM 17 metals were detected in the samples from both ponds, the test results indicate the levels are below the Title 22 specified total threshold limit concentration. Additionally, while relatively low levels of gasoline, motor oil, and a number of volatile hydrocarbons (gasoline constituents) were detected in the composite sample from the northern pond, the levels are below the San Francisco Bay Area Regional Water Quality Control Board's<sup>1</sup> "Tier 1" Environmental Screening Levels for soil.

While the pond materials do not appear to be considered hazardous per federal and state regulations, we note that individual landfills often impose their own criteria for soil disposal. Therefore, if offsite disposal of the sludge pond material is required, the test results should be provided to the potential disposal locations to confirm the material meets their specific acceptance criteria. From experience with similar projects, we anticipate that the materials would not be accepted at the Redwood Landfill in Novato based on the results of the total petroleum hydrocarbons testing. Other potential disposal locations may include the Keller Canyon Landfill in Pittsburg, the Forward Landfill in Stockton, the Casco Road Landfill in Livermore, or the Newby Island Landfill in Milpitas.

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<sup>1</sup> San Francisco Bay Regional Water Quality Control Board, "Environmental Screening Levels, Rev 3" ([www.waterboards.ca.gov](http://www.waterboards.ca.gov)), February 2016.

Las Gallinas Valley Sanitary District  
Page 3

July 17, 2018

We trust that this letter contains the information you require at this time. Please do not hesitate to contact us should there be any questions or should you wish to discuss the results of our testing.

Very truly yours,  
MILLER PACIFIC ENGINEERING GROUP

REVIEWED BY



Rusty Arend  
Geotechnical Engineer No. 3031  
(Expires 6/30/19)



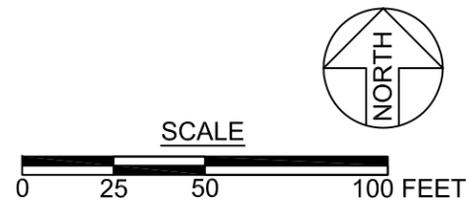
Scott Stephens  
Geotechnical Engineer No. 2398  
(Expires 6/30/19)

Attachments: Figure 1, Appendices A and B



**LEGEND:**

 APPROX. LOCATION OF TEST PIT



**MPEG**  
**MILLER PACIFIC**  
**ENGINEERING GROUP**

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 FILE: 1009\_093 Figures.dwg

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 www.millerpac.com

|   |                 |                    |
|---|-----------------|--------------------|
| <b>SLUDGE POND &amp; TEST PIT LOCATIONS</b>                           |                 | <b>1</b><br>FIGURE |
| LGVSD Secondary Treatment<br>Plant Upgrades<br>San Rafael, California |                 |                    |
| Project No. 1009.094  | Date: 7/16/2018 |                    |

|         |     |
|---------|-----|
| Drawn   | RCA |
| Checked | SAS |



**APPENDIX A**  
**ENVIRONMENTAL LABORATORY TEST RESULTS**



Report Date: July 12, 2018

## Laboratory Report

Rusty Arend  
Miller Pacific Engineering - Novato  
504 Redwood Blvd., Suite 220  
Novato, CA 94947

Project Name: **LBUSD** **1009.094 - Sludge Ponds**  
Lab Project Number: **8070904**

This 17 page report of analytical data has been reviewed and approved for release.

---

Michele Peters  
Laboratory Director



## Volatile Hydrocarbons by GC/MS

| Lab#       | Sample ID     | Compound Name                     | Result (µg/kg) | RDL (µg/kg) |
|------------|---------------|-----------------------------------|----------------|-------------|
| 8070904-01 | <b>Pond 1</b> | Dichlorodifluoromethane (F-12)    | ND             | 2.0         |
|            |               | Chloromethane                     | ND             | 2.0         |
|            |               | Vinyl chloride                    | ND             | 2.0         |
|            |               | Chloroethane (CE)                 | ND             | 2.0         |
|            |               | Bromomethane                      | ND             | 2.0         |
|            |               | Trichlorofluoromethane (F-11)     | ND             | 2.0         |
|            |               | Trichlorotrifluoroethane (F-113)  | ND             | 2.0         |
|            |               | 1,1-Dichloroethene (1,1-DCE)      | ND             | 2.0         |
|            |               | Methylene chloride                | ND             | 2.0         |
|            |               | trans-1,2-Dichloroethene          | ND             | 2.0         |
|            |               | 1,1-Dichloroethane (1,1-DCA)      | ND             | 2.0         |
|            |               | cis-1,2-Dichloroethene (c1,2-DCE) | ND             | 2.0         |
|            |               | 2,2-Dichloropropane               | ND             | 2.0         |
|            |               | Chloroform (THM1)                 | ND             | 2.0         |
|            |               | Bromochloromethane                | ND             | 2.0         |
|            |               | 1,1,1-Trichloroethane (TCA)       | ND             | 2.0         |
|            |               | 1,2-Dichloroethane (EDC)          | ND             | 2.0         |
|            |               | 1,1-Dichloropropene               | ND             | 2.0         |
|            |               | Carbon tetrachloride              | ND             | 2.0         |
|            |               | Benzene                           | ND             | 2.0         |
|            |               | Trichloroethene (TCE)             | ND             | 2.0         |
|            |               | 1,2-Dichloropropane (DCP)         | ND             | 2.0         |
|            |               | Dibromomethane                    | ND             | 2.0         |
|            |               | Bromodichloromethane (THM2)       | ND             | 2.0         |
|            |               | cis-1,3-Dichloropropene           | ND             | 2.0         |
|            |               | Toluene                           | ND             | 2.0         |
|            |               | 1,1,2-Trichloroethane             | ND             | 2.0         |
|            |               | 1,3-Dichloropropane               | ND             | 2.0         |
|            |               | Dibromochloromethane (THM3)       | ND             | 2.0         |
|            |               | Tetrachloroethene (PCE)           | ND             | 2.0         |
|            |               | 1,2-Dibromoethane (EDB)           | ND             | 2.0         |
|            |               | Chlorobenzene                     | 13             | 2.0         |
|            |               | 1,1,1,2-Tetrachloroethane         | ND             | 2.0         |
|            |               | Ethylbenzene                      | ND             | 2.0         |
|            |               | m,p-Xylene                        | ND             | 2.0         |
|            |               | Styrene                           | ND             | 2.0         |
|            |               | o-Xylene                          | ND             | 2.0         |
|            |               | Bromoform (THM4)                  | ND             | 2.0         |
|            |               | 1,1,2,2-Tetrachloroethane         | ND             | 2.0         |
|            |               | Isopropylbenzene                  | ND             | 2.0         |
|            |               | 1,2,3-Trichloropropane            | ND             | 2.0         |
|            |               | Bromobenzene                      | ND             | 2.0         |
|            |               | n-Propyl Benzene                  | ND             | 2.0         |
|            |               | 2-Chlorotoluene                   | ND             | 2.0         |
|            |               | 4-Chlorotoluene                   | ND             | 2.0         |
|            |               | 1,3,5-Trimethylbenzene            | ND             | 2.0         |
|            |               | tert-Butylbenzene                 | ND             | 2.0         |
|            |               | 1,2,4-Trimethylbenzene            | 4.4            | 2.0         |
|            |               | sec-Butylbenzene                  | ND             | 2.0         |



### Volatile Hydrocarbons by GC/MS

| Lab#                 | Sample ID      | Compound Name                  | Result (µg/kg)       | RDL (µg/kg) |
|----------------------|----------------|--------------------------------|----------------------|-------------|
| 8070904-01           | <b>Pond 1</b>  | 1,3-Dichlorobenzene            | 21                   | 2.0         |
|                      |                | 1,4-Dichlorobenzene            | 16                   | 2.0         |
|                      |                | 1,2-Dichlorobenzene            | ND                   | 2.0         |
|                      |                | p-Isopropyltoluene             | ND                   | 2.0         |
|                      |                | n-Butylbenzene                 | 3.8                  | 2.0         |
|                      |                | 1,2-Dibromo-3-chloropropane    | ND                   | 2.0         |
|                      |                | 1,2,4-Trichlorobenzene         | ND                   | 2.0         |
|                      |                | Naphthalene                    | 6.2                  | 2.0         |
|                      |                | Hexachlorobutadiene            | ND                   | 2.0         |
|                      |                | 1,2,3-Trichlorobenzene         | ND                   | 2.0         |
|                      |                | Tertiary Butyl Alcohol (TBA)   | ND                   | 25          |
|                      |                | Methyl tert-Butyl Ether (MTBE) | ND                   | 2.0         |
|                      |                | Di-isopropyl Ether (DIPE)      | ND                   | 2.0         |
|                      |                | Ethyl tert-Butyl Ether (ETBE)  | ND                   | 2.0         |
|                      |                | Tert-Amyl Methyl Ether (TAME)  | ND                   | 2.0         |
| Surrogates           | Result (µg/kg) | % Recovery                     | Acceptance Range (%) |             |
| Dibromofluoromethane | 47.3           | 98                             | 70-130               |             |
| Toluene-d8           | 50.7           | 104                            | 70-130               |             |
| 4-Bromofluorobenzene | 48.2           | 99                             | 70-130               |             |

|                |          |                |           |                   |
|----------------|----------|----------------|-----------|-------------------|
| Date Sampled:  | 07/06/18 | Date Analyzed: | 07/09/18  | QC Batch: B017838 |
| Date Received: | 07/09/18 | Method:        | EPA 8260B |                   |



## Volatile Hydrocarbons by GC/MS

| Lab#       | Sample ID     | Compound Name                     | Result (µg/kg) | RDL (µg/kg) |
|------------|---------------|-----------------------------------|----------------|-------------|
| 8070904-02 | <b>Pond 2</b> | Dichlorodifluoromethane (F-12)    | ND             | 2.0         |
|            |               | Chloromethane                     | ND             | 2.0         |
|            |               | Vinyl chloride                    | ND             | 2.0         |
|            |               | Chloroethane (CE)                 | ND             | 2.0         |
|            |               | Bromomethane                      | ND             | 2.0         |
|            |               | Trichlorofluoromethane (F-11)     | ND             | 2.0         |
|            |               | Trichlorotrifluoroethane (F-113)  | ND             | 2.0         |
|            |               | 1,1-Dichloroethene (1,1-DCE)      | ND             | 2.0         |
|            |               | Methylene chloride                | ND             | 2.0         |
|            |               | trans-1,2-Dichloroethene          | ND             | 2.0         |
|            |               | 1,1-Dichloroethane (1,1-DCA)      | ND             | 2.0         |
|            |               | cis-1,2-Dichloroethene (c1,2-DCE) | ND             | 2.0         |
|            |               | 2,2-Dichloropropane               | ND             | 2.0         |
|            |               | Chloroform (THM1)                 | ND             | 2.0         |
|            |               | Bromochloromethane                | ND             | 2.0         |
|            |               | 1,1,1-Trichloroethane (TCA)       | ND             | 2.0         |
|            |               | 1,2-Dichloroethane (EDC)          | ND             | 2.0         |
|            |               | 1,1-Dichloropropene               | ND             | 2.0         |
|            |               | Carbon tetrachloride              | ND             | 2.0         |
|            |               | Benzene                           | ND             | 2.0         |
|            |               | Trichloroethene (TCE)             | ND             | 2.0         |
|            |               | 1,2-Dichloropropane (DCP)         | ND             | 2.0         |
|            |               | Dibromomethane                    | ND             | 2.0         |
|            |               | Bromodichloromethane (THM2)       | ND             | 2.0         |
|            |               | cis-1,3-Dichloropropene           | ND             | 2.0         |
|            |               | Toluene                           | ND             | 2.0         |
|            |               | 1,1,2-Trichloroethane             | ND             | 2.0         |
|            |               | 1,3-Dichloropropane               | ND             | 2.0         |
|            |               | Dibromochloromethane (THM3)       | ND             | 2.0         |
|            |               | Tetrachloroethene (PCE)           | ND             | 2.0         |
|            |               | 1,2-Dibromoethane (EDB)           | ND             | 2.0         |
|            |               | Chlorobenzene                     | ND             | 2.0         |
|            |               | 1,1,1,2-Tetrachloroethane         | ND             | 2.0         |
|            |               | Ethylbenzene                      | ND             | 2.0         |
|            |               | m,p-Xylene                        | ND             | 2.0         |
|            |               | Styrene                           | ND             | 2.0         |
|            |               | o-Xylene                          | ND             | 2.0         |
|            |               | Bromoform (THM4)                  | ND             | 2.0         |
|            |               | 1,1,2,2-Tetrachloroethane         | ND             | 2.0         |
|            |               | Isopropylbenzene                  | ND             | 2.0         |
|            |               | 1,2,3-Trichloropropane            | ND             | 2.0         |
|            |               | Bromobenzene                      | ND             | 2.0         |
|            |               | n-Propyl Benzene                  | ND             | 2.0         |
|            |               | 2-Chlorotoluene                   | ND             | 2.0         |
|            |               | 4-Chlorotoluene                   | ND             | 2.0         |
|            |               | 1,3,5-Trimethylbenzene            | ND             | 2.0         |
|            |               | tert-Butylbenzene                 | ND             | 2.0         |
|            |               | 1,2,4-Trimethylbenzene            | ND             | 2.0         |
|            |               | sec-Butylbenzene                  | ND             | 2.0         |



### Volatile Hydrocarbons by GC/MS

| Lab#                 | Sample ID      | Compound Name                  | Result (µg/kg)       | RDL (µg/kg) |
|----------------------|----------------|--------------------------------|----------------------|-------------|
| 8070904-02           | <b>Pond 2</b>  | 1,3-Dichlorobenzene            | ND                   | 2.0         |
|                      |                | 1,4-Dichlorobenzene            | ND                   | 2.0         |
|                      |                | 1,2-Dichlorobenzene            | ND                   | 2.0         |
|                      |                | p-Isopropyltoluene             | ND                   | 2.0         |
|                      |                | n-Butylbenzene                 | ND                   | 2.0         |
|                      |                | 1,2-Dibromo-3-chloropropane    | ND                   | 2.0         |
|                      |                | 1,2,4-Trichlorobenzene         | ND                   | 2.0         |
|                      |                | Naphthalene                    | ND                   | 2.0         |
|                      |                | Hexachlorobutadiene            | ND                   | 2.0         |
|                      |                | 1,2,3-Trichlorobenzene         | ND                   | 2.0         |
|                      |                | Tertiary Butyl Alcohol (TBA)   | ND                   | 25          |
|                      |                | Methyl tert-Butyl Ether (MTBE) | ND                   | 2.0         |
|                      |                | Di-isopropyl Ether (DIPE)      | ND                   | 2.0         |
|                      |                | Ethyl tert-Butyl Ether (ETBE)  | ND                   | 2.0         |
|                      |                | Tert-Amyl Methyl Ether (TAME)  | ND                   | 2.0         |
| Surrogates           | Result (µg/kg) | % Recovery                     | Acceptance Range (%) |             |
| Dibromofluoromethane | 45.7           | 94                             | 70-130               |             |
| Toluene-d8           | 49.7           | 102                            | 70-130               |             |
| 4-Bromofluorobenzene | 51.1           | 105                            | 70-130               |             |

|                         |                         |                   |
|-------------------------|-------------------------|-------------------|
| Date Sampled: 07/06/18  | Date Analyzed: 07/09/18 | QC Batch: B017838 |
| Date Received: 07/09/18 | Method: EPA 8260B       |                   |

### TPH Gasoline

| Lab#       | Sample ID     | Compound Name | Result (mg/kg) | RDL (mg/kg) |
|------------|---------------|---------------|----------------|-------------|
| 8070904-01 | <b>Pond 1</b> | Gasoline      | 2.4            | 1.0         |

|                         |                         |                   |
|-------------------------|-------------------------|-------------------|
| Date Sampled: 07/06/18  | Date Analyzed: 07/09/18 | QC Batch: B017836 |
| Date Received: 07/09/18 | Method: EPA 8015B       |                   |



### TPH Gasoline

| Lab#       | Sample ID     | Compound Name | Result (mg/kg) | RDL (mg/kg) |
|------------|---------------|---------------|----------------|-------------|
| 8070904-02 | <b>Pond 2</b> | Gasoline      | ND             | 1.0         |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 07/06/18 | Date Analyzed: | 07/09/18  | QC Batch: | B017836 |
| Date Received: | 07/09/18 | Method:        | EPA 8015B |           |         |

### TPH Diesel & Motor Oil

| Lab#       | Sample ID     | Compound Name | Result (mg/kg) | RDL (mg/kg) |
|------------|---------------|---------------|----------------|-------------|
| 8070904-01 | <b>Pond 1</b> | Diesel        | ND             | 5.0         |
|            |               | Motor Oil     | 250            | 50          |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 07/06/18 | Date Analyzed: | 07/10/18  | QC Batch: | B017842 |
| Date Received: | 07/09/18 | Method:        | EPA 8015B |           |         |

### TPH Diesel & Motor Oil

| Lab#       | Sample ID     | Compound Name | Result (mg/kg) | RDL (mg/kg) |
|------------|---------------|---------------|----------------|-------------|
| 8070904-02 | <b>Pond 2</b> | Diesel        | ND             | 5.0         |
|            |               | Motor Oil     | ND             | 50          |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 07/06/18 | Date Analyzed: | 07/10/18  | QC Batch: | B017842 |
| Date Received: | 07/09/18 | Method:        | EPA 8015B |           |         |



### CAM Metals

| Lab#       | Sample ID     | Compound Name   | Result (mg/kg) | RDL (mg/kg) |
|------------|---------------|-----------------|----------------|-------------|
| 8070904-01 | <b>Pond 1</b> | Antimony (Sb)   | ND             | 5.0         |
|            |               | Arsenic (As)    | 1.5            | 1.5         |
|            |               | Barium (Ba)     | 100            | 2.0         |
|            |               | Beryllium (Be)  | ND             | 0.50        |
|            |               | Cadmium (Cd)    | ND             | 0.50        |
|            |               | Chromium (Cr)   | 29             | 1.5         |
|            |               | Cobalt (Co)     | 3.4            | 1.5         |
|            |               | Copper (Cu)     | 45             | 2.0         |
|            |               | Lead (Pb)       | 9.1            | 3.0         |
|            |               | Molybdenum (Mo) | ND             | 1.0         |
|            |               | Nickel (Ni)     | 28             | 2.0         |
|            |               | Selenium (Se)   | ND             | 5.0         |
|            |               | Silver (Ag)     | 12             | 1.0         |
|            |               | Thallium (Tl)   | ND             | 5.0         |
|            |               | Vanadium (V)    | 14             | 2.0         |
|            |               | Zinc (Zn)       | 180            | 5.0         |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 07/06/18 | Date Analyzed: | 07/11/18  | QC Batch: | B017830 |
| Date Received: | 07/09/18 | Method:        | EPA 6010B |           |         |



### CAM Metals

| Lab#       | Sample ID     | Compound Name   | Result (mg/kg) | RDL (mg/kg) |
|------------|---------------|-----------------|----------------|-------------|
| 8070904-02 | <b>Pond 2</b> | Antimony (Sb)   | ND             | 5.0         |
|            |               | Arsenic (As)    | 2.4            | 1.5         |
|            |               | Barium (Ba)     | 59             | 2.0         |
|            |               | Beryllium (Be)  | ND             | 0.50        |
|            |               | Cadmium (Cd)    | ND             | 0.50        |
|            |               | Chromium (Cr)   | 33             | 1.5         |
|            |               | Cobalt (Co)     | 8.4            | 1.5         |
|            |               | Copper (Cu)     | 35             | 2.0         |
|            |               | Lead (Pb)       | 15             | 3.0         |
|            |               | Molybdenum (Mo) | 2.3            | 1.0         |
|            |               | Nickel (Ni)     | 42             | 2.0         |
|            |               | Selenium (Se)   | ND             | 5.0         |
|            |               | Silver (Ag)     | 7.7            | 1.0         |
|            |               | Thallium (Tl)   | ND             | 5.0         |
|            |               | Vanadium (V)    | 21             | 2.0         |
|            |               | Zinc (Zn)       | 80             | 5.0         |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 07/06/18 | Date Analyzed: | 07/11/18  | QC Batch: | B017830 |
| Date Received: | 07/09/18 | Method:        | EPA 6010B |           |         |

### Mercury

| Lab#       | Sample ID     | Compound Name | Result (mg/kg) | RDL (mg/kg) |
|------------|---------------|---------------|----------------|-------------|
| 8070904-01 | <b>Pond 1</b> | Mercury (Hg)  | 1.1            | 0.20        |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 07/06/18 | Date Analyzed: | 07/11/18  | QC Batch: | B017785 |
| Date Received: | 07/09/18 | Method:        | EPA 7471A |           |         |

### Mercury

| Lab#       | Sample ID     | Compound Name | Result (mg/kg) | RDL (mg/kg) |
|------------|---------------|---------------|----------------|-------------|
| 8070904-02 | <b>Pond 2</b> | Mercury (Hg)  | 0.30           | 0.10        |

|                |          |                |           |           |         |
|----------------|----------|----------------|-----------|-----------|---------|
| Date Sampled:  | 07/06/18 | Date Analyzed: | 07/11/18  | QC Batch: | B017785 |
| Date Received: | 07/09/18 | Method:        | EPA 7471A |           |         |



## Notes and Definitions

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|     |  |
|-----|--|
| RDL | Reporting Detection Limit  |
| ND  | Analyte NOT DETECTED at or above the reporting detection limit (RDL) |
| RPD | Relative Percent Difference  |
| NR  | Not Reported   |



## Glossary of Terms & Qualifier Definitions

**Client:** Analytical Sciences  
**Project:** 8070904; LBUSD-Sludge Ponds  
**WorkOrder:** 1807339

### Glossary Abbreviation

|              |  |
|--------------|--|
| %D           | Serial Dilution Percent Difference   |
| 95% Interval | 95% Confident Interval   |
| DF           | Dilution Factor  |
| DI WET       | (DISTLC) Waste Extraction Test using DI water  |
| DISS         | Dissolved (direct analysis of 0.45 µm filtered and acidified water sample)               |
| DLT          | Dilution Test (Serial Dilution)  |
| DUP          | Duplicate  |
| EDL          | Estimated Detection Limit  |
| ERS          | External reference sample. Second source calibration verification.                       |
| ITEF         | International Toxicity Equivalence Factor  |
| LCS          | Laboratory Control Sample  |
| MB           | Method Blank   |
| MB % Rec     | % Recovery of Surrogate in Method Blank, if applicable                                   |
| MDL          | Method Detection Limit   |
| ML           | Minimum Level of Quantitation  |
| MS           | Matrix Spike   |
| MSD          | Matrix Spike Duplicate   |
| N/A          | Not Applicable   |
| ND           | Not detected at or above the indicated MDL or RL   |
| NR           | Data Not Reported due to matrix interference or insufficient sample amount.              |
| PDS          | Post Digestion Spike   |
| PDSD         | Post Digestion Spike Duplicate   |
| PF           | Prep Factor  |
| RD           | Relative Difference  |
| RL           | Reporting Limit (The RL is the lowest calibration standard in a multipoint calibration.) |
| RPD          | Relative Percent Deviation   |
| RRT          | Relative Retention Time  |
| SPK Val      | Spike Value  |
| SPKRef Val   | Spike Reference Value  |
| SPLP         | Synthetic Precipitation Leachate Procedure   |
| ST           | Sorbent Tube   |
| TCLP         | Toxicity Characteristic Leachate Procedure   |
| TEQ          | Toxicity Equivalents   |
| WET (STLC)   | Waste Extraction Test (Soluble Threshold Limit Concentration)                            |

### Analytical Qualifiers

a4 Reporting limits raised due to the sample's matrix prohibiting a full volume extraction.



## Glossary of Terms & Qualifier Definitions

**Client:** Analytical Sciences  
**Project:** 8070904; LBUSD-Sludge Ponds  
**WorkOrder:** 1807339

### Quality Control Qualifiers

F2 LCS/LCSD recovery and/or RPD is out of acceptance criteria.



## Analytical Report

**Client:** Analytical Sciences  
**Date Received:** 7/10/18 11:00  
**Date Prepared:** 7/10/18  
**Project:** 8070904; LBUSD-Sludge Ponds

**WorkOrder:** 1807339  
**Extraction Method:** SW3550B  
**Analytical Method:** SW8270C  
**Unit:** mg/Kg

### Semi-Volatile Organics

| Client ID                     | Lab ID       | Matrix | Date Collected   | Instrument       | Batch ID |
|-------------------------------|--------------|--------|------------------|------------------|----------|
| Pond 1                        | 1807339-001A | Soil   | 07/06/2018 08:30 | GC21 07101839.D  | 161168   |
| Analytes                      | Result       | RL     | DF               | Date Analyzed    |          |
| Acenaphthene                  | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Acenaphthylene                | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Acetochlor                    | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Anthracene                    | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Benzidine                     | ND           | 10     | 1                | 07/11/2018 02:49 |          |
| Benzo (a) anthracene          | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Benzo (a) pyrene              | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Benzo (b) fluoranthene        | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Benzo (g,h,i) perylene        | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Benzo (k) fluoranthene        | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Benzyl Alcohol                | ND           | 10     | 1                | 07/11/2018 02:49 |          |
| 1,1-Biphenyl                  | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Bis (2-chloroethoxy) Methane  | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Bis (2-chloroethyl) Ether     | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Bis (2-chloroisopropyl) Ether | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Bis (2-ethylhexyl) Adipate    | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Bis (2-ethylhexyl) Phthalate  | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 4-Bromophenyl Phenyl Ether    | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Butylbenzyl Phthalate         | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 4-Chloroaniline               | ND           | 4.0    | 1                | 07/11/2018 02:49 |          |
| 4-Chloro-3-methylphenol       | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2-Chloronaphthalene           | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2-Chlorophenol                | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 4-Chlorophenyl Phenyl Ether   | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Chrysene                      | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Dibenzo (a,h) anthracene      | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Dibenzofuran                  | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Di-n-butyl Phthalate          | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 1,2-Dichlorobenzene           | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 1,3-Dichlorobenzene           | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 1,4-Dichlorobenzene           | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 3,3-Dichlorobenzidine         | ND           | 4.0    | 1                | 07/11/2018 02:49 |          |
| 2,4-Dichlorophenol            | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Diethyl Phthalate             | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2,4-Dimethylphenol            | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Dimethyl Phthalate            | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 4,6-Dinitro-2-methylphenol    | ND           | 10     | 1                | 07/11/2018 02:49 |          |

(Cont.)



## Analytical Report

**Client:** Analytical Sciences  
**Date Received:** 7/10/18 11:00  
**Date Prepared:** 7/10/18  
**Project:** 8070904; LBUSD-Sludge Ponds

**WorkOrder:** 1807339  
**Extraction Method:** SW3550B  
**Analytical Method:** SW8270C  
**Unit:** mg/Kg

### Semi-Volatile Organics

| Client ID                       | Lab ID       | Matrix | Date Collected   | Instrument       | Batch ID |
|---------------------------------|--------------|--------|------------------|------------------|----------|
| Pond 1                          | 1807339-001A | Soil   | 07/06/2018 08:30 | GC21 07101839.D  | 161168   |
| Analytes                        | Result       | RL     | DF               | Date Analyzed    |          |
| 2,4-Dinitrophenol               | ND           | 50     | 1                | 07/11/2018 02:49 |          |
| 2,4-Dinitrotoluene              | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2,6-Dinitrotoluene              | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Di-n-octyl Phthalate            | ND           | 4.0    | 1                | 07/11/2018 02:49 |          |
| 1,2-Diphenylhydrazine           | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Fluoranthene                    | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Fluorene                        | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Hexachlorobenzene               | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Hexachlorobutadiene             | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Hexachlorocyclopentadiene       | ND           | 10     | 1                | 07/11/2018 02:49 |          |
| Hexachloroethane                | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Indeno (1,2,3-cd) pyrene        | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Isophorone                      | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2-Methylnaphthalene             | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2-Methylphenol (o-Cresol)       | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 3 & 4-Methylphenol (m,p-Cresol) | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Naphthalene                     | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2-Nitroaniline                  | ND           | 10     | 1                | 07/11/2018 02:49 |          |
| 3-Nitroaniline                  | ND           | 10     | 1                | 07/11/2018 02:49 |          |
| 4-Nitroaniline                  | ND           | 10     | 1                | 07/11/2018 02:49 |          |
| Nitrobenzene                    | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2-Nitrophenol                   | ND           | 10     | 1                | 07/11/2018 02:49 |          |
| 4-Nitrophenol                   | ND           | 10     | 1                | 07/11/2018 02:49 |          |
| N-Nitrosodiphenylamine          | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| N-Nitrosodi-n-propylamine       | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Pentachlorophenol               | ND           | 10     | 1                | 07/11/2018 02:49 |          |
| Phenanthrene                    | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Phenol                          | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Pyrene                          | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| Pyridine                        | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 1,2,4-Trichlorobenzene          | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2,4,5-Trichlorophenol           | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |
| 2,4,6-Trichlorophenol           | ND           | 2.0    | 1                | 07/11/2018 02:49 |          |

(Cont.)



## Analytical Report

|   |                                   |
|---|-----------------------------------|
| <b>Client:</b> Analytical Sciences          | <b>WorkOrder:</b> 1807339         |
| <b>Date Received:</b> 7/10/18 11:00         | <b>Extraction Method:</b> SW3550B |
| <b>Date Prepared:</b> 7/10/18               | <b>Analytical Method:</b> SW8270C |
| <b>Project:</b> 8070904; LBUSD-Sludge Ponds | <b>Unit:</b> mg/Kg                |

### Semi-Volatile Organics

| Client ID              | Lab ID         | Matrix | Date Collected                 | Instrument      | Batch ID             |
|------------------------|----------------|--------|--------------------------------|-----------------|----------------------|
| Pond 1                 | 1807339-001A   | Soil   | 07/06/2018 08:30               | GC21 07101839.D | 161168               |
| <u>Analytes</u>        | <u>Result</u>  |        | <u>RL</u>                      | <u>DF</u>       | <u>Date Analyzed</u> |
| <u>Surrogates</u>      | <u>REC (%)</u> |        | <u>Limits</u>                  |                 |                      |
| 2-Fluorophenol         | 120            |        | 30-130                         |                 | 07/11/2018 02:49     |
| Phenol-d5              | 94             |        | 30-130                         |                 | 07/11/2018 02:49     |
| Nitrobenzene-d5        | 101            |        | 30-130                         |                 | 07/11/2018 02:49     |
| 2-Fluorobiphenyl       | 85             |        | 30-130                         |                 | 07/11/2018 02:49     |
| 2,4,6-Tribromophenol   | 106            |        | 16-130                         |                 | 07/11/2018 02:49     |
| 4-Terphenyl-d14        | 84             |        | 30-130                         |                 | 07/11/2018 02:49     |
| <b>Analyst(s):</b> REB |                |        | <b>Analytical Comments:</b> a4 |                 |                      |

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CA ELAP 1644 • NELAP 4033ORELAP



## Analytical Report

**Client:** Analytical Sciences  
**Date Received:** 7/10/18 11:00  
**Date Prepared:** 7/10/18  
**Project:** 8070904; LBUSD-Sludge Ponds

**WorkOrder:** 1807339  
**Extraction Method:** SW3550B  
**Analytical Method:** SW8270C  
**Unit:** mg/Kg

### Semi-Volatile Organics

| Client ID                     | Lab ID       | Matrix | Date Collected   | Instrument       | Batch ID |
|-------------------------------|--------------|--------|------------------|------------------|----------|
| Pond 2                        | 1807339-002A | Soil   | 07/06/2018 08:30 | GC21 07101840.D  | 161168   |
| Analytes                      | Result       | RL     | DF               | Date Analyzed    |          |
| Acenaphthene                  | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Acenaphthylene                | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Acetochlor                    | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Anthracene                    | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Benzidine                     | ND           | 10     | 1                | 07/11/2018 03:16 |          |
| Benzo (a) anthracene          | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Benzo (a) pyrene              | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Benzo (b) fluoranthene        | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Benzo (g,h,i) perylene        | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Benzo (k) fluoranthene        | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Benzyl Alcohol                | ND           | 10     | 1                | 07/11/2018 03:16 |          |
| 1,1-Biphenyl                  | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Bis (2-chloroethoxy) Methane  | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Bis (2-chloroethyl) Ether     | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Bis (2-chloroisopropyl) Ether | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Bis (2-ethylhexyl) Adipate    | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Bis (2-ethylhexyl) Phthalate  | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 4-Bromophenyl Phenyl Ether    | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Butylbenzyl Phthalate         | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 4-Chloroaniline               | ND           | 4.0    | 1                | 07/11/2018 03:16 |          |
| 4-Chloro-3-methylphenol       | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2-Chloronaphthalene           | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2-Chlorophenol                | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 4-Chlorophenyl Phenyl Ether   | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Chrysene                      | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Dibenzo (a,h) anthracene      | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Dibenzofuran                  | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Di-n-butyl Phthalate          | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 1,2-Dichlorobenzene           | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 1,3-Dichlorobenzene           | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 1,4-Dichlorobenzene           | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 3,3-Dichlorobenzidine         | ND           | 4.0    | 1                | 07/11/2018 03:16 |          |
| 2,4-Dichlorophenol            | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Diethyl Phthalate             | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2,4-Dimethylphenol            | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Dimethyl Phthalate            | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 4,6-Dinitro-2-methylphenol    | ND           | 10     | 1                | 07/11/2018 03:16 |          |

(Cont.)



## Analytical Report

**Client:** Analytical Sciences  
**Date Received:** 7/10/18 11:00  
**Date Prepared:** 7/10/18  
**Project:** 8070904; LBUSD-Sludge Ponds

**WorkOrder:** 1807339  
**Extraction Method:** SW3550B  
**Analytical Method:** SW8270C  
**Unit:** mg/Kg

### Semi-Volatile Organics

| Client ID                       | Lab ID       | Matrix | Date Collected   | Instrument       | Batch ID |
|---------------------------------|--------------|--------|------------------|------------------|----------|
| Pond 2                          | 1807339-002A | Soil   | 07/06/2018 08:30 | GC21 07101840.D  | 161168   |
| Analytes                        | Result       | RL     | DF               | Date Analyzed    |          |
| 2,4-Dinitrophenol               | ND           | 50     | 1                | 07/11/2018 03:16 |          |
| 2,4-Dinitrotoluene              | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2,6-Dinitrotoluene              | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Di-n-octyl Phthalate            | ND           | 4.0    | 1                | 07/11/2018 03:16 |          |
| 1,2-Diphenylhydrazine           | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Fluoranthene                    | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Fluorene                        | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Hexachlorobenzene               | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Hexachlorobutadiene             | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Hexachlorocyclopentadiene       | ND           | 10     | 1                | 07/11/2018 03:16 |          |
| Hexachloroethane                | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Indeno (1,2,3-cd) pyrene        | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Isophorone                      | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2-Methylnaphthalene             | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2-Methylphenol (o-Cresol)       | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 3 & 4-Methylphenol (m,p-Cresol) | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Naphthalene                     | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2-Nitroaniline                  | ND           | 10     | 1                | 07/11/2018 03:16 |          |
| 3-Nitroaniline                  | ND           | 10     | 1                | 07/11/2018 03:16 |          |
| 4-Nitroaniline                  | ND           | 10     | 1                | 07/11/2018 03:16 |          |
| Nitrobenzene                    | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2-Nitrophenol                   | ND           | 10     | 1                | 07/11/2018 03:16 |          |
| 4-Nitrophenol                   | ND           | 10     | 1                | 07/11/2018 03:16 |          |
| N-Nitrosodiphenylamine          | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| N-Nitrosodi-n-propylamine       | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Pentachlorophenol               | ND           | 10     | 1                | 07/11/2018 03:16 |          |
| Phenanthrene                    | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Phenol                          | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Pyrene                          | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| Pyridine                        | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 1,2,4-Trichlorobenzene          | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2,4,5-Trichlorophenol           | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |
| 2,4,6-Trichlorophenol           | ND           | 2.0    | 1                | 07/11/2018 03:16 |          |

(Cont.)

CA ELAP 1644 • NELAP 4033ORELAP



## SECTION 321216 - ASPHALT PAVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Cold milling of existing asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt overlay.
5. Asphalt curbs.

##### B. Related Requirements:

1. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.

#### 1.2 ACTION SUBMITTALS

- ##### A. Product Data: For each type of product.

#### 1.3 INFORMATIONAL SUBMITTALS

- ##### A. Material Certificates: For each paving material.

#### 1.4 QUALITY ASSURANCE

- ##### A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.
- ##### B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the local standards where the project is located for asphalt paving work.
1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

### PART 2 - PRODUCTS

#### 2.1 DESIGN REQUIREMENTS

- ##### A. Design of the asphalt shall meet all requirements as shown in Section 319000, "Geotechnical Report," with a Traffic Index of 5.5.

## 2.2 AGGREGATES

- A. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- B. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
- C. Mineral Filler: ASTM D 242/D 242M, rock or slag dust, hydraulic cement, or other inert material.

## 2.3 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320.
- B. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

## 2.4 MIXES

- A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:
  - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
  - 2. Base Course: Materials for aggregate base shall be as specified in the Geotechnical Report. Aggregate base shall be provided where shown and to the thickness shown. Imported aggregate bases shall be delivered to the job site as uniform mixtures and each layer shall be spread in one operation. Segregation shall be avoided and the base shall be free of pockets of coarse or fine material. The base material shall be spread and compacted in layers of equal thickness and the maximum compacted thickness of any one layer shall not exceed 6-inches. The relative compaction of each layer of aggregate base shall not be less than ninety-five percent (95%) of maximum density when measured in accordance with ASTM D 1557. The compacted surface of the finished aggregate shall be hard, uniform, and smooth to grade.

## PART 3 - EXECUTION

### 3.1 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
  - 1. Mill to a depth of 3 inches.
  - 2. Patch surface depressions deeper than 1 inch after milling, before wearing course is laid.

### 3.2 PATCHING

- A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompress existing unbound-aggregate base course to form new subgrade.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseal concrete pieces firmly.
  - 1. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompress existing unbound-aggregate base course to form new subgrade.
- C. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd..
  - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- D. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

### 3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Any soft pockets shall be repaired.
- C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
- D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..
  - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

### 3.4 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Spread mix at a minimum temperature of 250 deg F.
  2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Asphalt concrete shall not be placed when the atmospheric temperature is below 40 degrees F, or during unsuitable weather as determined by the Engineer.
- C. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
- D. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
1. Clean contact surfaces and apply tack coat to joints.
  2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

### 3.6 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
1. Relative Density: 95 percent of reference maximum theoretical density according to ASTM D 1557-00.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.7 ASPHALT CURBS

- A. Construct hot-mix asphalt curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust. Spread mix at a minimum temperature of 250 deg F.
  - 1. Asphalt Mix: Same as pavement surface-course mix.
- B. Place hot-mix asphalt to curb cross section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

### 3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated in Drawings within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course: 1/4 inch.
  - 2. Surface Course: 1/8 inch.
  - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

### 3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Replace and compact hot-mix asphalt where core tests were taken.
- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.10 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 321216

## SECTION 338000 - PRECAST CONCRETE MANHOLES AND VAULTS

### PART 1 – GENERAL

#### 1.1 THE REQUIREMENT

- A. The Contractor shall provide precast concrete manholes, catch basins, drop inlets, potable water vaults; meter vaults, and other pre-cast concrete structures complete and in place, in accordance with the Contract Documents.

#### 1.2 RELATED SECTIONS

- A. Section 033000 – Cast-in-place Concrete
- B. Section 312000 – Earth Moving

#### 1.3 SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards

|            |  |
|------------|--|
| ASTM A 48  | Gray Iron Castings.  |
| ASTM C 150 | Portland Cement.   |
| ASTM C 443 | Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.   |
| ASTM C 478 | Precast Reinforced Concrete Manhole Sections   |
| ASTM C 877 | Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.                         |
| ASTM C 923 | Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.  |
| ASTM C 990 | Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants. |

#### 1.4 CONTRACTOR SUBMITTALS

- A. General: Furnish submittals in accordance with Section 013300 - Contractor Submittals.
- B. Shop Drawings:
  - 1. Show dimensions, locations, lifting inserts, reinforcement, and joints.
  - 2. Structural design calculations for vaults and boxes shall be stamped and signed by a structural engineer registered in the State of California.

- C. Manufacturer's Certification for Manholes and Vaults: Written certification that the structure complies with the requirements of this Section.
- D. Manufacturer's Test Results: Pull out force for manhole steps.

#### 1.5 QUALITY ASSURANCE

- A. Inspection: After installation, the Contractor shall demonstrate that manholes and vaults have been properly installed, level, with water-tight joints, at the correct elevations and orientations, and that the backfilling has been carried out in accordance with the Contract Documents.
- B. Any precast concrete which arrives on site with voids, cracked, or damaged, or is cracked or damaged during installation shall be cause for rejection. Contractor shall remove precast section(s) from the project site and replace with new undamaged sections at no additional cost to OWNER.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Handle precast units in positions consistent with their shape and design. Lift and support only from the support points indicated on the shop drawings.
- B. Embedded Lifting or Handling Devices: Capable of supporting units in positions anticipated during manufacturing, storage, transportation and installation.
- C. Block and brace units during storage. Provide lateral bracing which is sufficient to prevent bowing and/or warping and will not inhibit curing of the exposed surfaces.

### PART 2 – PRODUCTS

#### 2.1 MANHOLES

- A. The Contractor shall provide precast manhole sections and conical sections conforming to ASTM C 478 and the requirements of this Section. Cement used in manufacturing the manholes shall be Type II modified Portland cement in accordance with ASTM C 150.
  - 1. Adjusting rings shall be standard items from the manufacturer of the manhole sections. Minimum wall thickness of rings shall be 4-inches if steel reinforced and 6-inches if not reinforced.
- B. Axial length of sections shall be selected to provide the correct total height with the fewest joints. Joints shall be minimized and shall be located as close as possible to the top of the structure to help minimize opportunity for groundwater infiltration.
- C. Conical sections shall have an eccentric shape and shall be designed to support cast iron frames and covers under an H-20 loading, unless indicated otherwise.
- D. Design Criteria: Manhole walls, transitions, conical sections, and base shall be designed per ASTM C 478 for the depths indicated and the following:
  - 1. AASHTO H-20 loading applied to the cover.

2. Unit weight of soil of 120 pcf located above all portions of the manhole.
  3. Lateral soil pressure based on saturated soil producing 100 pcf acting on an empty manhole.
  4. Internal fluid pressure based on unit weight of 63 pcf with manhole filled from invert to cover with no balancing external soil pressure.
  5. External pressures and uplift forces due to groundwater elevations 2 feet below finish grade.
  6. Dead load of manhole sections fully supported by the base and transition.
  7. Additional reinforcing steel in walls to transfer stresses at openings.
  8. The minimum clear distance between the edges of any 2 wall penetrations shall be 12-inches or one-half of the diameter of the smaller penetration, whichever is greater.
  9. Information on the protective lining system (see Paragraph E of this section) including system specifications, requirements, performance data, etc.
- E. All manholes shall be furnished with “T-Lock” poly-vinyl chloride lining coatings on interior surfaces (or approved equal system).
- F. Joints shall have lipped male/female ends which shall provide uniform and continuous interior wall surfaces and shall be watertight. All joints (including joints between adjusting rings and manhole structure, other adjusting rings and frame and cover) shall be sealed with a preformed flexible sealant conforming to ASTM C 990.
- G. Raw Sewage, Plant Drain, drain manholes, plant effluent and all vaults shall also have each joint wrapped with an external joint sealant meeting ASTM C 877. Concrete for base and channel formation shall be 4000 psi concrete conforming to Section 033000 –Cast-In-Place Concrete.
- H. Barrel section to sewer pipe (Raw sewage, plant drain, drain, and plant effluent) connections shall be sealed with flexible resilient connectors complying with ASTM C923 and appropriate for the pipe material being used. Mechanical devices shall be stainless steel.
- I. Where required and specified in drawings, manhole steps shall be comprised of 1/2-inch grade 60 steel reinforcement rod encased in polypropylene copolymer plastic. Steps shall have tread width of 14-inches. Furnish test results demonstrating step capability to resist a pull out force of 2200 pounds.
- J. Manhole riser sections shall be greater than 12 inches in height.
- K. Manhole Manufacturers, or Equal
1. Jensen Precast
  2. OLDCASTLE Precast

## 2.2 FRAMES AND COVERS

- A. Castings: Castings for manhole frames, covers, and grates shall be non-rocking with machined flat bearing surfaces, and shall conform to the requirements of ASTM A 48, Class 30. Unless otherwise indicated, cast iron covers and frames shall be heavy traffic type, 30 inches in diameter. Covers shall have cleated surfaces with pick holes and shall be ventilated in improved areas and have a solid lid design in landscape or native areas.
- B. Manhole covers shall be with embossed with lettering saying "Sewer", "Storm Sewer", or "Water".
- C. Unless noted otherwise all frames and covers shall be designed for H-20 traffic loading. Grates and curb inlets in traffic areas shall be designed for H-20 traffic loading.
- D. Castings Manufacturers, or Equal
  - 1. D & L Supply
  - 2. Neenah Foundry Co.

## 2.3 VAULTS

- A. The Contractor shall provide precast vaults designed for the indicated applications and of the sizes indicated.
- B. The minimum structural member thickness for vaults shall be 5-inches. Cement shall be Type V Portland cement as specified in ASTM C 150. The minimum 28-day concrete compressive strength shall be 4,000 psi. All reinforcing steel shall be embedded in the concrete with a minimum clear cover as recommended by ACI 318.
- C. Design Loading: Vaults in areas subject to vehicular traffic shall be designed for H-20 traffic loading. Vaults in other areas shall be designed for a vertical live load of 300 psf. Lateral loads on vaults in all areas shall be calculated from:

$L = 90 h$ , plus surcharge of 240 psf in areas of vehicular traffic

Where  $L$  = loading in psf

$h$  = depth of fill in feet.

Unless noted otherwise design loading shall also take into account the lateral and uplift pressure resulting from a groundwater elevation 2 feet below existing grade.

- D. Where joints are designed in pre-cast concrete vaults, such joints shall be interlocking to secure proper alignment between members and prevent migration of soil through the joint. Structural sections at joints shall be sized sufficiently to reinforce the section against localized distress during transportation and handling and against excess contact bearing pressures through the joint. All openings through the precast structure shall be reinforced to transfer loads.

1. Joints shall be sealed watertight. All joints (including joints between adjusting rings and manhole structure, other adjusting rings and frame and cover) shall be sealed with a preformed flexible sealant conforming to ASTM C 990. In addition, all joints shall be wrapped with an external joint sealant meeting ASTM C 877.
  
- E. Where openings for access to the vault are required, the full clear space opening indicated shall be provided, without obstructions from brackets or supports. For large openings where brackets or supports are designed to protrude into the opening for support of required covers, such brackets or supports shall be designed to be easily removed and replaced with a minimum of effort and without cutting or welding.
  
- F. Covers for access openings shall be provided. Frames for covers shall be fabricated from aluminum, and shall be integrally cast into the vault concrete sections. All covers shall be tight fitting to prevent the entrance of dirt and debris. Where edge seams are permitted, no gaps greater than 1/16-inch between edges will be accepted. All covers, except round, heavy-weight, cast iron manhole covers, shall have securing mechanisms to hold the covers firmly in place against the effects of repetitious live loads such as pedestrian or vehicle traffic.
  
- G. Where penetrations of the pre-cast concrete vaults are required for piping, conduit, or ducts, such penetrations shall be accommodated through pre-cast openings or wall sleeves, as indicated. Storm drain structures may also use thin-wall knock-out sections. All openings for penetrations shall be smooth and free of surface irregularities and without exposed steel reinforcing. With the exception of vaults on pressurized water system, vaults need not be designed to resist thrust from piping passing through the vault.
  
- H. Lifting holes shall be plugged with a precast concrete plug sealed with a non-shrink grout.
  
- I. Vault Manufacturers, or Equal
  1. Jensen Precast,
  2. OLDCASTLE Precast

## 2.4 FABRICATION

- A. Maintain plant records and quality control program during fabrication of structural precast concrete sections. Make all quality control records available to Engineer upon request.
  
- B. Use molds that are rigid, and constructed of material that will result in uniform finished surfaces.
  
- C. If self-consolidating concrete is not used, thoroughly vibrate concrete to ensure proper consolidation, elimination of cold joints, and to minimize trapped air on at the concrete surface.
  
- D. Fabricate and provide the required lifting devices which are compatible with embedded components.
  
- E. Ensure reinforcing steel, anchors, inserts, plates, angle and other cast-in items are sufficiently embedded, properly secured, and correctly located. Ensure the reinforcing steel is properly

supported to prevent movement or shifting during fabrication. Inadequate concrete cover over reinforcing shall be cause for rejection.

- F. Cure precast concrete sections under identical conditions to develop specified concrete quality.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. Prior to accepting manholes on site, ensure that manhole meet the requirements of these specifications, are constructed of the correct materials, and are not cracked or damaged in any other way.
- B. Pre-cast concrete sections shall be transported and handled with care in accordance with the manufacturer's written recommendations. Where lifting devices are provided in pre-cast sections, such lifting devices shall be used as intended. Where no lifting devices are provided, the Contractor shall follow the manufacturer's recommendations for lifting procedures to provide proper support during lifting.
- C. Buried pre-cast concrete vaults and manholes shall be assembled and placed in excavations on properly compacted soil foundations as indicated. Pre-cast concrete vaults and manholes shall be set to grade, plumb and level, and oriented to provide the required dimensions and clearances from pipes and other structures.
- D. Prior to backfilling vaults, pipe and conduit penetrations and other, openings shall be sealed with polyurethane sealant or as indicated in the drawings. With the authorization of the Engineer, grout or a closed-cell flexible insulation may be used as filler material prior to placing a final bed of polyurethane sealant.

### 3.2 MANHOLES

- A. Connect pipe to manhole with flexible connection (unless noted otherwise), as recommended by connection manufacturer. Provide a pipe joint or additional flexible connection 18 inches from the outside of the manhole. Grout around pipe after installation is complete, unless otherwise indicated. All connections shall be watertight.
- B. Place top section, cone section or flat slab on top riser section, with the opening positioned over the steps. Top of cone section or flat slab shall be from 10 to 18 inches below finished grade.
- C. Install grade rings as required to adjust top of lid and frame to match finish grade elevation. Maximum height of grade rings shall be 12 inches. Maximum number of grade rings shall be two.
- D. In paved areas and as indicated in the plans, concrete collars shall be constructed around manhole covers as indicated. Collars shall be of 4000 psi concrete. Collars shall be constructed after pavement has been placed.

- E. Steps shall be cast-in-place or vibrated into green concrete.
- F. Steps shall be installed 12-inches on centers vertically, not more than 1/2 inch out of plumb. The top step shall be no more than 12-inches below the manhole cover.
- G. After manhole base has been completed, furnish and install temporary pipe plugs to seal all interior pipe opening. Plugs shall remain in place until final review and acceptance of completed pipeline. Plugs shall then be removed and shall be property of Contractor.
- H. Manhole interiors shall be coated as indicated in the protective coatings schedule.

### 3.3 QUALITY CONTROL

- A. Manholes shall be tested and accepted per the requirements of Section 331400 – Hydraulic Structures Testing. Precast concrete testing is the responsibility of the Contractor and supplier.
- B. Do not install precast concrete units until concrete has attained its design compressive strength.

END OF SECTION 338000

## SECTION 40 71 66 – TRANSIT TIME FLOW METERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. A transit time flow meter provides continuous flow measurement of the process. The flowmeter consists of a set of measurement transducers and a transmitter.

#### 1.2 ACTION SUBMITTALS

- A. Product Data:
  - 1. Dimensional Drawings
  - 2. Materials of Construction
  - 3. Measurement Accuracy
  - 4. Range and range ability
  - 5. Enclosure Rating
  - 6. Classification Rating
- B. Instrumentation TR20 forms.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. All submittals as required in 40 61 13.

#### 1.4 QUALITY ASSURANCE

- A. Equipment to be furnished under this section shall be the product of firms regularly engaged in the design and manufacturing of this type of equipment. Manufacturer shall assume responsibility for, and guarantee performance of equipment furnished. However, this shall not be construed as relieving the Contractor from responsibility for the proper installation and functionality of the work.
- B. Examine the Contract Documents and verify that instruments being provided are compatible with the physical and process conditions associated with the instrument. This includes compatibility with liquids, gases, pressures, temperatures, flows, materials, locations, and mounting requirements. Provide all necessary accessories to the instrument for a complete and operable system.
- C. All process lower and upper ranges to be coordinated with Engineer prior to instrument submittals being submitted.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver the process measurement equipment as a complete system. Each system shall be properly tagged and identified with its corresponding instrument tag as shown on the P&ID's and as required in section 26 05 00. Each system shall be factory calibrated and certified prior to delivery.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Each process measurement system shall typically consist of a sensor and a transmitter. Where shown on the drawings, the transmitter may be utilized for multiple sensors. When a transmitter is used for multiple sensors, it shall be capable of displaying simultaneously each process measurement.
- B. Each transmitter shall be equipped with means to transmit process measurement information to the plant SCADA system.
  - 1. For hardwired signals, unless otherwise indicated on the drawings, provide the following:
    - a. 4-20mA output signal for each process measurement (for up to 500 Ohm loads)
    - b. Two programmable SPDT relay outputs, rated at 5A up to 230VAC, for each process measurement
  - 2. Where shown on the drawings, provide the following digital communications to the plant SCADA system:
    - a. Hart Protocol
- C. Each transmitter shall be powered by 115VAC (+/- 10%) at 60Hz unless specifically shown on the drawings as being powered by 24VDC (+/- 15%). Each transmitter shall retain its programmable settings in non-volatile memory.
- D. Each sensor and corresponding transmitter shall be supplied as a complete and operable system. This includes all cabling, mounting hardware and fasteners. When installed outdoors, the transmitter shall be protected from the sun such that direct sunlight will not shine on the display.
- E. All transmitters shall be waterproof and made from corrosion resistant materials.
- F. All sensors to be immersed in liquids shall be rated for permanent submersion and shall be corrosion resistant.

### 2.2 FLOW PROCESS MEASUREMENT DEVICES

#### A. TRANSIT TIME FLOW METER

- 1. General

- a. Transit time flow meters shall be directional and utilize ultrasonic or Doppler velocity measurement principles. Utilizing the velocity sensors, the system shall accurately measure the flow in the pipe. The meters shall be suitable for use in water and wastewater applications, including raw sewage.
  - b. The flow meter shall have a transmitter housed in a NEMA 4X enclosure.
  - c. The flow sensors shall be corrosion and water resistant. If installed in a classified location, the sensors shall be rated for that location.
  - d. The flow sensor manufacturer shall select the signal and frequency for proper signal transmission, considering pipe material and fluid properties.
2. Submerged area velocity meter.
- a. The flow sensors shall be mounted in the pipe using factory mounting band in strategic location such that the signal pass diagonally upstream and downstream across the centerline of the pipe.
  - b. The system shall consist of all required accessories necessary for complete installation.
  - c. Acceptable Manufacturers:
    - 1) Hach FL900AV

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Equipment and materials specified in this section shall be installed, connected, and tested in accordance with the manufacturers' recommendations and as required by these specifications and contract drawings. Contractor shall coordinate with other trades to insure proper connection to piping and other mechanical equipment.
- B. Install all transmitters five feet above floor level. Install in a location that is easily accessible while as near to the sensor(s) as possible.

### 3.2 CALIBRATION AND COMMISSIONING

- A. A manufacturer representative shall field calibrate the process measurement system as required by section 40 61 21 and per the manufacturer's documented calibration procedure. The system shall be calibrated to the proper ranges as required by the Owner and the Engineer. Where analog signals are connected to local or remote monitoring equipment, verify that the calibrated ranges and scaling of the local and remote indicators are correct.
- B. Prior to final acceptance of the work, the Contractor shall certify the equipment and installation included under this section to be free of defects, and suitable for trouble-free operation.

### 3.3 FIELD QUALITY CONTROL

#### A. Tests and Inspections:

1. Visually inspect the installation of the process measurement systems. Verify that the incoming power is within the required range. Verify the functionality of all output signals and communications connections.
2. Test the process measurement system for proper operation at low, mid, and high process conditions.

#### B. Document data for each measurement and for system calibration. Update the TR20 instrument forms following testing and calibration. These shall be submitted as part of the O&M manual as called for in section 40 61 13.

### 3.4 TRAINING

#### A. Provide a minimum of four hours of training for each type of process measurement system provided. Provide training in accordance with section 40 61 26.

END OF SECTION 40 71 66

## SECTION 409000 – INSTRUMENTATION AND CONTROL FOR PROCESS SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. This Section includes the following:

1. General requirements which apply to all Instrumentation and Control for Process Systems (hereafter referred to as I&C).

B. Related Sections

1. The Contract Documents are a single integrated document. As such, all Divisions and Sections are applicable. The Contractor and its Subcontractors are responsible to review all parts of the Contract Documents in order to provide a complete and coordinated project.

C. Complete I&C System

1. The requirements for the I&C System shall be the responsibility of a single company hereafter referred to as the Instrumentation Supplier (IS). The IS shall be responsible for all parts of this Section and Sub-Sections as well as all other related sections that may pertain to the I&C System.
2. The Contractor, through the IS and qualified electrical and mechanical installers, shall be responsible to the Owner for the implementation of a complete I&C System. The IS shall provide all necessary coordination, material and labor such that the entire system be complete and functional. This includes but is not limited to the proper operation and monitoring of electrical power systems, process systems, mechanical equipment, instrumentation, control panels, programmable controllers, communications/networking, and SCADA system.
3. The overall I&C system design is based upon non-certified information that has been furnished by various equipment manufacturers and vendors. It is the Contractor's responsibility to include in the bid and installation all labor and material to provide a complete system based upon actual information from equipment being supplied for the project. Any changes or additions due to non-certified manufacturer or vendor information shall be provided at no additional cost to the Owner.

#### 1.2 REFERENCES

A. The installation and commissioning of the I&C System shall conform to all applicable codes, regulations, standards and specifications, including, but not limited to those listed below. These publications are referenced to by designation but not by edition. The latest edition accepted by the Authority Having Jurisdiction in effect at the time of bid shall govern.

1. State and Local Codes and Authority Having Jurisdiction (AHJ)
2. American National Standards Institute (ANSI)

3. American Petroleum Institute (API)
4. Federal Communications Commission (FCC)
5. Federal Occupational Safety and Health Act (OSHA)
6. International Society of Automation (ISA)
7. Institute of Electrical and Electronic Engineers (IEEE)
8. National Electric Code (NEC).
9. National Electrical Manufacturers Association (NEMA)
10. National Fire Protection Association (NFPA)
11. Underwriters Laboratories, Inc. (UL)

### 1.3 DEFINITIONS

A. The following definitions may be used throughout this section and subsections (refer to the contract drawings sheet GI-1 for instrumentation abbreviations):

1. CTC: Communications termination cabinet.
2. FAT: Factory acceptance test.
3. HMI: Human machine interface.
4. I&C: Instrumentation and control for process systems
5. IS: Instrumentation supplier.
6. LAN: Local area network.
7. LCP: Local control panel.
8. NC: Normally closed.
9. NO: Normally open.
10. OIT: Operator interface terminal.
11. OSI: Owner's System Integrator.
12. PC: Personal computer.
13. PID: Control action, proportional plus integral plus derivative.
14. PLC: Programmable logic controller.
15. P&ID: Process and instrumentation diagram
16. RIO: Remote input/output
17. SCADA: Supervisory control and data acquisition.
18. UPS: Uninterruptible power supply.
19. VCP: Vendor control panel.
20. WAN: Wide area network

### 1.4 I&C SYSTEM REQUIREMENTS

- A. Work provided outside of Contractor's scope:
1. The following equipment is being furnished by the Owner:
    - a. No Owner furnished equipment.
  2. The following equipment is being furnished by others under separate contract(s):
    - a. See Volume 3, Appendix A, Owner Selected Equipment.
  3. All PLC equipment being supplied by the IS is to be programmed by the Owner's Programmer.
    - a. All PLC equipment not specified in Volume 3, Appendix A, Owner Selected Equipment is being supplied by the IS, to be programmed by the Owner's Programmer.

4. All HMI equipment being supplied by the IS is to be programmed by the Owner's Programmer.
  5. All PLC and OIT Owner-selected equipment specified in Volume 3, Appendix A, shall be programmed by the equipment manufacturer. Those manufacturers shall provide complete control strategies, tag/register lists, and participate in all aspects of network system integration.
- B. The Work is to provide a complete and operational I&C System as described by the Contract Documents. This includes but is not limited to the following:
1. Before providing a bid as the IS, coordinate with all bidders such that all costs associated with a complete I&C System are accounted for. The Owner shall not be responsible for any additional costs for scope items that have been excluded from the bid as a result of not coordinating with all bidders.
  2. The IS shall submit a statement of qualifications verifying that it meets the requirements of 409000.1.8. The IS must be approved by the Engineer before proceeding with the Work.
  3. In order to provide a complete system, oversee and coordinate with all equipment and services being provided outside of Contractor's scope.
    - a. The Engineer is responsible to ensure that equipment being supplied by others related to the I&C System complies with the requirements of the Contract Documents
    - b. The Contractor and IS are responsible to coordinate the installation, commissioning and scheduling of equipment related to the I&C System that are provided by others.
  4. Oversee and coordinate with all equipment and services being provided by the Contractor but outside of the IS's scope.
    - a. Inform all vendors and suppliers providing equipment related to the I&C System the requirements of Division 40.
    - b. The Owner is not responsible for any additional costs incurred by requiring vendors and/or subcontractors to meet the requirements of Division 40.
    - c. If a vendor or supplier is unable to meet the requirements of Division 40, the Contractor may submit in writing to the Engineer the reasons for non-compliance. The Engineer will then evaluate the reasons and determine whether a solution may be determined or if a different vendor or supplier is required.
    - d. The Contractor and IS are responsible for coordinating with vendors and suppliers the FAT, installation, commissioning, calibration and scheduling for the associated I&C equipment.
    - e. The IS is responsible to insure that panel and loop drawings be supplied for vendor and subcontractor equipment. If the vendors and/or subcontractors are preparing the panel and/or loop drawings, they shall comply with the requirements of Division 40 and shall match those provided by the IS.
  5. The IS shall conduct a Pre-Submittal Conference before producing any submittals. The conference should include all parties involved with the I&C System including Contractor Representatives, the Engineer, Package System PLC Vendors, Owner, and Owner's Programmer. The purpose of the conference shall be to review the project as a whole,

make sure all parties understand their roles and responsibilities and to review submittal and coordination requirements.

6. Prepare I&C System Submittals which includes the following:
  - a. Instrumentation hardware submittal (including TR20 forms).
  - b. Control panels design and submittal.
  - c. Loop drawings design and submittal.
  - d. Recommended spare parts submittal.
  - e. PLC tag list submittal for Owner selected equipment (programmed by the equipment manufacturer)
  - f. HMI tag list submittal for Owner selected equipment (programmed by the equipment manufacturer)
7. Following submittal approvals, do the following:
  - a. Procure all instrumentation hardware and accessories.
  - b. Procure hardware for and fabricate all control panels being provided.
  - c. Perform FAT's for all control panels being provided.
8. Programming and integration shall be supplied by the OSI. Oversee and coordinate the programming and integration with the OSI for a complete I&C System.
9. Oversee the installation of the I&C System.
10. Perform bench and field calibrations of instruments as required.
11. Oversee and document loop testing.
12. Oversee and document commissioning.
13. Maintain record drawings.
  - a. Maintain on the construction site a set of the Instrumentation Drawings that shall be continuously marked up during construction.
  - b. The drawings should be updated at least weekly and will be checked monthly by the Owner's representative.
  - c. Upon completion of startup, submit the marked up drawings to the Engineer for review and for drafting.
14. Prepare O&M manuals.
  - a. Provide O&M manuals in accordance with Section 017823.
  - b. Prepare an O&M manual for each major process area or building. Each of these manuals shall be divided into the following categories:
    - 1) Table of Contents/Index.
    - 2) Process & Instrumentation Diagrams
    - 3) Control Panel Record Drawings, Bill of Materials and Design Data.
    - 4) Record Loop Drawings
  - c. Prepare O&M manuals that cover comprehensive information for the I&C System. These manuals shall include the following:
    - 1) Table of Contents/Index.
    - 2) Finalized Instrument Summary
    - 3) Finalized TR20 Instrument Forms
    - 4) Instrumentation Installation Details

- 5) Instrument Operational Manuals
- 6) Recommended Spare Parts List and sources.

15. Provide training.

## 1.5 ACTION SUBMITTALS

### A. General

1. Submittals for Division 40 shall meet the requirements of Section 013300 Contractor Submittals. In addition, the following requirements shall be met:
  - a. Submittals shall include bills of materials with quantities, makes, models, exact part numbers and descriptions.
  - b. Edit all submittals such that only pertinent information is submitted. Neatly cross out information that does not apply, options that are not being supplied, etc.
  - c. Show product dimensions, construction and installation details, wiring diagrams, and specifications.
  - d. If there are exceptions to the Contract Drawings and Specifications, provide a list of exceptions with detailed explanations for the exceptions. The Engineer will review the list of exceptions and determine whether a solution may be determined or if the exception(s) will not be allowed.
2. Furnish submittal required by each Section within Division 40.
3. When submitting on equipment, use the equipment and instrumentation tags depicted in the Contract Drawings.

### B. Instrumentation hardware submittal

1. Provide a comprehensive submittal that includes all instrumentation being supplied by the IS. Divide the submittal into the following:
  - a. Table of Contents/Index.
  - b. Instrument summary.
  - c. Instrument TR20 Forms.
  - d. Instrument Cut Sheets.
  - e. Instrument Installation Drawings.
2. Provide an instrument summary (sorted by tag number) that has the following information:
  - a. Tag number.
  - b. Make, model and description.
  - c. Associated process.
  - d. Location.
  - e. Calibrated range.
  - f. Referenced loop drawing number and P&ID.
  - g. Associated PLC.
3. Furnish TR20 instrumentation forms for each instrument using the forms outlined in ISA-TR20.00.01-2007. This requirement includes all instruments that are being installed as part of the project, whether they are Contractor, Owner and/or Vendor supplied. Show on each sheet who is the responsible party for supplying the instrument. The TR20 sheets should be provided electronically in Microsoft Word or Excel as well.
4. Provide instrument cut sheets for each instrument make and model being supplied for the project. Each cut sheet should have a list of instrument tag numbers that pertain to that particular cut sheet. The cut sheets should have enough information to verify that the instrument conforms to the Contract Drawings and Specifications.

5. Instrument installation drawings
    - a. Provide instrument installation drawings for each make and model of instrument being supplied.
    - b. Delineate what is being supplied by the IS and what is being supplied by other installers.
    - c. Show overall dimensions, mounting locations and elevations.
    - d. Show all cabling, conduit and piping locations.
    - e. Show the ambient conditions of the location where the instrument is being installed which includes ambient temperature and humidity extremes, whether or not the atmosphere is corrosive and the area classification.
    - f. Show mounting requirements, brackets, stands and anchoring.
    - g. Show means for sun protection where required.
- C. Control panels submittal
1. Provide a comprehensive submittal that includes all control panels supplied by the IS. The submittal should show that the panels are in conformance with the requirements of Section 409513. Divide the submittal into the following:
    - a. Table of Contents/Index.
    - b. Panel Bill of Materials and Design Data.
    - c. Panel Shop Drawings.
    - d. Panel Hardware Cut Sheets.
  2. The Panel Bill of Materials and Design Data shall include the following:
    - a. Each panel will have its own Bill of Materials and Design Data information presented in association with the panel drawings. The Bill of Materials shall include all hardware inside or on the enclosure. The design data will include UPS and/or battery load calculations to show that the UPS is sized appropriately for load and for backup time. The design data will show panel weight, materials and finishes. HVAC design data shall be shown. Seismic criteria shall be shown if required by the Contract Documents.
  3. Panel Shop Drawings:
    - a. Each control panel shall be designed to perform its function(s) as shown in the Contract Drawings. The control panel designs shall take into account information shown throughout the Contract Drawings and Specifications.
    - b. Show every internal wire and connection diagrammatically. Show all interfaces between the control panel and external equipment to be connected for power, controls, signal, communications, etc.
    - c. All shop drawings shall include a title block with the name of the firm designing the control panels. The title block shall also include project information, Owner information and/or logo, drawing number and description, revision fields and date.
    - d. All shop drawings shall be developed utilizing AutoCAD version 2008 or later. All shop drawings should be submitted in PDF and AutoCAD formats and as required by Section 013300.
    - e. Panel layout drawing(s):
      - 1) Each control panel shall have shop drawing(s) which depict the front, back, sides and top/bottom of the panel. This includes showing any hardware mounted on the inside or outside of the panel.
      - 2) Layout drawings should include subpanel and swing-out panel layouts.
      - 3) Layout drawings should show locations of panel penetrations for cutouts, conduit entry and/or access plates.
      - 4) Layout drawings should show all of the components and provide a reference to the bill of materials.

- 5) Show the elevations of door devices from the finished floor.
- f. AC and/or DC power distribution diagrams:
  - 1) Each panel shall show power distribution schematics that show how the panel receives power and feeds all of its internal loads as well as associated external loads.
- g. Communications and/or Network diagrams:
  - 1) For panels that utilize any means of communications both internally and externally, provide a diagram depicting each communication connection.
- h. Input/Output and/or Internal wiring diagrams
- i. Terminal block diagrams
4. Provide panel hardware cut sheets for each make and model of equipment being supplied for the project. The cut sheets should have enough information to verify that the equipment conforms to the Contract Drawings and Specifications.

#### D. Loop Drawings Submittal

1. Provide a comprehensive submittal that includes loop drawings for every control loop on the project. This includes but is not limited to all loops shown on the P&ID's, all loops associated with auxiliary inputs/outputs not shown on the P&ID's (e.g. UPS status information).
2. Loop drawings may only be finalized after all control panels, MCC's and other electrical submittals, and instrumentation submittals have been approved. Obtain all of the required information from each of these submittals to properly show the wiring of each control loop. The loop drawings shall not be submitted with incomplete information due to the lack of obtaining the appropriate information for each loop.
3. The loop drawings shall designed for and printed to 11x17 size paper. Divide the submittal into the following:
  - a. Laminated Cover and Back and Spiral Binding.
  - b. Table of Contents/Index (by loop number).
  - c. Loop Drawings.
4. Loop Drawings Requirements:
  - a. All loop drawings shall include a title block with the name of the firm designing the loop drawings. The title block shall also include project information, Owner information and/or logo, drawing number and description, revision fields and date.
  - b. All loop drawings shall be developed utilizing AutoCAD version 2008 or later. All loop drawings should be submitted in PDF and AutoCAD formats and as required by Section 013300.
  - c. Each loop drawing shall have a look and feel that follows that of the example loop drawing shown in the Contract Drawings.
  - d. Each loop drawing should have the following as a minimum:
    - 1) Six area divisions, from left to right which are:
      - a) Field/Process Area (this area will show field and process equipment).
      - b) Junction Boxes (this area will show any field junction boxes associated with the loop).
      - c) Local Control Panel (this area will show any local control panels associated with the loop).
      - d) Electrical Room (this area will show electrical equipment such as starters, VFD's, power feeders, etc. associated with the loop).
      - e) Programmable Logic Controller (this area will show PLC Inputs/Outputs associated with the loop).
      - f) SCADA (this area will show logical connections for the Inputs/Outputs from the PLC to the SCADA System).

- e. Each loop drawing will show each instrument or field device associated with the loop and its wiring connections and wire labels.
- f. Each electrical enclosure (junction box, local control panel, PLC panel, starter panel, etc.) will show terminal numbers and terminal block group references.
- g. All wires to be installed by the Contractor shall be dashed while all wires installed by the panel shop should be solid.
- h. Show continuation lines to associated loops that may interface with each loop.
- i. Show all wiring associated for the loop including power, controls, signal and communications.

E. Recommended Spare Parts Submittal

- 1. Submit a list of spare parts for all of the equipment associated with the I&C System. The list of spare parts shall include list pricing for each item.
- 2. Provide the name, address and phone number for each manufacturer and manufacturer's local sales representative.
- 3. Indicate whether or not the spare parts are being provided under this contract or not.

1.6 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.8 QUALITY ASSURANCE

- A. All equipment supplied for this project shall meet the requirements of the National Electric Code (NEC) and shall be listed by and bearing the label of the Underwriters' Laboratories (UL).
- B. The IS shall be a company that has been actively involved in the installation and commissioning of I&C Systems for a minimum period of five years.
- C. The IS shall have adequate facilities, manpower and technical expertise to perform the Work associated with the I&C System and as outlined by the Contract Documents.
- D. The IS shall have similar project experience of at least four successfully completed projects for a similar wastewater system. The IS company must have performed similar work for these projects as required herein.
- E. Experience requirements for the Control Systems Supervisor are specified later in this Section.

1.9 CONTROL SYSTEMS SUPERVISOR

- A. The Contractor shall designate an individual as project Control Systems Supervisor. This individual shall have at least 5 years of total experience in selection of instrumentation components and preparation of shop drawings, and startup and commissioning of instrumentation and control systems for municipal water or wastewater treatment plants. This

experience shall consist of at least \$15 million in electrical and instrumentation construction volume since January 1, 2010.

- B. The Control Systems Supervisor shall oversee all activities associated with planning, scheduling, documenting, and executing startup and testing of plant instrumentation and control systems. Systems include everything specified in Division 40, and applicable instrumentation and controls described in mechanical and package system specifications.
- C. Within 3 weeks of Notice to Proceed, the General Contractor shall provide a formal submittal declaring the identity of the Control Systems Supervisor, including evidence of his or her qualifications. This individual, once qualifications are favorably reviewed, may not be replaced without written consent of the Owner.
- D. The Control Systems Supervisor's responsibilities shall include, but not be limited to, the following:
  - 1. Participate in development of overall project schedules and construction sequencing, with specific attention to instrumentation and controls prerequisites and milestones.
  - 2. Take the lead in coordinating signal definitions and quantities, data formats, communications protocols and standards (hardware and software), control interfaces, and other aspects of integration with the plant control system. The Control Systems Supervisor shall document and resolve interface issues among the Contractor's organization, and for items irresolvable within the organization develop explicit Requests for Information (RFI's). RFI's shall include specific suggestions as to options and recommendations for resolution.
  - 3. Review and coordinate interconnection including control wiring, signal wiring, and communications interconnection among systems, devices, and sources of supply. This includes devices and systems installed under this project, as well as existing systems with which this project interfaces.
  - 4. Participate in workshops.
  - 5. Develop and/or review each submittal and RFI relating to instrumentation and controls.
  - 6. Supervise instrumentation and controls-related field investigations and development of submittals.
  - 7. Coordinate instrument and process control ranges and setpoints. Review instrument and configuration submittals and test procedures for these items, and coordinate among disciplines. Supervise selection of instrument options and ranges, mounting heights, and zero and span settings. Supervise development of preliminary instrument datasheets, and following plant startup supervise issuance of comprehensive instrument "as-built" settings.
  - 8. Review each applicable schedule, submittal, RFI, test procedure, test results, change, and other documents which include any instrumentation and/or controls to be transmitted to the Owner (regardless of where specified), and shall include with that transmittal a declaration such as the following.

"I, \_\_\_\_\_, have reviewed the accompanying documentation and find that it is in conformance with the requirements of the Contract Documents. I further attest that the signal interfaces and senses/ranges have been coordinated among devices and systems, that the functional requirements are met, that the physical characteristics and installations are coordinated and are suitable for the application, and that interconnection has been coordinated."
  - 9. Prior to submissions, review test plans and results associated with the control systems, including package systems with hardwired interfaces or networked interfaces. The Control Systems Supervisor shall provide a written statement similar to that above, to be

included with each submittal, that the test plans and results have been fully reviewed and are in conformance with the requirements of the contract documents.

10. Participate in all project testing and training activities as described elsewhere in the Specifications.
11. Take the lead in all aspects of startup planning which involve electrical, instrumentation, controls, programmed systems, and integration among existing/new systems and packages. Contribute to Contractor-specified deliverables. Account for outages and downtime limitations.
12. Supervise startup of instrumentation and control systems, regardless of where specified.
13. Supervise unwitnessed and witnessed factory and field testing of instrumentation and control systems.
14. Coordinate integration work with the existing plant control system.
15. Take overall responsibility/leadership for activities of the IS specified herein.

#### 1.10 WORKSHOPS

- A. Refer to Section 013100 – Project management and Coordination. Prepare for, conduct, and contribute to recordkeeping for workshops pertaining to control systems

#### 1.11 SUMMARY OF RESPONSIBILITIES

- A. This Article summarizes selected responsibilities associated with instrumentation and control for process systems, with emphasis on startup and testing. All specified requirements apply, regardless of whether they are listed below. The purpose is to draw attention to certain joint and coordination responsibilities.

| Work Item  | Where Specified | Where Executed |       | Responsible Parties       |                                   |
|--|-----------------|----------------|-------|---------------------------|-----------------------------------|
|  |                 | Factory        | Field | Contractor's Organization | Owner's Programmer                |
| <b>Factory Testing of I&amp;C Systems:</b>         |                 |                |       |                           |                                   |
| FAT (unwitnessed)                                  | 409000          | ✓              |       | ✓                         |                                   |
| FAT (witnessed)                                    | 409000          | ✓              |       | ✓                         | Participate in automated testing. |
| <b>Factory Testing of Networked Motor Control:</b> |                 |                |       |                           |                                   |
| MCT (unwitnessed)                                  | 260000          | ✓              |       | ✓                         |                                   |
| MCT (witnessed)                                    | 260000          | ✓              |       | ✓                         | ✓                                 |
| <b>Factory Testing of Packages/Equipment:</b>      |                 |                |       |                           |                                   |
| As specified                                       | 409000          |                | ✓     | ✓                         |                                   |
| <b>Precommissioning Tests:</b>                     |                 |                |       |                           |                                   |
| EPSET  | 017500          |                | ✓     | ✓                         |                                   |
| ORT's  | Various         |                | ✓     | ✓                         |                                   |
|  |                 |                |       |                           |                                   |

| Work Item                            | Where Specified | Where Executed |       | Responsible Parties       |  |
|--------------------------------------|-----------------|----------------|-------|---------------------------|--|
|                                      |                 | Factory        | Field | Contractor's Organization | Owner's Programmer                     |
| <b>Commissioning Tests:</b>          |                 |                |       |                           |  |
| FAT's                                | Various         |                | ✓     | ✓                         | Participate in automated testing.      |
| RAT                                  | 017500          |                | ✓     | ✓                         |  |
| <b>Test Planning And Procedures:</b> |                 |                |       |                           |  |
| Factory Test Procedures              | Various         |                |       | ✓                         | Automation insert for selected items.  |
| Field Test Procedures                | Various         |                |       | ✓                         | Automation inserts for selected items. |

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. All materials provided under this Contract shall be new and free from defects.

### 2.2 MANUFACTURERS

- A. All equipment provided for the I&C System shall be the most recent field-proven models marketed by their manufacturers at the time of submittal of the Shop Drawings unless otherwise required to match existing equipment.
- B. Instruments which utilize a common measurement principle (for example, float switches) shall be furnished by a single manufacturer. Panel mounted instruments shall have matching style and general appearance. Instruments performing similar functions shall be of the same type, model, or class, and shall be from a single manufacturer.

### 2.3 OPERATING CONDITIONS

- A. The I&C System shall be designed and constructed for satisfactory operation and long, low maintenance service under the following conditions:
1. Environment: Type the type of facility this is for such as "Wastewater Treatment Plant".
  2. Temperature Extremes: -4°F to 104°F (Outdoors); 40°F to 104°F (Indoors).
  3. Relative Humidity: 20% to 90%, non-condensing.
- B. Indoor and outdoor control panels and instrument enclosures shall be suitable for operation in the ambient conditions associated with the locations designated in the Contract Documents. Heating, cooling, and dehumidifying devices shall be provided in order to maintain instrumentation devices 20 percent within the minimums and maximums of their rated environmental operating ranges. The Contractor shall provide power wiring for these devices. Enclosures suitable for the environment shall be furnished. Instrumentation in hazardous areas

shall be suitable for use in the particular hazardous or classified location in which it is to be installed.

## 2.4 SPECIAL TOOLS

- A. The IS shall furnish a priced list of special tools required to calibrate and maintain the instrumentation provided. The Owner and Engineer will select which tools are to be purchased and the IS will supply them at the prices listed.
- B. In addition to the IS proposed special tools, the IS shall furnish the following:
  - 1. Fluke 789 Portable Process Meter, no equal.
  - 2. Fluke 726 Precision Multifunction Process Calibrator, no equal.
- C. Special tools shall be delivered to the Owner before startup commences.

## PART 3 - EXECUTION

### 3.1 DELIVERY, STORAGE AND HANDLING

- A. After completion of shop assembly, factory test, and approval, equipment, cabinets, panels, and consoles shall be packed in protective crates and enclosed in heavy duty polyethylene envelopes or secured sheeting to provide complete protection from damage, dust, and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving without removing protective covering. Boxed weight shall be shown on shipping tags together with instructions for unloading, transporting, storing, and handling at the Site.
- B. Special instructions for proper field handling, storage, and installation required by the manufacturer shall be securely attached to each piece of equipment prior to packaging and shipment.
- C. Each component shall be tagged to identify its location, instrument tag number, and function in the system. A permanent stainless steel or other non-corrosive material tag firmly attached and permanently and indelibly marked with the instrument tag number, as given in the tabulation, shall be provided on each piece of equipment in the PCIS. Identification shall be prominently displayed on the outside of the package.
- D. Equipment shall not be stored outdoors. Equipment shall be stored in dry permanent shelters, including in-line equipment, and shall be adequately protected against mechanical injury. If any apparatus has been damaged, such damage shall be repaired by the Contractor. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through tests as directed by the Engineer. If such tests reveal defects, the equipment shall be replaced.

### 3.2 MANUFACTURER'S SERVICES

- A. Manufacturer's services shall be furnished for the following equipment:
  - 1. Vendor supplied equipment that contain programmable controllers, operator interfaces and/or instrumentation that requires site calibration.

2. Chlorine Analyzers
3. pH Analyzers
4. ORP Analyzers
5. Dissolved Oxygen Analyzers

- B. The Contractor shall furnish the following manufacturer's services for the instrumentation listed below:
1. Perform bench calibration.
  2. Oversee installation.
  3. Verify installation of installed instruments.
  4. Certify installation and reconfirm manufacturer's accuracy statement.
  5. Oversee loop testing and pre-commissioning
  6. Train the Owner's personnel.

### 3.3 INSTALLATION

- A. Instrumentation shall be installed per the Instrument Installation Drawings that have been submitted and approved and per the requirements of Division 40. This includes all instrumentation for the I&C System, regardless of who the supplier is. Instrumentation shall be mounted so that it is easily accessible and viewable and such that it does not restrict access to other equipment. Mount instrumentation to pipe stands or wall mounts if they are not directly mounted or if the Contract Drawings indicate otherwise.
- B. The I&C System indicated throughout the design are diagrammatic and therefore locations of equipment are approximate. The exact locations and routing of wiring and cables shall be governed by structural conditions and physical interferences and by the location of electrical terminations on equipment. Equipment shall be located and installed so that it will be readily accessible for operation and maintenance. Where job conditions require reasonable changes in approximated locations and arrangements, or when the Owner exercises the right to require changes in location of equipment which do not impact material quantities or cause material rework, the Contractor shall make such changes without additional cost to the Owner.
- C. The I&C System is integrally connected to electrical, mechanical and structural systems. Coordinate with these other disciplines the installation of these related components. All conduit, cables and field wiring shall be as required by Division 26.
- D. Instruments, control panels and all other I&C System related equipment shall be anchored by methods that comply with seismic requirements applicable to the Site.
- E. Each existing instrument to be removed and reinstalled shall be cleaned, reconditioned, and recalibrated by an authorized service facility of the instrument manufacturer. The Contractor shall provide certification of this Work prior to reinstallation of each instrument.
- F. The Contract Documents show necessary conduit and instruments required to make a complete instrumentation system. The Contractor shall be responsible for providing any additional or different type connections as required by the instruments and specific installation requirements. Such additions and such changes, including the proposed method of installation, shall be submitted to the Engineer for approval prior to commencing that Work. Such changes shall not be a basis of claims for extra Work or delay.

- G. Instrumentation, control panels, wiring and all other I&C equipment shall be properly tagged and/or labeled per the requirements of Section 260553.
- H. Installation of the I&C System shall be according to the finalized Loop Drawings

### 3.4 FACTORY ACCEPTANCE TESTING (FAT)

- A. The IS shall arrange for the manufacturers of the equipment and fabricators of panels and cabinets supplied under this Section to allow the Engineer and Owner to inspect and witness the testing of the equipment. The test location shall be within 20 driving miles of the project site. Equipment shall include the cabinets, special control systems, networked devices, and other pertinent systems and devices.
- B. The IS shall develop and submit a FAT Plan and Procedure Document within 10 days of the FAT. IS-developed FAT procedures shall provide a complete framework for testing and control panel hardware and PLC/supervisory system software functions. Test procedures for software functions will be provided by the Owner's Programmer. The FAT Plan and Procedure shall as a minimum shall have the following:
  - 1. Descriptions of test methods to be performed during the FAT.
  - 2. FAT Schedule and Procedure
  - 3. FAT Checklists that allow for sign-off and comments for each test method and procedure.
  - 4. Placeholders for automaton testing, on a loop-by-loop basis. The IS shall use the Contract Control Descriptions, amended by workshop results, as the basis.
- C. Control Panel Completion Test Methods: The following test methods should be performed during the FAT for each control panel:
  - 1. Completed Shop Drawings: Demonstrate that the control panel has been built according to the shop drawings and that the shop drawings are accurate.
  - 2. Panel Layout: Demonstrate that the control panel has been laid out as designed and as required by Division 40.
  - 3. Power Distribution: Demonstrate all power distribution circuits, including but not limited to AC power circuits, UPS operation, signals and circuits and DC circuits.
  - 4. Control Circuits: Demonstrate the correct installation of each control circuit. Using a signal generator or multi-meter, show the correct operation of each input, output, relay, barrier, buttons, switches, or any other control device. Demonstrate the proper functionality of any hard-wired interlocks that may be associated with each control circuit.
  - 5. Panel Networking/Communications: If any form of communications is associated with the control panel, verify the proper operation of each communication port and link
- D. Test procedures shall be submitted in advance of testing. Allow for two submittal rounds in scheduling.
- E. Provide no less than 20 days' advance notice of any test, and adjust the schedule within reason to accommodate others' schedules
- F. Except for test steps requiring participation by the Owner's Programmer, the FAT shall be planned and executed unwitnessed, prior to scheduling the witnessed FAT. Test results shall be submitted in advance of conducting the test witnessed. For unwitnessed verification of signals

from the physical environment to within the programmed environment, the IS shall monitor states within the PLC's or use other IS-developed means to prove continuity.

- G. The purpose of the FAT is not only verification of functionality of all Contractor-furnished automation, but it will also comprise a forum for factory testing Owner-furnished programming, and identification of Owner-desired changes to that programming in advance of fieldwork. The Contractor shall allow the following in support of those goals:
1. Provide physical space, power, and network connections for SCADA servers which will be Owner-furnished for testing purposes. Network connections shall include those with the control network, plus Internet access for general use and testing of alarm notification
  2. Allow in the schedule, 1 day for setup by the Owner's Programmer, in advance of the witnessed FAT.
  3. The FAT schedule shall allow adequate hours for execution of the scope of testing specified herein, plus allow for the following dedicated to testing and demonstration of programmed supervisory and PLC functions:
    - a. Eight (8) days total for testing of automation, including District witnessing.
    - b. Allow 3 days for changes by the Owner's Programmer, for programming corrections and execution of Owner-desired changes.
    - c. Allow 3 days for retesting.
    - d. Any time for Contractor corrections/fixes are in addition to the intervals above.
  4. Section 260000 includes requirements for Motor Control Testing (MCT) whose purpose is to validate in the factory environment the networked interfaces. The MCT can be combined with the FAT, at the Contractor's discretion, or conducted separately if test location(s), project delivery schedules so require. If the MCT is to be combined, then the durations specified for the MCT shall be appended to the FAT durations for planning and scheduling.
- H. The Owner's Programmer may choose to include in the FAT additional PLC's as proxies for existing Plant PLC's, to prove out in a factory environment the PLC-to-PLC handshaking and interlocking. The IS shall accommodate such a request, and allow for up to these additional PLC's (likely the two spare PLC's plus one more Owner-furnished PLC). Provide power and network connections. Testing of the additional PLC's will be the subject of the witnessed FAT, and configuring and simulation of values within those PLC's will be the responsibility of the Owner's Programmer.
- I. Control Loop Test Methods: In order to demonstrate that the control panel will provide its function as intended, provide the following control loop test methods. Control Loop testing of Owner-selected equipment specified in Volume 3, Appendix A, shall include the equipment manufacturers programmer on site.

### 3.5 FIELD QUALITY CONTROL

- A. Allow for inspections by the Engineer and/or Owner of the I&C System at any time during the construction. Inspections shall be conducted to verify that the installation is per the requirements of the Contract Documents.

### 3.6 CALIBRATION

- A. Devices provided under Division 40 shall be calibrated according to the manufacturer's recommended procedures to verify operational readiness and ability to meet the indicated functional and tolerance requirements.
- B. Each instrument shall be calibrated at 0, 25, 50, 75, and 100 percent of span using test instruments to simulate inputs. The test instruments shall have accuracies traceable to National Institute of Standards and Testing.
- C. Instruments that have been bench-calibrated shall be examined in the field to determine whether any of the calibrations are in need of adjustment. Such adjustments, if required, shall be made only after consultation with the Engineer.
- D. Instruments which were not bench-calibrated shall be calibrated in the field to insure proper operation in accordance with the instrument loop diagrams or specification data sheets.
- E. Each analyzer system shall be calibrated and tested as a workable system after installation. Testing procedures shall be directed by the manufacturers' technical representatives. Samples and sample gases shall be furnished by the manufacturers.
- F. For each instrument calibration, provide a calibration sheet and update the corresponding TR20 Instrument Form with the new calibration data. The Calibration sheet shall include the following as a minimum:
  - 1. Date of calibration
  - 2. Project Name.
  - 3. Tag Number.
  - 4. Manufacturer, model and serial number.
  - 5. Calibration data including range, input, output and measurement at each calibration point.
  - 6. Space for comments.
  - 7. Space for sign-off by party performing calibration.
- G. A calibration and testing tag shall be attached to each piece of equipment or system at a location determined by the Engineer. The IS shall sign the tag when calibration is complete. The Engineer will sign the tag when the calibration and testing has been accepted.

### 3.7 LOOP TESTING

- A. Each control loop shall have been installed according to the finalized loop drawing. Prior to the commencement of loop testing, the following pre-requisites should have been met:
  - 1. All associated equipment, conduit and wire has been permanently installed, terminated and inspected.
  - 2. All wiring has been properly pulled, terminated and labeled.
  - 3. Each wire has been tested with a point-to-point test.
  - 4. All control panels and electrical equipment have been checked out and tested as required by Division 26.
  - 5. All instrumentation has been appropriately installed and calibrated.
  - 6. Loop Test Forms for each loop to be tested have been created and will be available during the loop testing.

- B. Each loop test shall have a Loop Test Form prepared and ready prior to each loop test. The loop test form shall have the following:
  - 1. Loop Number and Description
  - 2. Check-Off List with room for sign-off and dated by the IS, Programmer, and Owner's Witness as well as room for comments. The list of items to be checked off for each loop should include but is not limited to the following:
    - a. Each power distribution circuit.
    - b. Each control circuit.
    - c. Each alarm circuit.
    - d. Each PLC input/output point.
    - e. Each Local Manual, Local Auto, SCADA Manual & SCADA Auto function.
    - f. Each hard-wired and software interlock.
- C. Upon completion of the above pre-requisites for loop testing, the IS shall oversee and coordinate each loop test. The IS is responsible to be present for all loop testing, whether the equipment was supplied by the IS or not. The IS is responsible to have all responsible parties associated with each loop present. This includes but is not limited to manufacturer representatives, vendor technicians, electrical installers, mechanical installers, and programmer. The IS shall coordinate with the Owner and Engineer to allow for witnessing of loop testing as deemed necessary by the Owner and Engineer.
- D. Issues that arise during loop testing should be addressed and fixed immediately. If it is not feasible to immediately fix the issues, the loop testing should be re-scheduled as soon as possible to avoid delays. Any costs associated with re-testing and requiring all parties to return to the site shall in no way be incurred to the Owner.
- E. Following a successful loop test, the appropriate parties should sign and date the Loop Test Forms. All Forms shall be certified and submitted to the Engineer as part of the O&M Manuals.
- F. Following loop testing, in no way should any parts of the loop be modified. In no way shall any wiring be re-routed or re-terminated. If any such work occurs, all affected loops shall be re-tested at no expense to the Owner.

### 3.8 COMMISSIONING

- A. The IS shall oversee, coordinate and be present during all commissioning activities. The IS shall be responsible for obtaining the assistance of the Contractor and Subcontractors as may be required for commissioning activities.
- B. Commissioning shall commence after acceptance of wire test, calibration tests and loop tests, and inspections have demonstrated that the instrumentation and control system complies with Contract requirements. Pre-commissioning shall demonstrate proper operation of every system with process equipment operating over full operating ranges under conditions as closely resembling actual operating conditions as possible.
- C. Commissioning and test activities shall follow detailed test procedures and check lists accepted by the Engineer. Test data shall be acquired using equipment as required and shall be recorded on test forms accepted by the Engineer, which include calculated tolerance limits for each step. Completion of system commissioning and test activities shall be documented by a certified

report, including test forms with test data entered, delivered to the Engineer with a clear and unequivocal statement that system commissioning and test requirements have been satisfied.

- D. Where feasible, system commissioning activities shall include the use of water to establish service conditions that simulate, to the greatest extent possible, normal final control element operating conditions in terms of applied process loads, operating ranges, and environmental conditions. Final control elements, control panels, and ancillary equipment shall be tested under startup and steady state operating conditions to verify that proper and stable control is achieved using motor control center and local field mounted control circuits. Hardwired and software control circuit interlocks and alarms shall be operational. The control of final control elements and ancillary equipment shall be tested using both manual and automatic (where provided) control circuits. The stable steady state operation of final control elements running under the control of field mounted automatic analog controllers or software based controllers shall be assured by adjusting the controllers as required to eliminate oscillatory final control element operation. The transient stability of final control elements operating under the control of field mounted, and software-based automatic analog controllers shall be verified by applying control signal disturbances, monitoring the amplitude and decay rate of control parameter oscillations (if any), and making necessary controller adjustments as required to eliminate excessive oscillatory amplitudes and decay rates.
- E. Electronic control stations incorporating proportional, integral or differential control circuits shall be optimally tuned, experimentally, by applying control signal disturbances and adjusting the gain, reset, or rate settings as required to achieve a proper response. Measured final control element variable position/speed setpoint settings shall be compared to measured final control element position/speed values at 0, 25, 50, 75, and 100 percent of span and the results checked against indicated accuracy tolerances.
- F. Section 017419 includes Functional Acceptance Testing (FATC) which will generally call for participation by the Owner's Programmer. No fewer than 3 working days prior to an FATC which requires participation by the Owner's Programmer, the Control System's Supervisor shall issue a written certification that all instruments, equipment, and systems have been started up, are operable, ORT's are complete, and are ready to be put under full PLC monitoring and control. Exceptions, if any, shall be explicitly noted. If the exceptions are too great in the judgment of the Owner's Representatives, testing shall be delayed and the Contractor shall complete the missing work

### 3.9 TRAINING

- A. Provide training in accordance with Section 409000.
- B. Develop a Training Plan for the training requirements of Division 40 and submit it to the Engineer for approval. Coordinate with the Engineer and Owner the time and locations of each training session. Schedule the trainings for after the equipment has been pre-commissioned.
- C. As part of the Training Plan, submit a résumé for each individual to be providing training. Training shall be performed by qualified representatives of the equipment manufacturers and shall be specific to each piece of equipment.
- D. Each training session shall include a written agenda.

- E. The Contractor shall train the Owner's personnel on the maintenance, calibration and repair of instruments provided.
- F. Within 10 days after the completion of each session, the Contractor shall submit the following:
  - 1. A list of Owner personnel who attended the training.
  - 2. A copy of the training materials used during the session with notes, diagrams and comments.

END OF SECTION 409000