



MARIN COUNTY, CALIFORNIA

CONTRACT DOCUMENTS FOR

DIGESTER MCC-2 UPGRADE

JOB NO. 21600-06

JUNE 2023

DISTRICT BOARD

Megan Clark – President
Craig K. Murray – Vice President
Crystal J. Yezman
Ronald Ford
Gary E. Robards

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 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.

BID ITEM: DIGESTER MCC-2 UPGRADE

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 "DIGESTER MCC-2 UPGRADE," JOB NO. 21600-06, have been prepared under the direction of the following design professionals, licensed in the State of California.

LGVSD:



Responsible for the following sections:
All, except as noted below

HAZEN AND SAWYER:

Jack Yao, PE
Lic. No. E18390

Responsible for the following sections:
Volume 3 – Technical Specifications

<u>Division 1</u>	<u>Division 3</u>	<u>Division 9</u>	<u>Division 26</u>
01 11 00 01 33 00	All	All	All

<u>Division 31</u>	<u>Division 33</u>	<u>Division 40</u>
All	All	All

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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 DIGESTER MCC-2 UPGRADE 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, July 27, 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 **July 13, 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 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 DIGESTER MCC-2 UPGRADE project as shown in the project Technical Specifications and plans and in accordance with the Contract Documents within **365 calendar days** of the project commencement date specified in the Notice to Proceed for the project.
5. SCOPE OF WORK. The project work is generally described as:
Replacement of the existing low voltage Motor Control Center #2 (MCC-2) in the Digester Room and related power distribution equipment. The new MCC-2 shall be installed in the adjacent Shop Building.
 - a) Demolition of existing low voltage MCC-2, existing lighting systems and wiring devices, and off-site disposal of all demolished materials.
 - b) Procurement and installation of the following:
 - i) new MCC-2;
 - ii) one (1) lighting panelboard;
 - iii) one (1) dry-type transformer;
 - iv) other low voltage electrical power distribution equipment;
 - v) all aboveground and underground raceway systems including conduit, fittings, boxes, supports, and other pertinent components;

- vi) all low voltage wire and cable;
 - vii) new lighting systems and wiring devices; and,
 - viii) all ancillary components and electrical work necessary for a complete and operable electrical system.
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 \$3,000,000.**
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. 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: June 26, 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 includes the Cover letter to Prospective Bidders, Notice Inviting Sealed Bids, Instructions to Bidders, Contract Check List, Contract, Performance Bond, Payment/Labor Bond, Maintenance Bond (Not Used), 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 DIGESTER MCC-2 UPGRADE 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 (3rd) 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 guarantee the Project work against defects in materials, equipment, workmanship, or needed repair for three (3) years 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. 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 DIGESTER MCC-2 UPGRADE 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 DIGESTER MCC-2 UPGRADE project and read the bids aloud.
3. **PROJECT AWARD.** On _____, the District Board awarded the DIGESTER MCC-2 UPGRADE 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 DIGESTER MCC-2 UPGRADE 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 **365 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: _____

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 DIGESTER MCC-2 UPGRADE 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 rating of A or better from the current year Best Rating Guide. 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.

8.8.4 The insurance furnished by the Contractor must be primary in the amount of any loss.

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 all work the Contractor or its subcontractors perform 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.

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.

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 DIGESTER MCC-2 UPGRADE, JOB NO. 21600-06, 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, 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: DIGESTER MCC-2 UPGRADE, JOB NO. 21600-06.

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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 THREE (3) YEARS 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 THREE (3) YEARS 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 DIGESTER MCC-2 UPGRADE 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 DIGESTER MCC-2 UPGRADE, JOB NO. 21600-06.

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 DIGESTER MCC-2 UPGRADE PROJECT, JOB NO. 21600-06, 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

For the construction of **DIGESTER MCC-2 UPGRADE** complete in place and specified, including but not limited to:

- a) Mobilization, demobilization, and General Conditions including but not limited to preparatory work and operations and establishment of other facilities necessary to work on the Project, labor compliance, prevailing wage compliance, cleanup, and surface restoration to the satisfaction of the District at project completion.
- b) Demolition of existing low voltage MCC-2, existing lighting systems and wiring devices, and off-site disposal of all demolished materials.
- c) Procurement and installation of the following:
 - i) new MCC-2;
 - ii) one (1) lighting panelboard;
 - iii) one (1) dry-type transformer;
 - iv) other low voltage electrical power distribution equipment;
 - v) all aboveground and underground raceway systems including conduit, fittings, boxes, supports, and other pertinent components;
 - vi) all low voltage wire and cable;
 - vii) new lighting systems and wiring devices;
 - viii) all ancillary components and electrical work necessary for a complete and operable electrical system.
- d) Field verification.
- e) Freight Charges and Taxes
- f) Shop Drawings
- g) Operation & Maintenance Manuals
- h) Sheeting, Shoring, Bracing: The cost for planning, design, engineering fees, labor, materials, equipment, furnishing and constructing, and removal and disposal of such sheeting, shoring, and bracing, or equivalent method for the protection of life and limb in trenches and open excavation for all project sites in accordance with the requirements of OSHA and applicable safety orders, pursuant to the provisions Section 6707 of the California Labor Code.

TOTAL BASE BID, LUMP SUM, BASIS OF AWARD:

\$ _____ (In figures)

_____ Dollars (In words)

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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06.

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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06; 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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. _____

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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 (½) 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 (½) 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 (½) 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). _____

2. Subcontractor Name _____

Contact: _____

Phone No. _____ Email: _____

Business Location _____

Trade _____

Subcontract Amount _____

Current Contractor's License No(s). _____

3. Subcontractor Name _____

Contact: _____

Phone No. _____ Email: _____

Business Location _____

Trade _____

Subcontract Amount _____

Current Contractor's License No(s). _____

4. Subcontractor Name _____

Contact: _____

Phone No. _____ Email: _____

Business Location _____

Trade _____

Subcontract Amount _____

Current Contractor's License No(s). _____

(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:

For the District to consider the Bidder properly experienced in work of similar nature to this project, the Bidder must list at least **\$10,000,000** in construction volume on **no more than five (5)** projects completed **within the last five (5) years** of the following types of projects:

1. Installation of motor control centers and power distribution equipment in 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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 DIGESTER MCC-2 UPGRADE project, JOB NO. 21600-06, 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

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 (CH₄) and other combustible hazardous gases, including hydrogen sulfide (H₂S). 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.

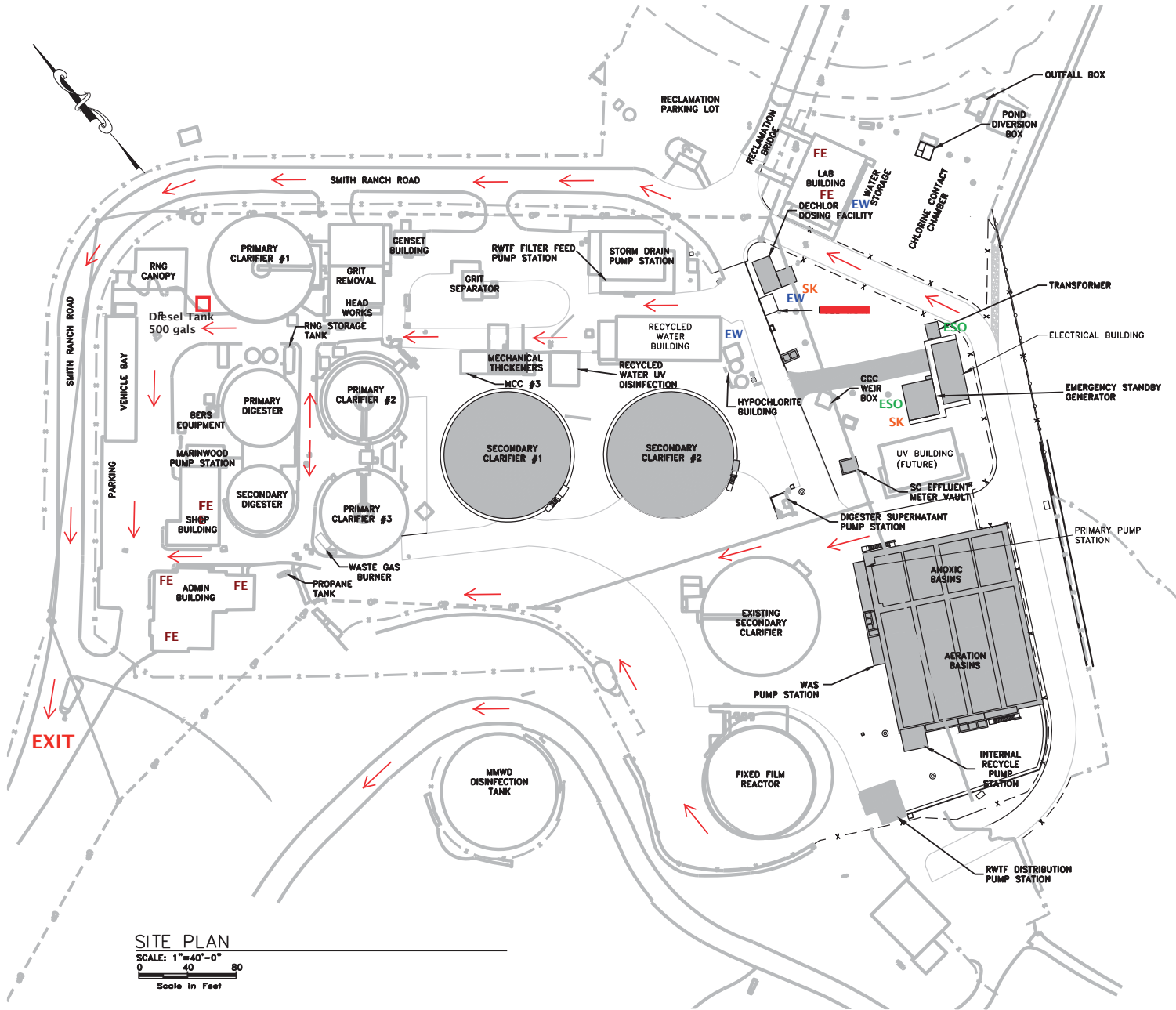
F. SODIUM BISULFITE

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.
- H₂S (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)



Legend

- EW = Eyewash/Shower Station
- SK = Spill Kit
- FE = Fire Extinguisher
- ESO = Emergency Shutoff

SITE PLAN
 SCALE: 1"=40'-0"
 0 40 80
 Scale in Feet

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

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

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SAMPLE

LGVSD 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 LGVSD'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 LGVSD confined spaces.

Confined spaces at LGVSD 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: O₂, LEL/LFL, H₂S.
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
RECLAMATION			PUMP STATIONS		
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		•
COLLECTION SYSTEM			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		•
SPECIAL ENTRY PROCEDURES (SP)					
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: _____ Location/Description of Space: _____ Street Address of Entry _____ Reason for Entry: _____	Work Site Permit: Authorized entry permit and monitoring data must remain at the work site until the job is complete.
	Fire Dept. Notified 472-0911 Before entry _____ initials 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.

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

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%, H₂S not more than 10 ppm.

Work Authorization Signatures All confined space work must be authorized by the General Manager, Plant Manager or Collection Crew Manager Work authorized by: _____ Date/Time: _____	Entry Authorization 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. Entry supervisor signature: _____	Permit Cancellation Date: _____ Time: _____ Entry supervisor signature: _____
---	---	--

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? 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: _____

I have reviewed and approved this permit: Date: _____ Time: _____ _____ Signature of District Manager	Please make note of any actions taken based on the above responses.
--	---

Revision: February 2006

P:\Safety\Hot Work Permit

LGVS D 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 O₂ deficiency, entry may proceed provided permit conditions and appropriate safety procedures are in effect.
11. If there is contamination or O₂ 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 (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 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 issue of such endorsement(s).				
PRODUCER This block identifies the Agent or Broker. 1		CONTACT NAME: _____ PHONE (A/C, No, Ext): _____ FAX (A/C, No): _____ E-MAIL ADDRESS: _____ ADDRESS: _____		
INSURED The insured is your entity's contractor or lessee. 4		INSURER(S) AFFORDING COVERAGE INSURER A: 3 _____ INSURER B: _____ INSURER C: _____ INSURER D: _____ INSURER E: _____ INSURER F: _____ The insurer will be identified here. The insurer letter appears again near the left margin at "3" to show which insurer provides which coverage.		
COVERAGES		CERTIFICATE NUMBER: _____		
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.				
TRM LTR	TYPE OF INSURANCE <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PROJECT <input type="checkbox"/> LOC OTHER: _____ AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> NON-OWNED AUTOS <input type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> DED <input type="checkbox"/> RETENTIONS \$ _____	ADDL TRM INSD WVD	PC	LIMITS MED EXP (Any one person) \$ _____ PERSONAL & ADV INJURY \$ _____ GENERAL AGGREGATE \$ _____ PRODUCTS - COMPROP AGG \$ _____ COMBINED SINGLE LIMIT \$ _____ BODILY INJURY (Per person) \$ _____ BODILY INJURY (Per accident) \$ _____ PROPERTY DAMAGE (Per occurrence) \$ _____ CURRENT LIABILITY \$ _____ E&O \$ _____ ACCIDENT \$ _____ E&O - EA EMPLOYEE \$ _____ E.L. DISEASE - POLICY LIMIT \$ _____
WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N <input type="checkbox"/> N/A <input type="checkbox"/> If yes, describe under DESCRIPTION OF OPERATIONS below		7 These two columns show inception and expiration dates for policies identified. Pay special attention that coverage does not expire before or during your project or lease.		
9 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.		8 This column identifies limits per occurrence and aggregate for each type of coverage afforded. Pay special attention to low aggregate limits for public works-type contractors. Losses on other jobs may reduce your coverage.		
10 Certificate holder is your entity.		11 Cancellation provisions		
12 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.		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 _____		

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) 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) 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. FormCOMMERCIAL 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

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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) 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".

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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) 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 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):

[Empty box for 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.

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

	Limits Of Insurance
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
Designation Of Project Or Premises:	
(This area is currently blank in the sample form.)	

(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

	Limits Of Insurance
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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- 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.

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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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- 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

STATE COMPENSATION INSURANCE FUND	P.O. BOX 807, SAN FRANCISCO, CALIFORNIA 94101 CERTIFICATE OF WORKERS' COMPENSATION INSURANCE
	POLICY NUMBER: 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

STATE COMPENSATION INSURANCE FUND	ADDITIONAL INSURED EMPLOYER ENDORSEMENT AGREEMENT
Home Office San Francisco	All Effective Dates are at 12:01 AM Pacific Standard Time 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 (ONE NAME PER ENDORSEMENT)
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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

STATE COMPENSATION INSURANCE FUND	ADDITIONAL INSURED EMPLOYER ENDORSEMENT AGREEMENT
Home Office San Francisco	All Effective Dates are at 12:01 AM Pacific Standard Time 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

STATE COMPENSATION INSURANCE FUND	ADDITIONAL INSURED EMPLOYER ENDORSEMENT AGREEMENT
Home Office San Francisco	All Effective Dates are at 12:01 AM Pacific Standard Time 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 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

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;

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- 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.

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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).

Fileings 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 any one 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 49 CFR 171.8 , 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 49 CFR 173.403 .	\$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 49 CFR 172.101 ; hazardous waste, hazardous materials, and hazardous substances defined in 49 CFR 171.8 and listed in 49 CFR 172.101 , 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 49 CFR 173.403 .	\$5,000,000

*The schedule of limits shown does not provide coverage. The limits shown in the schedule are for information purposes only.

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 BondBOND 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:

Original Contract:	\$0.00	
Previous Additions:	\$0.00	
Previous Deductions (-):	\$0.00	
This Change Order (+/-):	\$0.00	
Contract to Date:	\$0.00	

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: _____

COST BREAKDOWN FOR CHANGE ORDER PROPOSAL								
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:

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: _____

Contract
Change Order

Period to: _____

Attach Detail Sheet by Bid Line Item

To Owner: Las Gallinas Valley Sanitary District
From Contractor:
Via Construction Manager:

Contract Time working days)
Orig. Contract: 0
Added by CCOs: 0
Revised Total: 0 days

Contract Summary:

Original Contract Amount: _____
Net Change by Change Orders: _____
Total Contract Amount \$0

Previous Total Change Orders: _____
Change Orders This Month: _____
Total Change Orders: \$0

CONTRACT AND CHANGE ORDER WORK

Previous Total Work Completed: _____
Previous Total Completed and Stored: \$0.00
Previous Total Earned Less Retainage: _____
Work Completed This Period*: _____
Work Completed Retention this Period (5%): \$0.00 (a)
Payment For Work Completed: \$0.00 (b)
Total Work Completed to Date \$0.00 *

reference only - no progress payment toward matls stored until included as work complete; use other template if pymt for matls stored is contracted
Previous Materials Stored: _____
Materials Added This Period: _____
Materials Moved to Work Completed: _____
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: _____
Current Total Retainage: \$0.00 *
Retainage / Escrow for this Period: \$0.00 (e)
Percent to Finish: 100.0%
Percent Change Orders: 0.00%

Current Payment Due to Contractor: \$0.00 (b)

Current Amount Retained/to Escrow: \$0.00 (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						
	<u>CHANGE ORDERS</u>						
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		

----- FOR LGVSD USE ONLY -----

District Comments:

Other Comments:

SOR Approved SOR Acceptable with Comments as Noted SOR NOT Approved/Resubmit

Date of Final Transmission to Contractor: _____

APPROVED:

Mel Liebmann
Plant Manager

Date

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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 1st 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. 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

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).

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.

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 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 AWARDING 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.**

Date: _____	Contractor Requesting Dispatch:
To Applicable Apprenticeship Committee:	Name: _____
Name: _____	Address: _____
Address: _____	_____
_____	License No. _____
Tel. No. _____ Fax No. _____	Tel. No. _____ Fax No. _____

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 (JOURNEYPERSON)	Employer Payments					Straight-Time		Overtime Hourly Rate		
	Basic Hourly Rate	Health and Welfare	Pension	Vacation and Holiday	Training	Hours ^d Total	Hourly Rate	Daily 1 1/2X	Saturday ^a 1 1/2X	Sunday and Holiday
Cement Mason	\$30.00	8.15	9.80	5.24 ^b	0.47	8	53.66	68.660	68.660 ^c	83.66
Mastic Magnesite Gypsum, Epoxy, Polyester, Resin and all composition masons, swing or slip form scaffolds	\$30.75	8.15	9.80	5.24 ^b	0.47	8	54.41	69.785	69.785 ^c	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>.

^a 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).

^b Includes an amount for supplemental dues.

^c Rate applies to the first 8 hours of work on Saturday. All other hours worked on Saturday are paid at the Sunday/Holiday rate.

^d 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 (2nd) 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 (3rd) 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.

SAMPLE⁵³E

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: \$ _____
FRINGE BENEFITS	Health & Welfare \$ _____	PAID TO: Name: _____ Address: _____
	Pension \$ _____	PAID TO: Name: _____ Address: _____
	Vacation/ Holiday \$ _____	PAID TO: Name: _____ Address: _____
	Training Other \$ _____	PAID TO: Name: _____ Address: _____

Classification:	Effective Date:	Subsistence or Travel Pay: \$ _____
FRINGE BENEFITS	Health & Welfare \$ _____	PAID TO: Name: _____ Address: _____
	Pension \$ _____	PAID TO: Name: _____ Address: _____
	Vacation/ Holiday \$ _____	PAID TO: Name: _____ Address: _____
	Training Other \$ _____	PAID TO: Name: _____ Address: _____

Classification:	Effective Date:	Subsistence or Travel Pay: \$ _____
FRINGE BENEFITS	Health & Welfare \$ _____	PAID TO: Name: _____ Address: _____
	Pension \$ _____	PAID TO: Name: _____ Address: _____
	Vacation/ Holiday \$ _____	PAID TO: Name: _____ Address: _____
	Training Other \$ _____	PAID TO: Name: _____ Address: _____

Submitted: Contractor / Subcontractor	By: Name / Title
---------------------------------------	------------------

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).

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

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**SECTION 01 11 00
SUMMARY OF WORK**

1.01 SUMMARY

A. Section Includes:

1. Summary
2. Location and Description of Work
3. Construction Contracts, This Project
4. Construction Contracts, Other Projects
5. Work by Others
6. Work by Owner
7. Owner Furnished Equipment and Materials
8. Owner Assigned Procurement Contracts
9. Owner Pre-selected Equipment and Materials
10. Sequence and Progress of Work
11. Contractor's Use of Site
12. Easements and Rights-of-Way
13. Notices to Owners and Authorities of Properties Adjacent to the Work
14. Salvage of Equipment and Materials
15. Partial Utilization by Owner

1.02 LOCATION AND DESCRIPTION OF WORK

- A. The work will be located at the Las Gallinas Valley Sanitary District, 300 Smith Ranch Road, San Rafael, California.
- B. The Work to be performed under this contract includes, but is not limited to, demolition and replacement of MCC2 currently installed inside the Digester Room, and to relocate or replace other equipment as shown on the Drawings.

MUST LIST SPECIFICATION DIVISIONS AND DRAWING SHEET NUMBERS.

- A. The Contracts under which the Project will be constructed are:
 - 1. Work specified in Divisions 01 through 40 (inclusive) of the Specifications.
 - 2. Work shown on sheets 1 through 10 (inclusive) of the Drawings.

1.03 CONSTRUCTION CONTRACTS, OTHER PROJECTS (NOT USED)

- A. None.

1.04 WORK BY OTHERS

- A. PLC and SCADA programming will be performed by the Owner, via the services of ArcSine Engineering.
 - 1. Company Name: ArcSine Engineering
 - 2. Primary Contact: Mike Costa
 - 3. Address: 950 Executive Way, Redding, CA 96002
 - 4. Phone: (530) 222-7204

1.05 WORK BY OWNER

- A. Owner will perform the following in connection with the Work: Operate all existing valves, gates, pumps, equipment, and appurtenances that will affect Owner's operation, unless otherwise specified or indicated.

1.06 OWNER-FURNISHED EQUIPMENT AND MATERIALS

- A. Items of equipment and material to be furnished by Owner: None
- B. Owner's Responsibilities: None

1.07 OWNER ASSIGNED PROCUREMENT DOCUMENTS

- A. Items of equipment and material procured for assignment: None.

1.08 OWNER PRE-SELECTED EQUIPMENT AND MATERIALS

- A. Items of equipment and material to be provided by Contractor that have been pre-selected and with Bid Form price listed: None
- B. Contractor shall provide equipment and material in accordance with the Contract Documents.

1.09 SEQUENCE AND PROGRESS OF WORK

- A. Requirements for sequencing and coordinating with Owner's operations, including maintenance of plant operations during construction, and requirements for tie-ins and shutdowns, will be coordinated with the Owner prior to the start of construction.

1.10 CONTRACTOR'S USE OF SITE

- A. Contractors' use of the Site shall be confined to the areas shown. Contractors shall share use of the Site with other contractors and others specified in this Section.
- B. Contractor shall move stored products that interfere with operations of Owner, other contractors, or others performing work for Owner.

1.11 EASEMENTS AND RIGHTS-OF-WAY

- A. Easements and rights-of-way will be provided by Owner in accordance with the General Conditions. Confine construction operations to within Owner's property, public rights-of-way, easements obtained by Owner, and the limits shown. Use care in placing construction tools, equipment, excavated materials, and products to be incorporated into the Work to avoid damaging property and interfering with traffic. Do not enter private property outside the construction limits without permission from the owner of the property.

1.12 NOTICES TO OWNERS AND AUTHORITIES OF PROPERTIES ADJACENT TO THE WORK

- A. Notify owners of adjacent property and utilities when execution of the Work may affect their property, facilities, or use of property.
- B. When it is necessary to temporarily obstruct access to property, or when utility service connection will be interrupted, provide notices sufficiently in advance to enable affected persons to provide for their needs. Conform notices to Laws and Regulations and, whether delivered orally or in writing, include appropriate information concerning the interruption and instructions on how to limit inconvenience caused.
- C. Notify utility owners and other concerned entities at least 48 hours prior to cutting or closing streets or other traffic areas or excavating near Underground Facilities or exposed utilities.

1.13 SALVAGE OF EQUIPMENT AND MATERIALS

- A. Existing equipment and materials removed and not shown or specified to be reused in the Work will be Contractor's property, except the following items that shall remain Owner's property: None.
- B. Existing equipment and material removed by Contractor shall not be reused in the Work, except where specified or indicated.

- C. Carefully remove in manner to prevent damage all equipment and materials specified or indicated to be salvaged and reused or to remain property of Owner. Store and protect salvaged items specified or indicated to be used in the Work. Replace in kind or with new items equipment, materials, and components damaged in removal, storage, or handling through carelessness or improper procedures.
- D. Contractor may furnish and install new items, with Engineer's approval, instead of those specified or indicated to be salvaged and reused, in which case such removed items will become Contractor's property.

1.14 PARTIAL UTILIZATION BY OWNER

- A. Owner reserves the right to enter and use portions of the Work prior to Certificate of Substantial Completion is issued by Engineer.
- B. Owner shall be responsible to prevent premature connections by private and public parties, persons or groups of persons, before Engineer issues Certificate of Substantial Completion for the portion of Work being partially utilized by Owner.
- C. Contractor shall cooperate with Owner, Owner's agents, and Engineer to accelerate completion of Work designed for partial utilization by Owner in accordance with Contractor's progress schedule.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 14 00

COORDINATION AND SITE CONDITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for coordinating and sequencing the work under the Contract, and requirements regarding existing site conditions.

1.02 SITE CONDITIONS

- A. Information On Site Conditions:
 - 1. General: Information obtained by the Owner from other sources regarding site conditions, topography, subsurface information, groundwater elevations, existing construction of site facilities as applicable, and similar data will be available for inspection at the office of the Owner upon request. The Owner assumes no responsibility for its accuracy or completeness or for the Contractor's interpretation of such information.
- B. Existing Utilities:
 - 1. Location:
 - a. Contractor shall exercise reasonable care to verify locations of utilities and facilities marked by locating agencies or shown on the Drawings and to determine the presence of those not shown. Immediate and adjacent areas where excavations are to be made shall be thoroughly checked by visual examination for indications of underground facilities, and also checked with electronic metal and pipe detection equipment.
 - b. Where there is reasonable cause to verify the presence or absence of an underground facility, make exploratory excavations prior to proceeding with major excavation in the area.
 - c. Where information on buried facilities is required to verify their nature, shape, configuration, dimensions, materials, or other properties, make exploratory excavations as acceptable to the Owner.
 - 2. Contractor's Responsibilities:
 - a. Where Contractor's operations could cause damage or inconvenience to railway, telegraph, telephone, television, power, oil, gas, water, sewer, or irrigation systems, the Contractor shall make arrangements necessary for the protection of these utilities and services. Replace existing utilities removed or damaged during construction, unless otherwise provided for in these Contract Documents.
 - 1) Rock traps shall be installed in all downstream outlets of manholes. No concrete, pipe, or any debris shall be left in the sewer lines after construction. It is the sole responsibility of the contractor to install and maintain rock traps. Rock trap design shall be approved by the Owner.
 - b. Notify utility offices that are affected by construction operations at least 48 hours in advance. Under no circumstances expose any utility without

first obtaining permission from the appropriate agency. Once permission has been granted, locate, expose, and provide temporary support for the utilities. Contact Underground Services Alert (U.S.A.) at telephone number 1-800-227-2600 for marking prior to digging.

- c. Protect all utility poles from damage. If interfering utility poles will be encountered, notify the Owner at least 5 days in advance of construction operations to permit necessary arrangements with the utility company for protection or relocation of the interfering poles.
 - d. Contractor shall be solely and directly responsible to Owner and operator of such properties for damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of injuries or damage which may result from construction operations under this Contract.
 - e. Neither Owner nor its officers or agents shall be responsible to Contractor for damages as a result of Contractor's failure to protect utilities encountered in the work.
 - f. In event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental damage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration as promptly as possible and pay for repair. Prevent interruption of utility service unless granted by the utility owner.
 - g. In the event Contractor encounters water service lines that interfere with trenching, obtain prior approval of the water utility, shut down the service, dig through, remove service as necessary, and restore service to previous conditions using equal materials.
3. Names of known Utilities: Notify the following applicable utilities if conflicts or emergencies arise during the work:
- a. Gas Mains and Services:
PG&E Engineering: Jason Conihar at (415) 257-3404 or
Mindee Rayburn at (415) 257-3405
Emergency: (800) 743-5000
 - b. Electrical Utilities:
PG&E
Service Planning: (415) 257-3431 or
Al Caballero at (415) 257-3174
Emergency: (800) 743-5000
 - c. Telephone Utilities:
SBC/AT&T Debbie Barrios at (707) 575 2077 or
(707)321 6207
Emergency: (800) 310-2355
 - c. Marin County Public Works Department:
Front Desk: (415) 499-6530
 - d. City of San Rafael:
Front Desk: (415) 485-3355
 - e. Marin Municipal Water District:

Front Desk: (415) 945-1400

f. Comcast:
Customer Service: (866) 690 6996

C. Interfering Structures:

1. Take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground. An attempt has been made to show major structures on the Drawings. While the information has been compiled from the best available sources, its completeness and accuracy cannot be guaranteed.
2. Protect existing structures from damage, whether or not they lie within limits of easements obtained by the Owner. Where existing fences, gates, barns, sheds, buildings, or other structure must be removed to properly carry out work, or are damaged during work, restore them to original condition and to the satisfaction of property owner.
3. Contractor may remove and replace in equal or better than original condition, small structures such as fences, mailboxes, and signposts that interfere with Contractor's operations.

D. Field Relocation:

1. During construction, it is expected that minor relocations of proposed facilities will be necessary. Make such relocations only by direction of the Owner. If existing structures are encountered that prevent construction as shown, notify the Owner before continuing with work so Owner may make necessary field revisions.
2. Where shown or directed by and acceptable to the Owner provide relocation of existing facilities to include piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other miscellaneous items. Use only new materials for relocation of existing facilities. Match materials of existing facilities, unless otherwise shown or specified. Perform relocations to minimize downtime of existing facilities. Install new portions of existing facilities in their relocated position prior to removing existing facilities, unless otherwise accepted by Owner. Comply with cutting and patching requirements in this section.

E. Monuments and Markers:

1. Preserve and protect survey monuments and markers throughout construction. If damage occurs or removal becomes necessary, immediately notify Owner.
2. All survey markers or monuments which are damaged or removed as a result of the Contractor's operations will be reset by the Owner at the Contractor's expense.
3. In order to allow for properly referencing any existing survey monuments or markers which may be damaged or removed, the Contractor shall provide the Owner with a minimum of 10 working days' notice before proceeding with any work which might damage or remove any existing markers.

F. Easements:

1. Where portions of work will be located on public or private property, easements and permits have been obtained by Owner. Easements will provide for use of property for construction purposes only to the extent indicated on easements.

Copies of these easements and permits will be available from Owner for inspection. Contractor shall determine the adequacy of easements obtained and abide by easement provisions. Confine construction operations to within easement limits or make special arrangements with property owners or appropriate public agency for additional area required.

2. Before final payment will be authorized, Contractor shall furnish the Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way or property.
3. In the event Contractor is unable to secure written releases, inform the Owner of the reasons.
 - a. Owner or its representatives will examine the site, and Owner will direct Contractor to complete work that may be necessary to satisfy terms of the easement.
 - b. Should Contractor refuse to do this work, Owner reserves the right to have it done by separate contract and deduct the cost of same from the Contract amount, or require the Contractor to furnish a satisfactory bond in a sum to cover legal claims for damages.
 - c. When Owner is satisfied that work has been completed in agreement with the Contract Documents and terms of easements, the right is reserved to waive the requirement for written release if:
 - 1) Contractor's failure to obtain such statement is due to the grantor's refusal to sign, and this refusal is not based upon any legitimate claims that Contractor has failed to fulfill the terms of the easement, or
 - 2) Contractor is unable to contact or has had undue hardship in contacting the grantor.

1.03 SALVAGE OF MATERIALS

- A. Remove material to be salvaged with extreme care so as not to damage it for future use. Damage caused by the Contractor to equipment or material shall be replaced or repaired by the Contractor. Deliver salvaged material to Owner or at a site specified by the Owner. Hauling and disposal shall be at the expense of the Contractor.

1.04 CONNECTING TO EXISTING FACILITIES

- A. Unless otherwise shown or specified, determine methods of connecting new work to existing facilities, and obtain Owner's review and acceptance of connections.
 1. Determine location, elevation, nature, materials, dimensions, and configurations of existing facilities where necessary for connecting new work.
 2. Inspect existing record drawings and shop drawings, conduct exploratory excavations and field inspections, and conduct similar activities as needed.

1.05 PROGRESS MEETINGS

- A. Owner will schedule regular progress meetings at least monthly to review work progress, schedules, and other matters needing discussion and resolution.

1.06 SEQUENCE OF WORK

- A. Time of Work:
 - 1. Work hours are specified by governing agencies having jurisdiction through encroachment permits. If applicable, see Appendix section for encroachment permits from Marin County and City of San Rafael.
 - 2. Work hours specified by other governing agencies through encroachment permits shall be the responsibility of the Contractor. At the sole discretion of the governing agencies, work maybe limited anytime at no additional cost to the Owner.
 - 3. Unless noted otherwise, night work may be scheduled by Contractor only with the written permission of Owner. Such permission, however, may be revoked at any time if Contractor fails to properly execute and control nighttime work.

- B. Overtime Notice: If Contractor for convenience should desire to carry on work at night or outside regular hours, submit written notice to the Owner and allow ample time for satisfactory arrangements to be made for inspecting work in progress. The Owner will be the sole judge of whether on-site inspection is required.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

PART 4 PAYMENT

4.01 GENERAL

- A. Full compensation for the work specified herein shall be considered as included in the applicable lump sum or unit price items stated in the Contactor's proposal and no additional compensation will be allowed therefor.

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preconstruction meeting.
- B. Cutting and patching.
- C. Special procedures.

1.02 PRECONSTRUCTION MEETING

- A. Architect/Engineer will schedule meeting after Notice of Award.
- B. Attendance Required: Architect/Engineer and Contractor.
- C. Agenda:
 - 1. Submission of executed bonds and insurance certificates.
 - 2. Distribution of Contract Documents.
 - 3. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
 - 4. Designation of personnel representing parties in Contract and Architect/Engineer.
 - 5. Procedures and processing of field decisions, submittals, substitution, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 6. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, and those affected by decisions made.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.

- 3. Remove and replace defective and non-conforming Work.
- 4. Remove samples of installed Work for testing.
- C. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.
- D. Cut masonry and concrete materials using masonry saw or core drill.
- E. Restore Work with new products in accordance with requirements of Contract Documents.
- F. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. Identify hazardous substances or conditions exposed during the Work to Architect/Engineer for decision or remedy.

3.02 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Prepare surface and remove surface finishes to permit installation of new work and finishes.
- G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.

PART 4 PAYMENT

4.01 GENERAL

- A. Full compensation for the work specified herein shall be considered as included in the applicable lump sum or unit price items stated in the Contactor's proposal and no additional compensation will be allowed therefor.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. Contractor shall provide submittals in accordance with the General Conditions as modified by the Supplementary Conditions, and this Section.
2. Contractor is responsible to confirm and correct dimensions at the Site, for information pertaining to the fabrication processes and to techniques of construction, and for coordinating the work of all trades. Contractor's signature of submittal's stamp and letter of transmittal shall be Contractor's representation that Contractor has met his obligations under the Contract Documents relative to that submittal.

B. Related Sections:

1. General Conditions

1.02 ADMINISTRATIVE REQUIREMENTS

A. Types of Submittals: When type of submittal is not specified and is not specified in this Section, Engineer will determine type of submittal.

1. Action/Informational Submittals:

- a. Shop Drawings.
- b. Product data.
- c. Delegated design submittals in accordance with the General Conditions and as modified by the Supplemental Conditions.
- d. Samples.
- e. Testing plans, procedures, and testing limitations.
- f. Design data not sealed and signed by a design professional retained by Contractor, Subcontractor, or Supplier.
- g. Pre-construction test and evaluation reports, such as reports on pilot testing, subsurface investigations, potential Hazardous Environmental Conditions, and similar reports.

- h. Supplier instructions, including installation data, and instructions for handling, starting-up, and troubleshooting.
 - i. Sustainable design submittals (other than sustainable design closeout documentation).
 - j. Lesson plans for training and instruction of Owner's personnel.
2. Closeout Submittals:
- a. Maintenance contracts.
 - b. Operations and maintenance data.
 - c. Bonds, such as maintenance bonds and bonds for a specific product or system.
 - d. Warranty documentation.
 - e. Record documentation.
 - f. Sustainable design closeout documentation.
 - g. Software.
3. Maintenance Material Submittals:
- a. Maintenance materials schedule and checklist.
 - b. Spare parts.
 - c. Extra stock materials.
 - d. Tools.
4. Quality Assurance Submittals:
- a. Performance affidavits.
 - b. Certificates.
 - c. Source quality control submittals (other than testing plans, procedures, and testing limitations), including results of shop testing.
 - d. Field or Site quality control submittals (other than testing plans, procedures, and testing limitations), including results of operating and acceptability tests at the Site.
 - e. Supplier reports.

- f. Special procedure submittals, including health and safety plans and other procedural submittals.
- g. Qualifications statements.

B. Submittal Requirements:

- 1. Contractor shall submit electronic copy of submittals for Engineer's review via Procore Document Management, unless otherwise specified in individual Specification Sections. Acceptable electronic formats are Adobe PDF, Microsoft Word, Autodesk DWF and AutoCAD.
- 2. Submittals shall be furnished in two dimensional PDF.
- 3. Submittal shall be accompanied by letter of transmittal containing date, project title, Contractor's name, number and title of submittal, list of relevant Specification Sections, notification of deviations from Contract Documents, and other material required for Engineer's review.

C. Scheduling:

- 1. Provide submittals well in advance of the Work following Engineer's approval or acceptance of the associated submittal. Work covered by a submittal will not be included in progress payments until approval or acceptance of related submittals has been obtained in accordance with the Contract Documents.
- 2. Submittals shall be provided by Contractor with at least thirty (30) working days for review and processing.

1.03 SCHEDULE OF SUBMITTALS

A. Schedule of Submittals, as specified in this Section:

- 1. Timing:
 - a. Provide submittal within time frames specified in the Contract Documents.
 - b. Provide updated Schedule of Submittals with each submittal of the updated Progress Schedule.
- 2. Content: In accordance with the General Conditions as modified by the Supplementary Conditions, and this Section. Requirements for content of preliminary Schedule of Submittals and subsequent submittals of the Schedule of Submittals are identical.
 - a. Identify submittals required in the Contract Documents. Updates of Schedule of Submittals shall show scheduled dates and actual dates for completed tasks. Indicate submittals that are on the Project's critical path.

- b. Indicate the following for each submittal:
 - 1) Date when submittals are requested and received from Supplier.
 - 2) Date when certification is received from Supplier and when submitted to Engineer.
 - 3) Date when submittals are submitted to Engineer and returned with disposition from Engineer.
 - 4) Date when submittals are revised by Supplier and submitted to Engineer.
 - 5) Date when submittals are returned with "Furnish as Submitted" (FAS) or "Furnish as Corrected" (FAC) disposition from Engineer.
 - 6) Date when approved submittals are returned to Supplier.
 - 7) Date of Supplier scheduled delivery of equipment and material.
 - 8) Date of actual delivery of equipment and material.
 - 9) Whether submittal will be for a substitution or "equal". Procedures for substitutions and "or equals" are specified in the General Conditions.
 - 10) For submittals for materials or equipment, date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of other contractors.
3. Prepare Schedule of Submittals using same software, and in same format, specified for Progress Schedules.
4. Coordinate Schedule of Submittals with the Progress Schedule.
5. Schedule of Submittals that is not compatible with the Progress Schedule, or that does not indicate submittals on the Project's critical path, or that places extraordinary demands on Engineer for time and resources, is unacceptable. Do not include submittals not required by the Contract Documents.
6. In preparing Schedule of Submittals:
 - a. Considering the nature and complexity of each submittal, allow sufficient time for review and revision.
 - b. Reasonable time shall be allowed for: Engineer's review and processing of submittals, for submittals to be revised and resubmitted, and for returning submittals to Contractor.

- c. Identify and accordingly schedule submittals that are expected to have long anticipated review times.

1.04 ACTION/INFORMATIONAL SUBMITTALS

- A. Provide the following Submittals in accordance with the individual Specification Sections, including, but not limited to, the following:

- 1. Product Data:

- a. Catalog cut-sheets
- b. Descriptive bulletins/brochures/specifications
- c. Material of construction data, including details on all components including applicable ASTM designations.
- d. Lifting, erection, installation, and adjustment instructions, and recommendations.
- e. Finish/treatment data, including interior and exterior shop coating systems.
- f. Equipment/material weight/loading data, including total uncrated weight of the equipment plus the approximate weight of shipped materials. Support locations and loads that will be transmitted to bases and foundations following installation. Size, placement, and embedment requirements of anchor bolts.
- g. Complete information regarding location, type, size, and length of all field welds in accordance with "Standard Welding Symbols" AWS A2.0 of the American Welding Society. Special conditions shall be fully explained by notes and details.
- h. Motor data including horsepower; enclosure type; voltage; insulation class; temperature rise and results of dielectric tests; service-rating; rotative speed; motor speed-torque relationship; efficiency and power factor at $\frac{1}{2}$, $\frac{3}{4}$, and full load; slip at full load; running, full load, and locked rotor current values; safe running time-current curves; motor protective devices; and interconnection diagrams.
- i. Engineering design data, calculations, and system analyses
- j. Digital system documentation
- k. Operating sequence descriptions
- l. Software/programming documentation
- m. Manufacturer's instructions

2. Shop Drawings:
 - a. Equipment and material layout drawings, including panel layout drawings.
 - b. System schematics and diagrams including, but not limited to, piping systems; HVAC and ventilation systems; process equipment systems; electrical operating systems; wiring diagrams; controls, alarm and communication systems.
 - c. Layout and installation drawings (interior and exterior) for all pipes, valves, fittings, sewers, drains, heating and ventilation ducts, all electrical, heating, ventilating and other conduits, plumbing lines, electrical cable trays, lighting fixture layouts, and circuiting, instrumentation, interconnection wiring diagrams, communications, power supply, alarm circuits, etc.
 - d. Layout and installation drawings shall show connections to structures, equipment, sleeves, valves, fittings, etc.
 - e. Drawings shall show the location and type of all supports, hangers, foundations, etc., and the required clearances to operate valves, equipment, etc.
 - f. Drawings for pipes, ducts, conduits, etc., shall show all 3 inch and larger electrical conduits and pressure piping, electrical cable trays, heating and ventilation ducts or pipes, structure, manholes or any other feature within four (4) feet (measured as the clear dimension) from the pipe duct, conduit, etc., for which the profile is drawn.
 - g. Equipment and material schedules.
3. Delegated design submittals, which include documents prepared, sealed, and signed by a design professional retained by Contractor, Subcontractor, or Supplier for materials and equipment to be incorporated into the completed Work. Delegated design submittals do not include submittals related to temporary construction unless specified otherwise in the related Specification Section. Delegated design submittals include: design drawings, design data including calculations, specifications, certifications, and other submittals prepared by such design professional.

B. Samples:

1. General Requirements:
 - a. Conform submittal of Samples to the General Conditions as modified by the Supplementary Conditions, this Section, and the Specification Section in which the Sample is specified.

- b. Furnish at the same time Samples and submittals that are related to the same unit of Work or Specification Section. Engineer will not review submittals without associated Samples and will not review Samples without associated submittals.
 - c. Samples shall clearly illustrate functional characteristics of product, all related parts and attachments, and full range of color, texture, pattern, and material.
2. Submittal Requirements:
- a. Securely label or tag Samples with submittal identification number. Label or tag shall not cover, conceal, or alter appearance or features of Sample. Label or tag shall not be separated from the Sample.
 - b. Submit number of Samples required in Specifications. If number of Samples is not specified in the associated Specification Section, provide at least one identical Samples of each item required for Engineer's approval. If Contractor requires Sample(s) for Contractor's use, notify Engineer in writing and provide additional Sample(s). Contractor is responsible for furnishing, shipping, and transporting additional Samples.
 - c. Deliver one Sample to Engineer's field office at the Site. Deliver balance of Samples to location directed by Engineer.

1.05 CLOSEOUT SUBMITTALS

- A. Provide the following Closeout Submittals in accordance with the individual Specification Sections, including, but not limited to, the following:
 - 1. Maintenance contracts
 - 2. Bonds for specific products or systems
 - 3. Warranty documentation
 - 4. Sustainable design closeout documentation.
 - 5. Software programming and documentation.
- B. On documents such as maintenance contracts and bonds, include on each document furnished original signature of entity issuing the document.
- C. Operations and Maintenance Data: Submit in accordance with General Conditions.
- D. Record Documentation: Submit in accordance with General Conditions.
- E. Disposition: Dispositions and meanings are the same as specified for Informational Submittals.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. For spare parts, extra stock materials, and tools, submit quantity of items specified in associated Specification Section. Furnish in accordance with General Conditions.
- B. Disposition: Dispositions and meanings are the same as specified for Informational Submittals.

1.07 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall review, coordinate, and verify submittals with Subcontractors, Manufacturers, and Suppliers, including field measurements at Site, in accordance with the General Conditions and as modified by Supplemental Conditions prior to submitting material for Engineer's review.
- B. Contractor shall clearly and concisely indicate and mark equipment and material being submitted to meet the intent of the Contract Documents. Equipment and material not being submitted shall be deleted, stricken through, or otherwise designated not being submitted. Equipment and material data sheets shall be included once with cross references throughout the submittal. Multiple equipment and material data sheets for the same item within a submittal may receive a rejected disposition until corrected.
 - 1. Individual Specification Sections require a Compliance, Deviations, and Exceptions (CD&E) letter to be included with the submittal. When specified, submittals provided without the CD&E letter shall receive a rejected disposition without review.
 - 2. CD&E letter requirements:
 - a. Include a copy of entire Specification section with each paragraph and subparagraph noted with "C", "D", or "E" to indicate if equipment and material being provided is in compliance (C), deviates (D), or exceptions (E) are taken with the Contract Documents.
 - 1) Compliance (C): Full compliance with the specified requirement.
 - 2) Deviation (D): Deviation from the specified requirement.
 - 3) Exception (E): Exception with the specified requirement.
 - b. Include all comments, deviations and exceptions taken to the Contract Documents by the Contractor and Equipment Manufacturer/Supplier.
 - c. Any requirements with the letter "D" or "E" beside them shall be provided with a full typewritten explanation of the deviation/exception. Handwritten explanation of the deviations/exceptions is not acceptable.

- d. Address deviations and exceptions taken to each Contract Drawing related to the Specification section.
- C. Contractor shall provide Contractor's stamp of approval certifying submittal material has been reviewed and conform to the Contract Documents prior to submitting material for Engineer's review.
- D. Contractor shall provide written notice of deviations or variations that submittal may have with the Contract Documents.
- E. Contractor shall provide bound, dated, labeled, tabulated, and consecutively numbered submittals as specified in the individual Specification Section. Label shall contain the following:
 1. Specification Section.
 2. Referenced Drawing number.
 3. Subcontractor or Supplier name.
 4. Type of equipment and/or materials.
- F. Contractor shall perform the following after receiving Engineer's review disposition:
 1. Order, fabricate, or ship equipment and materials included in the submittal (pending Engineer's review of source quality control submittals) with the following disposition:
 - a. "Furnish as Submitted" (FAS).
 - b. "Furnish as Corrected" (FAC).
 - c. "Furnish as Corrected – Confirm" (FACC), only portions of Work that do not require resubmittal for Engineer's review.
 2. Resubmittal requirements:
 - a. Partial resubmittal of "Furnish as Corrected – Confirm" (FACC) returned dispositions, until Engineer's disposition is either "Furnish as Submitted" (FAS) or "Furnish as Corrected" (FAC).
 - b. Full resubmittal of material with Engineer's disposition of "Revise and Resubmit" (R&R), until Engineer's disposition is "Furnish as Submitted" (FAS), "Furnish as Corrected" (FAC), or "Furnish as Corrected – Confirm" (FACC) that requires a partial resubmittal.
 - c. Contractor shall be responsible for Engineer's charges to Owner if submittals are not approved within the number of specified submittals in accordance with the General Conditions. Engineer's charges shall include, but not limited

to, additional review effort, meetings, and conference calls with Contractor, Subcontractor, or Supplier.

1.08 ENGINEER'S REVIEW

- A. Engineer's review of the Contractor's submittal shall not relieve Contractor's responsibility under the Contract Document in accordance with the General Conditions and as modified in the Supplemental Conditions. An acceptance of a submittal shall be intended to mean the Engineer does not have specific objection to the submitted material, subject to conformance with the Contract Drawings and Specifications.
- B. Engineer's review of Contractor's submittal shall be confined to general arrangement and compliance with the Contract Documents, and shall not be for the purpose of checking dimensions, weights, clearances, fittings, tolerances, interferences, coordination of Subcontractor work, etc.
- C. Review Dispositions:
 - 1. "Furnish as Submitted" (FAS) – No exceptions are taken.
 - 2. "Furnish as Corrected" (FAC) – Minor corrections are noted for Contractor's correction.
 - 3. "Furnish as Corrected – Confirm" (FACC) – Corrections are noted and partial resubmittal shall be made as noted.
 - 4. "Revise and Resubmit" (R&R) – Corrections are noted and complete resubmittal shall be made. Submittal does not conform to applicable requirements of the Contract Documents and is not acceptable. Revise submittal and re-submit to indicate acceptability and conformance with the Contract Documents.
 - 5. "Receipt Acknowledged" (RA) –
 - a. Information included in submittal conforms to the applicable requirements of the Contract Documents and is acceptable. No further action by Contractor is required relative to this submittal, and the Work covered by the submittal may proceed, and products with submittals with this disposition may be shipped or operated, as applicable.
 - b. Information included in submittal is for Project record purposes and does not require Engineer's review or approval.
 - 6. "Rejected" (R) – Information included in submittal does not conform to the applicable requirements of the Contract Documents and is unacceptable. Contractor shall submit products and materials as specified in the Contract Documents or provide required information for substitution as specified in the Contract Documents for consideration by Engineer.

- D. Electronic Submittal Return to Contractor: Electronic submittals shall be returned electronically with dispositions provided.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 35 23

SAFETY AND HEALTH

PART 1.00 GENERAL

1.01 CONTRACTOR'S RESPONSIBILITY FOR SAFETY

- A. The Contractor certifies that he is experienced and qualified to anticipate and meet the safety and health requirements of this Project pursuant to California Administrative Code, Title 8, "Industrial Relations", and Code of Federal Regulations, Sections 1900 through 1910, "Occupational Safety and Health Standards", and Section 1926 "Construction". For information purposes only the Contractor shall submit to the Owner a copy of his Injury and Illness Prevention Program. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. This requirement will apply continuously twenty-four (24) hours a day every day until final acceptance of the Work and shall not be limited to normal working hours. The duties of the Owner, Engineer and Inspector do not include review of the adequacy of the Contractor's safety measures in, on, or about the site and vicinity.
1. Safety Officer. The Contractor shall designate a fully trained and responsible member of his organization at the site who is experienced in administering, enforcing and overseeing the safety standards contained in the California Administrative Code, Title 8 and 29, and the Code of Federal Regulations, Sections 1900 through 1910 and Section 1926, whose duty shall be the prevention of hazards and accidents and who shall have authority to direct work for the Contractor.
 2. Safety Supervisor. The Contractor shall designate Safety Supervisors for each work site. One Safety Supervisor may be the Safety Officer. The other Safety Supervisors shall work for the Safety Officer. Each shall be fully trained for the type of work being performed and shall have authority to direct the Contractor's work.
 3. Accident Reporting. Any accident occurring within the premise of the Regional Treatment Plant is to be reported to the Owner.

1.02 SAFETY MEASURES

- A. The Contractor shall comply with all laws, ordinances, codes, rules, regulations and lawful orders of any public authority having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. The Contractor shall maintain copies of all documents mentioned or referenced in this Section readily available at the site until the Work is completed. In the event the Contractor fails to observe any of the necessary safety provisions, the Owner may stop the work and direct the Contractor to comply with the applicable provisions, or may order the necessary work done by others. All impacts, both monetary and time-related, associated with stoppage of the work in order to comply with the Owner's directives pertaining to safety requirements, and all costs of having the necessary work done by others shall be borne by and be the obligation of the Contractor.

1.03 CONFINED SPACE SAFETY

- A. The Owner employs a "Permit Required" safety standard for all confined space entries per California General Industrial Safety Orders, Section 5157. Work performed in or about wastewater (sewage) facilities, including but not limited to manholes, pipes, tanks,

basins, and structures, carries with it the high potential for exposure of workers and other persons to hazardous conditions. The Contractor is required to be especially alert to these conditions and employ a "permit required" system for all confined space entries as specified in California General Industrial Safety Orders, Section 5157. These conditions may include, but are not limited to, exposure to hydrogen sulfide, carbon dioxide, methane, carbon monoxide and other gases; exposure to atmospheres containing insufficient oxygen to support human life; exposure to wastewater (sewage) which may contain bacteriological, chemical, and other constituents harmful to humans; working in conditions where engulfment or entrapment of personnel may occur (such as in trench excavations); and working in structures with uneven and slippery surfaces and with difficult and limited access. Many of these environments are classified as "confined spaces" in the Code of Federal Regulations, Sections 1900 through 1910 and Section 1926, the California Administrative Code, Title 8, and the State of California's General Industry Safety Orders. The Contractor shall be fully familiar with, and shall strictly adhere to and comply with, the applicable sections of these documents pertaining to confined spaces. In the event of a conflict between applicable requirements, the more restrictive shall apply.

1.04 PERSONAL HYGIENE

- A. Persons involved in the work may be exposed to disease-producing organisms in wastewater (sewage). The Contractor shall require his personnel to observe proper hygienic precautions, including washing of hands and other exposed portions of the body with disinfecting soap and water before eating or smoking.

1.05 PUBLIC SAFETY AND CONVENIENCE

- A. The Contractor shall conduct his work so as to insure the least possible obstruction to traffic and inconvenience to the general public in the vicinity of the work and to insure the protection of persons and property. No road or street shall be closed to the public except with the permission of the Owner and the proper governmental authority. Fire hydrants on or adjacent to the work shall be accessible to fire-fighting equipment. Temporary provisions shall be made by the Contractor to insure 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.

1.06 WARNINGS AND BARRICADES

- A. The Contractor shall provide and maintain barricades, guards, temporary bridges and walkways, watchmen, night lights and danger signals illuminated from sunset to sunrise, and all other necessary appliances and safeguards to protect the Work, life, property, the public, excavations, equipment, and materials. Barricades shall be of substantial construction and shall be painted such as to increase their visibility at night. Suitable warning signs shall be so placed and illuminated at night as to show in advance where construction, barricades, or detours exist. Guard rails shall be provided for bridges and walkways over or adjoining excavations, shafts, and other openings and locations where injury may occur.

1.07 FIRE PREVENTION

- A. The Contractor's Safety Officer shall inspect the entire Work and site, including storage areas, at frequent intervals to verify that fire prevention measures are constantly enforced.
1. Fire Extinguishers and Hoses. The Contractor shall furnish and maintain fully charged fire extinguishers of the appropriate type, supplements with temporary fire hoses wherever an adequate water supply exists, at the places where burning, welding or other operations that may cause a fire are being performed.
 2. Flammable, Hazardous or Toxic Materials. Solvents, gasoline, and other hazardous materials may be in the wastewater (sewage), and therefore, the work site may be hazardous to open flame, sparks, or unventilated occupancy. The Contractor shall take measures to assure his personnel observe proper safety precautions when working in these areas. Only a working supply of flammable, hazardous or toxic materials shall be permitted in or on any of the permanent structures and improvements, and shall be removed there from at the end of each day's operations. The Contractor shall store flammable, hazardous or toxic materials and waste separate from the Work and stored materials for the Work in a manner that prevents spontaneous combustion or dispersion, provides the appropriate level of secondary spill containment, and none shall be placed in any sewer or drain piping nor buried on the Owner's property. It is the Contractor's responsibility to request permission 15 days in advance, in writing, to bring hazardous, toxic, or flammable materials to the Owner's work site. The request will specify the type and quantity of material proposed to be brought on site, where and how it will be stored, what type of secondary containment will be used, where and by whom the material will be used, and what health hazards are associated with the proposed material (Material Safety Data Sheet). The Owner will respond to the Contractor, in writing, within seven days of the receipt of the request as to whether or not the material can be brought on site and of any special requirements the OWNER may have that are not covered in the Contractor's request. The Contractor shall maintain a current and up-to-date copy of all laws, ordinances, codes, rules, regulations and lawful orders of any regulatory authority having jurisdiction or control over flammable, hazardous or toxic materials and, at his expense, shall comply with said laws, ordinances, codes, rules, regulations and lawful orders.

1.08 SAFETY HELMETS, CLOTHING, AND EQUIPMENT

- A. The Contractor shall not permit any person for whom he is responsible or liable to enter or remain on the site of the Work unless the person is equipped with and wearing a safety helmet and other protective clothing and safety equipment conforming to the requirements of California General Industrial Safety Orders, and shall discharge from the site all persons not so equipped. The Contractor shall post conspicuous signs at appropriate locations warning the public and persons engaged upon the Work of this requirement.

1.09 HAZARDOUS AREAS

- A. The Contractor shall not permit or allow any person or persons to enter any pipe or space containing hazardous or noxious substances or gases, or where there is an insufficient amount of oxygen to sustain life and consciousness, or any other hazardous area unless equipped with lawful and appropriate safety equipment and life supporting apparatus, and unless those entering are continually monitored and guarded by and in communication with other persons outside the space or area who are equipped in the same way, can give

an alarm to others for assistance, and initiate immediate rescue operations in the event of mishap.

1.10 EMERGENCIES

- A. Work During an Emergency. The Contractor shall perform any and all operations and shall furnish any materials and equipment necessary during an emergency endangering life or property and, in all cases, shall notify the Owner of the emergency as soon as practicable, but shall not wait for instruction before proceeding to properly protect both life and property. Any additional compensation or extension of Contract Time claimed by the Contractor on account of an emergency shall be applied for as provided in contract documents.
- B. Representatives for Emergencies. The Contractor shall file with the Owner a written list giving the names, addresses, and telephone numbers of at least two of his representatives who can be contacted at any time in case of emergency. The representatives shall be fully authorized and equipped to correct unsafe or inconvenient conditions on short notice. The Contractor shall promptly notify the Owner of all changes in the listing.

1.11 SUBMITTALS

- A. Prior to receiving Notice to Proceed, the Contractor shall submit to the District Project Manager the following: (1) a copy of his Injury and Illness Prevention Program Manual, (2) a list of safety equipment he will maintain on site, (3) the name of his Safety Officer and Safety Supervisor(s) who will be responsible for maintaining safety at each work site, and (4) a description of any job-specific measures he will be using which are not contained in his manual. The Owner shall not review these materials, but shall maintain these materials for record purposes.

1.12 IMPLEMENTATION

- A. It is the Contractor's responsibility to follow his own safety program and provide one or more designated Safety Supervisor(s) at each work site.

1.13 COMMUNICATION

- A. It is the Contractor's responsibility to communicate to the Owner all hazards which they plan to introduce to the work site, whether by procedure or material.

PART 3.00 EXECUTION (Not Used)

PART 4.00 PAYMENT

4.01 GENERAL

Full compensation for the work specified herein shall be considered as included in the applicable lump sum or unit price items stated in the Contractor's proposal and no additional compensation will be allowed therefor.

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Tolerances
- C. References.
- D. Testing and inspection services.
- E. Examination.
- F. Preparation.

1.02 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

- C. Adjust products to appropriate dimensions; position before securing products in place.

1.04 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.05 TESTING AND INSPECTION SERVICES

- A. Unless noted otherwise, Contractor will employ and pay for specified services of an independent firm to perform testing and inspection.
- B. See Proposal, Bid Item Descriptions, for trench compaction requirements to be certified by a Registered Geotechnical Engineer to be hired by the Contractor.
- C. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Architect/Engineer.
 - 1. Laboratory: Authorized to operate at Project location.
 - 2. Laboratory Staff: Maintain full time specialist on staff to review services.
 - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- D. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Architect/Engineer or Owner.
- E. Reports will be submitted by independent firm to Architect/Engineer, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- F. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

- G. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- H. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Architect/Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- I. Testing Agency Responsibilities:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
 - 6. Perform additional tests required by Architect/Engineer.
- J. Testing Agency Reports: After each test, promptly submit two copies of report to Architect/Engineer. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name of inspector.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and specifications section.
 - 6. Location in Project.
 - 7. Type of inspection or test.
 - 8. Date of test.
 - 9. Results of tests.
- K. Limits On Testing Authority:
 - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency or laboratory may not approve or accept any portion of the Work.
 - 3. Agency or laboratory may not assume duties of Contractor.
 - 4. Agency or laboratory has no authority to stop the Work.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

PART 4 PAYMENT

GENERAL

- A. Full compensation for the work specified herein shall be considered as included in the applicable lump sum or unit price items stated in the Contactor's proposal and no additional compensation will be allowed therefor.

END OF SECTION

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities required during construction.
- B. Requirements for security and protection of facilities and property.
- C. Requirements for traffic regulation and access to the work.
- D. Temporary controls for protection of environment.

1.02 TEMPORARY UTILITIES

- A. Electric Power:
 - 1. Electric power is not available at the site. Contractor shall make arrangements with PG&E to obtain electrical power.
 - 2. Temporary electric power installations shall meet construction safety requirements of OSHA, state, and other governing agencies.
- B. Water:
 - 1. No water is available at the project site. Contractor shall make arrangements and bear all costs for obtaining and transporting water to the construction areas.
- C. Sewage:
 - 1. Provide and maintain sanitary facilities for Contractor's employees and subcontractor's employees that comply with regulations of local and state health departments.
 - 2. Provide chemical toilets of suitable types and maintain them in a sanitary condition at all times, conforming to code requirements and acceptable to the health authorities. They shall be of watertight construction so that no contamination of the area can result from their use. Make arrangements for frequent emptying of toilets.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 TEMPORARY CONSTRUCTION FACILITIES

- A. Storage Yards and Buildings:
 - 1. The Contractor shall maintain a suitable temporary office at or near the project site.
 - 2. The Contractor shall be responsible for providing the site for the temporary office

- and for a storage and staging area.
3. Store combustible materials (paints, solvents, fuels, etc.) in a well-ventilated building remote from other buildings.

3.02 SAFETY AND PROTECTION

A. Examination of Existing Facilities:

1. After the Contract is awarded and before the commencement of work, Contractor and Owner shall make a thorough examination of all existing buildings, structures, and other improvements in the vicinity of the work, as applicable, which might be damaged by construction operations.
2. Periodic examinations of existing buildings, structures, and other improvements in the vicinity of the work shall be made jointly by authorized representatives of the Contractor, Owner, and the affected property owners. The scope of the examination shall include cracks in structures, settlement, leakage, and similar conditions.
3. Records in triplicate of all observations shall be prepared by the Contractor and each copy of every document shall be signed by the authorized representative of the Owner and of the Contractor. Photographs, as requested by the Owner, shall be made by the Contractor and signed in the manner specified above. One signed copy of every document and photograph will be kept on file in the office of the Owner.
4. These records and photographs are intended for use as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of the Contractor's operations, and are for the protection of the adjacent property owners, the Contractor, and the Owner.

B. Safety Requirements:

1. Contractor shall do whatever work is necessary for safety and be solely and completely responsible for conditions of the jobsite, including safety of all persons (including employees) and property during the Contract period. This requirement shall apply continuously and not be limited to normal working hours.
2. Safety provisions shall conform to Federal and State Departments of Labor Occupational Safety and Health Act (OSHA), and other applicable federal, state, county, and local laws, ordinances, codes, requirements set forth herein, and regulations that may be specified in other parts of these Contract Documents. Where these are in conflict, the more stringent requirement shall be followed. Contractor shall become thoroughly familiar with governing safety provisions and shall comply with the obligations set forth therein.
3. Contractor shall develop and maintain for the duration of the Contract, a safety program that will effectively incorporate and implement required safety provisions. Contractor shall appoint a qualified employee who is authorized to supervise and enforce compliance with the safety program.
4. Owner's duty to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of Contractor's safety supervisor, safety program, or safety measures taken in, on, or near the construction site.
5. As part of safety program, Contractor shall maintain at his office or other well-

known place at the jobsite, safety equipment applicable to the work as prescribed by the governing safety authorities, and articles necessary for giving first-aid to the injured. Established procedures for the immediate removal to a hospital or a doctor's care of persons who may be injured on the jobsite.

6. Contractor shall do all work necessary to protect the general public from hazards, including, but not limited to, surface irregularities or unramped grade changes in pedestrian sidewalk or walkway, and trenches or excavations in roadway. Barricades, lanterns, and proper signs shall be furnished in sufficient amount to safeguard the public and the work.
7. Construct and maintain satisfactory and substantial temporary chain link fencing, solid fencing, railing, barricades or steel plates, as applicable, at all openings, obstructions, or other hazards in streets, sidewalks, floors, roofs, and walkways. Such barriers shall have adequate warning lights as necessary or required for safety.
8. Comply with Owner's safety rules while on Owner property.
9. If death or serious injuries or damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner. In addition, Contractor shall promptly report in writing all accidents whatsoever arising out of, or in connection with, the performance of the work whether on or adjacent to the site, giving full details and statements of witnesses.
10. If claim is made by anyone against Contractor or any subcontractor on account of accident, Contractor shall promptly report the facts in writing, giving full details of the claim.

C. Protection of Work and Property:

1. General:
 - a. Contractor shall employ such means and methods necessary to adequately protect public property and property of the Owner against damage. In the event of damage to such property, immediately restore the property to a condition equal to its original condition and to the satisfaction of the Owner and the owner of said property, and bear all costs therefor.
 - b. Protect stored materials, trees and crops, and other items located adjacent to the proposed work. During construction operations, construct and maintain facilities to enable pedestrian access by all property owners to their property at all times. No person shall be cut off from vehicular access to residence or place of business, unless the Contractor has made special arrangement with the affected person.
 - c. Protect from damage all trees outside the limits of the work and trees within the limits of the work which are designated on the Drawings to remain undisturbed. No trees, except those specifically shown on the Drawings to be removed, shall be removed without approval of the Owner. Dispose of removed trees in a legal manner off the jobsite.
2. Finished Construction:
 - a. Contractor shall assume the responsibility for protection of finished construction and shall repair and restore any and all damage to finished work to its original or better condition.
 - b. At such time temporary facilities and utilities are no longer required for the work, notify Owner of intent and schedule for their removal.

Remove temporary facilities and utilities from the site as Contractor's property and leave the site in such condition as specified, as shown on the Drawings or as directed by the Engineer.

- c. In unfinished areas, leave the site evenly graded in a condition that will restore original drainage, and with an appearance equal to or better than original. Existing planted or landscaped areas shall be restored and be left ready for replanting.

3.03 ENVIRONMENTAL CONTROLS

A. General:

1. The Contractor is executing the work shall maintain affected areas within and outside project boundaries free from environmental pollution that would be in violation of federal, state, or local regulations.

B. Water Pollution Control:

1. Comply with laws, rules, and regulations of the State of California and agencies of the United States Government prohibiting the pollution of lakes, wetlands, streams, or river waters from the dumping of refuse, rubbish, or debris.
2. Divert sewage and waste flow, including storm water flow, interfering wastewater treatment plant. Do not cause or permit action to occur which would cause an overflow to an existing waterway. Prior to commencing excavation and construction, obtain Owner's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and storm water flow, including dewatering pump discharges.
3. Contractor shall comply with the procedures outlined in the U.S. Environmental Protection Agency manuals entitled "Guidelines for Erosion and Sedimentation Control Planning and Implementation", "Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity", and "Erosion and Sediment Control-Surface Mining in Eastern United States".
4. The California Regional Water Quality Control Board has the power, derived from the Porter-Cologne Water Quality Control Act, to impose on the Owner up to \$10,000 per day (or portion thereof) fine for bypassing of sewage flows to the San Francisco Bay. Contractors shall be responsible for violations of Regional Board requirements caused by their operations. If an overflow to the Bay occurs because of the Contractor's operations or neglect, and fines are levied against the Owner, the fines will be considered direct damages caused by the Contractor which the Owner may recover by retention.

C. Waste Material Disposal:

1. Cleaning and disposal shall comply with local ordinances and pollution control laws. Do not burn or bury rubbish or waste materials on the project site. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

D. Air Pollution Control:

1. Trash burning will not be permitted on the construction site.

2. Operations of dumping rock and of carrying waste or excess material away in trucks shall be conducted to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in the construction area a dust-preventive treatment, or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.
 3. Sweep work area on daily basis, wet as required to control dust during sweeping operations.
- E. Noise Control:
1. Minimize noise by executing work using appropriate construction methods and equipment. Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.

PART 4 PAYMENT

4.01 GENERAL

- A. No separate measurement or payment will be made for work in this section. Payment shall be included as part of the appropriate lump sum or unit price bid items stated in the Proposal.
- B. Payment for furnishing and maintaining the Engineer's field office will be made as part of the lump sum bid amount for mobilization stated in the Proposal. Partial payments will be prorated based on the percent complete of the overall project costs.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.

1.02 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Furnish interchangeable components from same manufacturer for components being replaced.

1.03 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.04 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.

- E. Provide off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.05 PRODUCT OPTIONS

- A. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.06 PRODUCT SUBSTITUTION PROCEDURES

- A. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- C. A request constitutes a representation that Contractor:
 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 2. Will provide same warranty for Substitution as for specified product.
 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities having jurisdiction.
- D. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- E. Substitution Submittal Procedure:
 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
 3. Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

PART 4 PAYMENT

4.01 GENERAL

- A. Full compensation for the work specified herein shall be considered as included in the applicable lump sum or unit price items stated in the Contactor's proposal and no additional compensation will be allowed therefor.

END OF SECTION

SECTION 01 71 13

MOBILIZATION

PART 1.00 GENERAL

1.01 SECTION INCLUDES

- A. Work necessary to move in personnel and equipment, set up temporary facilities, and for all other work and operations which must be performed prior to beginning work on the various contract items.

PART 2.00 PRODUCTS

2.01 GENERAL

- A. Provide all materials and equipment required to accomplish the work as specified.

PART 3.00 EXECUTION (Not Used)

PART 4.00 PAYMENT

4.01 GENERAL

- A. Full compensation for the work specified herein shall be considered as included in the applicable lump sum or unit price items stated in the Contactor's proposal and no additional compensation will be allowed therefor.

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures to be followed in closing out the Contract.

1.02 FINAL SUBMITTALS

- A. No Contract will be finalized until all of the following have been submitted as required in Section SUBMITTALS:
 - 1. Final shop drawings.
 - 2. Record drawings.
 - 3. Manufacturer's certification of proper installation.
 - 4. Video tapes, construction photographs, including completed project.
- B. No Contract will be finalized until all guarantees, bonds, certifications, licenses, and affidavits required for work or equipment as specified are satisfactorily filed with the Owner.

1.03 RELEASE OF LIENS OR CLAIMS

- A. No Contract will be finalized until satisfactory evidence of release of liens has been submitted to Owner as required by the General Conditions.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 FINAL CLEANING

- A. At completion of work and immediately prior to final inspection, clean entire project according to the following provisions:
 - 1. Leave the structures and site in a complete and finished condition to the satisfaction of the Owner.
 - 2. Remove debris including dirt, sand, and gravel from sewers.
- B. The Contractor shall:
 - 1. Repair, patch, and touch up marred surfaces to specified finish, and match adjacent surfaces.
 - 2. Broom clean paved surfaces; rake clean other surfaces.
 - 3. Remove temporary structures and materials, equipment, and appurtenances not required as part of, or appurtenant to, the completed work.
 - 4. Leave water courses, gutters, and ditches open and in condition satisfactory to Owner.

3.02 FINAL INSPECTION

- A. After final cleaning and upon written notice from the Contractor that the work is completed, Owner will make preliminary inspection with the Contractor present. Upon completion of preliminary inspection, Owner will notify Contractor in writing of particulars in which the completed work is defective or incomplete.
- B. Upon receiving written notice from Owner, Contractor shall immediately undertake work required to remedy defects and complete the work to the satisfaction of Owner.
- C. After the items as listed in Owner's written notice are corrected or completed, inform Owner in writing that required work has been completed. Upon receipt of this notice, Owner, in the presence the Contractor, will make final inspection of the project.
- D. Should the Owner find all work satisfactory at the time of final inspection, Contractor will be allowed to make application for final payment in accordance with provisions of the General Conditions. Should Owner still find deficiencies in the work, Owner will notify Contractor in writing of deficiencies and will not approve Contractor's request for final payment until such time as Contractor has satisfactorily completed the required work.

PART 4 PAYMENT

4.01 GENERAL

- A. Full compensation for the work specified herein shall be considered as included in the applicable lump sum or unit price items stated in the Contactor's Proposal, and no additional compensation will be allowed therefor.

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION

The Contractor shall remove equipment, piping, and concrete work as necessary for the construction of work as shown on the plans and as specified. All materials removed not claimed by the District shall be disposed of at a legal disposal site.

1.02 SAFETY

The Contractor shall take all necessary precautions with regard to safety in carrying out the demolition work. Suitable barriers shall be erected around the demolition area to protect workmen and the public, and the Contractor shall rigorously comply with applicable safety requirements.

1.03 PAYMENT

The cost of all demolition, salvage, abandonment and disposal of materials and debris shall be included in the bid price for the construction work and no additional compensation will be allowed.

PART 3 - EXECUTION

3.01 REMOVAL AND DISPOSAL OF EQUIPMENT AND MATERIALS

The Contractor shall remove and dispose of materials and debris resulting from the demolition work. All removed materials shall become the sole property of the Contractor and shall be disposed of by the Contractor at a legal disposal site. The Contractor shall take care to deliver all salvaged equipment to the District in good condition.

3.02 SPECIFIC ITEMS TO BE SALVAGED

The following items shall be salvaged and delivered to the District's storage yard.

1. None.

3.03 METHODS AND EQUIPMENT

Before starting work, the Contractor shall inform the District fully as to the method of demolition he proposes to follow, and the amount and character of equipment he proposes to use, which shall be subject to the approval of the District. The approval of the District shall not be considered as relieving the Contractor of the responsibility for the safety of his method or equipment or from carrying out the work in full accordance with the plans and specifications.

3.04 REMOVAL OF OLD CONCRETE

The Contractor shall carefully remove old concrete work structures so as to minimize damage to adjacent concrete work and improvements to remain. All old concrete shall be removed from the site and disposed of at a legal disposal site.

3.05 DISPOSAL OF MATERIALS AND DEBRIS

All materials and debris resulting from the demolition work other than the materials to be retained by the District shall become the sole property of the Contractor and shall be disposed of by the Contractor at a legal disposal site.

END OF SECTION

SECTION 02 50 10

SURFACE RESTORATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work necessary to replace all pavement, curbs, gutters, sidewalks, drainage facilities, and other street features damaged either directly or indirectly by the operations incidental to the construction of the sewer system, complete.
- B. Included in this section also is the work necessary to restore culverts, catch basins and storm sewers disturbed by the construction of the sewer system, complete.
- C. All other surface features shall be restored to their preconstruction condition and shall be considered incidental to the construction. The Contractor shall include the cost of these features in other items of this section.

PART 2 PRODUCTS

2.01 ROCK FOR SURFACING AND BASE

- A. Rock shall conform to ASTM D 2321-89 for Class 2 Aggregate Base, 3/4-inch maximum.
- B. Submit proof in the form of test results from a commercial testing laboratory or other evidence satisfactory to the Owner to show that the materials meet the quality and gradation requirements.

2.02 CONCRETE

- A. All concrete for work specified in this Section shall be ready-bed conforming to ASTM C 94, Alternate 2. Portland cement shall be Type II or Type V.

2.03 HOT MIX ASPHALT (ASPHALT CONCRETE)

- A. Hot mix asphalt, asphalt cement, and asphalt prime conforming to the latest edition of the State Standard Specifications, Section 39.
- B. See Appendix Section of the Contract Documents for additional encroachment permit requirements by public agencies having jurisdiction.

2.04 BITUMINOUS SEALS

- A. Bituminous seals conforming to the latest edition of the State Standard Specifications, Section 37.

2.05 LIQUID ASPHALT

- A. Liquid asphalt conforming to the latest edition of the State Standard Specifications, Section 93.

2.06 PIPE FOR STORM SEWER REPLACEMENT

- A. Pipe for storm sewer replacement shall conform to the requirements of public agencies having jurisdiction.
- B. Unless noted otherwise, sewer pipe 12 inches and over shall conform to ASTM C 76, Class III. Pipe joints shall conform to the existing pipe.

PART 3 EXECUTION

3.01 CONSTRUCTION PROCEDURE

- A. Prior to construction, the condition of the existing roadway shall be inventoried by representatives of the Public Agency having jurisdiction, the Contractor and the Owner. Any existing damage should be documented and photographed. Unless documented prior to construction, it will be assumed that any other damage resulted from construction, and the cost of repairs shall be borne by the Contractor.
- B. Provide all tracked construction equipment with smooth "street pads." Protect existing pavement by placing pads under all tracked equipment if necessary. All work shall be carried out in such a manner as to minimize any potential damage to the existing roadway. Excessive surface damage shall be repaired as directed by the Owner.
- C. Replace all bituminous pavement damaged with asphalt concrete regardless of original type.
- D. In addition to the requirements set forth herein, the work shall conform to the applicable workmanship requirements of the state highway or municipal specifications.

3.02 HOT MIX ASPHALT (ASPHALT CONCRETE) PAVEMENT REPLACEMENT

- A. Subgrade:
 - 1. Bring the crushed rock trench backfill to a smooth, even grade at the correct distance below the top of the existing pavement surface so as to provide adequate space for the base course and pavement. Trim existing pavement to a straight line to remove any pavement which has been damaged or which is broken and unsound to provide a smooth, sound edge for joining the new pavement.
 - 2. Compact the subgrade to a minimum of 95 percent of maximum density as determined by ASTM D 1557 (or California Test 231). Accomplish supplementary compaction where required with approved mechanical vibrating or impact type tampers.
- B. Prime Coat: After the subgrade has been compacted and leveled, apply an asphalt prime coat, specified above, at 0.25 to 0.45 gallon per square yard, to the surface of the subgrade and to the edges of the existing pavement. Also, tack coat cast iron manhole frames and concrete surfaces which will be in contact with the new asphalt.
- C. Asphalt Concrete:

1. Asphalt concrete shall conform to the requirements of the latest edition of the State Standard Specifications, Section 39, for required temperature of asphalt concrete for delivery and installation.
2. Place the asphalt concrete on the prepared subgrade over the trench to a depth of not less than 4 inches or the depth of the adjacent pavement, whichever is greater, but not for more than 6 inches. Place asphalt concrete after the prime coat has set. If the thickness is greater than 4 inches, place the surfacing in two lifts. Spread and level the asphalt concrete with hand tools or by use of a mechanical spreader, depending upon the area to be paved. Bring the asphalt concrete to the proper grade and compact by rolling or the use of hand tampers where rolling is impossible or impractical.
3. Roll with power rollers capable of providing compression of 200 to 300 pounds per linear inch. Begin the rolling from the outside edge of the replacement progressing toward the existing surfacing, lapping the existing surface at least 1/2 the width of the roller. If existing surfacing bounds both edges of the replacement, begin rolling at the edges of the replacement, lapping the existing surface at least 1/2 the width of the roller, and progress toward the center of the replacement area. Overlap each preceding track by at least 1/2 the width of the roller and make sufficient passes over the entire area to remove all roller marks and to produce the desired result, as determined by the Owner.
4. The finished surface of the new compacted paving shall be flush with the existing surface and shall conform to the grade and crown of the adjacent pavement.
5. Immediately after the new paving is compacted, all joints between new and original asphalt pavement shall be painted with hot asphalt or asphalt emulsion and be covered with dry paving sand before the asphalt solidifies.

D. Surface Smoothness: The surface smoothness of the replaced pavement shall be such that when a straightedge is laid across the patched area between the edges of the old surfacing and the surface of the new pavement, the new pavement shall not deviate from the straightedge more than 1/4 inch.

3.03 WEATHER CONDITIONS

- A. Asphalt shall not be applied to wet material. Asphalt shall not be applied during rainfall, sand or dust storms, or any imminent storms that might adversely affect the construction. The Owner will determine when surfaces and material are dry enough to proceed with construction. Asphalt concrete shall not be placed:
 1. When the atmospheric temperature is lower than 40 degrees F.
 2. During heavy rainfall.
 3. When the surface upon which it is to be placed is wet.
- B. Asphalt for prime coat shall not be applied when the surface temperature is less than 50 degrees F. Exceptions will be permitted only in special cases and only with prior written approval of the Owner.

3.04 PROTECTION OF STRUCTURES

- A. Provide whatever protective coverings may be necessary to protect the exposed portions of bridges, culverts, curbs, gutters, posts, guard fences, road signs, and any other structures from splashing oil and asphalt from the paving operations. Remove any oil, asphalt, dirt, or

any other undesirable matter that may come upon these structures by reason of the paving operations.

- B. Where water valve boxes, manholes, catch basins, or other underground utility appurtenances are within the area to be surfaced, the resurfacing shall be level with the top of the existing finished elevation of these facilities. If it is evident that these facilities are not in accordance with the proposed finished surface, notify the Owner to have the proper authority contacted in order to have the facility altered before proceeding with the resurfacing around the obstruction. Consider any delays experienced from such obstructions as incidental to the paving operation. No additional payment will be made. Protect all covers during asphalt application.

3.05 EXCESS MATERIALS

- A. Dispose of all excess materials. Make arrangements for the disposal and bear all costs or retain any profit incidental to such disposal.

3.06 CONTRACTOR'S RESPONSIBILITY

- A. Settlement of replaced pavement over trenches within the warranty period shall be considered the result of improper or inadequate compaction of the subbase or base materials. The Contractor shall promptly repair all pavement deficiencies noted during the warranty period at the Contractor's sole expense.

3.07 SIDEWALKS, CURBS, AND GUTTERS

- A. Replace concrete sidewalks, curbs, and gutters to the same section width, depth, line, and grade as that removed or damaged. Cut ends of existing curb and gutter to a vertical plane. Install two No. 4 reinforcing bar dowels in curb, and three No. 4 reinforcing bar dowels in sidewalk. Dowels to extend a minimum of 6 inches into old and new concrete. Prior to replacing the sections, properly backfill and compact the trench to prevent subsequent settlement.
- B. Saw cut ends of existing curbs and gutters to a vertical plane at the nearest score lines. Construct forms to match existing. Place concrete and finish exposed surfaces similar to adjacent curbs and gutters.
- C. Replace concrete sidewalks up to the nearest scored joints and make replacement in a manner that will avoid a patched appearance. Provide a minimum 2-inch thick compacted leveling course of clean 3/4-inch minus crushed rock or gravel of quality hereinbefore specified. Finish concrete surface similar to the adjacent sidewalks. Score joints and finish edges with a steel edging tool.

3.08 STORM SEWERS

- A. All storm sewers and catch basins that are removed because of interference with the new construction shall be removed so as to do the least possible damage to the pipe or basin. Dispose of pipe that is in too poor condition for reuse because of age, physical condition, or other reasons, and install new pipe.

- B. Replace all pipe to the previously existing lines and grades. Pipe 15 inches and smaller shall be laid on a minimum 4-inch thick gravel base. Use a minimum 6-inch thick gravel base under pipe 18 inches and larger.
- C. Reinstall catch basins in their original locations and reconnect to the drainage system in a manner equal to the original. If the existing catch basins are damaged beyond repair by the operations, construct new basins of similar size, cross section, and design as the original at the Contractor's sole expense.

3.09 PAVEMENT STRIPPING AND MARKING

- A. Replace stripping and pavement markers as required to conform to that which previously existed.
- B. Application of thermoplastic traffic stripes and pavement markings shall be in accordance with Section 84 of the latest edition of the State Standard Specifications.
- C. Application of painted traffic stripes and pavement markings shall be in accordance with Section 84 of the latest edition of the State Standard Specifications.
- D. Placement of pavement markers shall be in accordance with Section 85 of the latest edition of the State Standard Specifications.

PART 4 PAYMENT

4.01 GENERAL

- A. No separate measurement or payment will be made for work in this section. Payment shall be included as part of the applicable unit price or lump sum bid stated in the Proposal.

END OF SECTION

SECTION 03 11 00
CONCRETE FORMWORK

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. Provide materials, labor, and equipment required for the design and construction of all concrete formwork, bracing, shoring and supports in accordance with the provisions of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03 21 00 – Reinforcing Steel
- B. Section 03 30 00 – Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. Building Code for the State or Commonwealth in which the project is located.
 - 2. ACI 318 – Building Code Requirements for Structural Concrete
 - 3. ACI 301 – Specifications for Structural Concrete
 - 4. ACI 347 – Recommended Practice for Concrete Formwork
 - 5. U.S. Product Standard for Concrete Forms, Class I, PS 1
 - 6. ACI 117 – Specification for Tolerances for Concrete Construction and Materials and Commentary

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.
 - 1. Manufacturer's data on proposed form release agent
 - 2. Manufacturer's data on proposed formwork system including form ties

1.05 QUALITY ASSURANCE

- A. Concrete formwork shall be in accordance with ACI 301, ACI 318, and ACI 347.

PART 2 – PRODUCTS

2.01 FORMS AND FALSEWORK

- A. All forms shall be smooth surface forms unless otherwise specified.
- B. Wood materials for concrete forms and falsework shall conform to the following requirements:
 - 1. Lumber for bracing, shoring, or supporting forms shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20. All lumber used for forms, shoring or bracing shall be new material.
 - 2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine high density overlaid (HDO) plywood manufactured especially for concrete formwork and shall conform to the requirements of PS1 for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.
- C. Other form materials such as metal, fiberglass, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade indicated may be submitted to the Engineer for approval, but only materials that will produce a smooth form finish equal or better than the wood materials specified will be considered.

2.02 FORMWORK ACCESSORIES

- A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 7/8-inch, and all such fasteners shall be such as to leave holes of regular shape for reaming.
- B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. A preformed mechanical EPDM rubber plug shall be used to seal the hole left after the removal of the taper tie. Plug shall be X-Plug by the Sika Corporation or approved equal. Friction fit plugs shall not be used.
- C. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "bug holes" in cast-in-place concrete.

PART 3 – EXECUTION

3.01 FORM DESIGN

- A. Forms and falsework shall be designed for total dead load, plus all construction live load as outlined in ACI 347. Design and engineering of formwork and safety considerations during construction shall be the responsibility of the Contractor.
- B. Forms shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members.
- C. All forms shall be designed for predetermined placing rates per hour, considering expected air temperatures and setting rates.

3.02 CONSTRUCTION

- A. The type, size, quality, and strength of all materials from which forms are made shall be subject to the approval of the Engineer. No falsework or forms shall be used which are not clean and suitable. Deformed, broken or defective falsework and forms shall be removed from the work.
- B. Forms shall be smooth and free from surface irregularities. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Joints between the forms shall be sealed to eliminate any irregularities. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to a practical minimum.
- C. Forms shall be true to line and grade and shall be sufficiently rigid to prevent displacement and sagging between supports. Curved forms shall be used for curved and circular structures. Straight panels joined at angles will not be acceptable for forming curved structures. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly placed concrete. Facing material shall be supported with studs or other backing which shall prevent both visible deflection marks in the concrete and deflections beyond the tolerances specified.
- D. Forms shall be mortar tight to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2-inch diameter polyethylene rod held in position to the underside of the wall form.
- E. All vertical surfaces of concrete members shall be formed, and side forms shall be provided for all footings, slab edges and grade beams, except where placement of the concrete against the ground is called for on the Drawings. Not less than 1-inch of

concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

- F. All forms shall be constructed in such a manner that they can be removed without hammering or prying against the concrete. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.
- G. Adequate clean-out holes shall be provided at the bottom of each lift of forms. Temporary openings shall be provided at the base of column forms and wall forms and at other points to facilitate cleaning and observation immediately before the concrete is deposited. The size, number and location of such clean-outs shall be as acceptable to the Engineer.
- H. Construction joints shall not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. For flush surfaces at construction joints exposed to view, the contact surface of the form sheathing over the hardened concrete in the previous placement shall be lapped by not more than 1 inch. Forms shall be held against hardened concrete to prevent offset or loss of mortar at construction joints and to maintain a true surface.
- I. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. Set forms and intermediate screed strips for slabs accurately to produce the designated elevations and contours of the finished surface. Ensure that edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. When formwork is cambered, set screeds to a like camber to maintain the proper concrete thickness.
- J. Positive means of adjustment (wedges or jacks) for shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. Shores and struts shall be securely braced against lateral deflections. Wedges shall be fastened firmly in place after final adjustment of forms prior to concrete placement. Formwork shall be anchored to shores or other supporting surfaces or members to prevent upward or lateral movement of any part of the formwork system during concrete placement. If adequate foundation for shores cannot be secured, trussed supports shall be provided.
- K. Runways shall be provided for moving equipment with struts or legs. Runways shall be supported directly on the formwork or structural member without resting on the reinforcing steel.

3.03 TOLERANCES

- A. Unless otherwise indicated in the Contract Documents, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in ACI 117.
- B. Structural framing of reinforced concrete around elevators and stairways shall be accurately plumbed and located within 1/4 in. tolerance from established dimensions.
- C. The Contractor shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project, sufficient control points and benchmarks to be used for reference purposes to check tolerances. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.
- D. Regardless of the tolerances specified, no portion of the structure shall extend beyond the legal boundary of the structure.

3.04 FORM ACCESSORIES

- A. Suitable moldings shall be placed to bevel or round all exposed corners and edges of beams, columns, walls, slabs, and equipment pads. Chamfers shall be 3/4 inch unless otherwise noted.
- B. Form ties shall be so constructed that the ends, or end fasteners, can be removed without causing appreciable spalling at the faces of the concrete. After ends, or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 2 inches from the formed face of the concrete that is exposed to water or enclosed surfaces above the water surface, and not less than 1 inch from the formed face of all other concrete. Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers to leave the surface of the holes clean and rough before being filled with mortar. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete member. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. No snap ties shall be broken off until the concrete is at least three days old. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste.

3.05 APPLICATION – FORM RELEASE AGENT

- A. Forms for concrete surfaces that will not be subsequently waterproofed shall be coated with a form release agent. Form release agent shall be applied on formwork in accordance with manufacturer's recommendations.

3.06 INSERTS AND EMBEDDED ITEMS

- A. Sleeves, pipe stubs, inserts, anchors, expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement prior to concreting. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

3.07 FORM CLEANING AND REUSE

- A. The inner faces of all forms shall be thoroughly cleaned prior to concreting. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture. Unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

3.08 FORM REMOVAL AND SHORING

- A. Forms shall not be disturbed until the concrete has attained sufficient strength. Sufficient strength shall be demonstrated by structural analysis considering proposed loads, strength of forming and shoring system, and concrete strength data. Shoring shall not be removed until the supported member has acquired sufficient strength to support its weight and the load upon it. Members subject to additional loads during construction shall be adequately shored to sustain all resulting stresses. Forms shall be removed in such manner as not to impair safety and serviceability of the structure. All concrete to be exposed by form removal shall have sufficient strength not to be damaged thereby.
- B. Provided the strength requirements specified above have been met and subject to the Engineer's approval, forms may be removed at the following minimum times. The Contractor shall assume full responsibility for the strength of all such components from which forms are removed prior to the concrete attaining its full design compressive strength. Shoring may be required at the option of the Engineer beyond these periods.

Ambient Temperature (°F.) During Concrete Placement

	Over 95°	70°-95°	60°-70°	50°-60°	Below 50°
Edge Forms for Slabs on Grade	1 day	1 day	1 day	1 day	
Walls	5 days	2 days	2 days	3 days	Do not remove until directed by Engineer (7 days minimum)
Columns	7 days	2 days	3 days	4 days	
Beam Soffits	10 days	7 days	7 days	7 days	
Elevated Slabs	12 days	7 days	7 days	7 days	

- C. When, in the opinion of the Engineer, conditions of the work or weather justify, forms may be required to remain in place for longer periods of time.

- D. An accurate record shall be maintained by the Contractor of the dates of concrete placings and the exact location thereof and the dates of removal of forms. These records shall always be available for inspection at the site, and two copies shall be furnished the Engineer upon completion of the concrete work.

3.09 RESHORING

- A. When reshoring is permitted or required the operations shall be planned and subjected to approval by the Engineer.
- B. Reshores shall be placed after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.
- C. Reshoring for the purpose of early form removal shall be performed so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no construction or live loads shall be permitted on the new construction. Reshores shall be tightened to carry their required loads but they shall not be overtightened so that the new construction is overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified.
- D. For floors supporting shores under newly placed concrete, the original supporting shores shall remain in place or reshores shall be placed. The shoring or reshoring system shall have a capacity sufficient to resist the anticipated loads and, in all cases, shall have a capacity equal to at least one-half of the capacity of the shoring system above. Reshores shall be located directly under a reshore position above unless other locations are permitted.
- E. In multi-story buildings, reshoring shall extend over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads so the design superimposed loads of the floors supporting shores are not exceeded.

END OF SECTION

SECTION 03 21 00
REINFORCING STEEL

PART 1 – GENERAL

1.01 THE REQUIREMENTS

- A. Provide all concrete reinforcing including all cutting, bending, fastening and any special work necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this section.
- B. Provide deformed reinforcing bars to be grouted into reinforced concrete masonry walls.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03 11 00 – Concrete Formwork
- B. Section 03 30 00 – Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. Building Code for the State or Commonwealth in which the project is located.
 - 2. CRSI - Concrete Reinforcing Institute Manual of Standard Practice
 - 3. ACI SP66 - ACI Detailing Manual
 - 4. ACI 315 - Details and Detailing of Concrete Reinforcing
 - 5. ACI 318 - Building Code Requirements for Structural Concrete
 - 6. WRI - Manual of Standard Practice for Welded Wire Fabric
 - 7. ASTM A 615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 8. ASTM A 1064 - Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
 - 9. ASTM E 3121 – Standard Test Methods for Field Testing of Anchors in Concrete or Masonry

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.
1. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (SP66), shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, spacing and splicing of the bars.
 2. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (SP66), shall be furnished for all deformed bar reinforcing used in masonry. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, locations, spacing and splicing of the bars.
 3. Mill test certificates - 3 copies of each.
 4. Description of the reinforcing steel manufacturer's marking pattern.
 5. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.
 6. Proposed supports for each type of reinforcing.
 7. Request to use splices not shown on the Drawings.
 8. Request to use mechanical couplers along with manufacturer's literature on mechanical couplers with instructions for installation, and certified test reports on the couplers' capacity.
 9. Request for placement of column dowels without the use of templates.
 10. Request and procedure to field bend or straighten partially embedded reinforcing.
 11. International Code Council–Evaluation Services Report (ICC-ES ESR) for dowel adhesives.
 12. Certification that all installers of dowel adhesive systems in horizontal to vertically overhead applications are certified as Adhesive Anchor Installers in accordance with the ACI-CRSI Anchor Installer Certification Program.
 13. Adhesive dowel testing plan.

1.05 QUALITY ASSURANCE

- A. If requested by the Engineer, the Contractor shall provide samples from each load of reinforcing steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Owner. Costs of additional tests due to material failing initial tests shall be paid by the Contractor.

- B. Provide a list of names of all installers who are trained by the Manufacturer's Field Representative on this jobsite prior to installation of products. Record must include the installer name, date of training, products included in the training and trainer name and contact information.
- C. Provide a copy of the current ACI/CRSI "Adhesive Anchor Installer" certification cards, or equivalent, for all installers who will be installing adhesive anchors in the horizontal to vertically overhead orientation.
- D. Inspection of the adhesive dowel system may be made by the Engineer or other representatives of the Owner in accordance with the requirements of the ESR published by the manufacturer. Provide adequate time and access for inspections of products and anchor holes prior to injection, installation, and proof testing.

PART 2 – PRODUCTS

2.01 REINFORCING STEEL

- A. Bar reinforcing shall conform to the requirements of ASTM A 615 for Grade 60 deformed billet-steel reinforcing. All reinforcing steel shall be from domestic mills and shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type, and grade. All reinforcing bars shall be deformed bars. Smooth reinforcing bars shall not be used unless specifically called for on Drawings.
- B. Welded wire fabric reinforcing shall conform to the requirements of ASTM A 1064 and the details shown on the Drawings.
- C. A certified copy of the mill test on each load of reinforcing steel delivered showing physical and chemical analysis shall be provided, prior to shipment. The Engineer reserves the right to require the Contractor to obtain separate test results from an independent testing laboratory in the event of any questionable steel. When such tests are necessary because of failure to comply with this Specification, such as improper identification, the cost of such tests shall be borne by the Contractor.
- D. Field welding of reinforcing steel will not be allowed.
- E. Use of coiled reinforcing steel will not be allowed.

2.02 ACCESSORIES

- A. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcing during concrete placement. Wire bar supports shall be plastic protected (CRSI Class 1).
- B. Concrete blocks (dobies), used to support and position bottom reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located.

2.03 MECHANICAL COUPLERS

- A. Mechanical couplers shall develop a tensile strength which exceeds 100 percent of the ultimate tensile strength and 125 percent of the yield strength of the reinforcing bars being spliced. The reinforcing steel and coupler used shall be compatible for obtaining the required strength of the connection.
- B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied.
- C. Hot forged sleeve type couplers shall not be used. Acceptable mechanical couplers are Dayton Superior Dowel Bar Splicer System by Dayton Superior, Dayton, Ohio, or approved equal. Mechanical couplers shall only be used where shown on the Drawings or where specifically approved by the Engineer.
- D. Where the threaded rebar to be inserted into the coupler reduces the diameter of the bar, the threaded rebar piece shall be provided by the coupler manufacturer.

2.04 DOWEL ADHESIVE SYSTEM

- A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.
- B. All holes shall be drilled in accordance with the manufacturer's instructions except that core drilled holes shall not be permitted unless specifically allowed by the Engineer. Cored holes, if allowed by the manufacturer and approved by the Engineer, shall be roughened in accordance with manufacturer's requirements.
- C. Thoroughly clean drill holes of all debris, drill dust, and water in accordance with manufacturer's instructions prior to installation of adhesive and reinforcing bar.
- D. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Installation conditions shall be dry, or water saturated unless otherwise permitted by the engineer. If water saturated installation is approved, appropriate reduction factors in accordance with manufacturer's design requirements should be considered. Water filled or submerged holes shall not be permitted unless specifically approved by the Engineer.
- E. Injection of adhesive into the hole shall be performed in a manner to minimize the formation of air pockets in accordance with the manufacturer's instructions.
- F. Embedment Depth:
 - 1. The embedment depth of the bar shall be as shown on the Drawings. If the Contractor submits one of the other named dowel adhesives from the list below, the Engineer shall evaluate the required embedment and the Contractor shall

provide the required embedment depth stipulated by the Engineer specific to the approved dowel adhesive.

2. Where the embedment depth is not shown on the Drawings, the embedment depth shall be determined to provide the minimum allowable bond strength equal to the tensile strength of the rebar according to the manufacturer's ICC-ES ESR.
 3. The embedment depth shall be determined using design parameters listed below. In no case shall the embedment depth be less than the minimum, or more than the maximum, embedment depths stated in the manufacturer's ICC-ES ESR.
 4. Design of adhesive anchor system shall be based on the following parameters:
 - a. Actual compressive strength of concrete.
 - b. Cracked concrete state.
 - c. Dry or water saturated condition for installation.
 - d. Base material temperature between 40- and 104-degrees Fahrenheit.
 - e. Installation with either a hammer drill with carbide bit or hollow-drill bit system drilling methods.
 - f. Minimum age of concrete 21 days at time of installation.
- G. Engineer's approval is required for use of this system in locations other than those shown on the Drawings.
- H. The adhesive system shall be IBC compliant for use in both cracked and uncracked concrete in all Seismic Design Categories and shall be "HIT-HY 200 Adhesive Anchoring System" as manufactured by Hilti, Inc. "SET-3G Epoxy Adhesive Anchors" as manufactured by Simpson Strong-Tie Co. or "Pure 110+ Epoxy Adhesive Anchor System" by DeWalt. Fast-set epoxy formulations shall not be acceptable. No or equal products will be considered, unless pre-qualified and approved.
- I. All individuals installing dowel adhesive systems in horizontal to vertically overhead applications shall be certified as an Adhesive Anchor Installer in accordance with the ACI-CRSI Anchor Installation Certification Program, or equivalent.

PART 3 – EXECUTION

3.01 FABRICATION

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.

- B. The Contractor shall fabricate reinforcing bars for structures in accordance with the bending diagrams, placing lists and placing Drawings.
- C. No fabrication shall commence until approval of Shop Drawings has been obtained. All reinforcing bars shall be shop fabricated unless approved to be bent in the field. Reinforcing bars shall not be straightened or bent in a manner that will injure the material. Heating of bars will not be permitted.
- D. Welded wire fabric with longitudinal wire of W9.5 size or smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches. Welded wire fabric with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only.

3.02 DELIVERY, STORAGE AND HANDLING

- A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.
- B. Reinforcing steel shall be stored above ground on platforms or other supports and shall always be protected from the weather by suitable covering. Reinforcing steel shall be stored in an orderly manner and plainly marked to facilitate identification.
- C. Reinforcing steel shall always be protected from conditions conducive to corrosion until concrete is placed around it.
- D. The surfaces of all reinforcing 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 delay in depositing concrete occurs, reinforcing shall be inspected again and if necessary recleaned.

3.03 PLACING

- A. Reinforcing steel shall be accurately positioned as shown on the Drawings and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or plastic protected (CRSI Class 1) metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the reinforcing bars without settlement. In no case shall concrete block supports be continuous.
- B. The portions of all accessories in contact with the formwork shall be made of plastic or steel coated with a 1/8-inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.
- C. Tie wires shall be bent away from the forms to provide the specified concrete coverage.

- D. Reinforcing bars additional to those shown on the Drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcing in position, shall be provided by the Contractor at no additional cost to the Owner.
- E. Reinforcing placing, spacing, and protection tolerances shall be within the limits specified in ACI 318 except where in conflict with the Building Code, unless otherwise specified.
- F. Reinforcing bars may be moved within one bar diameter as necessary to avoid interference with other concrete reinforcing, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed placing tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer.
- G. Welded wire fabric shall be supported on slab bolsters spaced not less than 30 inches on centers, extending continuously across the entire width of the reinforcing mat and supporting the reinforcing mat in the plane shown on the Drawings.
- H. Reinforcing shall not be straightened or bent unless specifically shown on the drawings. Bars with kinks or bends not shown on the Drawings shall not be used. Coiled reinforcement shall not be used.
- I. Dowel Adhesive System shall be installed in strict conformance with the manufacturer's recommendations and as required in Article 2.04 above. A representative of the manufacturer must be on site prior to adhesive dowel installation to provide instruction on proper installation procedures for all adhesive dowel installers. Testing of adhesive dowels shall be as indicated below. If the dowels have a hook at the end to be embedded in subsequent work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate adhesive dowel testing while maintaining required hook embedment in subsequent work.
- J. All adhesive dowel installations in the horizontal or overhead orientation shall be conducted by a certified Adhesive Anchor Installer as certified by ACI/CSRI Adhesive Anchor Installer Certification program, or equivalent, per ACI 318-11 D.9.2.2 or ACI 318-14 17.8.2.2. Current AAI Certificates must be submitted to the Engineer for approval prior to commencement of any adhesive anchor installations.
- K. Adhesive Dowel Testing
 - 1. At all locations where adhesive dowels are shown on the Drawings, at least 10 percent of all adhesive dowels installed shall be tested to 80% of the yield load of the reinforcing bar, with a minimum of one tested dowel per group.
 - 2. Contractor shall submit a plan and schedule indicating locations of dowels to be tested, load test values, and proposed dowel testing procedure (including a diagram of the testing equipment proposed for use) prior to conducting any testing. Proof testing procedures shall be in accordance with ASTM E 3121.

3. Where Contract Documents indicate adhesive dowel design is the Contractor's responsibility, the Contractor shall submit a plan and schedule indicating locations of dowels to be tested and load test values, sealed by a Professional Engineer currently registered in the State or Commonwealth in which the project is located. The Contractor shall also submit documentation indicating the Contractor's testing procedures have been reviewed and the proposed procedures are acceptable.
4. Adhesive Dowel shall have no visible indications of displacement or damage during or after the load test. Dowels exhibiting damage shall be removed and replaced. If more than 5 percent of tested dowels fail, then 100 percent of dowels shall be load tested.
5. Load testing of adhesive dowels shall be performed by an independent testing laboratory hired directly by the Contractor. The Contractor shall be responsible for costs of all testing, including additional testing required due to previously failed tests.

3.04 SPLICING

- A. Reinforcing bar splices shall only be used at locations shown on the Drawings. When necessary to splice reinforcing at points other than where shown, the splice shall be as acceptable to the Engineer.
- B. The length of lap for reinforcing bars, unless otherwise shown on the Drawings shall be in accordance with ACI 318 for a class B splice.
- C. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
- D. Mechanical splices shall be used only where shown on the drawings or when approved by the Engineer.
- E. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown on the Drawings. The couplers shall be sealed during concrete placement to eliminate concrete, or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an O-ring seal.

3.05 INSPECTION

- A. The Contractor shall advise the Engineer of his intentions to place concrete and shall allow him adequate time to inspect all reinforcing steel before concrete is placed.
- B. The Contractor shall advise the Engineer of his intentions to place grout in masonry walls and shall allow him adequate time to inspect all reinforcing steel before grout is placed.

3.06 CUTTING OF EMBEDDED REBAR

- A. The Contractor shall not cut embedded rebar cast into structural concrete without prior approval.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. Provide all labor, equipment, materials, and services necessary for the manufacture, transportation, and placement of all plain and reinforced concrete work, as shown on the Drawings or as required by the Engineer.

- B. The requirements in this section shall apply to the following types of concrete:
 - 1. Class A1 Concrete: Normal weight structural concrete to be used in all structures qualifying as environmental concrete structures designed in accordance with ACI 350 including pump stations, tanks, basins, process structures, and any structures containing fluid or process chemicals, or other materials used in treatment process.
 - 2. Class A2 Concrete: Normal weight structural concrete in all structures other than environmental concrete structures as described above, and for all sidewalks and pavement.
 - 3. Class A3 Concrete: Normal weight structural concrete to be used for interior slabs where a Type “D” Steel Troweled Finish or Type “G” Hardened Finish is required. Class A3 concrete shall not contain entrained air.
 - 4. Class A4 Concrete: Normal weight structural concrete to be used where specifically called for on Contract Drawings or areas where specifically requested by Contractor and approved by Engineer. Class A4 concrete is identical to Class A2 concrete except that coarse aggregate specified in Article 2.08 below shall be Size #8 in accordance with ASTM C33.
 - 5. Class A5 Concrete: Normal weight structural concrete used where concrete is indicated to be placed underwater (tremie concrete).
 - 6. Class B Concrete: Normal weight structural concrete used for duct bank encasements, catch basins, fence and guard post embedment, concrete fill, and other areas where specifically noted on Contract Drawings.
 - 7. Class C Concrete: Light weight structural concrete used only where specifically noted on Contract Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03 11 00 – Concrete Formwork
- B. Section 03 21 00 – Reinforcing Steel

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the Specifications, all work herein shall conform to or exceed the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. International Building Code
 - 2. ACI 214 – Guide to Evaluation of Strength Test Results of Concrete
 - 3. ACI 301 – Specifications for Structural Concrete
 - 4. ACI 304 – Guide for Measuring, Mixing, Transporting, and Placing Concrete
 - 5. ACI 305 – Specification for Hot Weather Concreting
 - 6. ACI 306 – Standard Specification for Cold Weather Concreting
 - 7. ACI 309R – Guide for Consolidation of Concrete
 - 8. ACI 318 – Building Code Requirements for Structural Concrete and Commentary
 - 9. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures
 - 10. ASTM C 31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - 11. ASTM C 33 – Standard Specification for Concrete Aggregates
 - 12. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - 13. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - 14. ASTM C 88 – Standard Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
 - 15. ASTM C 94 – Standard Specification for Ready-Mixed Concrete
 - 16. ASTM C 114 – Standard Test Method for Chemical Analysis of Hydraulic Cement

17. ASTM C 136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
18. ASTM C 138 – Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
19. ASTM C 143 – Standard Test Method for Slump of Hydraulic Cement Concrete
20. ASTM C 150 – Standard Specification for Portland Cement
21. ASTM C 157 - Standard Test Method for Length Change of Hardened Hydraulic Cement, Mortar and Concrete
22. ASTM C 172 – Standard Practice for Sampling Freshly Mixed Concrete
23. ASTM C 192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
24. ASTM C 231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
25. ASTM C 260 – Standard Specification for Air-Entraining Admixtures for Concrete
26. ASTM C 295 – Standard Guide for Petrographic Examination of Aggregates for Concrete
27. ASTM C 457 – Standard Test Method for Microscopical Determination of the Air-Void System in Hardened Concrete
28. ASTM C 494 – Standard Specification for Chemical Admixtures for Concrete
29. ASTM C 595 – Standard Specification for Blended Hydraulic Cements
30. ASTM C 618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
31. ASTM C 989 – Standard Specification for Slag Cement for Use in Concrete and Mortars
32. ASTM C 1012 – Standard Test Method for Length Change of Hydraulic Cement Mortars Exposed to a Sulfate Solution
33. ASTM C 1077 – Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
34. ASTM C 1157 – Standard Performance Specification for Hydraulic Cement
35. ASTM C 1260 – Test Method for Potential Alkali Reactivity of Aggregates (Mortar Bar Method)

36. ASTM C 1567 – Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
37. ASTM C 1579 – Standard Test Method for Evaluating Plastic Shrinkage Cracking of Restrained Fiber Reinforced Concrete (Using a Steel Form Insert)
38. ASTM C 1602 – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
39. ASTM C 1609 – Standard Test Method for Flexural Performance of Fiber Reinforced Concrete (Using Beam with Third-Point Loading)
40. ASTM C 1778 – Standard Guide for Reducing the Risk of Deleterious Alkali – Aggregate Reaction in Concrete

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.
 1. Sources of all materials and certifications of compliance with specifications for all materials.
 2. Certified current (less than 1 year old) chemical analysis (mill test report) of the Portland Cement or Blended Cement to be used. The chemical analysis must include the equivalent alkali content of the Portland Cement or Blended Cement.
 3. Certified current (less than 1 year old) chemical analysis of fly ash or slag cement to be used.
 4. Aggregate test results showing compliance with required standards, i.e., sieve analysis, potential reactivity, aggregate soundness tests, petrographic analysis, mortar bar expansion testing, etc.
 5. Manufacturer's data on all admixtures stating compliance with required standards.
 6. Concrete mix design for each class of concrete specified herein.
 7. Verification concrete mix and individual constituents in concrete meet requirements for NSF 61 approval for potable water applications where required.
 8. Field experience records and/or trial mix data for the proposed concrete mixes for each class of concrete specified herein.
 9. Drying shrinkage test results from trial concrete mixes.

1.05 QUALITY ASSURANCE

- A. Tests on materials used in the production of concrete shall be required as specified in Part 2 – Products. These tests shall be performed by an independent testing laboratory approved by the Engineer at no additional cost to the Owner.
- B. Trial concrete mixes shall be tested when required in accordance with Article 3.01 at no additional cost to the Owner.
- C. Field quality control tests, as specified in Article 3.11, unless otherwise stated, will be performed by a materials testing consultant employed by the Owner. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. Any individual who samples and tests concrete to determine if the concrete is being produced in accordance with this Specification shall be certified as a Concrete Field-Testing Technician, Grade I, in accordance with ACI CP-2. Testing laboratory shall conform to requirements of ASTM C-1077.

PART 2 – PRODUCTS

2.01 NSF/ANSI STANDARD 61 CERTIFIED CONCRETE

- A. NSF/ANSI Standard 61 certified concrete is required only where the concrete is uncoated and in contact with potable water, the volume of water is less than 350,000 gallons, and the ratio of the concrete surface area in contact with potable water to the volume of water exceeds 0.8 square inches per liter for static water conditions or 0.08 square inches per liter for flowing water conditions.
- B. Potable water is water at the start of flash mixing in drinking water treatment plants, and at all locations downstream of flash mixing in the water treatment, storage, and distribution system. Concrete surface area in contact with potable water shall include submerged surfaces and surfaces above the water where water can condense and drip back into the water.
- C. Where NSF/ANSI certified concrete is required by the paragraphs above, certification of compliance with NSF/ANSI Standard 61 shall be included with the concrete mix design submittal(s) and shall be provided by either one of the following two options:
 - 1. NSF/ANSI Standard 61 certified testing of concrete aggregates, hydraulic cement, and supplemental cementitious materials shall be provided individually for each constituent showing that each constituent complies with NSF/ANSI Standard 61
 - 2. NSF/ANSI Standard 61 testing of concrete cylinders formed from the trial batch concrete containing all the proposed constituents of the concrete shall be provided showing that the concrete mix complies with NSF/ANSI Standard 61.

- D. Regardless of whether NSF/ANSI Standard 61 certified concrete is required by the paragraphs above, all admixtures used in concrete where the concrete is uncoated and in contact with potable water shall be individually tested and confirm to follow NSF/ANSI Standard 61.

2.02 HYDRAULIC CEMENT

A. Portland Cement

1. Portland Cement shall be Type II conforming to ASTM C 150. Type I cement may be used provided either fly ash or slag cement is also included in the mix in accordance with Articles 2.03 or 2.04, respectively.
2. The proposed Portland Cement shall not contain more than 8% tricalcium aluminate and more than 12% tetracalcium aluminoferrite.
3. Portland Cement shall also meet performance requirements of ASTM C 1157.

B. Blended Cement

1. Blended cements shall be Type IP (Portland Fly Ash Cement), Type IS (Portland Slag Cement), or Type IL (Portland Limestone Cement) conforming to ASTM C 595.
2. Type IP cement shall be an inter-ground blend of Portland Cement and fly ash in which the fly ash constituent is between 15% and 25% of the weight of the total blend.
3. Type IS cement shall be an inter-ground blend of Portland Cement and slag cement in which the slag cement constituent is between 30% and 40% of the weight of the total blend.
4. Type IL cement shall be an inter-ground blend of Portland Cement and limestone in which the limestone constituent is between 5% and 15% of the weight of the total blend.
5. Fly ash, slag cement, and limestone used in the production of blended cements shall meet the requirements of Articles 2.03, 2.04, and 2.05 respectively.
6. Cements meeting ASTM C 1157 shall not be used in manufacture of blended cements.
7. Blended cement shall meet the Physical Requirements of Tables 2 and 3 of ASTM C 595 including the requirements for high sulfate resistance in Table 3 as tested per ASTM C1012.

- C. Different types of cement shall not be mixed, nor shall they be used alternately except when authorized in writing by the Engineer. Different brands of cement or the same

brand from different mills may be used alternately. A resubmittal will be required if different cements are proposed during the Project.

- D. Cement shall be stored in a suitable weather-tight building to prevent deterioration or contamination. Cement which has become caked, partially hydrated, or otherwise damaged will be rejected.

2.03 FLY ASH

- A. Fly ash shall meet the requirements of ASTM C 618 for Class F, except that the loss on ignition shall not exceed 4%. Fly ash shall also meet the optional physical requirements for uniformity as shown in Table 3 of ASTM C 618. Fly ash shall be considered as a supplemental cementitious material.
- B. For fly ash to be used in the production of Type IP cement, the Pozzolan Activity Index shall be greater than 75% as specified in Table 3 of ASTM C 595.
- C. Where reactive aggregates as defined in Article 2.08 are used in the concrete mix, the fly ash constituent shall be as needed to satisfy the concrete alkali loading requirements stipulated in Section 2.06. The percentage of fly ash shall also be set to meet the mean mortar bar expansion requirements in provisions of Article 2.08.G.2. Where fly ash is used, the minimum fly ash content shall be 15%.
- D. For Type A1 concrete as required for use in environmental concrete structures, i.e., process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.
- E. Additional fly ash shall not be included in concrete mixed with Type IS or IP cement.

2.04 SLAG CEMENT

- A. Slag cement shall meet the requirements of ASTM C 989 including tests for effectiveness of slag in preventing excessive expansion due to alkali-aggregate reactivity as described in Appendix X-3 of ASTM C 989.
- B. Where reactive aggregates as defined in Article 2.08 are used in concrete mix, the slag cement constituent shall be as needed to satisfy the concrete alkali loading requirements stipulated in Section 2.06. The percentage of slag cement shall also be set to meet the mean mortar bar expansion requirements in provisions of Article 2.08.G.2. Where Slag Cement is used, the minimum Slag Cement content shall be 30%, and the maximum Slag Cement content shall be 40%.
- C. For Type A1 concrete as required for use in environmental concrete structures, i.e., process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.
- D. Additional slag cement shall not be included in concrete mixed with Type IS or IP cement.

2.05 PORTLAND LIMESTONE CEMENT (TYPE IL)

- A. Portland Limestone Cement (Type IL) cement shall meet the requirements of ASTM C 595.
- B. Limestone used for blended cement Type IL shall be naturally occurring and meet the requirements of ASTM C 33.
- C. Fly ash or slag cement shall be used with Type IL cement to meet requirements for durability, ASR resistance, sulfate resistance, and use for environmental structures, as specified herein.

2.06 CONCRETE ALKALI LOADING

- A. All concrete mixes containing potentially reactive aggregates shall have a maximum alkali loading of the concrete of 3.0 pounds per cubic yard.
- B. The alkali loading of concrete is the Portland Cement equivalent alkali content multiplied by the Portland Cement content of the mix in pounds per cubic yard divided by 100. The Portland Cement equivalent alkali content shall be included in the certified chemical analysis of the Portland Cement.
- C. Means of evaluating alkali loading of concrete and proportioning constituents of concrete to minimize alkali loading of content shall also conform to the guidelines of ASTM C1778.

2.07 WATER

- A. Water used for mixing concrete shall be clear, potable, and free from deleterious substances such as objectionable quantities of silty organic matter, alkali, salts, and other impurities.
- B. Water shall not contain more than 100 PPM chloride.
- C. Water shall not contain more than 500 PPM dissolved solids.
- D. Water shall have a pH in the range of 4.5 to 8.5.
- E. Water shall meet requirements of ASTM C 1602.

2.08 AGGREGATES

- A. All aggregates used in normal weight concrete shall conform to ASTM C 33.
- B. Fine Aggregate (Sand) in the various concrete mixes shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the limits of ASTM C 33.

- C. Coarse aggregates shall consist of hard, clean, durable gravel, crushed gravel, or crushed rock. Coarse aggregate shall be size #57 or #67 as graded within the limits given in ASTM C 33 unless otherwise specified.
- D. For Class A4 concrete, coarse aggregate shall be Size #8 in accordance with ASTM C33.
- E. Aggregates shall be tested for gradation by sieve analysis tests in conformance with ASTM C 136.
- F. Aggregates shall be tested for soundness in accordance with ASTM C 88. The loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using either magnesium sulfate or sodium sulfate.
- G. All aggregates shall be evaluated in accordance with ASTM C 1778 to determine potential reactivity. All aggregates shall be considered reactive unless they meet the requirements below for non-reactive aggregates. Aggregates with a lithology like sources in the same region found to be reactive in service shall be considered reactive regardless of the results of the tests above.
 - 1. Non-reactive aggregates shall meet the following requirements:
 - a. A petrographic analysis in accordance with ASTM C295 shall be performed to identify the constituents of the fine and coarse aggregate. Non-reactive aggregates shall meet the following limitations:
 - 1) Optically strained, micro-fractured, or microcrystalline quartz, 5.0%, maximum.
 - 2) Chert or chalcedony, 3.0%, maximum.
 - 3) Tridymite or cristobalite, 1.0%, maximum.
 - 4) Opal, 0.5%, maximum.
 - 5) Natural volcanic glass in volcanic rocks, 3.0%, maximum.
 - 2. Concrete mixed with reactive aggregates shall meet the following requirements:
 - a. If aggregates are deemed potentially reactive as per ASTM C1778 and fly ash or slag cement is included in proposed concrete mix design, proposed concrete mix including proposed aggregates shall be evaluated by ASTM C-1567. Mean mortar bar expansions at 16 days shall be less than 0.08%. Tests shall be made using exact proportion of all materials proposed for use on the job in design mix submitted.
 - b. If aggregates are deemed potentially reactive as per ASTM C-1778 and a straight cement mix without fly ash or slag cement is proposed for concrete

mix design, aggregates shall be evaluated by ASTM C-1260. Mean mortar bar expansions at 16 days shall be less than 0.08%.

- c. If the proposed aggregates are deemed potentially reactive, the concrete mix shall be evaluated and confirmed to meet the requirements for concrete alkali loading as stipulated in Section 2.06.
- H. Contractor shall submit a new trial mix to the Engineer for approval whenever a different aggregate or gradation is proposed.
- I. Lightweight aggregate for Class C concrete shall conform to ASTM C330 and shall be Stalite by Carolina Stalite Company or equivalent approved expanded slate produced by the rotary kiln method. Maximum aggregate size shall be 1/2 inch.

2.09 SYNTHETIC FIBERS

- A. Micro-synthetic fibers shall meet requirements of ASTM C 1116 and shall provide a minimum cracking reduction ratio (CRR) of 40 percent when tested in accordance with ASTM C 1579. Acceptable products are MasterFiber F Series or M Series by Master Builders Solutions, or equal. Micro-synthetic fibers shall be included in cement grout mixes where grout topping is to be swept into place by equipment mechanism.
- B. Macro-synthetic fibers shall meet the requirements of ASTM C 1116 and shall have a minimum equivalent flexural strength ratio of 25 percent when tested in accordance with ASTM C 1609. Acceptable products are MasterFiber MAC Series by Master Builders Solutions, Tuf Strand SF by the Euclid Chemical Company, Strux 90/40 by W.R. Grace, or equal.
- C. Fibers shall be used only where specifically required on Contract Drawings or where specifically approved by Engineer.

2.10 ADMIXTURES

- A. Admixtures containing intentionally added chlorides shall not be used.
- B. Admixtures containing 1,4 Dioxane shall not be used.
- C. Air entraining admixture shall be added to all concrete unless noted otherwise. The air entraining admixture shall conform to ASTM C 260. The admixture proposed shall be selected in advance so that adequate samples may be collected, and the required tests made. Air content of concrete, when placed, shall be within the ranges given in the concrete mix design.
- D. The following admixtures are required or used for water reduction, slump increase, and/or adjustment of initial set, and enhancing durability. Admixtures permitted shall conform to the requirements of ASTM C 494. Admixtures shall be non-toxic after 30 days

and shall be compatible with and made by the same manufacturer as the air-entraining admixtures.

1. Water reducing admixture shall conform to ASTM C 494, Type A and shall contain no more than 0.05% chloride ions. Acceptable products are “Eucon Series” by the Euclid Chemical Company, “Master Pozzoloth Series or Master Polyheed Series” by Master Builders Solutions, and “Plastocrete Series” by Sika Corporation.
2. High range water reducer shall conform to ASTM C 494, Type F or G. The high range water reducer shall be added to the concrete at the batch plant and may be used in conjunction with a water reducing admixture. The high range water reducer shall be accurately measured, and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day’s operation of the job site system. Concrete shall be mixed at mixing speed for a minimum of 100 mixer revolutions after the addition of the high range water reducer. Acceptable products are “Eucon 37” or Plastol 5000 by the Euclid Chemical Company, “Master Rheobuild 1000 or Master Glenium Series” by Master Builders Solutions, and “Daracem 100 or Advaflow Series” by W.R. Grace.
3. A non-chloride, non-corrosive accelerating admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C 494, Type C or E. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year’s duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Acceptable products are “MasterSet AC 534 or MasterSet FP 20” by Master Builders Solutions, “Accelguard 80/90 or NCA” by the Euclid Chemical Company and “Daraset” by W.R. Grace.
4. A retarding admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C494, Type B or D. Acceptable products are “Eucon NR or Eucon Retarder 100” by the Euclid Chemical Company, “MasterSet R Series or MasterSet DELVO Series” by Master Builders Solutions, and “Plastiment” by Sika Corporation.
5. Workability Retaining Admixture shall conform to ASTM C 494, Type S. The admixture shall retain concrete workability without affecting time of setting or early-age strength development. Acceptable products are “MasterSure Z 60” by Master Builders Solutions, or equal.
6. A crystalline permeability reducing admixture shall be used where specifically indicated on the Drawings or required herein. The admixture shall conform to ASTM C 494, Type S. The admixture shall be of the crystalline type that chemically controls and permanently establishes a non-soluble crystalline structure throughout the capillary voids and cracks within the concrete. The crystalline structure shall assist in sealing the concrete to minimize both infiltration and exfiltration of liquids from any direction. The admixture shall be capable of sealing hairline cracks and resisting hydrostatic pressure. Acceptable products are “Xypex

Admix C-500 NF” by Xypex Chemical Corporation, “MasterLife® 300 Series” by Master Builders Solutions, and “Krystol Internal Membrane (KIM)” by Kryton International Inc. Submit certified letter from manufacturer of crystalline admixture stating required dosage rate for job specific concrete mix. Concrete truck ticket shall confirm crystalline admixture was included in concrete being placed.

- 7. A shrinkage reducing admixture shall be used where specifically indicated on the drawings. Acceptable products include Tetraguard AS20 by BASF, Eclipse by W. R. Grace, Eucon SRA by Euclid Chemical Company, or equal.
- E. Admixtures containing calcium chloride, thiocyanate or more than 0.05 percent chloride ions are not permitted. The addition of admixtures to prevent freezing is not permitted.
- F. The Contractor shall submit manufacturer's data including the chloride ion content of each admixture and certification from the admixture manufacturer that all admixtures utilized in the design mix are compatible with one another and properly proportioned prior to mix design review.

2.11 CONCRETE MIX DESIGN

- A. The proportions of cement, aggregates, admixtures, and water used in the concrete mixes shall be based on laboratory trial mixes in conformance with ACI 301. Trial mixes shall also conform to Article 3.01 of this Specification. Trial mix data used as the basis for the proposed concrete mix design shall be submitted to the Engineer along with the proposed mix.
- B. Structural concrete shall conform to the following requirements. Cementitious materials refer to the total combined weight of all cement, fly ash, and slag cement contained in the mix.

1. Compressive Strength (28-Day)

Concrete Class A1, A5	4,500 psi (min.), 6500 psi (max.)
Concrete Class A2, A3, A4	4,000 psi (min.), 6000 psi (max.)
Concrete Class B	3,000 psi (min.), 5000 psi (max.)

2. Water/cementitious materials ratio, by weight

	Maximum	Minimum
Concrete Class A1, A5	0.42	0.39
Concrete Class A2, A3, A4	0.45	0.39
Concrete Class B	0.50	0.39

3. Slump range

- a. 4" nominal unless high range water reducing admixture is used
- b. 8" max if high range water reducing admixture is used.

4. Air Content

Concrete Class A1, A2, A4, A5	6% ±1.5%
Concrete Class A3, B	3% Max (non-air-entrained)

C. Lightweight concrete (Class C) shall be composed of cement, lightweight aggregate, sand, synthetic fibers, water, and admixtures, and shall conform to the following requirements:

- 1. Compressive Strength (28-Day) - 4,000 psi (min.), 6,000 psi (max.)
- 2. Minimum Cementitious Materials Content - 550 lb/cy
- 3. Air Content - 6% ±1.5%
- 4. Maximum Slump - 4"-8" after addition of high range water reducer
- 5. Maximum Equilibrium Density - 115 PCF
- 6. Lightweight aggregate shall be presoaked for 48 hours prior to mixing concrete.
- 7. Fiber Content – per manufacturer’s recommendations
 - a. Add to wet concrete at batch plant per manufacturer’s representative.

PART 3 – EXECUTION

3.01 TRIAL MIXES

- A. Trial mixes shall be used to confirm the quality of a proposed concrete mix in accordance with ACI 301. An independent qualified testing laboratory designated and retained by the Contractor shall test a trial batch of each of the preliminary concrete mixes submitted by the Contractor. The trial batches shall be prepared using the aggregates, cement, supplementary cementitious materials, and admixtures proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain enough samples to satisfy requirements stated below. Tests on individual materials stated in PRODUCTS should already be performed before any trial mix is done. The cost of laboratory trial batch tests for each specified concrete mix will be borne by the Contractor and the Contractor shall furnish and deliver the materials to the testing laboratory at no cost to the Owner.
- B. The independent testing laboratory shall prepare a minimum of fifteen (15) standard test cylinders in accordance with ASTM C 31 in addition to conducting slump (ASTM C 143),

air content (C 231) and density (C 138) tests. Compressive strength test on the cylinders shall subsequently be performed by the same laboratory in accordance with ASTM C 39 as follows: Test 3 cylinders at age 7 days; test 3 cylinders at age 21 days; test 3 cylinders at age 28 days and test 3 cylinders at 56 days. The cylinders shall be carefully identified as "Trial Mix, Contract No. ". If the average 28-day compressive strength of the trial mix is less than that specified, or if any single cylinder falls below the required strength by more than 500 psi, the mix shall be corrected, another trial batch prepared, test cylinders taken, and new tests performed as before. Any such additional trial batch testing required shall be performed at no additional cost to the Owner. Adjustments to the mix shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor.

3.02 SHRINKAGE TESTS

- A. Concurrent with the trial batch requirements stated in Article 3.01, the testing laboratory shall perform drying shrinkage tests for the trial batches as specified herein.
- B. Fabricate, cure, dry, and measure specimens in accordance with ASTM C157 modified as follows.
 - 1. Remove specimens from molds at an age of 23 hours \pm 1 hour after trial batching.
 - 2. Place specimens immediately in water at 70 °F \pm 3 °F for at least 30 minutes.
 - 3. Measure within 30 minutes thereafter to determine original length, then submerge in saturated lime water at 73 °F \pm 3 °F.
 - 4. At age seven days, measure to determine expansion, expressed as a percentage of original length. This length at age seven days shall be the base length for drying shrinkage calculations (zero days' drying age).
 - 5. Store specimens immediately in a humidity-controlled room maintained at 73 °F \pm 3 °F and 50 percent \pm 4 percent relative humidity for the remainder of the test.
 - 6. Make and report separately measurements to determine shrinkage expressed as base length percentage for 7, 14, 21, and 28 days of drying after 7 days of moist curing.
- C. Compute the drying shrinkage deformation for each specimen as the difference between the base length (at zero days' drying age) and the length after drying at each test age. Compute the average drying shrinkage deformation for the specimens to the nearest 0.0001 inch at each test age. If the drying shrinkage for any specimen departs from the average test age for that test by more than 0.0004 inch, disregard the results obtained from that specimen. Report results from the shrinkage test to the nearest 0.001 percent of shrinkage. Take compression test specimens in each case from the same concrete used for preparing drying shrinkage specimens. These tests shall be considered part of the normal compression tests for the project.

- D. 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, shall be 0.036 or 0.042 percent, respectively. Use a mix design for construction that has first met the trial batch shrinkage requirements.
- E. If the trial batch specimens do not meet both the strength and shrinkage requirements, revise the mix designs and/or materials and retest.

3.03 PRODUCTION OF CONCRETE

- A. All concrete shall be machine mixed. Hand mixing of concrete will not be permitted. The Contractor may supply concrete from a ready-mix concrete plant or from a site mixed plant. In selecting the source for concrete production, the Contractor shall carefully consider its capability for providing quality concrete at a rate commensurate with the requirements of the placements so that well bonded, homogenous concrete, free of cold joints, is assured.
- B. Ready-Mixed Concrete
 - 1. At the Contractor's option, ready-mixed concrete may be used meeting the requirements for materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.
 - 2. Truck mixers shall be equipped with electrically actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.
 - 3. Each batch of concrete shall be mixed in a truck mixer for not less than 100 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 revolutions of mixing.
 - 4. 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 1/4 and 3/4 points of the load during discharge give slumps differing by more than one inch when the specified slump is 3 inches or less, or if they differ by more than 2 inches 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 tests. 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.

5. Ready-mixed concrete shall be delivered to the site for the work and discharge shall be completed within the time requirements stated in Article 3.04 of this Section.
6. Every concrete delivery shall be accompanied by a delivery ticket containing at least the following information:
 - a. Date and truck number
 - b. Ticket number
 - c. Mix designation of concrete
 - d. Cubic yards of concrete
 - e. Cement brand, type, and weight in pounds
 - f. Weight in pounds of fine aggregate (sand)
 - g. Weight in pounds of coarse aggregate (stone)
 - h. Air entraining agent, brand, and weight in pounds and ounces
 - i. Other admixtures, brand, and weight in pounds and ounces
 - j. Water, in gallons, stored in attached tank
 - k. Water, in gallons, maximum that can be added without exceeding design water/cementitious materials ratio
 - l. Water, in gallons, used (by truck driver)
 - m. Time of loading
 - n. Time of delivery to job (by truck driver)
7. Any truck delivering concrete to the job site, which is not accompanied by a delivery ticket showing the above information will be rejected and such truck shall immediately depart from the job site.
8. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to inspection at the batching plant by the Engineer.

C. Site Mixed Concrete

1. Scales for weighing concrete ingredients shall be accurate when in use within ± 0.4 percent of their total capacities. Standard test weights shall be available to permit checking scale accuracy.
2. Operation of batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances:
 - a. Cement, fly ash, or slag cement ± 1 percent
 - b. Water ± 1 percent
 - c. Aggregates ± 2 percent
 - d. Admixtures ± 3 percent
3. Each batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to prevent batched ingredients from entering the mixer before the previous batch has been completely discharged.
4. The concrete shall be mixed in a batch mixer capable of thoroughly combining the aggregates, cement, and water into a uniform mass within the specified mixing time, and of discharging the concrete without harmful segregation. The mixer shall bear a manufacturer's rating plate indicating the rated capacity and the recommended revolutions per minute and shall be operated in accordance therewith.
5. Mixers with a rated capacity of one cubic yard or larger shall conform to the requirements of the Plant Mixer Manufacturers' Division of the Concrete Plant Manufacturers' Bureau.
6. Except as provided below, batches of one cubic yard or less shall be mixed for not less than one minute. The mixing time shall be increased 15 seconds for each cubic yard or fraction thereof of additional capacity.
7. Shorter mixing time may be permitted provided performance tests made in accordance with of ASTM C 94 indicate that the time is sufficient to produce uniform concrete.
8. Controls shall be provided to ensure that the batch cannot be discharged until the required mixing time has elapsed. At least three-quarters of the required mixing time shall take place after the last of the mixing water has been added.
9. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Mixer blades shall be replaced when they have lost 10 percent of their original height.

10. Air-entraining admixtures and other chemical admixtures shall be charged into the mixer as solutions and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added in solution may be weighed or may be measured by volume if recommended by the manufacturer.
11. If two or more admixtures are used in the concrete, they shall be added separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete.
12. Addition of retarding admixtures shall be completed within one minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Retarding admixtures shall not be used unless approved by the Engineer.
13. Concrete shall be mixed only in quantities for immediate use and within the time and mixing requirements of ASTM C 94.

3.04 CONCRETE PLACEMENT

- A. No concrete shall be placed prior to approval of the concrete mix design. Concrete placement shall conform to the recommendations of ACI 304.
- B. Prior to concrete placement, all reinforcement shall be securely and properly fastened in its correct position. Formwork shall be clean, oiled and form ties at construction joints shall be retightened. All bucks, sleeves, castings, hangers, pipe, conduits, bolts, anchors, wire, and any other fixtures required to be embedded therein shall be in place. Forms for openings to be left in the concrete shall be in place and anchored by the Contractor. All loose debris in bottoms of forms or in keyways shall be removed and all debris, water, snow, ice, and foreign matter shall be removed from the space to be occupied by the concrete. The Contractor shall notify the Engineer in advance of placement, allowing sufficient time for a concurrent inspection and for any corrective measures required.
- C. On horizontal joints where concrete is to be placed on hardened concrete, flowing concrete containing a high range water reducing admixture or cement grout shall be placed with a slump not less than 8 inches for the initial placement at the base of the wall. Concrete or cement grout shall meet all strength and service requirements specified herein for applicable class of concrete. This concrete shall be worked well into the irregularities of the hard surface.
- D. All concrete shall be placed during the daylight hours except with the consent of the Engineer. If special permission is obtained to carry on work during the night, adequate lighting must be provided.
- E. When concrete arrives at the project with slump below that suitable for placing, as indicated by the Specifications, water may be added to bring the concrete within the specified slump range provided the design water-cementitious materials ratio is not

exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. Water may be added only to full trucks. On-site tempering shall not relieve the Contractor from furnishing a concrete mix meeting all specified requirements.

- F. Concrete shall be conveyed as rapidly as practical to the point of deposit by methods which prevent the separation or loss of the ingredients. The concrete shall be deposited so that additional handling will be unnecessary. Discharge of the concrete to its point of deposit shall be completed within 90 minutes after the addition of the cement to the aggregates unless workability-retaining admixtures are included and approved by the Engineer. In hot weather, or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed the requirements stated in Article 3.10 of this Section.
- G. Where concrete is conveyed to position by chutes, a continuous flow in the chute shall be maintained. The angle and discharge arrangement of the chute shall be such to prevent segregation of the concrete ingredients. The delivery end of the chute shall be as close as possible to the point of deposit and in no case shall the free pour from the delivery end of the chute exceed five feet, unless approved otherwise.
- H. Special care must be exercised to prevent splashing of forms or reinforcement with concrete, and any such splashes or accumulations of hardened or partially hardened concrete on the forms or reinforcement above the general level of the concrete already in place must be removed before the work proceeds.
- I. Placing of concrete shall be regulated so the pressure caused by the wet concrete shall not exceed that used in the design of the forms.
- J. All concrete for walls shall be placed through openings in the form spaced at frequent intervals or through tremies (heavy duct canvas, rubber, etc.), equipped with suitable hopper heads. Tremies shall be of variable lengths so the free fall shall not exceed five (5) feet, and enough tremies shall be placed in the form to ensure the concrete remains level.
- K. When placing concrete which will be exposed, sufficient illumination shall be provided in the interior of the forms so the concrete, at places of deposit, is visible from deck and runways.
- L. Concrete shall be placed to thoroughly embed all reinforcement, inserts, and fixtures.
- M. When forms are removed, surfaces shall be even and dense, free from aggregate pockets or honeycomb. Concrete shall be consolidated using mechanical vibration, supplemented by forking and spading by hand in the corners and angle of forms and along form surfaces while the concrete is plastic under the vibratory action. Consolidation shall conform to ACI 309.
- N. Mechanical vibration shall be applied directly to the concrete, unless otherwise approved by the Engineer. The bottom of vibrators used on floor slabs must not be permitted to

ride the form supporting the slab. Vibration shall be applied at the point of deposit and in freshly placed concrete by a vertical penetration of the vibrator. Vibrators shall not be used to move concrete laterally within the forms.

- O. The intensity of vibration shall be sufficient to cause settlement of the concrete into place and to produce monolithic joining with the preceding layer. Vibration shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures with a vibrator transmitting not less than 7,500 impulses per minute. Since the duration of vibration per square foot of surface is dependent on the frequency (impulses per minute), size of vibrator, and slump of concrete, the length of time must therefore be determined in the field. Vibration shall not be continued in any one location to the extent that pools of grout are formed.
- P. Care shall be taken to prevent cold joints when placing concrete in any portion of the work. The concrete placing rate shall ensure that each layer is placed while the previous layer is soft or plastic, so the two layers can be made monolithic by penetration of the vibrators. Maximum thickness of concrete layers shall be 18 inches. The surface of the concrete shall be level whenever a run of concrete is stopped.
- Q. To prevent featheredges, construction joints located at the tops of horizontal lifts near sloping exposed concrete surfaces shall be inclined near the exposed surface, so the angle between such inclined surface and the exposed concrete surface will be not less than 50°.
- R. In placing unformed concrete on slopes, the concrete shall be placed ahead of a non-vibrated slip-form screed extending approximately 2-1/2 feet back from its leading edge. The method of placement shall provide a uniform finished surface with the deviation from the straight line less than 1/8 inch in any concrete placement. Concrete ahead of the slip-form screed shall be consolidated by internal vibrators to ensure complete filling under the slip-form. Prior to placement of concrete on sloped walls or slabs, the Contractor shall submit a plan specifically detailing methods and sequence of placements, proposed concrete screed equipment, location of construction joints and water stops, and/or any proposed deviations from the stated requirements to the Engineer for review and approval.
- S. Concrete shall not be placed during rains sufficiently heavy or prolonged to prevent washing of mortar from coarse aggregate on the forward slopes of the placement. Once placement of concrete has commenced in a block, placement shall not be interrupted by diverting the placing equipment to other uses.

3.05 PLACING FLOOR SLABS ON GROUND

- A. The subgrade for slabs on ground shall be well drained and of adequate and uniform loadbearing nature. The in-place density of the subgrade soils shall be at least the minimum required by the specifications. No foundation, slab, or pavement concrete shall be placed until the depth and character of the foundation soils have been inspected and approved by the materials testing consultant.

- B. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a building where concrete is to be placed is below freezing, the temperature shall be raised and maintained above 50° long enough to remove all frost from the subgrade.
- C. The subgrade shall be moist at the time of concreting. If necessary, the subgrade shall be dampened with water in advance of concreting, but no free water shall remain standing on the subgrade nor any muddy or soft spots when the concrete is placed.
- D. Thirty-pound felt-paper shall be provided between edges of slabs-on-ground and vertical and horizontal concrete surfaces, unless otherwise indicated on the Drawings.
- E. Contraction joints shall be provided in slabs-on-ground at locations indicated on the Drawings. Contraction joints shall be installed as per Section 03 15 16 – Joints in Concrete.
- F. Floor slabs shall be screeded level or pitched to drain as indicated on the Drawings. Finishes shall conform with requirements of Section 03 35 00 – Concrete Finishes. Interior floor slabs shall be placed with non-air-entrained concrete (Class A3) if a steel troweled or hardened finish is required.

3.06 PLACING CONCRETE UNDERWATER (CLASS A5 CONCRETE)

- A. Placing concrete underwater (tremie concrete) will be permitted only when shown on the Drawings. Concrete deposited under water shall be carefully placed in a compacted mass in final position by means of a tremie, a closed bottom dump bucket or other approved method. Care must be exercised to maintain still water at the point of deposit. Concrete shall not be placed in running water. Underwater formwork shall be watertight. The consistency of the concrete shall be regulated to prevent segregation of materials. The method of depositing concrete shall be regulated such that the concrete enters the mass of the previously placed concrete from within, displacing water with a minimum disturbance to the surface of the concrete.
- B. Tremie shall consist of a tube having a diameter of not less than 10 inches and constructed in sections having flanged couplings fitted with gaskets. The tremie shall be supported to permit free movement of the discharge and over the entire top surface of the work and shall permit rapid lowering when necessary to choke off or retard the flow. The discharge end shall be sealed, and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper, the tremie shall be slightly raised, but not out of the concrete at the bottom, until the batch discharges to the bottom of the hopper. The flow shall then be stopped by lowering the tremie. The flow shall be continuous until the placement has been completed.

3.07 PLACING CONCRETE UNDER PRESSURE

- A. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall have the capacity for the operation. The operation of the pump shall produce a continuous stream of concrete without air pockets. To obtain the least line resistance, the layout of the pipeline system shall contain minimum bends with no

change in pipe size. If two sizes of pipe must be used, the smaller diameter should be used at the pump end and the larger at the discharge end. When pumping is completed, the concrete remaining in the pipelines shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.

- B. Priming of the concrete pumping equipment shall be with cement grout only. Use of specialty mix pump primers or pumping aids will not be allowed.
- C. No aluminum parts shall be in contact with the concrete during the placing of concrete under pressure.
- D. Prior to placing concrete under pressure, the Contractor shall submit the concrete mix design together with test results from a material's testing consultant proving the proposed mix meets all requirements. In addition, an actual pumping test under field conditions is required prior to acceptance of the mix. This test requires a duplication of anticipated site conditions from beginning to end. The batching and truck mixing shall be the same as will be used during construction, and the pipe and pipe layouts will reflect the maximum height and distance contemplated. All submissions shall be subject to approval by the Engineer.
- E. If the pumped concrete does not produce satisfactory end results, the Contractor shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- F. The pumping equipment must have two cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor may have a standby pump on the site during pumping.
- G. The minimum diameter of the hose (conduits) shall be four inches.
- H. Pumping equipment and hoses (conduits) that are not functioning properly shall be replaced.
- I. Concrete samples for quality control in accordance with Article 3.11 will be taken at the placement (discharge) end of the line.

3.08 ORDER OF PLACING CONCRETE

- A. To minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. Where required on the Drawings and wherever else practical, the placing of such units shall be done in a strip pattern in accordance with ACI 302.1. A minimum of 72 hours shall pass prior to placing concrete directly adjacent to previously placed concrete.

3.09 CONCRETE WORK IN COLD WEATHER

- A. Cold weather concreting procedures shall conform to the requirements of ACI 306.1.

- B. The Engineer may prohibit the placing of concrete at any time when air temperature is 40°F. or lower. If concrete work is permitted, the concrete shall have a minimum temperature, as placed, of 55°F. for placements less than 12" thick, 50°F. for placements 12" to 36" thick, and 45°F. for placements greater than 36" thick. The temperature of the concrete as placed shall not exceed these minimum values by more than 20°F, unless otherwise approved by the Engineer.
- C. All aggregate and water shall be preheated. Precautions shall be taken to avoid the possibility of flash set when aggregate or water are heated to a temperature greater than 100°F. to meet concrete temperature requirements. The addition of admixtures to the concrete to prevent freezing is not permitted. All reinforcement, forms, and concrete accessories shall be defrosted by an approved method. No concrete shall be placed on frozen ground.

3.10 CONCRETE WORK IN HOT WEATHER

- A. Hot weather concreting procedures shall conform to the requirements of ACI 305.1.
- B. When air temperatures exceed 85°F., or when extremely dry or high wind conditions exist even at lower temperatures, the Contractor and his concrete supplier shall exercise special and precautionary measures in preparing, delivering, placing, finishing, curing, and protecting the concrete mix. The Contractor shall consult with the Engineer regarding such measures prior to each day's placing operation, and the Engineer reserves the right to modify the proposed measures consistent with the requirements herein. All necessary materials and equipment shall be in place prior to each placing operation.
- C. Preparatory work at the job site shall include thorough wetting of all forms, reinforcing steel and, in the case of slab pours on ground or subgrade, spraying the ground surface on the preceding evening and again just prior to placing. No standing puddles of water shall be permitted in those areas which are to receive the concrete.
- D. The temperature of the concrete mix when placed shall not exceed 95°F.
- E. Temperature of mixing water and aggregates shall be carefully controlled and monitored at the supplier's plant, with haul distance to the job site being considered. Stockpiled aggregates shall be shaded from the sun and sprinkled intermittently with water. If ice is used in the mixing water for cooling purposes, the ice must be entirely melted prior to addition of the water to the dry mix.
- F. Delivery schedules shall be carefully considered in advance to ensure concrete is placed as soon as practical after mixing. For hot weather concrete work (air temperature greater than 85°F), discharge of the concrete to its point of deposit shall be completed within 60 minutes from the time the concrete is batched, unless workability-retaining admixtures are included and approved by the Engineer.

- G. The Contractor shall arrange for an ample work force to be on hand to accomplish transporting, vibrating, finishing, and covering of the fresh concrete as rapidly as possible.

3.11 QUALITY CONTROL

A. Field Testing of Concrete

1. The Contractor shall coordinate with the Engineer's project representative the on-site scheduling of the materials testing consultant personnel as required for concrete testing.
2. Concrete for testing shall be supplied by the Contractor at no additional cost to the Owner, and the Contractor shall assist the materials testing consultant in obtaining samples. The Contractor shall dispose of and clean up all excess material.

B. Consistency

1. The consistency of the concrete will be checked by the materials testing consultant by standard slump cone tests. The Contractor shall make any necessary adjustments in the mix as the Engineer and/or the materials testing consultant may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for any delays, material, or labor costs due to such occurrences.
2. Slump tests shall be made in accordance with ASTM C 143. Slump tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.
3. Concrete with a specified nominal slump shall be placed having a slump within 1" (higher or lower) of the specified slump. Concrete with a specified maximum slump shall be placed having a slump less than the specified slump.

C. Density

1. Samples of freshly mixed concrete shall be tested for density by the materials testing consultant in accordance with ASTM C 138.
2. Density tests will be performed as deemed necessary by the Engineer and each time compressive strength samples are taken.

D. Air Content

1. Samples of freshly mixed concrete will be tested for entrained air content by the materials testing consultant in accordance with ASTM C 231.
2. Air content tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.

3. In the event test results are outside the limits specified, additional testing shall occur. Admixture quantity adjustments shall be made immediately upon discovery of incorrect air entrainment.

E. Compressive Strength

1. Samples of freshly mixed concrete will be taken by the materials testing consultant and tested for compressive strength in accordance with ASTM C 172, C 31, and C 39, except as modified herein.
2. In general, one sampling shall be taken for each placement more than five (5) cubic yards, with a minimum of one (1) sampling for each day of concrete placement operations, or for each one hundred (100) cubic yards of concrete, or for each 5,000 square feet of surface area for slabs or walls, whichever is greater.
3. Each sampling shall consist of at least five (5) 6x12 cylinders or (8) 4x8 cylinders. Each cylinder shall be identified by a tag, which shall be hooked or wired to the side of the container. The materials testing consultant will fill out the required information on the tag, and the Contractor shall satisfy himself that such information shown is correct.
4. The Contractor shall be required to furnish labor to the Owner for assisting in preparing test cylinders. The Contractor shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the cylinders made in any four consecutive working days and to protect the specimens from falling over, being jarred, or otherwise disturbed during the period of initial curing. The box shall be erected, furnished, and maintained by the Contractor. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C 31. The curing box shall be placed in an area free from vibration such as pile driving and traffic of all kinds and such that all cylinders are shielded from direct sunlight and/or radiant heating sources. No concrete requiring testing shall be delivered to the site until such storage curing box has been provided. Cylinders shall remain undisturbed in the curing box until ready for delivery to the testing laboratory, but not less than sixteen hours.
5. The Contractor shall be responsible for maintaining the temperatures of the curing box during the initial curing of cylinders with the temperature preserved between 60°F and 80°F as measured by a maximum-minimum thermometer. The Contractor shall maintain a written record of curing box temperatures for each day the curing box contains cylinders. Temperature shall be recorded a minimum of three times a day with one recording at the start of the day and one recording at the end of the day.
6. When transported, the cylinders shall not be thrown, dropped, allowed to roll, or be damaged in any way.

7. Compression tests shall be performed in accordance with ASTM C 39. For 6x12 cylinders, two test cylinders will be tested at seven days and two at 28 days. For 4x8 cylinders, three test cylinders will be tested at seven days, three at 28 days. The remaining cylinders will be held to verify test results, if needed.

F. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 214, ACI 318, and ACI 350.
2. The strength level of concrete will be considered satisfactory if the following conditions are satisfied.
 - a. Every arithmetic average of any three consecutive strength tests equals or exceeds the minimum specified 28-day compressive strength for the mix (see Article 2.11).
 - b. No individual compressive strength test result falls below the minimum specified strength by more than 500 psi.
3. If any of the conditions listed above are not met, the mix proportions shall be corrected for the next concrete placing operation.
4. If condition 3.11.F.2.b is not met, additional tests in accordance with Article 3.11, Paragraph H shall be performed.
5. When a ratio between 7-day and 28-day strengths has been established by these tests, the 7-day strengths shall subsequently be taken as a preliminary indication of the 28-day strengths. Should the 7-day test strength from any sampling be more than 10% below the established minimum strength, the Contractor shall:
 - a. Immediately provide additional periods of curing in the affected area from which the deficient test cylinders were taken.
 - b. Maintain or add temporary structural support as required.
 - c. Correct the mix for the next concrete placement operation, if required to remedy the situation.
6. All concrete which fails to meet the ACI requirements, and these specifications is subject to removal and replacement at no additional cost to the Owner.

- G. When non-compliant concrete is identified, test reports shall be sent immediately to the Engineer for review.

H. Additional Tests

1. When ordered by the Engineer, additional tests on in-place concrete shall be provided and paid for by the Contractor.

2. If the 28-day test cylinders fail to meet the minimum strength requirements as outlined in Article 3.11, Paragraph F, the Contractor shall have concrete core specimens obtained and tested from the affected area immediately.
 - a. Three cores shall be taken for each sample in which the strength requirements were not met.
 - b. The drilled cores shall be obtained and tested in conformance with ASTM C 42. The tests shall be conducted by a materials testing consultant approved by the Engineer.
 - c. The location from which each core is taken shall be approved by the Engineer. Each core specimen shall be located, when possible, so its axis is perpendicular to the concrete surface and not near formed joints or obvious edges of a unit of deposit.
 - d. The core specimens shall be taken, if possible, so no reinforcing steel is within the confines of the core.
 - e. The diameter of core specimens should be at least 3 times the maximum nominal size of the coarse aggregate used in the concrete but must be at least 2-inches in diameter.
 - f. The length of specimen, when capped, shall be at least twice the diameter of the specimen.
 - g. The core specimens shall be taken to the laboratory and when transported, shall not be thrown, dropped, allowed to roll, or damaged in any way.
 - h. Two (2) copies of test results shall be mailed directly to the Engineer. The concrete in question will be considered acceptable if the average compressive strength of a minimum of three test core specimens taken from a given area equal or exceed 85% of the specified 28-day strength and if the lowest core strength is greater than 75% of the specified 28-day strength.
3. If the concrete placed by the Contractor is suspected of not having proper air content, the Contractor shall engage a materials testing consultant approved by the Engineer, to obtain and test samples for air content in accordance with ASTM C 457.

3.12 CARE AND REPAIR OF CONCRETE

- A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Care shall be exercised to avoid jarring forms or placing any strain on the ends of projecting reinforcing bars. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at

any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at no additional cost to the Owner.

- B. Areas of honeycomb shall be chipped back to sound concrete and repaired as directed.
- C. Concrete formwork blowouts or unacceptable deviations in tolerances for formed surfaces due to improperly constructed or misaligned formwork shall be repaired as directed. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and redressed as directed.
- D. Areas of concrete in which cracking, spalling, or other signs of deterioration develop prior to final acceptance shall be removed and replaced or repaired as directed. This stipulation includes concrete that has experienced cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an approved epoxy injection system. Non-structural cracks shall be repaired using an approved hydrophilic resin pressure injected grout system unless other means of repair are deemed necessary and approved. All repair work shall be performed at no additional cost to the Owner.
- E. Concrete which fails to meet the strength requirements as outlined in Article 3.11, Paragraph F, will be analyzed as to its adequacy based upon loading conditions, resultant stresses, and exposure conditions for the area of concrete in question. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Contractor at no additional cost to the Owner. The method of strengthening or extent of replacement shall be as directed by the Engineer.

END OF SECTION

**¹SECTION 09 90 00
PAINTING**

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. Furnish labor, materials, equipment and appliances required for complete execution of Work shown on Drawings and Specified herein.
- B. Section Includes:
 - 1. Paint Materials
 - 2. Shop Painting
 - 3. Field Painting
 - a. Surface Preparation
 - b. Piping and Equipment Identification
 - c. Schedule of Colors
 - d. Work in Confined Spaces
 - e. OSHA Safety Colors

1.02 RELATED SECTIONS

- A. Division 40

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of these specifications, the Work shall conform to the applicable requirements of the following documents:
 - 1. SSPC – The Society for Protective Coatings Standards
 - a. SSPC-Vis 1 – Pictorial Surface Preparation Standards for Painting Steel Structures
 - b. SSPC-SP2 – Hand Tool Cleaning
 - c. SSPC-SP3 – Power Tool Cleaning
 - d. SSPC-SP5/NACE 1 – White Metal Blast Cleaning

- e. SSPC-SP6/NACE 3 – Commercial Blast Cleaning
 - f. SSPC-SP7/NACE 4 – Brush-off Blast Cleaning
 - g. SSPC-SP10/NACE 2 – Near-White Metal Blast
 - h. SSPC-SP11 – Power Tool Cleaning to Bare Metal
 - i. SSPC-SP13/NACE6 – Surface Preparation of Concrete
2. ICRI – International Concrete Repair Institute
 3. NACE – National Association of Corrosion Engineers
 4. NAFP – The National Association of Pipe Fabricators
 5. ASTM D1737 – Test Method for Elongation of Attached Organic Coatings with Cylindrical Mandrel Apparatus
 6. ASTM B117 – Method of Salt Spray (Fog) Testing
 7. ASTM D4060 – Test Method for Abrasion Resistance of Organic Coating by the Taber Abraser
 8. ASTM D3359 – Method for Measuring Adhesion by Tape Test

1.04 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in Section 01 33 00 – Submittal Procedures, submit the following:
 1. Manufacturer's literature and Material Safety Data Sheets for each product.
 2. Painting schedule identifying surface preparation and paint systems proposed. Cross reference with Tables 1 and 2. Provide the name of the paint manufacturer, and name, address, and telephone number of manufacturer's representative who will inspect the work. Submit schedule for approval as soon as possible following the Award of Contract, so approved schedule may be used to identify colors and specify shop paint systems for fabricated items. Manufacturer shall substitute paint system with equal performance where required for VOC compliance.
 3. Contractor shall submit Q.C. Inspection plan describing all tests and inspections task to be performed. Include copy of daily log showing environmental conditions measurements and frequency. Copy of completed log shall be provided at completion of work.

1.05 SYSTEM DESCRIPTION

- A. Work shall include surface preparation, paint application, inspection of painted surfaces and corrective action required, protection of adjacent surfaces, cleanup and appurtenant work required for the proper painting of all surfaces to be painted. Surfaces to be painted are designated within the Painting Schedule and may include new and existing piping, miscellaneous metals, equipment, buildings, exterior fiberglass, exposed electrical conduit and appurtenances.
- B. Perform Work in strict accordance with manufacturer's published recommendations and instructions, unless the Engineer stipulates that deviations will be for the benefit of the project.
- C. Paint surfaces which are customarily painted, whether indicated to be painted or not, with painting system applied to similar surfaces, areas and environments, and as approved by Engineer.
- D. Submerged ferrous metal, piping, and internal pump surfaces within potable water facilities or potable water distribution systems shall be painted with NSF 61/600 approved coatings.
- E. Piping and equipment shall receive color coding and identification. Equipment shall be the same color as the piping system.

1.06 QUALITY ASSURANCE

- A. Painting operations shall be accomplished by skilled craftsman and licensed by the state/commonwealth to perform painting work.
- B. Provide a letter indicating that the painting applicator has five years of experience, and 5 references which show previously successful application of the specified or comparable painting systems. Include the name, address, and the telephone number for the Owner of each installation for which the painting applicator provided services.
- C. Contractor shall coordinate Q.C Inspections.
- D. Notify Owner and Engineer at completion of surface preparation, priming application and final cure to allow inspection by Owner and Engineer or their Third-Party Inspector.

1.07 STORAGE AND DELIVERY

- A. Bring materials to the job site in the original sealed and labeled containers.
- B. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

- C. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

PART 2 – MATERIALS

2.01 GENERAL INFORMATION

- A. The term "paint" is defined as both paints and coatings including emulsions, enamels, stains, varnishes, sealers, and other coatings whether organic or inorganic and whether used as prime, intermediate, or finish coats.
- B. Purchase paint from an approved manufacturer. Manufacturer shall assign a representative to inspect application of their product both in the shop and field. The manufacturer's representative shall submit a report to the Engineer at the completion the Work identifying products used and verifying that surfaces were properly prepared, products were properly applied, and the paint systems were proper for the exposure and service.
- C. Provide primers and intermediate coats produced by same manufacturer as finish coat. Use only thinners approved by paint manufacturer, and only within manufacturer's recommended limits.
- D. Ensure compatibility of total paint system for each substrate. Test shop primed equipment delivered to the site for compatibility with final paint system. Provide an acceptable barrier coat or totally remove shop applied paint system when incompatible with system specified, and repaint with specified paint system.
- E. Use painting materials suitable for the intended use and recommended by paint manufacturer for the intended use.
- F. Require that personnel perform work in strict accordance with the latest requirements of OSHA Safety and Health Standards for construction. Meet or exceed requirements of regulatory agencies having jurisdiction and the manufacturer's published instructions and recommendations. Maintain a copy of all Material Safety Data Sheets at the job site of each product being used prior to commencement of work. Provide and require that personnel use protective and safety equipment in or about the project site. Provide respiratory devices, eye and face protection, ventilation, ear protection, illumination and other safety devices required to provide a safe work environment.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Specifications, provide products from one of the following manufacturers:
 - 1. Tnemec Company Inc.

2. PPG
3. CARBOLINE
4. Sherwin-Williams
5. International Paints (Akzo Nobel)

PART 3 – EXECUTION

3.01 SHOP PAINTING

- A. Shop prime fabricated steel and equipment with at least one shop coat of prime paint compatible with finish paint system specified. Prepare surface to be shop painted in strict accordance with paint manufacturer's recommendations and as specified. Finish coats may be shop applied, if approved by the Engineer. Package, store and protect shop painted items until they are incorporated into Work. Repair painted surfaces damaged during handling, transporting, storage, or installation to provide a painting system equal to the original painting received at the shop.
- B. Identify surface preparation and shop paints on Shop Drawings. Verify compatibility with field applied paints.
- C. Coordinate shop painting and field coating to ensure item is delivered and field coating occurs within recoat window of shop painted system requirements.

3.02 SURFACE PREPARATION

- A. General
 1. Surfaces to be painted shall be clean and dry, and free of dust, rust, scale, and foreign matter. No solvent cleaning, power or hand tool cleaning shall be permitted unless approved by the Engineer.
 2. Protect or remove, during painting operations, hardware, accessories, machined surfaces, nameplates, lighting fixtures, and similar items not intended to be painted prior to cleaning and painting. Reposition items removed upon completion of painting operations.
 3. Examine surfaces to be coated to determine that surfaces are suitable for specified surface preparation and painting. Report to Engineer surfaces found to be unsuitable in writing. Do not start surface preparation until unsuitable surfaces have been corrected. Starting surface preparation precludes subsequent claim that such surfaces were unsuitable for the specified surface preparation or painting.
 4. Surface preparation shall be in accordance with specifications and manufacturer's recommendations. Provide additional surface preparation, and fill coats where

manufacturer recommends additional surface preparation, in addition to requirements of specification.

5. Touch-up shop or field applied coatings damaged by surface preparation or any other activity, with the same shop or field applied coating; even to the extent of applying an entire coat when required to correct damage prior to application of the next coating. Touchup coats are in addition to the specified applied systems, and not considered a field coat.
6. Protect motors and other equipment during blasting operation to ensure blasting material is not blown into motors or other equipment. Inspect motors and other equipment after blasting operations and certify that no damage occurred, or where damage occurred, the proper remedial action was taken.
7. Field paint shop painted equipment in compliance with Color Coding and as approved by Engineer.

B. Metal Surface Preparation

1. Prepare all welds to a minimum NACE weld preparation level "C" per NACE Standard SP0178. Provide additional weld preparation where required by the coating manufacturer. Contractor shall provide NACE SP0178 weld mold visual aids on site for evaluation of all weld preparation.
2. Conform to current The Society for Protective Coatings Standards (SSPC) Specifications for metal surface preparation. Use SSPC-Vis-1 pictorial standards or NACE visual standards TM-01-70 or TM-01-75 to determine cleanliness of abrasive blast cleaned steel.
3. Perform blast cleaning operations for metal when following conditions exist:
 - a. Moisture is not present on the surface.
 - b. Relative humidity is below 80%.
 - c. Ambient and surface temperatures are 5°F or greater than the dew point temperature.
 - d. Painting or drying of paint is not being performed in the area.
 - e. Equipment is in good operating condition.
 - f. Proper ventilation, illumination, and other safety procedures and equipment are being provided and followed.
4. Abrasive blast ferrous metals to be shop primed, or component mechanical equipment in accordance with SSPC-SP5, White Metal Blast.

5. Abrasive blast field prepared ferrous metals in accordance with SSPC-SP10, Near White Metal Blast, where metal is to be submerged, in a corrosive environment, or in severe service. Provide a 3.0 mil minimum angular anchor profile unless recommended otherwise by the coating manufacturer in writing.
6. Abrasive blast field prepared ferrous metals in accordance with SSPC-SP6 Commercial Blast, where metal is to be used in mild or moderate service, or non-corrosive environment or weathering exposure. Provide a 1.5 mil minimum angular anchor profile unless recommended otherwise by the coating manufacturer in writing.
7. Clean nonferrous metals, copper, or galvanized metal surfaces in accordance to SSPC-SP1, Solvent Cleaning, or give one coat of metal passivator or metal conditioner compatible with the complete paint system. Galvanized metal shall be prepared in accordance with SSPC SP-16. Abrasive blast clean to increase mechanical adhesion in accordance with ASTM D6386, Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting when required by coating manufacturer. Provide a 1.5 mil minimum angular anchor profile unless recommended otherwise by the coating manufacturer in writing.
8. Abrasive blast clean internal and external ductile iron pipe surfaces prior to coating in accordance with NAPF 500-03-04, Surface Preparations Standard for Abrasive Blast Cleaning of Ductile Iron Pipe. Abrasive blast clean internal and external cast ductile iron and cast-iron fitting surfaces in accordance with NAPF-03-05.
9. Prime cleaned metals immediately after cleaning to prevent rusting.
10. Clean rusted metals down to bright metal by abrasive blasting and immediately field primed.

C. Concrete Surface Preparation

1. Cure concrete a minimum of 28 days at 75° F before surface preparation, and painting begins. Allow more time at lower temperatures if specified by paint manufacturer.
2. Test concrete for pH and salts using test methods recommended by the paint manufacturer. A minimum of one test per 1000 square feet of area to be coated shall be performed unless approved otherwise by Engineer. Do not begin surface preparation, or painting until acceptable to manufacturer.
3. Moisture content of concrete and masonry surfaces shall conform to manufacturer's recommended limits, and as listed in SSPC-SP13/NACE 6 Section 6 Acceptance Criteria Table 1. Floor surfaces to be coated shall be tested in accordance with ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride or as required by the coating manufacturer. Moisture vapor transmission shall not

exceed three pounds per 1,000 square feet in a 24-hour period or less if specified by Coating Manufacturer. Vertical and horizontal overhead surfaces shall be tested in accordance with ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes (relative humidity shall not exceed 80% or as required by the coating manufacturer) or with ASTM D4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Test Method (test results shall be no moisture present). Engineer or Coating Manufacturer Representative shall specify all test locations. A minimum of one test per 1000 square feet of area to be coated shall be performed unless approved otherwise by Engineer.

4. Prepare concrete surfaces to receive coatings in accordance with NACE 6/SSPC-13 – Joint Surface Preparation Standards and ICRI Technical Guidelines. Remove contaminants, open bugholes, surface voids, air pockets, and other subsurface irregularities using abrasive blasting, shot blasting, water jetting or mechanical abrading. Use dry, oil-free air for blasting operations. Surface texture after blasting shall achieve profile as required by manufacturer or where not defined by manufacturer, profile shall be a minimum ICRI-CSP 5 surface profile. Remove residual abrasives, dust, and loose particles by vacuuming or other approved method.
5. Surface defects, such as hollow areas, bugholes, honeycombs, and voids shall be filled with polymeric or waterborne epoxy cementitious filler compatible with painting system. Complete fill coats may be used in addition to specified painting system and as approved by the Engineer. Fins, form marks, and all protrusions or rough edges shall be removed.
6. Repair existing concrete surfaces which are deteriorated to the point that surface preparation exposes aggregate with fill coats or patching mortar as recommended by paint manufacturer and as directed by the Engineer.
7. Clean concrete of all dust, form oils, curing compounds, oil, tar, laitance, efflorescence, loose mortar, and other foreign materials before paints are applied.
8. To ease coating around outside corners, provide $\frac{3}{4}$ -inch chamfered edges on all new concrete outside corners and grind existing concrete outside corners to a minimum radius of $\frac{3}{4}$ -inch.
9. Unless recommended otherwise by the coating manufacturer, provide $\frac{1}{4}$ " deep by $\frac{1}{4}$ " wide tool cut terminations at 1-inch maximum from all coating edges for anchorage. Provide terminations around all equipment, piping, openings, gates, top and bottom of walls, stop locations of each day's work and overlap onto previously completed work. Transition coating 3-inches onto interior lining of piping except where coating compatibility concerns are noted by coating manufacturer.

10. Apply epoxy or polymeric filler compatible with painting system to all inside corners of areas to be coated with a margin trowel to form a continuous 45-degree cant cove across corners with a minimum dimension of 1.5-inch. Roughen or prepare cured filler as recommended by coating manufacturer for proper coating adhesion.
11. All equipment grouting shall be installed and cured prior to starting coating work. Coating shall be applied over grout up to the edges of all equipment, gates and uninterrupted piping unless specifically noted otherwise.

D. Wood

1. Clean wood surfaces free of all foreign matter, with cracks and nail holes and other defects properly filled and smoothed. Remove sap and resin by scraping and wipe clean with rags dampened with mineral spirits.
2. Saturate end grain, cut wood, knots, and pitch pockets with an appropriate sealer before priming.
3. Prime and backprime wood trim before setting in place.
4. After prime coat has dried, fill nailholes, cracks, open joints, and other small holes with approved spackling putty. Lightly sand wood trim prior to applying second coat of paint.

E. Castings

1. Prepare castings for painting by applying a brush or a knife-applied filler. Fillers are not to be used to conceal cracks, gasholes, or excessive porosity.
2. Apply one coat of primer with a minimum thickness of 1.2 mils in addition to coats specified. Allow sufficient drying time before further handling.

F. Masonry

1. Cure for a minimum of 30 days prior to paint application.
2. Clean masonry surfaces free from all dust, dirt, oil, grease, loose mortar, chalky deposits, efflorescence, and other foreign materials.
3. Test masonry for moisture content. Use test method recommended by paint manufacturer. Do not begin painting until moisture content is acceptable to manufacturer.

G. Gypsum Drywall

1. Sand joint compound with sandpaper to provide a smooth flat surface. Avoid sanding of adjacent drywall paper.
2. Remove dust, dirt, and other contaminants.

H. Previously-Painted Surfaces

1. Totally remove existing paint when: surface is to be submerged in a severe environment, paint is less than 75% intact, brittle, eroded or has underfilm rusting.
2. Surfaces which are greater than 75% intact require removal of failed paints and then spot primed. Spot priming is in addition to coats specified.
3. Remove surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold, mildew, mortar, efflorescence, and sealers.
4. Clean and dull glossy surfaces prior to painting in accordance with the manufacturer's recommendations.
5. Check existing paints for compatibility with new paint system. If incompatible, totally remove existing paint system or apply a barrier coat recommended by the paint manufacturer. Remove existing paints of undetermined origin. Prepare a test patch of approximately 3 square feet over existing paint. Allow test patch to dry thoroughly and test for adhesion. If proper adhesion is not achieved remove existing paint and repaint.

3.03 APPLICATION OF PAINT

- A. Apply paint by experienced painters with brushes or other applicators approved by the Engineer, and paint manufacturer.
- B. Apply paint without runs, sags, thin spots, or unacceptable marks.
- C. Apply at rate specified by the manufacturer to achieve at least the minimum dry mil thickness specified. Apply additional coats, if necessary, to obtain thickness.
- D. Special attention shall be given to nuts, bolts, edges, angles, flanges, welds, etc., where insufficient film thicknesses are likely. Stripe paint outside corners and edges in accordance with SSPC PA Guide 11. Stripe painting shall be in addition to coats specified.
- E. Perform thinning in strict accordance with the manufacturer's instructions, and with the full knowledge and approval of the Engineer and paint manufacturer.
- F. Allow paint to dry a minimum of twenty-four hours between application of any two coats of paint on a particular surface, unless shorter time periods are a requirement by the manufacturer. Longer drying times may be required for abnormal conditions as defined by the Engineer and paint manufacturer. Do not exceed manufacturer's recommended drying time between coats.
- G. Suspend painting when any of the following conditions exist:
 1. Rainy or excessively damp weather.

2. Relative humidity exceeds 85%.
 3. General air temperature cannot be maintained at 50°F or above through the drying period, except on approval by the Engineer and paint manufacturer.
 4. Relative humidity will exceed 85% or air temperature will drop below 40°F within 18 hours after application of paint.
 5. Surface temperature of item is within 5 degrees of dewpoint.
 6. Dew or moisture condensation are anticipated.
 7. Surface temperature exceeds the manufacturer's recommendations.
- H. Where application of coating across concrete control joints or expansion joints has the potential to crack, turn coating into joints and caulk joints with a sealant compatible with coating rated for the intended service.

3.04 INSPECTION

- A. Each field coat of paint will be inspected and approved by the Engineer or his authorized representative before succeeding coat is applied. Tint successive coats so that no two coats for a given surface are exactly the same color. Tick-mark surfaces to receive black paint in white between coats.
- B. Use magnetic dry film thickness gauges and wet film thickness gauges for quality control. Furnish magnetic dry film thickness gauge for use by the Engineer.
- C. Coatings shall pass a holiday detector test.
- D. Determination of Film Thickness: Randomly selected areas, each of at least 107.5 contiguous square feet, totaling at least 5% of the entire control area shall be tested. Within this area, at least 5 squares, each of 7.75 square inches, shall be randomly selected. Three readings shall be taken in each square, from which the mean film thickness shall be calculated. No more than 20 percent of the mean film thickness measurements shall be below the specified thickness. No single measurement shall be below 80 percent of the specified film thickness. Total dry film thickness greater than twice the specified film thickness shall not be acceptable. Areas where the measured dry film thickness exceeds twice that specified shall be completely redone unless otherwise approved by the Engineer. When measured dry film thickness is less than that specified additional coats shall be applied as required.
- E. Holiday Testing: Holiday test painted ferrous metal surfaces which will be submerged in water or other liquids, or surfaces which are enclosed in a vapor space in such structures. Mark areas which contain holidays. Repair or repaint in accordance with paint manufacturer's printed instructions and retest.

1. Dry Film Thickness Exceeding 20 Mils: For surfaces having a total dry film thickness exceeding 20 mils: Pulse-type holiday detector such as Tinker & Razor Model AP-W, D.E. Stearns Co. Model 14/20, shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the specified coating thickness.
 2. Dry Film Thickness of 20 Mils or Less: For surfaces having a total dry film thickness of 20 mils or less: Tinker & Razor Model M1 non-destructive type holiday detector, K-D Bird Dog, shall be used. The unit shall operate at less than 75-volts. For thicknesses between 10 and 20 mils, a non-sudsing type wetting agent, such as Kodak Photo-Flow, shall be added to the water prior to wetting the detector sponge.
- F. Paint manufacturer's NACE certified representative shall provide their services as required by the Engineer. Services shall include, but not be limited to, inspecting existing paint, determination of best means of surface preparation, inspection of completed work, and final inspection of painted work 11 months after the job is completed.

3.05 PROTECTION OF ADJACENT PAINT AND FINISHED SURFACES

- A. Use covers, masking tape, other method when protection is necessary, or requested by Owner or Engineer. Remove unwanted paint carefully without damage to finished paint or surface. If damage does occur, repair the entire surface adjacent to and including the damaged area without visible lapmarks and without additional cost to the Owner.
- B. Take all necessary precautions to contain dispersion of abrasive blasting debris and paint to the limits of the work. Take into account the effect of wind and other factors which may cause dispersion of the abrasive blasting debris and paint. Suspend painting operations when abrasive blasting debris or paint cannot be properly confined. Assume all responsibilities and cost associated with damage to adjacent structures, vehicles, or surfaces caused by the surface preparation and painting operations.

3.06 PIPING AND EQUIPMENT IDENTIFICATION

- A. Piping and equipment identification shall be in accordance Owner's direction.

3.07 SCHEDULE OF COLORS

- A. Match colors indicated. Piping and equipment colors shall be field verified with the Owner. Colors which are not indicated shall be selected from the manufacturer's full range of colors by the Engineer. No variation shall be made in colors without the Engineer's approval. Color names and numbers shall be identified according to the appropriate color chart issued by the manufacturer of the particular product in question.

3.08 WORK IN CONFINED SPACES

- A. Provide and maintain safe working conditions for all employees. Supply fresh air continuously to confined spaces through the combined use of existing openings,

forceddraft fans and temporary ducts to the outside, or direct air supply to individual workers. Exhaust paint fumes to the outside from the lowest level in the contained space. Provide explosionproof electrical fans, if in contact with fumes. No smoking or open fires will be permitted in, or near, confined spaces where painting is being done. Follow OSHA, state/commonwealth, and local regulations at all times.

3.09 OSHA SAFETY COLORS

- A. Paint wall around wall-mounted breathing or fire apparatus with the appropriate safety red color; area not to exceed 2 feet wide by 3 feet high, unless apparatus covers the area. Fire apparatus include fire hoses, extinguisher, and hydrants.
- B. Paint hazardous areas and objects in accordance with OSHA regulations.

3.10 VOC REGULATIONS

- A. Provide paint systems in accordance with local, state, and federal regulations. Where paint systems shown in schedule do not comply, substitute equal products with VOC limits which comply with local, state, and federal regulations.

Table 1: Painting Schedule

Surface	Application	Painting System and No. of Coats	Product Reference (Table 2)	Total Min. Dry Film Thickness (Mils)
Concrete and Masonry				
Interior masonry and concrete walls and ceilings	All new structures	1 coat sealer 2 coats acrylic epoxy	101 116	75-85 sq.ft./gal. 4-6/coat
Interior masonry and concrete walls in chemical rooms		1 coat sealer 2 coats epoxy polyamide	117 102	60-80 sq.ft./gal. 4-6/coat
Submerged or occasional contact with potable or raw water	Water retaining side of new wall surfaces where opposite side of wall is interior and dry and where indicated "epoxy waterproofing" on drawing	2 coats NSF 61/600 approved epoxy polyamide Provide filler as required and recommended by manufacturer	105	4-6/coat
Submerged wastewater		2 coats high solids epoxy Provide filler as required and recommended by manufacturer	119	6-10/coat
Containment Liner ¹	Interior and exterior secondary containment floors, tank supports and walls	2 coats high solids epoxy coating	119	6-10/coat
Metals				
Interior and exterior nonsubmerged (gloss)	All new blowers, pumps, motors and mechanical equipment, piping, etc.	1 coat epoxy polyamide primer	104	4-6
		1 coat epoxy polyamide	102	4-6
		1 coat aliphatic polyurethane	115	3-5
Interior insulated		1 coat acrylic latex	103	4
Submerged or occasional contact with potable or raw water	All metal piping, mechanical equipment, etc.	2 coats NSF 61/600 approved epoxy polyamide	105	4-6/coat
Submerged Wastewater		2 coats high solids epoxy	119	8-10/coat
Steel doors, windows and door frames, steel stairs, monorails, structural steel, misc. metals (steel), galvanized lintels,		1 coat epoxy polyamide	102	5-8
		1 coat aliphatic polyurethane	115	3-4
Aluminum surfaces in contact with concrete		2 coats coal tar	107	26
Shop Primed Structural Steel	Pre-Engineered Buildings	1 tie coat	113	2-3
		1 coat epoxy	114	3-4
		1 coat epoxy	120	3-4
Other				
Interior: Gypsum Wallboard	All new structures	2 coats acrylic latex matte or satin	103	2-3/coat
Interior: Tar-dipped piping where color is required		1 coats epoxy resin sealer	112	2-3/coat
		1 coats epoxy polyamide	102	5-8/coat
PVC Piping		1 coat epoxy polyamide	102	5-8
		1 coat aliphatic polyurethane	115	3-4

¹ Painting manufacturer shall verify compatibility of containment liner and chemical to be contained. Where incompatible substitute a compatible coating system.

Table 2: Product Listing

Ref.	System	Purpose	Product			
			Tnemec Series	PPG	CARBOLINE	Sherwin-Williams
101	Acrylic filler	Primer-sealer	130-6601	BLOXFIL 400BF	Sanitile 100	Cement-Plex 875
102	Epoxy polyamide	Finish coat semi-gloss or gloss	N69	AMERLOCK 600 (SEMI-GLOSS)	Carboguard 890	Macropoxy 646
103	Acrylic latex	Sealer	1028/1029	PITT TECH PLUS	Carbocrylic 3359DTM	DTM Acrylic Primer/Finish
104	Epoxy Polyamide – metal	Primer	66	AMERCOAT 600	Carboguard 893SG	Macropoxy 646
105	Epoxy polyamide	Primer/Finish	L140	AMERLOCK 2 VOC	Carboguard 61/891VOC	Macropoxy 646 PW
106	Coal tar epoxy	Finish high-coat build	46H-413	AMERCOAT 78HB	Bitumastic 300M	Hi-Mil Sher Tar Epoxy
107	Coal tar	Sealer	46-465	AMERCOAT 78HB	Bitumastic 300M	Hi-Mil Sher Tar Epoxy
108	Alkyd-medium oil	Finish coat	2H	HP INDUSTRIAL ALKYD 4308	Carbocoat 8215	Industrial Enamel
109	Alkyd-long oil	Finish coat	1029	HP INDUSTRIAL ALKYD 4308	Carbocoat 8215	Industrial Enamel
110	Epoxy polyamide	Primer	66-1211	AMERCOAT 600	Carboguard 893SG	Macropoxy 646
112	Epoxy polyamide	Sealer	66-1211	AMERLOCK SEALER	Carboguard 893SG	Macropoxy 920 Pre-Prime
113	Urethane	Barrier coat	530	AMERLOCK SEALER	Rustbond	-
114	Polyamine Epoxy	Intermediate coat	27	AMERLOCK 600	Carboguard 893SG	-
115	Aliphatic Polyurethane	Finish coat	1094 or 1095	PITTHANE ULTRA SERIES	Carbothane 134HG	Acrolon 218HS
116	Acrylic epoxy	Finish coat	113 or 114	AQUAPON WB EP	Sanitile 255	Water-Based Catalyzed Epoxy
117	Epoxy block filler	Sealer	1254	AMERLOCK 400BF	Sanitile 500	Kem Cati-Coat HS Epoxy Filler
118	Catalyzed epoxy	Finish coat	84	AMERLOCK 2/400	Carboguard 890	Macropoxy 646
119	High solids epoxy	Finish coat	104	AMERLOCK 240	Carboguard 890	Dura-Plate 235
120	Epoxy	Top coat	N69	AMERLOCK 240	Carboguard 890	-

END OF SECTION

1

SECTION 26 05 00
BASIC ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all labor, materials, tools, and equipment, and perform all work and services necessary for, or incidental, to the furnishing and installation of all electrical work as shown on the Drawings, and as specified in accordance with the provisions of the Contract Documents and completely coordinate with the work of other trades involved in the general construction. Although such work is not specifically shown or specified, all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation shall be furnished and installed as part of this work. The Contractor shall obtain approved Shop Drawings showing wiring diagrams, connection diagrams, roughing-in and hook up details for all equipment and comply therewith. All electrical work shall be complete and left in operating condition in accordance with the intent of the Drawings and the Specifications for the electrical work.
- B. The electrical scope of work for this project primarily includes, but is not limited to, the following:
1. Demo existing low voltage motor control center (MCC-2)
 2. Demo existing wall-mounted motor starter enclosures
 3. Demo existing lighting systems and wiring devices
 4. Furnish and install low voltage motor control center (MCC-2)
 5. Furnish and install one (1) lighting panelboard, one (1) dry-type transformer, and other low voltage electrical power distribution equipment.
 6. Furnish and install all aboveground raceway systems including conduit, fittings, boxes, supports, and other pertinent components.
 7. Furnish and install all underground raceway systems including conduit, fittings, and other pertinent components.
 8. Furnish and install all low voltage wire and cable resulting in a complete and operable electrical system.
 9. Furnish and install new lighting systems and wiring devices.

10. Other electrical work as specified herein and indicated on the Drawings.

- C. All material and equipment must be the product of an established, reputable, and approved manufacturer; must be new and of first class construction; must be designed and guaranteed to perform the service required; and must bear the label of approval of the Underwriters Laboratories, Inc., where such approval is available for the product of the listed manufacturer as approved by the Engineer.
- D. When a specified or indicated item has been superseded or is no longer available, the manufacturer's latest equivalent type or model of material or equipment as approved by the Engineer shall be furnished and installed at no additional cost to the Owner.
- E. Where the Contractor's selection of equipment of specified manufacturers or additionally approved manufacturers requires changes or additions to the system design, the Contractor shall be responsible in all respects for the modifications to all system designs, subject to approval of the Engineer. The Contractor's bid shall include all costs for all work of the Contract for all trades made necessary by such changes, additions or modifications or resulting from any approved substitution.
- F. Furnish and install all stands, racks, brackets, supports, and similar equipment required to properly serve the equipment which is furnished under this Contract, or equipment otherwise specified or indicated on the Drawings.

1.02 EQUIPMENT LOCATION

- A. The Drawings show the general location of feeders, transformers, outlets, conduits, and circuit arrangements. Because of the small scale of the Drawings, it is not possible to indicate all of the details involved. The Contractor shall carefully investigate the structural and finish conditions affecting the work and shall arrange such work accordingly; furnishing such fittings, junction boxes, and accessories as may be required to meet such conditions. The Contractor shall refer to the entire Drawing set to verify openings, special surfaces, and location of other equipment, or other special equipment prior to roughing-in for panels, switches, and other outlets. The Contractor shall verify all equipment dimensions to ensure that proposed equipment will fit properly in spaces indicated.
- B. Where outlets are shown near identified equipment furnished by this or other Contractors, it is the intent of the Specifications and Drawings that the outlet be located at the equipment to be served. The Contractor shall coordinate the location of these outlets to be near the final location of the equipment served whether placed correctly or incorrectly on the Drawings.

1.03 LOCAL CONDITIONS

- A. The Contractor shall examine the site and become familiar with conditions affecting the work. The Contractor shall investigate, determine, and verify locations of any overhead

or buried utilities on or near the site, and shall determine such locations in conjunction with all public and/or private utility companies and with all authorities having jurisdiction. All costs, both temporary and permanent to connect all utilities, shall be included in the Bid. The Contractor shall be responsible for scheduling and coordinating with the local utility for temporary and permanent services.

1.04 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in Section 01 33 00 – Submittal Procedures and the requirements of the individual Specification Sections, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Operation and Maintenance Manuals
 - 3. Spare Parts List
 - 4. Proposed Testing Methods and Reports of Certified Shop Tests
 - 5. Reports of Certified Field Tests
 - 6. Manufacturer's Representative's Certification
- B. Submittals shall be sufficiently complete in detail to enable the Engineer to determine compliance with Contract requirements.
- C. Submittals will be approved only to the extent of the information shown. Approval of an item of equipment shall not be construed to mean approval for components of that item for which the Contractor has provided no information.
- D. Some individual electrical specification sections may require a Compliance, Deviations, and Exceptions (CD&E) letter to be submitted. If the CD&E letter is required and shop drawings are submitted without the letter, the submittal will be rejected. The letter shall include all comments, deviations and exceptions taken to the Drawings and Specifications by the Contractor AND Equipment Manufacturer/Supplier. This letter shall include a copy of this specification section. In the left margin beside each and every paragraph/item, a letter "C", "D", or "E" shall be typed or written in. The letter "C" shall be for full compliance with the requirement. The letter "D" shall be for a deviation from the requirement. The letter "E" shall be for taking exception to a requirement. Any requirements with the letter "D" or "E" beside them shall be provided with a full typewritten explanation of the deviation/exception. Handwritten explanation of the deviations/exceptions is not acceptable. The CD&E letter shall also address deviations, and exceptions taken to each Drawing related to this Specification Section.

- E. Seismic support design for all nonstructural electrical components (conduit, raceways, freestanding equipment, etc.) shall be in accordance with all applicable federal, state and local building code requirements.

1.05 APPLICABLE CODES AND REQUIREMENTS

A. Conformance

1. All work, equipment and materials furnished shall conform with the existing rules, requirements and specifications of the following:
 - a. Insurance Rating Organization having jurisdiction
 - b. The serving electrical utility company
 - c. The currently adopted edition of the National Electrical Code (NEC)
 - d. The National Electric Manufacturers Association (NEMA)
 - e. The Institute of Electrical and Electronic Engineers (IEEE)
 - f. The Insulated Cable Engineers Association (ICEA)
 - g. The American Society of Testing Materials (ASTM)
 - h. The American National Standards Institute (ANSI)
 - i. The requirements of the Occupational Safety Hazards Act (OSHA)
 - j. The National Electrical Contractors Association (NECA) Standard of Installation
 - k. National Fire Protection Association (NFPA)
 - l. International Electrical Testing Association (NETA)
 - m. All other applicable Federal, State/Commonwealth and local laws and/or ordinances.
2. All material and equipment shall bear the inspection labels of Underwriters Laboratories, Inc., if the material and equipment is of the class inspected by said laboratories.

B. Nonconformance

1. Any paragraph of requirements in these Specifications, or Drawings, deviating from the rules, requirements and Specifications of the above organizations shall be invalid and their (the above organizations) requirements shall hold precedent thereto. The Contractor shall be held responsible for adherence to all rules, requirements and specifications as set forth above. Any additional work or material necessary for adherence will not be allowed as an extra, but shall be included in the Bid. Ignorance of any rule, requirement, or Specification shall not be allowed as an excuse for nonconformity. Acceptance by the Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

C. Certification

1. Upon completion of the work, the Contractor shall obtain certificate(s) of inspection and approval from the National Board of Fire Underwriters or similar inspection organization having jurisdiction and shall deliver same to the Engineer and the Owner.

1.06 PERMITS AND INSPECTIONS

- A. The Contractor shall reference the General Conditions and Section 01 11 00 – Summary of Work.

1.07 TESTS

- A. Upon completion of the installation, the Contractor shall perform tests for operation, load (Phase) balance, overloads, and short circuits. Tests shall be made with and to the satisfaction of the Owner and Engineer.
- B. The Contractor shall perform all field tests and shall provide all labor, equipment, and incidentals required for testing and shall pay for electric power required for the tests. All defective material and workmanship disclosed shall be corrected by the Contractor at no cost to the Owner. The Contractor shall show by demonstration in service that all circuits and devices are in good operating condition. Test shall be such that each item of control equipment will function not less than five (5) times.
- C. Refer to each individual specification section for detailed test requirements.
- D. Before each test commences, the Contractor shall submit a detailed test procedure, and also provide test engineer resume, personnel and scheduling information for the approval by the Engineer. In addition, the Contractor shall furnish detailed test procedures for any electrical equipment required as part of the field tests of other systems.

1.08 INFRARED INSPECTION

- A. Just prior to the final acceptance of a piece of equipment, the Contractor shall perform an infrared inspection to locate and correct all heating problems associated with electrical equipment terminations.
- B. The infrared inspection shall apply to all new equipment and existing equipment that is in any way modified under this Contract. All heating problems detected with new equipment furnished and installed under the Scope of this Contract shall be corrected by the Contractor. All problems detected with portions of existing equipment modified under this Contract shall also be corrected by the Contractor.
- C. Any issues detected with portions of existing equipment that were not modified under this Contract are not the responsibility of the Contractor. Despite the Contractor not being held responsible for these problems, the Contractor shall report them to the Owner and Engineer immediately for resolution.
- D. The infrared inspection report shall include both digital and IR pictures positioned side by side. Both the digital and IR pictures shall be clear and high quality. Fuzzy, grainy, or poorly illuminated pictures are not acceptable. The IR picture shall be provided with a temperature scale beside it, and an indication of the hot spot temperature in each picture. Reports shall be furnished in a 3-ring binder, with all pages printed in full color, with equipment assemblies separated by tabs.

1.09 PROTECTIVE DEVICE SETTING AND TESTING

- A. The Contractor shall provide the services of a field services organization to adjust, set, calibrate and test all protective devices in the electrical system. The organization shall be a subsidiary of or have a franchise service agreement with the electrical equipment manufacturer. The qualifications of the organization and resumes of the technicians as well as all data forms to be used for the field testing shall be submitted.
- B. All protective devices in the electrical equipment shall be set, adjusted, calibrated and tested in accordance with the manufacturers' recommendations, the coordination study, and best industry practice.
- C. Proper operation of all equipment associated with the device under test and its compartment shall be verified, as well as complete resistance, continuity and polarity tests of power, protective and metering circuits. Any minor adjustments, repairs and/or lubrication necessary to achieve proper operation shall be considered part of this Contract.
- D. All solid state trip devices shall be checked and tested for setting and operation using manufacturers recommended test devices and procedures.

- E. Circuit breakers and/or contactors associated with the above devices shall be tested for trip and close functions with their protective device.
- F. When completed, the Contractor shall provide a comprehensive report for all equipment tested indicating condition, readings, faults and/or deficiencies in same. Inoperative or defective equipment shall be brought immediately to the attention of the Engineer.
- G. Prior to placing any equipment in service, correct operation of all protective devices associated with this equipment shall be demonstrated by field testing under simulated load conditions.

1.10 SCHEDULES AND FACILITY OPERATIONS

- A. Since the equipment testing required herein shall require that certain pieces of equipment be taken out of service, all testing procedures and schedules must be submitted to the Engineer for review and approval one (1) month prior to any work beginning. When testing has been scheduled, the Engineer must be notified 48 hours prior to any work to allow time for load switching and/or alternation of equipment. In addition, all testing that requires temporary shutdown of facility equipment must be coordinated with the Owner/Engineer so as not to affect proper facility operations.
- B. At the end of the workday, all equipment shall be back in place and ready for immediate use should a facility emergency arise. In addition, should an emergency condition occur during testing, at the request of the Owner, the equipment shall be placed back in service immediately and turned over to Owner personnel.
- C. In the event of accidental shutdown of Owner equipment, the Contractor shall notify Owner personnel immediately to allow for an orderly restart of affected equipment.
- D. Maintaining the operation of these facilities during the duration of the construction period is essential and required. The Contractor shall furnish and install temporary equipment as required to maintain facility operation. Reference Section 01 14 00 – Coordination with Owner’s Operations for construction sequencing and specific operational constraint information.

1.11 MATERIALS HANDLING

- A. Materials arriving on the job site shall be stored in such a manner as to keep material free of rust and dirt and so as to keep material properly aligned and true to shape. Rusty, dirty, or misaligned material will be rejected. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Rigid non-metallic conduit shall be stored on even supports and in locations not subject to direct sun rays or excessive heat. Cables shall be sealed, stored, and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Adequate protection shall be required at all times for electrical equipment and accessories until installed and accepted. Materials damaged during shipment, storage, installation, or testing shall be

replaced or repaired in a manner meeting with the approval of the Engineer. If space heaters are provided in a piece of electrical equipment, they shall be temporarily connected to a power source during storage. The Contractor shall store equipment and materials in coordination with the Owner.

1.12 WARRANTIES

- A. Warranties specified for products shall be in addition to, and run concurrent with, Contractor's general warranty and guarantee and requirements for the required correction period. Disclaimers and limitations in specific product warranties do not limit Contractor's general warranty and guarantee.
1. Product manufacturer's warranty is preprinted written warranty published by product manufacturer and specifically endorsed by product manufacturer to Owner.
 2. Equipment and material shall be guaranteed to be free from defects in workmanship, design, and/or materials for a period of one (1) year unless otherwise specified in the individual Specification Section for a Special Warranty.
 3. Warranty period shall start on the date of the particular equipment and material is substantially complete.
 4. Warranty requirements may be added to or modified in the individual Specification Sections. Special warranty is written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by product manufacturer's warranty or to provide increased rights to Owner.
 5. Special warranty information, if any, will be located in the Specification Section for that product.
- B. Requirements for Special Warranties: Provide written special warranty document that contains appropriate terms and identification, ready for execution by product manufacturer and Owner. Submit draft warranty with submittals required for product.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed by product manufacturer and other parties as appropriate.
 2. Specified Form: When specified forms are included in the Contract Documents, prepare written document, properly executed by product manufacturer and Owner, using appropriate form.
 3. Refer to Specifications for content and requirements for submitting special warranties.

- C. Submit product manufacturer's warranties and special warranties as submittals in accordance with Schedule of Submittals accepted by Engineer.

1.13 TRAINING

- A. Contractor shall furnish services of operation and maintenance training specialists to instruct Owner's personnel in recommended operation and maintenance procedures for materials and equipment furnished, in accordance with the Contract Documents.
- B. Contractor shall provide a combination of classroom and field training at the Site, unless otherwise required elsewhere in the Contract Documents.
- C. Owner reserves the right to record training sessions on video for Owner's later use in instructing Owner's personnel.

PART 2 – PRODUCTS

2.01 PRODUCT REQUIREMENTS

- A. Unless otherwise indicated, the materials to be provided under this Specification shall be the products of manufacturers regularly engaged in the production of all such items and shall be the manufacturer's latest design. The products shall conform to the applicable standards of UL and NEMA, unless specified otherwise. International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured, and labeled in compliance with IEC standards is not acceptable.
- B. All items of the same type or ratings shall be identical. This shall be further understood to include products with the accessories indicated.
- C. All equipment and materials shall be new, unless indicated or specified otherwise.
- D. The Contractor shall submit proof if requested by the Engineer that the materials, appliances, equipment, or devices that are provided under this Contract meet the requirements of Underwriters Laboratories, Inc., in regard to fire and casualty hazards. The label of or listing by the Underwriters Laboratories, Inc., will be accepted as conforming to this requirement.

2.02 SUBSTITUTIONS

- A. Unless specifically noted otherwise, any reference in the Specifications or on the Drawings to any article, service, product, material, fixture, or item of equipment by name, make, or catalog number shall be interpreted as establishing the type, function, and standard of quality and shall not be construed as limiting competition. The Contractor, in such cases may use any article, device, product, material, fixture, or item of equipment which in the judgment of the Engineer, expressed in writing, is equal to that specified.

2.03 RUBBER INSULATING MATTING

- A. Rubber insulating matting shall be furnished and installed on the floor and in front of each piece of electrical equipment that is located indoors and installed under this Contract. Rubber insulating matting shall not be installed outdoors. The mat shall be long enough to cover the full length of the equipment. The mat shall be ¼-inch thick with beveled edges, canvas back, solid type with corrugations running the entire length of the mat. The matting shall meet OSHA requirements and the requirements of ASTM D-178 for Type 2, Class 2 insulating matting. Matting shall be 36 inches wide, minimum. However, matting width shall be no less than the NEC working clearance for the equipment with which it is associated.

PART 3 – EXECUTION

3.01 CUTTING AND PATCHING

- A. Coordination
 - 1. The Work shall be coordinated between all trades to avoid delays and unnecessary cutting, channeling and drilling. Sleeves shall be placed in concrete for passage of conduit wherever possible.
- B. Damage
 - 1. The Contractor shall perform all chasing, channeling, drilling and patching necessary to the proper execution of this Contract. Any damage to the building, structure, or any equipment shall be repaired by qualified mechanics of the trades involved at the Contractor's expense. If, in the Engineer's judgment, the repair of damaged equipment would not be satisfactory, then the Contractor shall replace damaged equipment at the Contractor's expense.
- C. Existing Equipment
 - 1. Provide a suitable cover or plug for openings created in existing equipment as the result of work under this Contract. For example, provide round plugs in equipment enclosures where the removal of a conduit creates a hole and the enclosure. Covers and plugs shall maintain the NEMA rating of the equipment enclosure. Covers and plugs shall be watertight when installed in equipment located outdoors.

3.02 EXCAVATION AND BACKFILLING

- A. The Contractor shall perform all excavation and backfill required for the installation of all electrical work. All excavation and backfilling shall be in complete accordance with the applicable requirements of Division 31.

3.03 CORROSION PROTECTION

- A. Wherever dissimilar metals, except conduit and conduit fittings, come into contact, the Contractor shall isolate these metals as required with neoprene washers, nine (9) mil polyethylene tape, or gaskets.

END OF SECTION

SECTION 26 05 19
LOW VOLTAGE CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, connect, test, and place in satisfactory operating condition, all low voltage wire and cable indicated on the Drawings and as specified herein and/or required for proper operation. The work of connecting cables to equipment and devices shall be considered a part of this Section. All appurtenances required for the installation of wire and cable systems shall be furnished and installed by the Contractor.
- B. The scope of this Section does not include internal wiring factory installed by electrical equipment manufacturers.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 33.16 – Boxes for Electrical Systems.

1.02 CODES AND STANDARDS

- A. Low voltage wire, cable, and appurtenances shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. Underwriters Laboratories (UL)
 - a. UL 13 – Standard for Power-Limited Circuit Cables
 - b. UL 44 – Thermoset-Insulated Wires and Cables
 - c. UL 83 – Thermoplastic-Insulated Wires and Cables
 - d. UL 1277 – Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
 - e. UL 1581 – Reference Standard for Electrical Wires, Cables, and Flexible Cords
 - f. UL 1685 – Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
 - g. UL 2250 – Standard for Instrumentation Tray Cable
 - h. UL 2556 – Wire and Cable Test Methods
 - 2. American Society for Testing and Materials (ASTM)

- a. ASTM B3 – Standard Specification for Soft or Annealed Copper Wire
 - b. ASTM B8 – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - c. ASTM B33 – Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
 - d. ASTM D69 – Standard Test Methods for Friction Tapes
 - e. ASTM D4388 – Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes
3. Insulated Cable Engineers Association (ICEA)
- a. ICEA S-58-679 – Standard for Control, Instrumentation and Thermocouple Extension Conductor Identification
 - b. ICEA T-29-250 – Conducting Vertical Cable Tray Flame Tests with Theoretical Heat Input Rate of 210,000 B.T.U./Hour
4. Institute of Electrical and Electronics Engineers (IEEE)
- a. IEEE 1202 – Standard for Flame Testing of Cables

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the wire and cable manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Reports of Field Tests
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed material's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible Submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets for the following:

- a. Wire and cable
 - b. Power and control wire terminations
 - c. Instrumentation cable terminations
 - d. Pulling lubricant.
2. Cable pulling calculations (if required).
 3. Wiring identification methods and materials.
- D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 CABLE PULLING CALCULATIONS

- A. Prior to the installation of the wire and cable specified herein, the Contractor shall submit cable pulling calculations for Engineer review and approval when all of the following are true:
1. The amount of cable to be installed will be greater than 200 linear feet between pull points.
 2. The installation will have one or more bends.
 3. The wire and cable is size #1/0 AWG and larger.
- B. Cable pulling calculations shall be performed by a currently registered Professional Engineer in the State or Commonwealth in which the project is located and shall define pulling tension and sidewall loading (sidewall bearing pressure values).

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The wire and cable to be furnished and installed for this project shall be the product of manufacturers who have been in the business of manufacturing wire and cable for a minimum of ten (10) years. Wire and cable shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as specified herein and indicated on the Drawings. Only one (1) manufacturer for each wire and cable type shall be permitted.

2.02 POWER AND CONTROL WIRE AND CABLE

- A. Power and control wire shall consist of insulated copper conductors with a nylon (or equivalent) outer jacket. Conductor insulation shall be rated 90°C for dry locations, 75°C for wet locations, and 600V. Insulated conductors shall be UL 83 Listed as NEC Type THHN/THWN.
- B. Unless specified otherwise herein, conductors shall be stranded copper per ASTM B-8 and B-3, with Class B or C stranding contingent upon the size. Power conductors for lighting and receptacle branch circuits shall be solid copper per ASTM B-3.
- C. Power conductor size shall be no smaller than No. 12 AWG and Control conductor size shall be no smaller than No. 14 AWG.
- D. Multi-conductor cable assemblies shall include a grounding conductor and an overall PVC jacket. The jacket shall be PVC and resistant to abrasion, sunlight, and flame in accordance with UL 1277. Multi-conductor cable assemblies shall be UL 1277 Listed as NEC Type TC (Power and Control Tray Cable).
- E. Power wire and cable shall be as manufactured by the Okonite Company, the Southwire Company, General Cable, Encore Wire, or equal.

2.03 INSTRUMENTATION CABLE

- A. For single-analog signal applications, instrumentation cable shall consist of a single, twisted pair or triad of individually insulated and jacketed copper conductors with an overall cable shield and jacket. Conductor insulation shall be rated 90°C in both wet and dry locations, and 600V. The jacket shall be PVC and resistant to abrasion, sunlight, and flame in accordance with UL 1277. Cable shall be UL 1277 Listed as NEC Type TC (Power and Control Tray Cable).
- B. For multiple-analog signal applications, instrumentation cable shall consist of multiple, twisted pairs or triads (i.e. groups) of individually insulated and jacketed copper conductors with individual pair/triad shields (i.e. group shields) and an overall cable shield and jacket. Conductor insulation shall be rated 90°C in both wet and dry locations, and 600V. The jacket shall be PVC and resistant to abrasion, sunlight, and flame in accordance with UL 1277. Cable shall be UL 1277 Listed as NEC Type TC (Power and Control Tray Cable).
- C. Cable and group shields shall consist of overlapped aluminum/polyester tape/foil providing 100% coverage. Instrumentation cables shall include an overall copper shield drain wire. Cables containing multiple twisted pairs or triads shall also include group shield drain wires.
- D. Conductors, including drain wires, shall be tin or alloy coated (if available), soft, annealed copper, stranded per ASTM B-8, with Class B stranding unless otherwise specified.

- E. Instrumentation signal conductor size shall be no smaller than No. 16 AWG.
- F. Instrumentation cable shall be Okoseal-N Type P-OS (for single pair or triad applications) or Okoseal-N Type SP-OS (for multiple pair or triad applications) as manufactured by the Okonite Company, Belden equivalent, Southwire Company equivalent, or equal.

2.04 CONDUCTOR IDENTIFICATION

- A. Conductors shall be identified using a color-coding method. Color coding for individual power, control, lighting, and receptacle conductors shall be as follows:
 - 1. 480/277V AC Power
 - a. Phase A – BROWN
 - b. Phase B – ORANGE
 - c. Phase C – YELLOW
 - d. Neutral – GREY
 - 2. 120/208V or 120/240V AC Power
 - a. Phase A – BLACK
 - b. Phase B – RED
 - c. Phase C – BLUE
 - d. Neutral – WHITE
 - 3. DC Power
 - a. Positive Lead – RED
 - b. Negative Lead - BLACK
 - 4. DC Control
 - a. All wiring – BLUE
 - 5. 120 VAC Control
 - a. 120 VAC control wire shall be RED except for a wire entering a motor control center compartment, motor controller, or control panel which is an interlock. This interlock conductor shall be color coded YELLOW. For the purposes of this Section, an interlock is defined as any wiring that brings voltage into the above-mentioned equipment from a source outside that equipment.

- 6. 24 VAC Control
 - a. All wiring - ORANGE
 - 7. Equipment Grounding Conductor
 - a. All wiring - GREEN
- B. Individual conductors No. 2 AWG and smaller shall have factory color coded insulation. It is acceptable for individual conductors larger than No.2 AWG to be provided with factory color coded insulation as well, but it is not required. Individual conductors larger than No.2 AWG that are not provided with factory color coded insulation shall be identified by the use of colored tape in accordance with the requirements listed in Part 3 herein. Insulation colors and tape colors shall be in accordance with the color-coding requirements listed above.
- C. Conductors that are part of multi-conductor cable assemblies shall have black insulation. The conductor number shall be printed on each conductor's insulation in accordance with ICEA S-58-679, Method 4. Each conductor No.2 AWG and smaller within the cable assembly shall also be identified with a heat shrink tag with color coded background. Each conductor larger than No.2 AWG within the cable assembly shall also be identified by the use of colored tape. Heat shrink tags and colored tape shall be in accordance with the requirements listed in Part 3 herein. Tape color and heat shrink tag background color shall be in accordance with the color-coding requirements listed above.

2.05 CABLE PULLING LUBRICANTS

- A. Cable pulling lubricants shall be non-hardening type and approved for use on the type of cable installed. Lubricant shall be Yellow #77 Plus by Ideal, Cable Gel by Greenlee, Poly-Gel by Gardner Bender, or equal.

PART 3 – EXECUTION

3.01 WIRE AND CABLE INSTALLATION

- A. General
 - 1. Wire and Cable shall be installed as specified herein and indicated on the Drawings. Unless specifically indicated otherwise on the Drawings, wire and cable shall be installed in separate raceways according to wiring type. For example, power wiring shall not be combined with control wiring, and control wiring shall not be combined with instrumentation wiring.
 - 2. Wire shall be furnished and installed as single conductor cables, with limited exceptions. Multi-conductor cable assemblies shall only be installed where indicated on the Drawings, required by the NEC, or after obtaining written permission from the Engineer.

3. Where instrumentation cables are installed in control panels, motor controllers, and other locations, the Contractor shall arrange wiring to provide maximum clearance between these cables and other conductors. Instrumentation cables shall not be installed in same bundle with conductors of other circuits.
4. Instrumentation cable shielding shall be continuous and shall be grounded at one point only.

B. Splices

1. Splices shall not be allowed in power or control wire and cable unless approved in writing by the Engineer. If unique field conditions exist or pulling calculations indicate that splices may be required, the Contractor shall submit a detailed request indicating why splices are required to the Engineer. The Engineer shall be under no obligation to grant such request.
2. Splicing materials shall be barrel type butt splice connectors and heat shrink tubing as manufactured by 3M, Ideal, or equal. The use of screw-on wire connectors (wire nuts) shall only be permitted for lighting and receptacle circuits.
3. No splicing of instrumentation cable is permitted.

C. Wire and Cable Sizes

1. The sizes of wire and cable shall be as indicated on the Drawings, or if not shown, as approved by the Engineer. If required due to field routing, the size of conductors and respective conduit shall be increased so that the voltage drop measured from source to load does not exceed 2-1/2%.

D. Additional Conductor Identification

1. In addition to the color-coding identification requirements specified in Part 2 herein, individual conductors shall be provided with heat shrinkable identification tags. Identification tags for individual conductors shall have a white background where the conductor insulation is colored. Identification tags for individual conductors shall have a colored background where the conductor insulation is black. Background color shall match that of the taping provided on the individual black conductors.
2. Multi-conductor cables shall be provided with heat shrinkable identification tags in accordance with Part 2 herein.
3. All wiring shall be identified at each point of termination. This includes but is not limited to identification at the source, load, and in any intermediate junction boxes where a termination is made. The Contractor shall meet with the Owner and Engineer to come to an agreement regarding a wire identification system prior to installation of any wiring. Wire numbers shall not be duplicated.

4. Wire identification shall be by means of a heat shrinkable sleeve with appropriately colored background and black text. Wire sizes #14 AWG through #10 AWG shall have a minimum text size of 7 points. Wire sizes #8 AWG and larger shall have a minimum text size of 10 points. Sleeves shall be of appropriate length to fit the required text. The use of handwritten text for wire identification shall not be permitted.
5. Sleeves shall be suitable for the size of wire on which they are installed. Sleeves shall not be heat-shrunk onto control cables. Tags shall remain loose on cable to promote easier identification. For all other applications, sleeves shall be tightly affixed to the wire and shall not move. Sleeves shall be heat shrunk onto wiring with a heat gun approved for the application. Sleeves shall not be heated by any means which employs the use of an open flame. The Contractor shall take special care to ensure that the wiring insulation is not damaged during the heating process.
6. Sleeves shall be installed prior to the completion of the wiring terminations and shall be oriented so that they can be easily read.
7. Sleeves shall be polyolefin as manufactured by Brady, Seton, Panduit, or equal.
8. Wire identification in manholes, handholes, pull boxes, and other accessible components in the raceway system where the wiring is continuous (no terminations are made) shall be accomplished by means of a tag installed around the bundled group of individual conductors or around the outer conductor jacket of a multi-conductor cable. Identification shall utilize a FROM-TO system. Each group of conductors shall consist of all of the individual conductors in a single conduit or duct. The tag shall have text that identifies the bundle in accordance with the 'FROM' and 'TO' column for that particular conduit number in the conduit and wire schedule. Minimum text size shall be 10 point. The tag shall be affixed to the wire bundle by the use of nylon wire ties and shall be made of polyethylene as manufactured by Brady, Seton, Panduit, or equal.
9. Where colored tape is used to identify cables, it shall be wrapped around the cable with a 25% overlap and shall cover at least 2 inches of the cable.

E. Wiring Supplies

1. Rubber insulating tape shall be in accordance with ASTM D4388. Friction tape shall be in accordance with ASTM D69.

F. Training of Cable in Manholes, Handholes, and Vaults

1. The Contractor shall furnish all labor and material required to train cables around cable vaults, manholes, and handholes. Sufficient length of cable shall be provided in each handhole, manhole, and vault so that the cable can be trained and racked in an approved manner. In training or racking, the radius of bend of any cable shall

be not less than the manufacturer's recommendation. The training shall be done in such a manner as to minimize chaffing.

2. Instrumentation cable shall be racked and bundled separate from AC wiring to maintain the required separation as follows:
 - a. 18 inches for 480/277 VAC wiring
 - b. 12 inches for 208/120 VAC wiring
 - c. 6 inches for 24 VAC wiring

G. Conductor Terminations

1. Where wires are terminated at equipment which requires lugs, connections shall be made by solderless mechanical lug, crimp type ferrule, or irreversible compression type lugs. Reference individual equipment Specification Sections as applicable for additional termination requirements.
2. Where enclosure sizes and sizes of terminals at limit switches, solenoid valves, float switches, pressure switches, temperature switches, and other devices make terminations impractical due to the size of the field wiring, the Contractor shall terminate field wiring in an adjacent junction box per the requirements of Section 26 05 33.16 – Boxes for Electrical Systems, complete with terminal strips. Contractor shall install the smaller wiring from the device to the junction box in a conduit, using the terminal strip as the means for joining the two different wire sizes. Splicing of wires in lieu of using terminal strips is not acceptable.
3. The cables shall be terminated in accordance with the cable and/or termination product manufacturer's instructions for the particular type of cable.
4. To minimize oxidation and corrosion, wire and cable shall be terminated using an oxide-inhibiting joint compound recommended for "copper-to-copper" connections. The compound shall be Penetrox E as manufactured by Burndy Electrical, or equal.
5. All spare conductors shall be terminated on terminal blocks mounted within equipment or junction boxes. Unless otherwise noted, coiling up of spare conductors within enclosure is not acceptable.

H. Pulling Temperature

1. Cable shall not be installed when the temperature of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature of 40°F or less within a three (3) day period prior to pulling, the cable reels shall be stored three (3) days prior to pulling in a protected storage area with an ambient temperature of 55°F or more. Cable pulling shall be completed during the workday for which the cable is removed from the

protected storage. Any cable reels with wire remaining on them shall be returned to storage at the completion of the workday.

3.02 TESTING

- A. All testing shall be performed in accordance with the requirements of the General Conditions. The following tests are required:
1. Shop Test
 - a. Wires and cables shall be tested in accordance with the applicable ICEA Standards. Wire and cable shall be physically and electrically tested in accordance with the manufacturer's standards.
 2. Field Tests
 - a. After installation, all wires and cables shall be tested for continuity. Testing for continuity shall be "test light" or "buzzer" style.
 - b. After installation, wires and cables shall be tested for insulation resistance levels between conductors of the same circuit and between conductor and ground as follows:
 - 1) For #8 AWG and larger 600V wire and cable, apply 1,000 VDC from a Megohmmeter for one (1) minute. Resistance shall be no less than 100 Megohms.
 - 2) Instrumentation signal cable shall be tested from conductor to conductor, conductor to shield, and conductor to ground using a Simpson No. 260 volt-ohmmeter or approved equal. The resistance value shall be 200 Megohms or greater.
 - 3) Insulation resistance testing is not required for power and control cables smaller than #8 AWG.
 - c. Wires and cables shall be tested after required terminations are made, but before being connected to any equipment.
 - d. If tests reveal defects or deficiencies, the Contractor shall make the necessary repairs or shall replace the cable as directed by the Engineer, without additional cost to the Owner. All conductors of a multi-phase circuit shall be replaced if one conductor fails the required testing. If part of a multi-set (parallel conductors per phase) circuit fails testing, only the set containing failure shall be replaced.
 - e. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment. Test reports shall be submitted to the Engineer.

Exhibit A
Test Data – Megohms
Test No. _____

Part Tested:	Test Performed: _____ Hours/Days: _____ After Shutdown: _____
Grounding Time:	Dry Bulb Temperature: _____ Wet Bulb Temperature: _____
Test Voltage:	Equipment Temperature: _____ How Obtained: _____ Relative Humidity: _____ Absolute Humidity: _____ Dew Point: _____

Megohmmeter: Serial Number: _____ Range: _____
 Voltage: _____ Calibration Date: _____

Test Connections	To Line	To Line	To Line	Test Connections	To Line	To Line	To Line
	To Earth	To Earth	To Earth		To Earth	To Earth	To Earth
	To Ground	To Ground	To Ground		To Ground	To Ground	To Ground
1/4 Minute				5 Minutes			
1/2 Minute				6 Minutes			
3/4 Minute				7 Minutes			
1 Minute				8 Minutes			
2 Minutes				9 Minutes			
3 Minutes				10 Minutes			
4 Minutes				10/1 Minute Ratio			

Remarks:

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install grounding systems complete in accordance with the minimum requirements established by Article 250 of the NEC. Article 250 of the NEC shall be considered a minimum requirement for compliance with this Specification.
- B. Grounding of all instrumentation and control systems shall be furnished and installed in accordance with the manufacturer/system requirements and IEEE 1100. Conflicts shall be promptly brought to the attention of the Engineer.
- C. In addition to the NEC requirements, building structural steel columns shall be permanently and effectively grounded:
- D. Reference Section 26 05 00 – Basic Electrical Requirements

1.02 CODES AND STANDARDS

- A. Equipment and materials covered under this Section shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. UL 467 – Grounding and Bonding Equipment
 - 2. IEEE 81 – Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
 - 3. IEEE 1100 – Recommended Practice for Power and Grounding Electronic Equipment

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Reports of certified field tests.
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets.
 - 2. Drawings and written description of how the Contractor intends to furnish and install the grounding system.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by these specifications shall be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 GROUND RODS AND GRID

- A. Ground rods shall be rolled to a commercially round shape from a welded copper-clad steel manufactured by the molten-welding process or by the electro-formed process (molecularly bonded). They shall have an ultimate tensile strength of 75,000 pounds per square inch (psi) and an elastic limit of 49,000 psi. The rods shall be not less than 3/4 inch in diameter by 10 feet in length; and the proportion of copper shall be uniform throughout the length of the rod. The copper shall have a minimum wall thickness of 0.010 inch at any point on the rod. Ground rods shall be UL 467 listed. The ground rods shall be manufactured by Erico Products, Blackburn, or equal.
- B. Except where specifically indicated otherwise, all exposed non current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductors in nonmetallic raceways and neutral conductors of wiring systems shall be grounded.
- C. The ground connection shall be made at the main service equipment and shall be extended to the ground grid surrounding the structure. The ground grid shall also be connected to the point of entrance of the metallic water service. Connection to the water pipe shall be made by a suitable ground clamp or lug connection to a plugged tee. If flanged pipes are encountered, connection shall be made with the lug bolted to the street side of the flanged connection.

- D. Where ground fault protection is employed, care shall be taken so that the connection of the ground and neutral does not interfere with the correct operation of the ground fault protection system.

2.03 FITTINGS

- A. Grounding connections to equipment shall be bolted. Cable end connections shall be made by hydraulic crimp or exothermically welded. Split bolt type connectors are not acceptable. Fittings shall be UL 467 listed.

2.04 EQUIPMENT GROUNDING CONDUCTORS

- A. An insulated equipment grounding conductor, which shall be separate from the electrical system neutral conductor, shall be furnished and installed for all circuits. Insulation shall be of the same type as the ungrounded conductors in the raceway and shall be green in color. Equipment grounding conductors shall be furnished and installed in all conduits. Use of conduits as the NEC required equipment grounding conductor is not acceptable.

2.05 EQUIPMENT GROUNDS

- A. Equipment grounds shall be solid and continuous from a connection at earth to all distribution panelboards. Ground connections at panelboards, outlets, equipment, and apparatus shall be made in an approved and permanent manner.
- B. For all control panels, disconnect switches, and other electrical enclosures, equipment grounds and bonding jumpers shall be terminated individually on a ground bar or mechanical lugs. No wire nuts will be permitted.

2.06 EXOTHERMIC WELDS

- A. All exothermic welding shall be completed per welding kit manufacturer's instructions. Exothermic welds shall be CadWeld by Erico or ThermoWeld.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Metal surfaces where grounding connections are to be made shall be clean and dry. Steel surfaces shall be ground or filed to remove all scale, rust, grease, and dirt. Copper and galvanized steel shall be cleaned with emery cloth to remove oxide before making connections.
- B. Ground Grid
 - 1. A main ground grid shall be provided for each structure and interconnecting structure grids consisting of driven ground rods as shown on the Drawings. Ground rods shall be driven straight down into the earth, or if objects are encountered, at an angle to avoid the obstruction.

2. The ground rods shall be interconnected by the use of copper cable exothermically welded to the rods. The grounding cables shall be installed after the excavations for the building have been completed and prior to the pouring of concrete for the footings, mats, etc. Copper "pigtailes" shall be connected to the ground grid and shall enter the buildings and structure from the outside and shall be connected to steel structures, and equipment as described in this Section and as required to provide a complete grounding system. The copper pigtailes shall be exothermically welded to the ground grid and connected to building reinforcement steel by hydraulic crimp.
3. Grounding conductors shall be continuous between points of connection; splices shall not be permitted.
4. Where conductors are exposed and subject to damage from personnel, traffic, etc., conductors shall be installed in metal raceway. The raceway shall be bonded to the grounding system.
5. Where subsurface conditions do not permit use of driven ground rods to obtain proper ground resistance, rods shall be installed in a trench or plate electrodes shall be provided, as applicable and necessary to obtain proper values of resistance.
6. Buried exothermic welds and ground ring shall not be backfilled until inspected by Engineer.

C. Raceways

1. Conduit which enters equipment such as switchgear, motor control centers, transformers, panelboards, variable frequency drives, instrument and control panels, and similar equipment shall be bonded to the ground bus or ground lug, where provided, and as otherwise required by the NEC.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 1. Witnessed Shop Tests
 - a. None required.
 2. Field Tests
 - a. Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 01, and NETA Acceptance Testing Specifications, latest edition.

- b. Fall of potential tests shall be performed on the ground grid per IEEE81 recommendations by a third party, independent testing firm. A fall of potential plot shall be submitted at the conclusion of testing for Engineer review. Documentation indicating the location of the rod and grounding system as well as the resistance and soil conditions at the time the measurements were made shall be submitted. Testing shall show that the ground grid has 5 ohms resistance or less. Due to soil conditions and/or unforeseen field conditions, ground resistances greater than 5 ohms may be acceptable if specifically approved in writing by the Engineer. Ground resistance measurements shall be made in normally dry weather not less than 48 hours after rainfall and with the ground grid under test isolated from other grounds.
- c. Continuity tests for the grounding electrode conductor shall be performed. Test will be accepted when a resistance of less than 1 ohm is shown for this conductor.

END OF SECTION

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install structural supports for mounting and installing all conduit, electrical equipment, lighting, alarm systems, instrumentation, and communications equipment furnished under this Contract.
- B. Equipment shall be installed strictly in accordance with recommendations of the manufacturer and best practices of the trade resulting in a complete, operable, and safe installation. The Contractor shall obtain written installation manuals from the equipment manufacturer prior to installation.
- C. Reference Section 26 05 00 – Basic Electrical Requirements.

1.02 CODES AND STANDARDS

- A. Equipment and materials covered under this Section shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. ASTM A123 – Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A153 – Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
 - 3. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 4. ASTM A276 – Standard Specification for Steel Bars and Shapes
 - 5. ASTM B783 – Standard Specification for Materials for Ferrous Powder Metallurgy Structural Parts

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop drawings
 - 2. Structural support calculations (if required)

- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets.
 - 2. Complete assembly, layout, installation, and foundation drawings with clearly marked dimensions.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 MATERIALS

- A. Support channel shall be 1-5/8" by 1-5/8" minimum, with 12 gage material thickness.
- B. Support channel, support channel fittings, and threaded rod shall be furnished with the following material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Material of Construction
Indoor Wet Process Area	Type 304 Stainless Steel
Indoor Dry Process Area	Hot Dipped Galvanized Steel
Indoor Dry Non-process Area	Hot Dipped Galvanized Steel
Indoor Type 1 Chemical Storage/Transfer Area	Fiberglass
Indoor Type 2 Chemical Storage/Transfer Area	Type 304 Stainless Steel
All Outdoor Areas	Type 304 Stainless Steel
All Hazardous Areas	Type 304 Stainless Steel

- C. Fastening hardware (bolts, nuts, washers, and screws) shall be furnished with the following material of construction, dependent upon the designation of the area in which

they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Material of Construction
Indoor Wet Process Area	Type 304 Stainless Steel
Indoor Dry Process Area	Type 304 Stainless Steel
Indoor Dry Non-process Area	Type 304 Stainless Steel
Indoor Type 1 Chemical Storage/Transfer Area	Fiberglass
Indoor Type 2 Chemical Storage/Transfer Area	Type 304 Stainless Steel
All Outdoor Areas	Type 304 Stainless Steel
All Hazardous Areas	Type 304 Stainless Steel

PART 3 – EXECUTION

3.01 INSTALLATION

A. Concrete or Masonry Inserts

1. The Contractor shall be responsible for the furnishing and installation of all anchor bolts, masonry inserts, and similar devices required for installation of equipment furnished under this Contract.
2. If a time delay for the arrival of any special inserts or equipment drawings, etc. occurs, the Contractor may, if permitted by the Engineer, make arrangements for providing approved recesses and openings in the concrete or masonry and, upon subsequent installation, the Contractor shall be responsible for filling in such recesses and openings. Any additional costs that may be incurred by this procedure shall be borne by the Contractor.
3. The Contractor shall furnish leveling channels for all switchgear, switchboards, motor control centers, and similar floor mounted equipment. The leveling channels shall be provided for embedment in the equipment housekeeping pads. Coordination of the installation of these channels with the concrete pad is essential and required. Pad height shall be as required to maintain concrete coverage of the reinforcement bars while not causing associated equipment to exceed the maximum mounting height requirements of the NEC.

B. Support Fastening and Locations

1. All equipment fastenings to columns, steel beams, and trusses shall be by beam clamps or welded. No holes shall be drilled in the steel.
2. Unless otherwise indicated on the Drawings or in the Specifications, guards/handrails shall not be utilized as supports for electrical equipment, devices, or appurtenances. Guards/handrails shall not be cut, drilled, or otherwise modified in order to accommodate electrical supports without written approval from the Engineer.

3. All holes made in reflected ceilings for support rods, conduits, and other equipment shall be made adjacent to ceiling grid bars where possible, to facilitate removal of ceiling panels.
4. Support channel shall be provided wherever required for the support of starters, switches, panels, and miscellaneous equipment.
5. All equipment, devices, and raceways that are installed on the dry side of a water bearing wall shall not be installed directly onto the wall. Support channel shall be used to allow ventilation air to pass behind the equipment, devices, or raceway.
6. All supports shall be rigidly bolted together and braced to make a substantial supporting framework. Where possible, control equipment shall be grouped together and mounted on a single framework.
7. Aluminum support members shall not be installed in direct contact with concrete. Stainless steel or non-metallic "spacers" shall be used to prevent contact of aluminum with concrete.
8. Actual designs for supporting framework should take the nature of a picture frame of support channels and bracket with a plate for mounting the components. The Contractor is responsible for the design of supporting structure; Contractor shall submit design details to the Engineer for acceptance before proceeding with the fabrication.
9. Wherever dissimilar metals come into contact, the Contractor shall isolate these metals as required with neoprene washers, nine (9) mil polyethylene tape, or gaskets.
10. For all installations where fiberglass supporting materials are required, the Contractor shall submit structural calculations and the details of the proposed system of support. Structural calculations shall be signed and sealed by a registered Professional Engineer in the State or Commonwealth in which the project is located.
11. For the following installations where conduits are provided with a support system suspended from the above or attached to a vertical structure, the Contractor shall submit structural calculations and details of the proposed system of support. Structural calculations shall be signed and sealed by a registered Professional Engineer in the State or Commonwealth in which the project is located.
 - a. A quantity of twelve (12) or more conduits trade size 1" and smaller are proposed for a conduit support rack.
 - b. A quantity of eight (8) or more conduits trade sizes 1 1/2" to 2 1/2" are proposed for a conduit support rack.

- c. A quantity of four (4) or more conduits trade sizes 3" and larger are proposed for a conduit support rack.
- 12. Single conduits installed exposed along walls and ceilings shall be secured to the wall or ceiling with a one-hole conduit clamp and clamp-back. Where multiple conduits are installed exposed together, support channel and conduit clamps shall be used.
- C. Equipment, boxes, and enclosures which are factory-constructed with integral mounting provisions (such as brackets., mounting feet, bolt holes, etc.) shall be installed/supported utilizing those mounting provisions. Equipment, boxes and enclosures shall not be field-modified by any means which compromises the UL listing or NEMA rating of the enclosure/assembly.

END OF SECTION

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install conduits and conduit fittings to complete the installation of all electrically operated equipment as specified herein, indicated on the Drawings, and as required.
- B. Requirements for conduit clamps, support systems, and anchoring are not included in this Section. Reference Section 26 05 29 – Hangers and Supports for Electrical Systems, for these requirements.
- C. Reference Section 26 05 00 – Basic Electrical Requirements.

1.02 CODES AND STANDARDS

- A. Conduits and conduit fittings shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. American National Standards Institute (ANSI)
 - a. ANSI B1.20.1 – Pipe Threads, General Purpose
 - b. ANSI C80.1 – Electrical Rigid Steel Conduit
 - c. ANSI C80.3 – Steel Electrical Metallic Tubing
 - d. ANSI C80.5 – Electrical Rigid Aluminum Conduit
 - e. ANSI FB 1 – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
 - 2. Underwriters Laboratories (UL)
 - a. UL 1 – Standard for Flexible Metal Conduit
 - b. UL 6 – Electrical Rigid Metal Conduit-Steel
 - c. UL 6A – Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel
 - d. UL 360 – Standard for Liquid-tight Flexible Metal Conduit
 - e. UL 467 – Grounding and Bonding Equipment

- f. UL 514B – Conduit, Tubing, and Cable Fittings
 - g. UL 651 – Standard for Schedule 40 and 80 Conduit and Fittings
 - h. UL 797 – Electrical Metallic Tubing-Steel
 - i. UL 1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations
 - j. UL 1479 – Standard for Fire Tests of Penetration Fire Stops
 - k. UL 1660 – Liquid-tight Flexible Nonmetallic Conduit
3. National Electrical Manufacturer’s Association (NEMA)
- a. NEMA FB 2.40 – Installation Guidelines for Expansion and Expansion/Deflection Fittings
 - b. NEMA RN 1 – PVC Externally Coated Galvanized Rigid Steel Conduit
 - c. NEMA RV-3 – Application and Installation Guidelines for Flexible and Liquid-tight Flexible Metal and Nonmetallic Conduits
 - d. NEMA TC-2 – Electrical PVC Conduit
 - e. NEMA TC-3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing
4. National Electrical Contractors Association (NECA)
- a. NECA 1 – Standard for Good Workmanship in Electrical Construction
5. Others
- a. ACI-318 – Building Code Requirements for Structural Concrete

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets for conduits and fittings.
 - 2. Conduit identification methods and materials.
 - 3. Evidence of training for all personnel that will install PVC coated rigid metal conduit.

1.05 DEFINITIONS

- A. Conduits are categorized by the circuit type of the wiring to be installed inside. Conduits are defined as follows:
 - 1. Power Conduits – Conduits that carry AC or DC power wiring from a source to a load. Conduits that carry lighting and receptacle wiring.
 - 2. Control Conduits – Conduits that carry AC or DC discrete control wiring between devices and/or equipment. Conduits that carry fiber optic cables between devices and/or equipment.
 - 3. Instrumentation Conduits – Conduits that carry AC or DC analog signal wiring between devices and/or equipment. Conduits that carry Category 5e or Category 6 unshielded cables.
- B. Conduit categories are indicated on the Drawings by the leading letter of the conduit tag. Conduit tag leading letters are defined as follows:
 - 1. P – Power Conduit
 - 2. C – Control Conduit
 - 3. I – Instrumentation Conduit

PART 2 – PRODUCTS

2.01 GENERAL

- A. Conduit and conduit fitting products are specified in the text that follows this article. Reference Part 3 herein for the application, uses and installation requirements of these conduits and conduit fittings.
- B. All metallic conduit fittings shall be UL 514B and UL 467 Listed and constructed in accordance with ANSI FB 1. All metallic conduit fittings for use in Class I Division I hazardous areas shall be UL 1203 Listed. All non-metallic fittings shall be UL 651 Listed and constructed in accordance with NEMA TC-3.
- C. Flexible conduit couplings for use in Class I Division I hazardous areas shall have threaded stainless steel end fittings and a flexible braided core. Flexible braid shall be constructed of stainless steel where available in the conduit trade size required for the application. Where stainless steel braid is not available, the braid shall be provided with a PVC coating. No other braid types or materials are acceptable.
- D. Where threading is specified herein for conduit fitting connections, the fittings shall be manufactured to accept conduit that is threaded to ANSI B1.20.1 requirements.
- E. Conduit expansion fittings for all conduit materials of construction shall be capable of 4 inches of movement along the axis of the conduit for trade sizes 2 inches or less. Expansion fittings shall be capable of 8 inches of movement along the axis of the conduit for trade sizes greater than 2 inches.
- F. Conduit deflection fittings for all conduit materials of construction shall be provided with a flexible neoprene outer jacket that permits up to $\frac{3}{4}$ inch of expansion/contraction along the axis of the conduit as well as up to $\frac{3}{4}$ inch of parallel misalignment between the conduit axes. Outer jacket shall be secured to the conduit hubs by stainless steel clamps.
- G. Conduit seals shall either be Listed and labeled for 40% fill, or conduit reducing fittings and a trade size larger conduit seal shall be provided to achieve 25% or less fill within the seal. Percentage fill calculation shall be based on the conductors to be installed. Conduit seals shall be provided with breathers and/or drains where required by the NEC.
- H. Conduit insulating bushings shall be constructed of plastic and shall have internal threading.
- I. Additional conduit and conduit fitting requirements are specified in the articles that follow based on the specific conduit material of construction to be used.

2.02 RIGID GALVANIZED STEEL (RGS) CONDUIT AND ASSOCIATED FITTINGS

- A. Conduit

1. Conduit shall be hot dip galvanized on the inside and outside and made of heavy wall high strength ductile steel. Conduit shall be manufactured in accordance with ANSI C80.1 and shall be UL 6 Listed.
2. Conduit shall be provided with factory-cut 3/4 inch per foot tapered threads at each end in accordance with ANSI B1.20.1. Threads shall be cut prior to galvanizing to ensure corrosion protection adequately protects the threads. Conduit shall be provided with a matching coupling on one end and a color-coded thread protector on the other.

B. Conduit Bodies for use with Rigid Galvanized Steel

1. Conduit bodies shall be constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish. Conduit bodies shall have integral threaded conduit hubs.
2. Conduit bodies for Class I Division I hazardous areas shall be provided with integrally threaded covers constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish.
3. Conduit bodies for all other areas shall be provided with covers that are affixed in place by stainless steel screws which thread directly into the conduit body. Covers that utilize wedge nuts or any other method of attachment to the conduit body are not acceptable. Covers shall be constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish. Covers shall be provided with matching gasket.

C. Conduit Couplings, Nipples, and Unions for use with Rigid Galvanized Steel

1. Couplings and nipples shall be threaded and shall be constructed of hot dipped galvanized steel. Split-type couplings that use compression to connect conduits are not acceptable.
2. Unions shall be threaded, rain-tight, and constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish.

D. Conduit Expansion and Deflection Fittings for use with Rigid Galvanized Steel

1. Conduit expansion fittings and conduit deflection fittings shall be constructed of bronze or an electro-galvanized malleable iron alloy. Expansion and deflection fittings shall have threaded conduit connections.
2. Expansion fittings shall have an integral bonding jumper and deflection fittings shall have an external bonding jumper.

E. Conduit Seals for use with Rigid Galvanized Steel

1. Conduit seals shall be constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish. Conduit seals shall have threaded conduit connections.

F. Conduit Termination Fittings for use with Rigid Galvanized Steel

1. Conduit hubs shall be constructed of stainless steel and shall have threaded connections to the conduit and enclosure. Hubs shall have a plastic insulated throat and shall be watertight when assembled to an enclosure.
2. Conduit locknuts shall be constructed of zinc plated steel. Locknuts shall have internal threading. Locknuts with integral gasket or seal are not acceptable. Locknuts shall have integral bonding screw where required for proper bonding.
3. Conduit bonding bushings shall be constructed of zinc plated malleable iron. Bonding bushings shall have a threaded conduit connection. Bonding bushing shall be provided with properly sized set screw for connecting bonding conductor and an integral plastic insulator rated for 150 degrees C located in the throat.

2.03 RIGID NONMETALLIC CONDUIT AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be Schedule 40 or 80 (dependent on application) polyvinyl chloride (PVC) construction, manufactured in accordance with NEMA TC-2, UL 651 Listed, and suitable for conductors with 90 degree C insulation.

B. Conduit Bodies for use with Rigid Nonmetallic Conduit

1. Conduit bodies shall be constructed of PVC. Conduit hubs shall be integral to the conduit body and shall be smooth inside to accept a glued conduit connection.
2. Conduit body shall be provided with cover that is affixed in place by stainless steel screws which thread directly into the conduit body. Covers that utilize wedge nuts or any other method of attachment to the conduit body are not acceptable. Covers shall be provided with matching gasket.

C. Conduit Couplings and Unions for use with Rigid Nonmetallic Conduit

1. Conduit couplings and unions shall be constructed of PVC and shall be smooth inside to accept a glued conduit connection.

D. Conduit Expansion and Deflection Fittings for use with Rigid Nonmetallic Conduit

1. Conduit expansion fittings and conduit deflection fittings shall be constructed of PVC and shall be smooth inside to accept a glued conduit connection.

E. Conduit Termination Fittings for use with Rigid Nonmetallic Conduit

1. Conduit hubs shall be constructed of PVC and shall be smooth inside to accept a glued conduit connection. Hubs shall have external threads and an accompanying PVC locknut, and shall be watertight when assembled to an enclosure.
2. Conduit locknuts shall be constructed of zinc plated steel. Locknuts shall have internal threading. Locknuts constructed of PVC and locknuts with integral gasket or seal are not acceptable.
3. Conduit end bells shall be constructed of PVC and shall be smooth inside to accept a glued conduit connection. End bell shall have a smooth inner surface that curves outward towards the edge of the fitting.

2.04 PVC COATED RIGID GALVANIZED STEEL CONDUIT AND ASSOCIATED FITTINGS

A. General

1. Where an external coating of polyvinyl chloride (PVC) is specified for conduit and fittings, the coating shall be 40 mil (minimum) thickness. Where an internal coating of urethane is specified for conduit and fittings, the coating shall be 2 mil (minimum) thickness.
2. All conduit fittings shall have a sealing sleeve constructed of PVC which covers all connections to conduit. Sleeves shall be appropriately sized so that no conduit threads will be exposed after assembly.

B. Conduit

1. Conduit shall be hot dip galvanized on the inside and outside and made of heavy wall high strength ductile steel. Conduit shall be manufactured in accordance with ANSI C80.1 and shall be UL 6 Listed.
2. Conduit shall be provided with factory-cut 3/4 inch per foot tapered threads at each end in accordance with ANSI B1.20.1. Threads shall be cut prior to galvanizing to ensure corrosion protection adequately protects the threads. Conduit shall be provided with a matching coupling on one end and a color-coded thread protector on the other.
3. Conduit shall be coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Conduit shall be manufactured in accordance with NEMA RN 1.

C. Conduit Bodies for use with PVC Coated Rigid Galvanized Steel Conduit

1. Conduit bodies shall be constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Conduit bodies shall have integral threaded conduit hubs.

2. Conduit bodies for Class I Division I hazardous areas shall be provided with integrally threaded covers constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane.
 3. Conduit bodies for all other areas shall be constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Covers shall be affixed in place by stainless steel screws which thread directly into the conduit body and have a plastic encapsulated head. Covers that utilize wedge nuts or any other method of attachment to the conduit body are not acceptable. Covers shall be provided with matching gasket.
- D. Conduit Couplings, Nipples, and Unions for use with PVC Coated Rigid Galvanized Steel Conduit
1. Couplings and nipples shall be threaded and shall be constructed of hot dipped galvanized steel which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Split-type couplings that use compression to connect conduits are not acceptable.
 2. Unions shall be threaded, rain-tight, and constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane.
- E. Conduit Expansion and Deflection Fittings for use with PVC Coated Rigid Galvanized Steel Conduit
1. Conduit expansion fittings and conduit deflection fittings shall be constructed of bronze or an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Expansion and deflection fittings shall have threaded conduit connections.
 2. Expansion fittings shall have an integral bonding jumper and deflection fittings shall have an external bonding jumper.
- F. Conduit Seals for use with PVC Coated Rigid Galvanized Steel Conduit
1. Conduit seals shall be constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Conduit seals shall have threaded conduit connections.
- G. Conduit Termination Fittings for Use with PVC Coated Rigid Galvanized Steel Conduit
1. Conduit hubs shall be constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Hubs shall have threaded connections to the conduit and

enclosure. Hubs shall have a plastic insulated throat and shall be watertight when assembled to an enclosure.

2. Conduit bonding bushings shall be constructed of zinc plated malleable iron which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Bonding bushings shall have a threaded conduit connection. Bonding bushing shall be provided with properly sized set screw for connecting bonding conductor and an integral plastic insulator rated for 150 degrees C located in the throat.

2.05 LIQUID TIGHT FLEXIBLE METAL CONDUIT (LFMC) AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be manufactured using a single strip of hot dip galvanized high strength steel alloy, helically formed into a continuously interlocked flexible metal conduit. Trade size 1-1/4 inch and smaller conduits shall be provided with an integrally woven copper bonding strip.
2. Conduit shall be covered with an outside PVC jacket that is UV resistant, moisture-proof, and oil-proof. Conduit shall be UL 360 Listed. Conduits shall be Listed for and marked with maximum temperature ratings as follows:
 - a. 105 degrees C dry, 60 degrees C wet for all conduit installed against or within 2 inches of equipment capable of having a surface temperature of 80 degrees C or greater (e.g. blowers, incinerators, etc)
 - b. 80 degrees C dry, 60 degrees C wet for all other locations

B. Conduit Termination Fittings for use with LFMC

1. Conduit termination fittings shall be constructed of either 304 stainless steel or an electro-galvanized malleable iron alloy which is coated on the exterior with a 40 mil (minimum) PVC jacket and coated on the interior with a 2 mil (minimum) layer of urethane. PVC coated fittings shall have a sealing sleeve constructed of PVC which covers the connection to conduit.
2. Termination fittings shall have a threaded end with matching locknut and sealing ring for termination to equipment and shall have an integral external bonding lug where required for proper bonding. Termination fittings shall have a plastic insulated throat and shall be watertight when assembled to the conduit and equipment.

2.06 FLEXIBLE METAL CONDUIT (FMC) AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be manufactured using a single strip of hot dip galvanized high strength steel alloy, helically formed into a continuously interlocked flexible metal conduit. Conduit shall be UL 1 Listed.

B. Conduit Termination Fittings for use with FMC

1. Conduit termination fittings shall be constructed of an electro-galvanized malleable iron alloy. Fittings shall have a threaded end with matching locknut for termination to equipment, and a compression-style connection to the associated conduit.

2.07 CONDUIT BENDS

- A. Rigid conduit bends, both factory-fabricated and field-fabricated, shall meet the same requirements listed in the articles above for the respective conduit type and material of construction.

- B. Conduit bend radii for standard radius bends shall be no less than as follows:

Trade Size (inches)	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	5	6
Min. Radius (inches)	4-1/2	5-3/4	7-1/4	8-1/4	9-1/2	10-1/2	13	15	16	24	30

- C. Conduit bend radii for long radius bends shall be no less than as follows:

Trade Size (inches)	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	5	6
Min. Radius (inches)	N/A	12	18	24	30	30	36	36	48	48	60

2.08 MISCELLANEOUS

A. Conduit Periphery Sealing

1. The sealing of the exterior surface of conduits to prevent water and/or air from passing around the conduit periphery from one space to another (where required) shall be through the use of one of the following:
 - a. A conduit sleeve and pressure bushing sealing system. Acceptable products are FSK by OZ-GEDNEY, Link-Seal by Crouse-Hinds, or Engineer approved equal.
 - b. A conduit sleeve that is two trade sizes larger than the conduit being sealed, with 2-hour fire rated UL 1479 Listed caulk filling the entire void between the conduit and sleeve. This method is only suitable for penetrations in non-fire

rated walls and floors between spaces within buildings. This method shall not be used for the sealing of conduits leaving a building and/or structure.

2. Conduit penetrations through fire-rated walls and floors shall be made with an approved UL 1479 Listed product specifically intended for the trade size of the conduit.

B. Primer and Cement

1. Nonmetallic conduit shall be cleaned with primer and connected to fittings with the manufacturer's recommended cement that is labeled Low VOC.

C. Galvanizing Compounds

1. Galvanizing compounds for field application shall be the cold-applied type, containing no less than 93% pure zinc.

D. Conduit Interior Sealing

1. The sealing of the inside of conduits against water ingress shall be achieved through the use of one of the following:
 - a. Two-part expanding polyurethane foam sealing compound, dispensed from a single tube which mixes the two parts as it is injected into the conduit. Expanding foam shall be compatible with the conduit material of construction as well as the outer jacket of the cables in the conduit. Acceptable products are Q-Pak 2000 by Chemque, FST by American Polywater Corporation, or Hydra-seal S-60 by Duraline.
 - b. Inflatable bag that provides seal around cables and around inside diameter of conduit. Provide appropriate quantity of additional fittings for applications with three or more cables in the conduit to be sealed. Acceptable products are Rayflate by Raychem, or Engineer approved equal. This sealing method is only applicable to conduits trade size 2 inch and larger.
 - c. Neoprene sealing ring provided with the required quantity and diameter of holes to accommodate the cables in each conduit. Sealing ring shall be compressed by two stainless steel pressure plates. Acceptable products are type CSB by OZ-GEDNEY, or Engineer approved equal. This sealing method is only applicable to metallic conduits containing 4 or less cables.
2. The use of aerosol-based expanding foam sealants or any other method of sealing against water ingress not listed above is not acceptable.

E. Pull Rope

1. Pull ropes for empty and/or spare conduits shall be woven polyester, ½-inch wide, with a minimum tensile strength of 1250 lbs.

2. Pull ropes for the Contractors use in installing conductors shall be the size and strength required for the pull and shall be made of a non-metallic material.

PART 3 – EXECUTION

3.01 GENERAL

- A. All conduit and associated fittings and appurtenances shall be installed in accordance with NECA 1.
- B. Minimum trade size for all rigid conduits shall be 3/4 inch in exposed applications and 1 inch in embedded applications. Conduits installed within ductbanks shall be allowed to be increased in size to trade size 2 inch, at the Contractor's option, to accommodate the saddle size of the ductbank spacers. However, no combining of circuits shall be allowed in the larger conduits.
- C. Minimum trade size for flexible conduits (where specifically allowed herein) shall be 1/2 inch in all applications.
- D. Conduit routing and/or homeruns within structures is not shown on the Drawings. Conduits shall be installed concealed wherever practical and within the limitations specified herein. All other conduits not capable of being installed concealed shall be installed exposed.
- E. Empty and/or spare conduits shall be provided with pull ropes which have no less than 12 inches of slack at each end.
- F. Nonmetallic conduits for installations requiring less than a factory length of conduit shall be field cut to the required length. The cut shall be made square, cleaned of debris, and primer shall be applied to ready each joint for fusing. Conduits shall then be fused together with the conduit manufacturer's approved cement compound.
- G. Metallic conduits for installations requiring less than a factory length of conduit shall be field cut to the required length. The cut shall be made square, be cleaned of all debris and be de-burred, then threaded. Conduit threading performed in the field shall be 3/4 inch per foot tapered threads in accordance with ANSI B1.20.1.
- H. Conduits shall be protected from moisture, corrosion, and physical damage during construction. Install dust-tight and water-tight conduit fittings on the ends of all conduits immediately after installation and do not remove until conductors are installed.
- I. Conduits shall be installed to provide no less than 12 inches clearance from pipes that have the potential to impart heat upon the conduit. Such pipes include, but are not limited to, hot water pipes, steam pipes, exhaust pipes, and blower air pipes. Clearance shall be maintained whether conduit is installed in parallel or in crossing of pipes.

- J. Where non-metallic instrumentation conduits are installed exposed, the following clearances to other conduit types shall be maintained:
1. Instrumentation conduits installed parallel to conduits with conductors energized at 480V or above shall be 18 inches.
 2. Instrumentation conduits installed parallel to conduits with conductors energized at 240V and below shall be 12 inches.
 3. Instrumentation conduits installed at right angles to conductors energized at 480V and below shall be 6 inches.
 4. Instrumentation conduits installed at right angles to conductors energized at voltages above 480V shall be 12 inches.
- K. Where conduit fittings do not include an integral insulated bushing, an insulated bushing shall be installed at all conduit termination points.
- L. Conduits which serve multi-section equipment shall be terminated in the section where wiring terminations will be made.
- M. Conduits shall not penetrate the floors or walls inside liquid containment areas without specific written authorization from the Engineer. Liquid containment areas are indicated on the Drawings.
- N. Conduits that terminate at roof mounted equipment shall be installed through the roof curb for the associated equipment to avoid additional roof penetrations wherever possible. Conduits that are installed horizontally on roof surfaces shall be supported by roof blocks that do not impact the roof manufacturer's warranty and shall be installed at least 7/8 inch above the roof surface to avoid the need to further de-rate the conductors inside.
- O. All field fabricated threads for rigid galvanized steel conduit shall be thoroughly coated with two coats of galvanizing compound, allowing at least two minutes to elapse between coats for proper drying.
- P. The appropriate specialized tools shall be used for the installation of PVC coated conduit and conduit fittings. No damage to the PVC coating shall occur during installation. Conduit and conduit fittings with damaged PVC coating shall be replaced at the Contractor's cost. The use of PVC coating touch-up compounds is not permitted.
- Q. Conduits which emerge from within or below concrete encasement shall be PVC coated rigid galvanized steel in accordance with Standard Detail E-26-0102 where the conduit is not protected by an equipment enclosure that surrounds the conduit on all sides at the point where it emerges from the encasement.

3.02 CONCEALED AND EMBEDDED CONDUITS

- A. Conduits are permitted to be installed concealed and/or embedded with the following requirements:
1. Conduits shall not be installed horizontally when concealed within CMU walls, only vertical installation is acceptable.
 2. Conduits installed embedded within concrete floors or walls shall be located so as not to affect the designed structural strength of the floor or wall. Embedded conduits shall be installed in accordance with Standard Detail S-03-0403 and ACI-318.
 3. Where conduit bends emerge from concrete embedment, none of the curved portion of the bend shall be visible. Only the straight portion of the bend shall be visible. The straight portion shall emerge perpendicular to the embedment (i.e. neatly oriented 90-degrees to floor/slab/grade). Conduits that emerge in a non-perpendicular orientation are not acceptable.
 4. Where multiple conduits emerge from concrete embedment or from concealment below a concrete floor, ample clear space shall be provided between conduits to allow for the appropriate and required conduit termination fittings to be installed.
 5. Conduits installed embedded within concrete encasement of any kind shall be installed such that conduit couplings for parallel conduits are staggered so that they are not side by side.
- B. Conduits are NOT permitted to be installed concealed and/or embedded for the following situations:
1. Conduits shall not be installed embedded within any water-bearing floors or walls. Conduits shall not be installed embedded within any liquid containment area floors or walls.
 2. Conduits shall not be installed concealed within CMU walls or gypsum walls that are adjacent to Class I and II hazardous areas (Division I and Division II).
 3. Conduits shall not be installed concealed within CMU walls or gypsum walls that are adjacent to indoor Type 1 or Type 2 chemical storage/transfer areas.

3.03 CONDUIT USES AND APPLICATIONS

- A. Rigid Conduit
1. Rigid conduit for non-hazardous areas shall be furnished and installed in the materials of construction as follows:

Rigid Conduit for Non-Hazardous Areas

Installation Area Designation / Scenario	Conduit Category by Wiring / Circuit Type	
	Power and Control	Instrumentation
Exposed in indoor wet process areas	PVC coated rigid galvanized steel conduit	Same as Power and Control
Exposed in indoor dry process areas	Rigid galvanized steel conduit	Same as Power and Control
Exposed in indoor dry non-process areas	Rigid galvanized steel conduit	Same as Power and Control
Exposed in outdoor areas	PVC coated rigid galvanized steel conduit	Same as Power and Control
Concealed within underground direct-bury or concrete-encased ductbanks	Schedule 40 rigid non-metallic PVC conduit	Rigid galvanized steel conduit
Concealed within non-elevated (i.e. "slab-on-grade" construction) concrete slabs	Schedule 40 rigid non-metallic PVC conduit	Rigid galvanized steel conduit
Concealed within elevated concrete slabs	Rigid galvanized steel conduit	Same as Power and Control
Emerging from concealment within or below a concrete floor and transitioning to exposed conduit (Reference Detail E-26-0102)	PVC coated rigid galvanized steel conduit	Same as Power and Control

- Rigid conduit for hazardous areas shall be furnished and installed in the materials of construction as follows:

Rigid Conduit for Hazardous Areas

Installation Area Hazard / Scenario	Conduit Category by Wiring / Circuit Type	
	Power and Control	Instrumentation
Exposed in Class I and II areas (Division I and Division II)	PVC coated rigid galvanized steel conduit	Same as Power and Control
Concealed within concrete slabs in Class I and II areas (Division I and Division II)	Rigid galvanized steel conduit	Same as Power and Control

Rigid Conduit for Hazardous Areas

Installation Area Hazard / Scenario	Conduit Category by Wiring / Circuit Type	
	Power and Control	Instrumentation
Concealed below concrete slabs (within earth or fill material) in Class I and II areas (Division I and Division II)	Rigid galvanized steel conduit	Same as Power and Control
Concealed within concrete walls in Class I and II areas (Division I and Division II)	Rigid galvanized steel conduit	Same as Power and Control
Concealed below concrete slabs encased in at least two inches of concrete and buried 24 inches below top of slab in Class I Division I areas	Schedule 40 rigid non-metallic PVC conduit	Rigid galvanized steel conduit

3. The tables for the materials of construction for rigid conduits are intended to exhaustively cover all possible scenarios and installation areas under this Contract. However, if a scenario or installation area is found that is not explicitly governed by these tables, it shall be assumed for bid purposes that the conduit material of construction is to be rigid galvanized steel. This discrepancy shall be brought to the attention of the Engineer (in writing) immediately for resolution.

B. Conduit Bends

1. All conduit bends shall be the same material of construction as the rigid conduit listed in the tables above, with the following exceptions:
 - a. All 90-degree bends or combinations of adjacent bends that form a 90-degree bend where concealed within concrete or below a concrete slab shall be rigid galvanized steel.
2. Field fabricated bends of metallic conduit shall be made with a bending machine and shall have no kinks. Field fabricated standard radius and long radius bends shall have minimum bending radii in accordance with the associated tables in Part 2 herein.
3. Field bending of non-metallic conduits is not acceptable, factory fabricated bends shall be used.
4. Long radius bends shall be furnished and installed for the following specific applications, all other bends shall be standard radius:
 - a. All conduits containing medium voltage cable.
 - b. All conduits containing fiber optic cable.

- c. All conduits containing shielded VFD cable.
- d. Where specifically indicated on the Drawings.

C. Flexible Conduit

1. Flexible conduit shall only be installed for the limited applications specified herein. Flexible conduit shall not be installed in any other application without written authorization from the Engineer. Acceptable applications are as follows:
 - a. Connections to motors and engine-generator sets (and similar vibrating equipment)
 - b. Connections to solenoid valves and limit switches
 - c. Connections to lighting fixtures installed in suspended ceilings
 - d. Connections to lighting transformers and combination power units
 - e. Connections to pre-fabricated equipment skids
 - f. Connections to HVAC equipment
 - g. Connections to instrument transmitters and elements
 - h. Where specifically indicated in the Standard Details
2. Flexible conduit length shall be limited to three (3) feet, maximum. Flexible conduit shall not be installed buried or embedded within any material.
3. Unless otherwise specified herein, flexible conduits shall be installed in accordance with the Installation Guidelines published within NEMA RV-3.
4. Flexible conduit for non-hazardous areas shall be furnished and installed in the materials of construction as follows:

Flexible Conduit for Non-Hazardous Areas

Installation Area Designation / Scenario	Conduit Category by Wiring / Circuit Type	
	Power and Control	Instrumentation
Exposed in indoor wet process areas	Liquid-tight flexible metal conduit	Same as Power and Control
Exposed in indoor dry process areas	Liquid-tight flexible metal conduit	Same as Power and Control

Flexible Conduit for Non-Hazardous Areas

Installation Area Designation / Scenario	Conduit Category by Wiring / Circuit Type	
	Power and Control	Instrumentation
Exposed in indoor dry non-process areas	Flexible metal conduit	Same as Power and Control
Exposed in indoor Type 1 chemical storage/transfer areas	Liquid-tight flexible non-metallic conduit	Same as Power and Control
Exposed in indoor Type 2 chemical storage/transfer areas	Liquid-tight flexible metal conduit	Same as Power and Control
Exposed in outdoor areas	Liquid-tight flexible metal conduit	Same as Power and Control
Concealed above suspended ceilings (all indoor areas)	Same material as exposed conduit in same area	Same as Power and Control

5. For Class I Division I hazardous areas, the NEC does not permit the installation of flexible conduit. In lieu of flexible conduit in these areas, flexible conduit couplings shall be installed as specified in Part 2 herein. Flexible conduit for all other hazardous areas shall be furnished and installed in the materials of construction as follows:

Flexible Conduit for Hazardous Areas

Installation Area Hazard / Scenario	Conduit Category by Wiring / Circuit Type	
	Power and Control	Instrumentation
Exposed in Class I Division II areas	Liquid-tight flexible metal conduit	Same as Power and Control
Exposed in Class II (Division I and Division II) areas	Liquid-tight flexible metal conduit	Same as Power and Control
Concealed above suspended ceilings in Class I and II (Division I and Division II) areas	Same material as exposed conduit in same area	Same as Power and Control

3.04 CONDUIT FITTING USES AND APPLICATIONS

A. General

1. Conduit fittings shall be furnished and installed in the materials of construction as indicated in Part 2, herein. Conduit fitting materials of construction are dependent on the material of construction used for the associated conduit.
2. Conduit fittings shall be provided in the trade size and configuration required to suit the application.

B. Conduit Bodies

1. Conduit bodies shall be installed where wire pulling points are desired or required, or where changes in conduit direction or breaking around beams is required.
2. Where conduit bodies larger than trade size 2 inches are intended to be used as a pull-through fitting during wire installation, oversized or elongated conduit bodies shall be used. Oversized or elongated conduit bodies shall not be required if the conduit body is intended to be used as a pull-out point during wire installation.

C. Conduit Nipples and Unions

1. Conduits with running threads shall not be used in place of 3-piece couplings (unions) or close nipples. After installation of a conduit fitting of any kind, there shall be no more than $\frac{1}{4}$ inch of exposed threads visible. Factory fabricated all-thread nipples may be used between adjacent enclosures, however, the same restriction applies regarding the length of exposed threads that are visible.

D. Conduit Expansion and Deflection Fittings

1. Conduit expansion fittings shall be installed where required by the NEC and where indicated on the Drawings. Expansion fittings shall also be installed for exposed straight metallic conduit runs of more than 75 feet, in both indoor and outdoor locations. Expansion fittings for runs of non-metallic conduit shall be installed in accordance with the NEC.
2. Conduit deflection fittings shall be installed where required by the NEC and where conduits are installed (exposed and concealed) across structural expansion joints.
3. Unless otherwise specified herein, conduit expansion and deflection fittings shall be installed in accordance with the Installation Guidelines published within NEMA FB 2.40.

E. Conduit Seals

1. Conduit seals shall be installed for conduits installed within or associated with hazardous areas and other areas as required by the NEC.

F. Conduit Termination Fittings

1. Where conduits terminate at enclosures with a NEMA 4, 4X, or 3R rating and the enclosure does not have integral conduit hubs, an appropriately sized watertight conduit hub shall be installed to maintain the integrity of the enclosure. The use of locknuts with integral gasket in lieu of watertight conduit hubs is not acceptable.
2. Where conduits terminate at enclosures that do not require conduit hubs, a two-locknut system shall be used to secure the conduit to the enclosure. One locknut shall be installed on the outside of the enclosure, and the other inside, drawn tight against the enclosure wall. The locknut on the interior of the enclosure shall be the type with integral bonding lug, or a conduit bonding bushing may be used in place of the interior locknut.
3. Conduits shall not be installed such that conduit fittings penetrate the top of any enclosure located outdoors, except in cases where specifically required by the serving electric utility. Conduits which serve outdoor equipment or an enclosure from above shall instead be routed into the side of the enclosure at the bottom. The conduit termination fitting shall be provided with a conduit drain to divert moisture from the raceway away from the enclosure.

3.05 MISCELLANEOUS

A. Conduit Periphery Sealing

1. All conduit penetrations through exterior walls shall be sealed around the periphery using the appropriate products specified in Part 2 herein to prevent air and/or water entry into the structure.
2. All conduit penetrations through interior walls and floors shall be sealed through the use of with conduit sleeves and caulk as specified in Part 2 herein. Alternatively, mortar may be used to seal around the conduit periphery.
3. Conduit penetrations through fire-rated walls as floors shall be made with the appropriate fire rated penetration product.

B. Conduit Interior Sealing

1. All conduits (including spares) entering a structure below grade shall be sealed on the interior of the conduit against water ingress. Sealing shall be at an accessible location in the conduit system located within the building structure and shall be via one of the methods specified in Part 2 herein. If conduit sealing cannot be achieved at an accessible location within the building structure, sealing shall be placed in the conduits in the nearest manhole or handhole outside the structure.
2. Conduit interior sealing shall not be installed until conductors inside are tested and test results are deemed acceptable by the Engineer. Conduit interior sealing shall be installed prior to energization of the conductors inside.

3.06 CONDUIT IDENTIFICATION

- A. The identification system for the conduits furnished and installed under this Contract shall match the existing identification system used at the project location.

3.07 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. All conduit installed below grade or concrete encased shall be tested to ensure continuity and the absence of obstructions by pulling through each conduit a swab followed by a mandrel 85% of the conduit inside diameter. After testing, all conduits shall be capped after installation of a suitable pulling rope.

3.08 TRAINING OF INSTALLATION PERSONNEL

- A. All Contractor personnel that install PVC coated RGS conduit shall be trained by the PVC coated RGS conduit manufacturer. Training shall include proper conduit system assembly techniques, use of tools appropriate for coated conduit systems, and field bending/cutting/threading of coated conduit. Training shall have been completed within the past 24 months prior to the Notice to Proceed on this Contract to be considered valid. Contractor personnel not trained within this timeframe shall not be allowed to install coated conduit or shall be trained/re-trained as required prior to commencement of conduit installation.

END OF SECTION

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The scope of work under this Section includes furnishing and installing all pull boxes, junction boxes, and outlet boxes.
- B. Requirements for other boxes and enclosures are not included in this Section. Reference each specific equipment Section for requirements related to that equipment's respective enclosure.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 33.13 – Conduit for Electrical Systems.

1.02 CODES AND STANDARDS

- A. Boxes shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. UL 514A – Metallic Outlet Boxes
 - 2. UL 514C – Standard for Non-metallic Outlet Boxes, Flush Device Boxes, and Covers
 - 3. UL 50 – Enclosures for Electrical Equipment, Non-environmental Considerations
 - 4. UL 50E – Enclosures for Electrical Equipment, Environmental Considerations
 - 5. UL 1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations.
 - 6. NEMA 250 – Enclosures for Electrical Equipment

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer(s) and submit the following:
 - 1. Shop Drawings
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible Submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets for boxes, terminal strips, and all accessories

1.05 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01.
- B. As-built drawings showing dimensions, internal box layout, terminal strip information, and terminal strip identification information shall be provided for all junction boxes. As-built drawings are not required for pull boxes or outlet boxes.

1.06 IDENTIFICATION

- A. Each pull and junction box shall be identified with the box name as indicated on the Contract Drawings (e.g. PPB-1 or as directed by the Engineer. A nameplate shall be securely affixed in a conspicuous place on each box. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 PULL AND JUNCTION BOXES

- A. General
 - 1. All pull and junction boxes shall be UL listed and labeled.
 - 2. Pull and junction boxes shall not be provided with eccentric or concentric knockouts.

3. Pull and junction boxes mounted embedded in concrete shall be UL listed for embedment.
4. Where metallic boxes are used, they shall be of all welded construction. Tack welded boxes are not acceptable.

B. Pull Boxes

1. Metallic pull boxes in non-hazardous locations and in hazardous locations where general-purpose enclosures are permitted (e.g. Class I, Division 2 locations) shall be provided with a matching gasketed cover. For covers with dimensions of less than 12 inches by 12 inches, the cover shall be held in place by stainless steel machine screws. Other screw types are not acceptable. For covers with dimensions 12 inches by 12 inches and larger, the cover shall be hinged and held in place by 1/4-turn style latches. Latch mechanism shall be all stainless steel. Hinge pins shall be removable.
2. Metallic pull boxes in hazardous locations where general-purpose enclosures are not permitted (e.g. Class I, Division 1 locations) shall be provided with a matching gasketed cover. Cover shall be hinged and held in place by stainless steel bolts. Hinge pins shall be removable. Covers shall be installed and bolts torqued in accordance with manufacturer requirements to maintain the hazardous location rating of the enclosure.
3. Non-metallic pull boxes shall be provided with a matching gasketed cover. The cover shall be hinged and held in place by quick-release (e.g. "flip") latches. Latch material of construction shall match the box material, and include stainless steel hasps. For covers with dimensions 24 inches by 24 inches and larger, a 3-point latching mechanism with external pad-lockable handle may be substituted. Latch mechanism and handle shall be all stainless steel. Hinge pins shall be removable.
4. Pull boxes shall not have any wire terminations inside, other than those for grounding/bonding. A ground bar shall be provided with the necessary number of screw type terminals. Twenty (20) percent of the total amount of terminals otherwise required for the pull box (minimum of two) shall be provided as spare terminations. Boxes requiring any other wire terminations shall be furnished and installed in accordance with the requirements for junction boxes herein.
5. Pull boxes shall be 6 inches wide by 6 inches tall by 4 inches deep, minimum. For applications requiring larger boxes, the box shall be sized in accordance with the fill requirements and dimensional requirements of the NEC.
6. Barriers shall be provided in pull boxes to isolate conductors of different voltages, types, and functions. Barrier material of construction shall match that of the box. Isolation shall be provided between the following groups:
 - a. Power wiring

- b. AC control wiring
- c. DC control wiring
- d. Instrumentation wiring

C. Junction Boxes

1. Metallic junction boxes in non-hazardous locations shall be provided with a matching gasketed cover. For covers with dimensions of less than 12 inches by 12 inches, the cover shall be held in place by stainless steel machine screws. Other screw types are not acceptable. For covers with dimensions 12 inches by 12 inches and larger, the cover shall be hinged and held in place by 1/4-turn style latches. Latch mechanism shall be all stainless steel. Hinge pins shall be removable.
2. Metallic junction boxes in hazardous locations shall be provided with a matching gasketed cover. Cover shall be hinged and held in place by stainless steel bolts. Hinge pins shall be removable. Covers shall be installed and bolts torqued in accordance with manufacturer requirements to maintain the hazardous location rating of the enclosure.
3. Non-metallic junction boxes shall be provided with a matching gasketed cover. The cover shall be hinged and held in place by quick-release (e.g. "flip") latches. Latch material of construction shall match the box material and include stainless steel hasps. For covers with dimensions 24 inches by 24 inches and larger, a 3-point latching mechanism with external pad-lockable handle may be substituted. Latch mechanism and handle shall be all stainless steel. Hinge pins shall be removable.
4. Barriers shall be provided in junction boxes to isolate conductors and terminal blocks of different voltages, types, and functions. Barrier material of construction shall match that of the box. Isolation shall be provided between the following groups:
 - a. Power wiring
 - b. AC control wiring
 - c. DC control wiring
 - d. Instrumentation wiring
5. Junction boxes used for lighting and receptacle circuits only shall be allowed to have screw-on (wire nut) type connectors for wire terminations/junctions.
6. Junction boxes for all uses other than lighting and receptacle circuits shall be provided with terminal strips, consisting the necessary number of screw type terminals. Current carrying parts of the terminal blocks shall be of ample capacity

to carry the full load current of the circuits connected, with a 10A minimum capacity. Terminal strips shall be rated for the voltage of the circuits connected. A separate ground bar shall be provided with the necessary number of screw type terminals. Twenty (20) percent of the total amount of terminals otherwise required for the junction box (minimum of two) shall be provided as spare terminations. When barriers are provided within the box, separate terminal strips shall be provided in each barrier area. Terminals shall be lettered and/or numbered to conform to the wiring labeling scheme in place on the project.

7. Junction boxes shall be 6 inches wide by 6 inches tall by 4 inches deep, minimum. For applications requiring larger boxes, the box shall be sized in accordance with the fill requirements and dimensional requirements of the NEC. Terminal blocks (including spare terminals) shall be considered when sizing the junction box.

D. Enclosure Types and Materials

1. In non-hazardous locations, pull and junction boxes shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 4X, Type 304 Stainless Steel
Indoor Dry Process Area	NEMA 12, Painted Steel
Indoor Dry Non-Process Area	NEMA 1, Painted Steel
Indoor Type 1 Chemical Storage/Transfer Area	NEMA 4X, Fiberglass or PVC
Indoor Type 2 Chemical Storage/Transfer Area	NEMA 4X, Type 304 Stainless Steel
All Outdoor Areas	NEMA 4X, Type 304 Stainless Steel

2. In hazardous locations, pull and junction boxes shall be furnished with the following enclosure type and material of construction, dependent upon the classification of the area in which they are to be installed. Area classifications are indicated on the Drawings.

Area Classification	Enclosure Type and Material
Class I, Division 1, Group D	NEMA 7, Die Cast Aluminum
Class I, Division 2, Group D	NEMA 4X, Type 304 Stainless Steel
Class II, Division 1, Group F	NEMA 9, Die Cast Aluminum
Class II, Division 2, Group F	NEMA 4X, Type 304 Stainless Steel

3. Non-metallic enclosures, NEMA 7 enclosures, and NEMA 9 enclosures shall be provided with threaded integral conduit hubs.
4. Where located outdoors or in indoor wet process areas, NEMA 7 and NEMA 9 enclosures shall also carry a NEMA 4X rating.

2.03 OUTLET BOXES

A. General

1. Outlet boxes shall be provided with a trim appropriate for the wiring device installed inside. Reference Section 26 27 26 – Wiring Devices for outlet box trim requirements. An appropriate outlet box trim is required to achieve the NEMA rating of the outlet boxes as specified herein.

B. Surface Mount Outlet Boxes

1. Outlet boxes shall be the deep type, no less than 2.5 inches deep.
2. Outlet boxes shall be provided in single or multi-gang configuration as required, sized in accordance with the requirements of the NEC.
3. In non-hazardous locations, outlet boxes shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 4X, Cast Aluminum
Indoor Dry Process Area	NEMA 1, Cast Aluminum
Indoor Dry Non-process Area	NEMA 1, Cast Aluminum
All Outdoor Areas	NEMA 4X, Cast Aluminum

4. In hazardous locations, outlet boxes shall be furnished with the following enclosure type and material of construction, dependent upon the classification of the area in which they are to be installed. Area classifications are indicated on the Drawings.

Area Classification	Enclosure Type and Material
Class I, Division 1, Group D	NEMA 7, Die Cast Aluminum
Class I, Division 2, Group D	NEMA 4X, PVC Coated Steel

5. Outlet boxes shall be provided with integral threaded conduit hubs mounted external to the box. Boxes with threaded conduit hubs mounted internal to the box or as a part of the box wall are not acceptable.

C. Flush Mount Outlet Boxes

1. Outlet boxes shall be no less than 2-1/8 inches deep, and 4-11/16 inches square. Boxes shall be UL listed and labeled. Pre-punched single diameter conduit knockouts are acceptable; however, concentric and eccentric knockouts are not acceptable.
2. Outlet boxes mounted flush in CMU walls shall be made of galvanized, tack welded steel, and suitable for installation in masonry walls. Sectional type boxes are not acceptable for this application.
3. Outlet boxes mounted flush in gypsum walls shall be made of galvanized pressed steel. Tack welded boxes are not acceptable for this application. Sectional type boxes are not acceptable for this application.
4. Outlet boxes mounted cast into concrete shall be concrete tight and made of galvanized steel or PVC.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Pull and Junction Boxes

1. Pull boxes and junction boxes shall be solidly attached to structural members prior to installation of conduit and set true and plumb. Boxes shall not be supported by their associated conduits.
2. Wooden plugs are not permitted for securing boxes to concrete. Appropriately rated anchors specifically suited for use in concrete shall be used.
3. Box penetrations for conduits shall be made with a punch tool, and penetrations shall be of the size required for the conduit entry and/or hub. Oversized penetrations in boxes are not acceptable.
4. Watertight conduit hubs shall be provided for boxes where a NEMA 4X enclosure rating is specified. Reference Section 26 05 33.13 – Conduit for Electrical Systems for conduit hub requirements.
5. Pull and junction boxes may be installed flush mounted in gypsum, concrete or CMU walls where appropriate provided that covers are easily removed or opened.
6. Pull and junction boxes shall be provided in the enclosure type and material of construction required for the area in which it is installed. Reference the

requirements in Part 2 herein, and the area designations indicated on the Drawings.

B. Outlet Boxes

1. Outlet boxes shall be solidly attached to structural members prior to installation of conduit and set true and plumb. Boxes shall not be supported by their associated conduits.
2. Wooden plugs are not permitted for securing boxes to concrete. Appropriately rated anchors specifically suited for use in concrete shall be used.
3. Flush mounted outlet boxes shall be arranged and located so that tile and grout lines fit closely around the boxes, and so placed that the cover or device plate shall fit flush to the finished wall surface.
4. Outlet boxes shall be flush mounted in finished areas and other areas where practical. Flush mounted outlet boxes shall not be installed in hazardous areas and type 1 or 2 chemical storage/transfer areas.
5. For the below-named items, mounting heights from finished floor, or finished grade to top is applicable, depending on the type of wiring device to be installed in the outlet box. Mounting heights for outlet boxes shall be as follows, unless otherwise specified herein, indicated on the Drawings, or required by the Americans with Disability Act (ADA):
 - a. Light switches and wall mounted occupancy sensors, 48 inches
 - b. Receptacles in indoor dry process/non-process areas, 16 inches
 - c. Receptacles in indoor wet process areas and all indoor chemical storage/transfer areas, 48 inches
 - d. Receptacles in outdoor locations, 24 inches
6. Outlet boxes shall be provided in the material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein, and the area designations indicated on the Drawings.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. All electrical equipment shall be properly identified in accordance with these Specifications and the Contract Drawings. All switchgear, switchboards, motor control centers, variable frequency drives, lighting and distribution panelboards, combination starters, control panels, pull and junction boxes, enclosures, disconnect switches, control stations, and similar equipment shall be identified in the manner described, or in an equally approved manner.
- B. The types of electrical identification specified in this Section include, but are not limited to, the following:
 - 1. Operational instructions and warnings.
 - 2. Danger signs.
 - 3. Equipment/system identification signs.
 - 4. Nameplates.

1.02 SIGNS

- A. "DANGER-HIGH-VOLTAGE" signs shall be securely mounted on the entry doors of all electrical rooms.

1.03 LETTERING AND GRAPHICS

- A. The Contractor shall coordinate names, abbreviations, and other designations used in the electrical identification work with the corresponding designations shown, specified or scheduled. Provide numbers, lettering, and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of the electrical systems and equipment.

1.04 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit shop drawings. Each submittal shall be identified by the applicable Specification Section.

1.05 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The material covered by these Specifications is intended to be standard material of proven performance as manufactured by reputable concerns. Material shall be fabricated, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as specified herein and shown on the Drawings.

2.02 NAMEPLATES

- A. Nameplates shall be engraved, high pressure plastic laminate, white with black lettering.
- B. Nameplates shall be attached to NEMA 4X enclosures utilizing UL-recognized mounting kits designed to maintain the overall UL Type rating of the enclosure. Mounting kit fasteners shall be stainless steel Type AHK10324X as manufactured by Hoffman, or equal.

2.03 HIGH VOLTAGE SIGNS

- A. Standard "DANGER" signs shall be of baked enamel finish on 20 gage steel; of standard red, black and white graphics; 14 inches by 10 inches size except where 10 inches by 7 inches is the largest size which can be applied where needed, and except where a larger size is needed for adequate identification.

2.04 CONDUIT IDENTIFICATION

- A. Conduit identification shall be as specified in Section 26 05 33.13 – Conduit for Electrical Systems.

2.05 WIRE AND CABLE IDENTIFICATION

- A. Field installed wire and cable identification shall be as specified in Section 26 05 19 – Low Voltage Conductors and Cable.

- B. A plastic laminate nameplate shall be provided at each panelboard, motor control center, switchgear assembly, and switchboard assembly. This nameplate shall be used to clearly convey the conductor identification means used at that piece of equipment (i.e. Phase A=Brown, Phase B=Orange, C = Yellow).
- C. Wiring identification for factory installed wiring in equipment enclosures shall be as specified in the respective Section.

2.06 BOX IDENTIFICATION

- A. Pull, junction and device box identification shall be as specified in Section 26 05 33.16 – Boxes for Electrical Systems.

PART 3 – EXECUTION

3.01 NAMEPLATES

- A. Nameplates shall be attached to the equipment enclosures with (2) two stainless steel sheet metal screws for nameplates up to 2-inches wide. For nameplates over 2-inches wide, four (4) stainless steel sheet metal screws shall be used, one (1) in each corner of the nameplate. The utilization of adhesives is not permitted.

3.02 OPERATIONAL IDENTIFICATION AND WARNINGS

- A. Wherever reasonably required to ensure safe and efficient operation and maintenance of the electrical systems and electrically connected mechanical systems and general systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install plastic signs or similar equivalent identification, instruction, or warnings on switches, outlets, and other controls, devices, and covers or electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for the intended purposes. Signs shall be attached as specified above for nameplates.

3.03 POWER SOURCE IDENTIFICATION

- A. After installation of all field equipment (i.e. valves, motors, fans, unit heaters, instruments, etc.) install nameplates at each power termination for the field equipment. Nameplate data shall include equipment designation (tag number), power source (MCC number, panelboard, etc.), circuit number, conduit number from schedule and voltage/phase.
- B. Contractor to coordinate with the Engineer and the Owner regarding exact nameplate placement during construction.
- C. Nameplates shall be as specified herein.

END OF SECTION

SECTION 26 05 60
LOW-VOLTAGE ELECTRIC MOTORS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all labor, materials, tools and equipment necessary for furnishing, installing, connecting, testing and placing into satisfactory operation all low voltage electric motors as shown on the Drawings and specified herein. All motors required for this Contract shall comply with this Section unless otherwise noted.

1.02 CODES AND STANDARDS

- A. Motors and related accessories shall be designed, manufactured, and/or listed to the following standards as applicable:
1. Institute of Electrical and Electronics Engineers (IEEE)
 - a. IEEE 112 – Standard Test Procedure for Polyphase Induction Motors and Generators
 2. National Electrical Manufacturer’s Association (NEMA)
 - a. NEMA MG 1 – Motors and Generators
 3. Underwriters Laboratories (UL)
 - a. UL 547 – Standard for Safety Thermal Protectors for Motors
 - b. UL 674 – Electric Motors and Generators for Use in Hazardous (Classified) Locations
 - c. UL 1004-1 – Standard for Rotating Electrical Machines
 - d. UL 1004-3 – Standard for Thermally Protected Motors
 - e. UL 1004-8 – Standard for Inverter Duty Motors

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
1. Shop Drawings.
 2. Spare Parts List.

- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Individual shop drawings for electric motors shall be submitted in accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, unless submitted as a part of the shop drawings for the driven equipment.
- D. Shop drawings for electric motors shall include motor data sheets, dimensioned drawings, wiring diagrams for devices such as space heaters, temperature devices, and shaft grounding rings. Shop drawings shall identify electric characteristics and design, mechanical construction, manufacturer's name, type and pertinent specifications for the use intended, along with the name of the equipment to be driven. For motors rated 50 horsepower or greater, submittal of motor data for acceptance shall include, as a minimum, the following:
 - 1. Manufacturer's type and frame designation
 - 2. Horsepower rating
 - 3. Time rating (per NEMA Standards)
 - 4. Ambient temperature rating
 - 5. Motor winding insulation system designation
 - 6. RPM at rated load
 - 7. Frequency
 - 8. Number of phases
 - 9. Rated load amperes
 - 10. Voltage
 - 11. Code letter (starting KVA per horsepower)
 - 12. Design letter for integral horsepower induction motors (per NEMA Standards)
 - 13. Service factor

14. Temperature rise at full load and at service factor load
 15. Efficiency at 1/4, 1/2, 3/4 and full load
 16. Power factor at 1/4, 1/2, 3/4 and full load
 17. Motor outline, dimensions and weight
 18. Motor winding insulation system description
 19. Horsepower required by connected machine at specified conditions (load curves) shall be supplied for all compressors, propeller and positive displacement pumps.
 20. The foregoing data shall also be verified after manufacture and shall be included with the information to be furnished in the operation and maintenance manuals specified.
- E. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 SPARE PARTS

- A. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
- B. Electric motors shall be manufactured by Baldor/Reliance Electric Company; Nidec Motors; Toshiba Industrial and Power Systems, Inc.; Siemens Energy & Automation, Inc.; General Electric Company; or equal.

2.02 MATERIALS AND CONSTRUCTION

- A. Motors shall be built in accordance with the latest standards of NEMA, including, but not limited to MG-1 and MG-2, IEEE, ANSI and to the requirements specified herein.
- B. Type

1. Unless otherwise noted, motors specified herein shall be polyphase squirrel cage, NEMA Design B, or single phase capacitor or repulsion start induction motors. Special equipment requiring a motor drive with unusual characteristics shall be equipped with a definite purpose motor to meet the necessary requirements.
2. Unless otherwise shown or specified, all motors 1/2 horsepower or larger shall be three- phase, 60 Hertz, NEMA Design B, squirrel cage induction motors designed for operation at 480 volts or greater as specified herein or shown on the Drawings.
3. Unless otherwise specified in the individual equipment specification for the driven equipment, or as required by the dynamic characteristics of the load as determined by the manufacturer of the machine to be driven, all polyphase squirrel cage motors shall be designed to withstand the starting voltage shown on the Drawings and shall have torque and locked rotor current characteristics as specified for NEMA Design B motors.
4. All motors 2 horsepower and smaller shall have windings encapsulated with a flexible epoxy compound, or insulated with a flexible epoxy compound, or insulated with the manufacturer's premium quality system which shall be subject to acceptance by the Engineer.
5. All motors above 250 horsepower shall have stator windings vacuum impregnated with a polyester insulation compound.
6. Unless otherwise noted, all motors smaller than 1/2 horsepower shall be standard single-phase capacitor start or repulsion start induction type designed for operation on 120 volts or 208 volts, 60 Hz alternating current. The motor shall deliver rated load without exceeding a 80 degrees C temperature rise while operating in a 40 degrees C ambient temperature. Small fan motors less than 1/4 HP may be split-phase or shaded pole type. Shaded pole motors rated more than 1/4 horsepower are not acceptable. Fractional horsepower motors shall be completely equipped with all necessary auxiliary components for starting and labeled as "Thermally Protected". Insulation shall be Class B, except that submersible motors shall have epoxy encapsulation. Unless otherwise noted, the motors shall be totally enclosed. Small fan motors may be of the open type where they are suitably protected from moisture dripping and lint accumulation. Motors shall be provided with sealed ball bearings lubricated for 10 years of normal use.

C. Rating

1. Each motor shall develop ample torque for its required service through its acceleration range and throughout its rated load range. The rating of the motors offered shall in no case be less than the horsepower shown on the Drawings or elsewhere specified. It should be noted that the motor sizes indicated on the Drawings or as otherwise specified herein, are motor sizes required to operate the specific equipment which is specified. Higher rated motor sizes may be determined from the actual equipment submitted, approved, purchased, and installed.

Protective devices, motor starters, disconnect switches, and other necessary equipment shall be furnished and installed for the actual motor sizes required at no additional cost.

2. Motor ratings shall be based on continuous operation. The maximum temperature rise for open and drip proof type motors shall not exceed 90 degrees C, and for totally enclosed type motors shall not exceed 80 degrees C.

D. Motor Winding Insulation

1. Insulation shall be as specified for each particular type or class of motor. The insulation system shall provide a high dielectric strength, long life covering for the windings which may be required to operate in a continually damp, corrosive, and/or chemically contaminated environment. The insulation shall be resistant to attack by moisture, acids, alkalies, abrasives, and mechanical and thermal shock. Leads shall be sealed with a non-wicking, non-hydroscopic insulation material.
2. Motor insulation resistance may be checked at any time after delivery to the job site or during the warranty period. Encapsulated motor stators may be subjected to insulation testing while completely submerged in water. Any motor not meeting the requirements specified herein will be rejected and shall be promptly replaced at no cost to the Owner.
3. Torque and locked rotor current characteristics for three phase motors shall be NEMA Design B. The locked rotor KVA/HP input at full voltage for 10 horsepower. motors and larger shall not exceed that permitted for Code Letter "J", except for specialized equipment requiring a motor drive with special definite characteristics.
4. Unless otherwise specified, non-inverter duty motors shall be furnished with a Class F insulation system. Unless otherwise specified, inverter duty motors shall be furnished with a Class H insulation system. In either case, temperature rise shall be limited to that for Class B insulation. Output torque and speed characteristics of each motor shall be suitable to operate the driven equipment through the full range of acceleration and operating load conditions without exceeding the nameplate current rating, and/or temperature rise.

E. Nameplates

1. The motor manufacturer's nameplate shall be engraved, embossed, or stamped on a stainless steel sheet and fastened to the motor frame with No. 4 or larger oval head stainless steel screws or drive pins. Printed or laser-etched nameplates are not acceptable.
2. Nameplates shall include as a minimum, Items 1 through 14 as listed in Article 1.04 D in addition to that required by NEMA standards. The nameplate shall be positioned so as to be readily visible for inspection as installed in the facility.

F. Design

1. Motors shall be designed to accelerate and drive the connected equipment under all normal operating conditions without exceeding nameplate ratings.
2. Motors specified for operation with variable frequency drives shall be inverter duty rated. Motors shall be considered inverter duty rated only if they meet all of the requirements for NEMA MG-1 Part 31.
3. Motors shall be designed to output 100 percent of nameplate horsepower under continuous duty service without exceeding the temperature rise specified herein when controlled by the actual drives furnished. Inverter duty motors shall be designed to operate down to 10% of full load speed without the need for a line powered cooling fan.
4. Unless otherwise specified, electric motors shall be furnished with service factors in accordance with NEMA MG-1 as follows:

Type of Motor	Service Factor
Non-inverter Duty	1.15
Inverter Duty	1.0

5. Design selection with respect to the driven machine shall be such that the requirements do not exceed 85 percent of the motors' maximum rating modified by service factor, ambient temperature, enclosure, altitude and electrical service. The electrical service conditions shall be assumed to be 10 percent undervoltage, 5 percent underfrequency, and 3 percent voltage unbalance. Altitude shall be assumed to be the project site elevation plus 10 percent. Ambient temperature shall be assumed to be 95 degrees F in exterior locations, 104 degrees F (40 degrees C) in interior locations, and 122 degrees F (50 degrees C) within housings or enclosures; except where higher temperatures may be encountered within or on individual items of equipment. The applicable paragraphs of NEMA MG-1 shall be used in making the design selection.
6. Motors used with belt drives shall have sliding bases to provide for belt take up.
7. Terminal boxes shall be of sufficient size to accommodate the required quantity and size of conduits. Gasketed terminal boxes shall be furnished with all splash-proof and totally enclosed motors. NEMA ratings of the terminal boxes shall be suited for the application. Motors located in hazardous locations shall be furnished with terminal boxes suitable for the specific Class, Division, and Group suitable for the application. Terminal boxes shall be sized to accommodate accessory equipment such as motor differential current transformers, where required.
8. Terminal boxes for horizontal motors shall be located on the left-hand side when viewing the motor from the drive shaft end and shall be so designed that conduit entrance can be made from above, below, or either side of the terminal box.

9. Motors larger than 250hp shall be manufactured with the six stator coil leads wired to a suitably sized motor junction box for application in a differential relay scheme. Current transformers shall be provided by the motor manufacturer and installed in the factory. All ground connections and current transformer connections shall be made in the factory.

G. Construction

1. Frames, mounting means, and shafts shall meet NEMA Standards for the horsepower, RPM, and enclosure selected. Enclosures shall be selected according to the degree of mechanical protection required and shall not be of aluminum construction. All motors shall have a manufacturer's standard shop machinery finish, consisting of a rust-resisting priming coat of zinc chromate and a finish coat of alkyd machinery enamel. Reference Section 09 90 00 – Painting.
2. Motors shall have cast iron frames and a heavy gauge steel terminal box, with neoprene gaskets between the frame and the box and between the box and its cover. A grounding lug(s) shall be provided inside the terminal box.
3. Motors weighing more than 50 pounds shall be equipped with at least one lifting eye. All lifting hardware shall be corrosion resistant.
4. Motors located in hazardous locations shall be totally enclosed and suitable for the specific Class, Division, and Group suitable for the application.
5. Motors located in Class I or II, Division 1 hazardous locations shall bear a U.L.-674 label and shall be provided with a breather/drain approved for the hazardous location. The U.L. listed breather/drain shall prevent the entrance of contaminants while allowing moisture to drain out of the motor.
6. When located outdoors, or elsewhere if specified, motors shall be totally enclosed, nonventilated (TENV) or totally enclosed, fancooled (TEFC) machines, unless otherwise noted. Totally enclosed motors shall be provided with two (2) 1/4 inch drain holes drilled through the bottom of the frame, which allows complete drainage of the frame. Where specified, TEFC motors controlled by a variable frequency drive shall be provided with a separately powered cooling fan motor that runs at 60HZ to ensure proper cooling of the motor at low speeds. Cooling fan motor shall be suitable for 120VAC, single phase operation. Vertically oriented motors located outdoors shall be provided with a drip cover over the fan end to prevent accumulation of precipitation.
7. Unless otherwise specified, motors rated 100 horsepower or greater located outdoors, in unheated structures, in below grade areas, or as otherwise indicated, shall be furnished with space heaters and embedded motor winding high temperature switches with leads brought out of the motor terminal box. Space heaters shall be suitable for 120VAC operation and for a maximum surface temperature of less than 200 degrees C. Space heaters shall be of sufficient

wattage to maintain the internal temperature of the motor at approximately 10 degrees C above the ambient temperature when the motor is not running.

- a. Embedded motor winding temperature switches shall operate at temperatures well below the temperature rating of the motor winding insulation system. Motor winding temperature switches are not required where other temperature monitoring devices (e.g. RTD's) are required.
8. Unless otherwise specified in the equipment specifications, motors rated 200HP or greater that are controlled by a VFD shall be furnished with resistance thermal detectors (RTD's) embedded in the stator windings, two per phase. RTD's shall be pre-wired to terminal blocks located in a separate terminal box as specified herein.
9. Unless otherwise specified in the equipment specifications, motors rated less than 200HP that are controlled by a VFD shall be furnished with motor winding high temperature switches embedded in the stator windings with the leads brought out to the motor terminal box.
10. If so specified and when located in indoor areas which are heated and weatherproof, motors shall be open drip-proof machines. Ventilation openings shall be arranged to prevent the entrance of drops of liquid or solid particles at any angle from zero to 15 degrees downward from vertical.
11. Unless otherwise specified, or required, motors rated less than 200 horsepower shall be furnished with bearings of the grease lubricated, antifriction ball type with conveniently located grease fittings and drain plugs. A means of preventing bearings from becoming over-greased shall be provided. Bearings shall have a minimum B-10 life of 20,000 hours.
12. Rotors shall be statically and dynamically balanced. Rotor windings shall be one-piece cast aluminum. Where applicable, rotors shall be constructed with integral fins.
13. Externally mounted motor shaft grounding rings shall be provided to protect motors against motor shaft and bearing currents. Grounding rings shall be provided for all motors controlled by VFDs, with the following exceptions:
 - a. Motors located in hazardous areas
 - b. Motors rated less than 1 horsepower
 - c. Submersible motors
14. All motors shall be provided with factory-installed one-hole terminations (ring terminals) on the ends of all motor leads. Terminations shall be identified for use with cables that have stranding other than Class B and shall be the irreversible compression type.

H. Power Factor and Efficiency

1. All motors, including vertical hollowshaft motors, in the range of 1-500 horsepower, inclusive, shall be designed specifically for energy efficiency and high power factor. The motor efficiency and power factor shall meet or exceed the values listed in the table below when the motors are tested in accordance with the NEMA preferred test method IEEE 112A, Method B, Dynamometer. Each motor shall meet the minimum guaranteed efficiency value indicated in the table below. All tests shall be performed in accordance with the procedures contained in NEMA Standard MG1-12.58.

**Table 12-11
FULL-LOAD EFFICIENCIES OF ENERGY EFFICIENT MOTORS
ENCLOSED MOTORS**

HP	2 POLE		4 POLE		6 POLE		8 POLE	
	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency
1	75.5	72	82.5	80	80	77	74	70
1.5	82.5	80	84	81.5	85.5	82.5	77	74
2	84	81.5	84	81.5	86.5	84	82.5	80
3	85.5	82.5	87.5	85.5	87.5	85.5	84	81.5
5	87.5	85.5	87.5	85.5	87.5	85.5	85.5	82.5
7.5	88.5	86.5	89.5	87.5	89.5	87.5	85.5	82.5
10	89.5	87.5	89.5	87.5	89.5	87.5	88.5	86.5
15	90.2	88.5	91	89.5	90.2	88.5	88.5	86.5
20	90.2	88.5	91	89.5	90.2	88.5	89.5	87.5
25	91	89.5	92.4	91	91.7	90.2	89.5	87.5
30	91	89.5	92.4	91	91.7	90.2	91	89.5
40	91.7	90.2	93	91.7	93	91.7	91	89.5
50	92.4	91	93	91.7	93	91.7	91.7	90.2
60	93	91.7	93.6	92.4	93.6	92.4	91.7	90.2
75	93	91.7	94.1	93	93.6	92.4	93	91.7
100	93.6	92.4	94.5	93.6	94.1	93	93	91.7
125	94.5	93.6	94.5	93.6	94.1	93	93.6	92.4
150	94.5	93.6	95	94.1	95	94.1	93.6	92.4
200	95	94.1	95	94.1	95	94.1	94.1	93
250	95.4	94.5	95	94.1	95	94.1	94.5	93.6
300	95.4	94.5	95.4	94.5	95	94.1		
350	95.4	94.5	95.4	94.5	95	94.1		
400	95.4	94.5	95.4	94.5				
450	95.4	94.5	95.4	94.5				
500	95.4	94.5	95.8	95				

**Table 12-12
FULL-LOAD EFFICIENCIES FOR NEMA PREMIUM™ EFFICIENCY ELECTRIC MOTORS
RATED 600 VOLTS OR LESS (RANDOM WOUND)
OPEN MOTORS**

HP	2 POLE		4 POLE		6 POLE	
	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency
1	77	74	85.5	82.5	82.5	80
1.5	84	81.5	86.5	84	86.5	81.5
2	85.5	82.5	86.5	84	87.5	81.5
3	85.5	82.5	89.5	84	88.5	86.5
5	86.5	84	89.5	84	89.5	87.5
7.5	88.5	86.5	91	89.5	90.2	88.5
10	89.5	87.5	91.7	90.2	91.7	90.2
15	90.2	88.5	93	91.7	91.7	90.2
20	91	89.5	93	91.7	92.4	91
25	91.7	90.2	93.6	92.4	93	91.7
30	91.7	90.2	94.1	93	93.6	92.4
40	92.4	91	94.1	93	94.1	93
50	93	91.7	94.5	93.6	94.1	93
60	93.6	92.4	95	94.1	94.5	93.6
75	93.6	92.4	95	94.1	94.5	93.6
100	93.6	92.4	95.4	94.5	95	94.1
125	94.1	93	95.4	94.5	95	94.1
150	94.1	93	95.8	95	95.4	94.5
200	95	94.1	95.8	95	95.4	94.5
250	95	94.1	95.8	95	95.4	94.5
300	95.4	94.5	95.8	95	95.4	94.5
350	95.4	94.5	95.8	95	95.4	94.5
400	95.8	95	95.8	95	95.8	95
450	95.8	95	96.2	95.4	96.2	95.4
500	95.8	95	96.2	95.4	96.2	95.4

NOTES:

(Motor data for continuous duty, NEMA Design B, 1.15 service factor, 40 degrees Celsius ambient, Class F insulation, 3 phase, 460 volt, at listed speed rating.

(TEFC efficiencies apply to both horizontal and vertical motors.

2. Motors rated 50 horsepower or greater shall be individually tested at the factory before shipment, with a copy of test results provided for the Engineer, to assure compliance with the efficiency and power factor specifications.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Motors shall be installed as shown on the Drawings and in accordance with the manufacturer's installation instructions.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Motors shall be properly protected from weather hazards. Motors shall not be allowed to be wrapped tightly in plastic while outdoors. Motors delivered to the site which will not be put in service for a time in excess of 30 calendar days, whether in storage or installed, shall have the shafts rotated a minimum of five (5) rotations every 30 days.
- B. Motors provided with space heaters shall have temporary power applied to the heaters no later than 30 calendar days after delivery to the site until permanent power can be applied to the heaters.
- C. Motors that, in the opinion of the Engineer, have not been properly protected shall be inspected by the manufacturer's representative. Any required electrical corrections for testing shall be made at the Contractor's expense prior to acceptance and/or use.
- D. All motors shall operate without any undue noise or vibration and shall show no signs of phase unbalance.

3.03 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. Witnessed Shop Tests
 - a. All motors shall be shop tested and inspected in accordance with the equipment manufacturer's standard procedures. Shop tests for motors 100 horsepower and larger may be witnessed by the Engineer. The manufacturer's testing and inspection procedures shall demonstrate that the equipment tested conforms to the requirements specified, all other applicable requirements, and shall be approved by the Engineer. At least 10 days' notice shall be given the Engineer prior to tests and inspection dates.
 - b. In addition to the efficiency and power factor testing specified herein, each motor shall be tested to determine compliance with the applicable requirements of the IEEE, ANSI and NEMA. Tests shall be as follows:
 - 1) Motors less than 50 HP:

- a) Each motor shall be subjected to a standard, short commercial test including the following:
 - i. Running current, no load
 - ii. Locked rotor current
 - iii. High potential
 - iv. Winding resistance
 - v. Bearing inspection
- 2) Motors between 50 and 100 HP
 - a) Each motor shall be subjected to the above tests and shall be furnished with certified test results.
- 3) Motors larger than 100 HP
 - a) Each motor shall be furnished with certified test results. Each motor shall be subjected to a complete test consisting of full load heat run, percent slip, running load current, locked rotor current, breakdown torque (calculated), starting torque, winding resistance, high potential, secondary current and voltage at collector rings (wound rotor), efficiencies at 100, 75 and 50 percent of full load, power factors at 100, 75 and 50 percent of full load and bearing inspection. Tests will be witnessed by the Engineer where specifically indicated.
- 4) Test Reports
 - a) All test results for motors over 100 horsepower shall be submitted to the Engineer for approval. Copies of witnessed test raw data shall be submitted to the Engineer immediately upon completion of such tests.
- 2. Field Tests
 - a. Field tests shall be performed in accordance with the requirements specified in the General Conditions, Division 01, and Section 26 05 00 – Basic Electrical Requirements.
 - b. All electric motors furnished for this project one (1) horsepower or larger shall have the information required in the following tabulation completed. See Exhibit "A" on following page.
 - c. All field testing shall be witnessed by the Engineer.

(EXHIBIT A)

MOTOR TEST RECORD					
Motor Identification Remarks	Location	Specified Horsepower	Nameplate Horsepower	Nameplate Amperage (FLA)	Measured Amperage Under Normal Operating Conditions

END OF SECTION

SECTION 26 05 73
POWER SYSTEM STUDIES

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall provide all power system studies for the project as specified herein. The following shall be performed:
 - 1. Short Circuit Studies
 - 2. Load Flow Analyses
 - 3. Protective Device Coordination Studies
 - 4. Equipment Evaluation
 - 5. Arc Flash Risk Assessment
- B. The scope of the work for these studies shall include all existing electrical equipment as well as new electrical equipment furnished under this Contract at the project site.
- C. The studies shall include all electric utility protective devices, transformers, generators, cables, switchgear, switchboards, motor control centers, variable-frequency drives, panelboards, protection relays, and control panels.
- D. Prior to receiving final approval of the distribution equipment shop drawings for the equipment proposed under this Contract and/or prior to release of that equipment for manufacture, the Preliminary Report, as specified herein, shall be submitted and approved. Contractor shall expedite the completion of the Preliminary Report so that final approval of proposed equipment is not delayed.
- E. The studies shall be performed with the aid of SKM Systems Analysis Power Tools for Windows (PTW) software, Version 9.0 or newer. No other software analysis packages are acceptable.

1.02 CODES AND STANDARDS

- A. All work shall be performed in accordance with the following Codes and Standards, as applicable (latest edition, unless otherwise specified):
 - 1. Institute of Electrical and Electronic Engineers (IEEE):
 - a. Standard 141, Recommended Practice for Electric Power Distribution for Industrial Plants

- b. Standard 241, Recommended Practice for Electric Power Systems in Commercial Buildings
 - c. Standard 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
 - d. Standard 3002.2, IEEE Recommended Practice for Conducting Load Flow Studies and Analysis of Industrial and Commercial Power Systems
 - e. Standard 3002.3, IEEE Recommended Practice for Conducting Short-Circuit Studies and Analysis of Industrial and Commercial Power Systems
 - f. Standard 1584-2018, IEEE Guide for Performing Arc-Flash Hazard Calculations
2. American National Standards Institute (ANSI):
- a. Standard C37.90, IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus
 - b. Standard C37.91, Guide for Protective Relay Applications to Power Transformers
 - c. Standard C37.95, Guide for Protective Relaying of Utility-Consumer Interconnections
 - d. Standard C37.96, Guide for AC Motor Protection
 - e. Standard C57.12.59, Guide Dry-Type Transformer Through-Fault Current Duration
 - f. Standard C.57.13, Standard Requirements for Instrumentation Transformers
 - g. Standard C57.109, Guide for Liquid-Immersed Transformer Through Fault-Current Duration
3. National Fire Protection Agency (NFPA):
- a. NFPA 70, National Electrical Code (NEC)
 - b. NFPA 70E, Standard for Electrical Safety in the Workplace (2021 Edition)

1.03 SUBMITTALS

- A. The Contractor shall submit the following reports for review and approval:
- 1. One (1) printed copy and one (1) electronic copy of the Preliminary Report.
 - 2. One (1) printed copy and one (1) electronic copy of the Pre-final Report.

3. Four (4) printed copies and one (1) electronic copy of the Final Report.
- B. The Contractor shall submit one (1) complete electronic copy of the final power system model and all required database files generated by the software analysis package used. Files shall be placed on portable storage media (USB 3.0 flash storage device) or be uploaded to a cloud-based file sharing service and be submitted with the Final Report. Furnish any necessary documentation requiring the Owner's signature to allow model to be transferred to the Owner.

1.04 QUALIFICATIONS

- A. The studies shall be performed by a professional electrical engineer actively licensed in the state or commonwealth in which the project is located. The licensed professional electrical engineer shall have a minimum of five (5) years of experience in performing power system studies.
- B. The resume of the licensed professional electrical engineer shall be submitted for approval prior to the start of work. An experience table shall also be provided detailing the power system studies of similar scope to this Contract that have been performed by the proposed engineer over the last two (2) years. The table shall, at a minimum, list the facility owner's name, facility contact person with phone number and email address, and overall scope of work that was provided.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 DATA COLLECTION

- A. The Contractor shall collect all required utility transformer and service information for use in these studies. The serving electric utility representative contact information can be found in Section 26 05 00, Basic Electrical Requirements.
- B. Approved equipment shop drawings and product information for all equipment furnished under this Contract shall be used for these studies. Including data for equipment that is not yet approved is not acceptable.
- C. One (1) field visit to the project site to collect pertinent data from existing equipment by the personnel performing the studies is permitted. The visit shall span as many days as required to collect all necessary information. This visit shall occur as soon after the Contract is awarded as possible and shall be coordinated with the Owner. The Contractor and personnel performing these studies are responsible for collecting all required data for these studies. If equipment is to be examined while energized parts are exposed, the examining personnel shall wear appropriate PPE in accordance with the requirements of NFPA 70E.

- D. Using data from record drawings, “as-built” drawings, or a previous power system study is not acceptable. All data for existing equipment shall be field verified.

3.02 STUDY PARAMETERS

- A. The following parameters shall be used for all studies:
 - 1. Transformers 75kVA (nominal) and larger shall be modeled with actual nameplate data including impedance data. Motors 30hp and larger shall be modeled with actual nameplate power factor and efficiency data.
 - 2. Room heating and cooling loads are mutually exclusive. Only the larger of these two load types shall be modeled as in service.
 - 3. For the purposes of these studies, all new loads shall be considered operating.
 - 4. The sources that shall be used in these studies are the serving electric utility and the standby generator. These sources are incapable of paralleling with each other, so each one shall be considered independent of the other for the purposes of these studies.

3.03 SHORT CIRCUIT STUDIES

- A. The short circuit studies shall be performed in accordance with IEEE Standard 3002.3.
- B. The study input data shall include the short circuit contribution obtained from each source. Short circuit close and latch duty values and interrupting duty values shall be calculated on the basis of assumed three-phase bolted short circuits at each bus. Single-line diagrams shall show the results of the analysis by using datablocks constructed as shown in Appendix A. Provide the results of this study in a tabular format as well, included as an appendix to the report.
- C. The short circuit study report shall include an analysis of whether the equipment short circuit and withstand ratings shown in the Contract Documents are suitable.

3.04 PROTECTIVE DEVICE COORDINATION STUDIES

- A. A protective device coordination study shall be performed to provide the necessary calculations and logic decisions required to select or to check the selection of power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, and low voltage circuit breaker trip characteristics and settings.
- B. The coordination study shall include all equipment from the serving electric utility company source protective devices down to and including all adjustable circuit protective devices. The phase and ground overcurrent protection shall be included as well as settings of all other adjustable protective devices.

- C. The time-current characteristics of the proposed protective devices shall be printed on log-log scale coordination plots as specified below.
1. Each plot shall be accompanied by a representative single-line diagram. The coordination plot and single-line diagram shall each occupy one-half of the same printed sheet for ease of cross reference. Each printed sheet shall have a distinct title that identifies the portion of the electrical system it represents.
 2. Each coordination plot shall include the following:
 - a. Sufficient number of separate curves shall be used to clearly indicate the coordination achieved
 - b. Identification of each curve with its respective component's name
 - c. Complete operating bands for fuse and low voltage circuit breaker trip curves
 - d. Transformer magnetizing inrush and ANSI transformer withstand parameters
 - e. Cable thermal overcurrent withstand limits
 - f. Significant symmetrical and asymmetrical fault currents for the portion of the electrical system represented by the plot
 3. Each accompanying single-line shall include datablocks as described in Appendix A.
 4. All restrictions of the National Electrical Code shall be adhered to, and proper coordination intervals and separation of characteristic curves shall be maintained.
- D. The selection and settings of all protective devices shall be provided separately in the report in a tabulated form listing circuit identification, IEEE device number, current transformer ratios and connections, manufacturer and type, range of adjustment and recommended settings.

3.05 LOAD FLOW ANALYSIS

- A. The load flow analysis shall be performed in accordance with IEEE Standard 3002.2.
- B. A load flow analysis shall be performed to determine the steady-state loading profile of the system(s) being studied. From the results of the load flow analysis, the report shall indicate areas of overloaded conductors, busses, or other equipment in the power distribution system. The load flow analysis results shall be presented in a tabular format as well as a single-line diagram format. Single-line diagrams shall show the results of the analysis by using datablocks constructed as shown in Appendix A. All assumptions associated with the analysis shall be documented in the report.

3.06 EQUIPMENT EVALUATION

- A. An equipment evaluation shall be performed to determine the adequacy of existing circuit breakers, panelboards, motor control centers, automatic transfer switches, busses, etc. located at the facility by tabulating and comparing the short circuit ratings of these devices with the calculated fault currents that result from the short circuit study.
- B. Appropriate multiplying factors based on system X/R ratios and protective device rating standards shall be applied. A table shall be provided in the report showing the calculated fault currents and the corresponding short circuit ratings of the existing equipment along with a pass or fail status for each piece of equipment.

3.07 ARC FLASH RISK ASSESSMENT

- A. An arc flash risk assessment shall be performed in accordance with IEEE Std. 1584-2018, NFPA 70E, and OSHA 29-CFR, Part 1910 Subpart S. The assessment shall use the incident energy analysis method. The arc flash PPE category method shall not be used.
- B. The following parameters shall be used for the arc flash risk assessment:
 - 1. Working distance for all equipment: 18 inches
 - 2. Arcing duration limit: 2 seconds, or higher (based on engineering judgement) for equipment locations where additional time may be required to exit the arc flash boundary.
 - 3. Equipment box dimensions and electrode configuration shall be entered for each piece of equipment (existing and/or new) to be assessed. Using software default dimensions and electrode configuration is not acceptable.
 - 4. For equipment operating at 240VAC or below, report incident energy as " $<1.2 \text{ cal/cm}^2$ " if the bolted fault current is calculated to be less than 2000A.
 - 5. Any protective device settings changes that were recommended as part of these studies shall be included. For devices where settings changes are recommended, the "as-found" settings shall be documented separately in dedicated tables for record purposes.
 - 6. The following operational scenarios shall be used in the assessment, with the worst-case values from each scenario being shown in the study report and on the arc flash labels:
 - a. Scenario 1: Main circuit breaker is closed, standby generator automatic transfer switch is on utility power, and both 65kW micro-turbine generators are running. The facility is served by the electric utility source supplemented by the micro-turbine generators.

- b. Scenario 2: Main circuit breaker is open, standby generator automatic transfer switch is on standby power, and both 65kW micro-turbine generators are not running. The facility is served by the standby generators only.

C. The arc flash risk assessment report shall include but not be limited to the following:

1. A brief overview of what arc flash hazards are and how to avoid them.
2. Definitions of key terms used in the report.
3. Confirmation of all parameters and scenarios used in the report.
4. Documentation of any assumptions made for the report.
5. Serving electric utility information received. Copies of the information received shall be included in an appendix.
6. Any recommendations to reduce the arc flash incident energies via protective device settings changes where incident energies are found to exceed 12 cal/cm². Protective device settings change recommendations shall not negatively impact selective coordination.
7. A copy of the PPE information from Table 130.5 G in NFPA 70E.
8. Arc flash labels as specified herein.
9. An NFPA 70E energized electrical work permit for each location where an arc flash label is provided.
10. An arc flash evaluation summary sheet, based on the worst-case scenario, that contains the following minimum information:
 - a. Bus name
 - b. Protective device name
 - c. Bus line-to-line voltage
 - d. Bus bolted fault
 - e. Protective device bolted fault
 - f. Protective device arcing fault
 - g. Trip/delay time
 - h. Breaker opening time

- i. Equipment type
- j. Gap
- k. Electrode configuration
- l. Box height, width, and depth
- m. Arc flash boundary
- n. Working distance
- o. Incident energy
- p. Notes

D. Arc Flash Labels

1. Arc flash labels shall be provided for each piece of equipment that is likely to require examination, adjustment, servicing, or maintenance while energized. When opening an enclosure exposes energized parts on both the line and load side of a device, provide a label with the worst case (line versus load) incident energy printed. The following equipment, at a minimum, shall be provided with labels in the quantities specified:
 - a. Switchgear/Switchboards – quantity of 1 label per section on front, 1 label per section on rear if rear is accessible. Provide second label at main circuit breaker sections where it is possible to open covers and separately expose line side and load side energized parts.
 - b. Motor control centers – quantity of 1 label per section on front, 1 label per section on rear if rear is accessible. Provide second label at main circuit breaker sections where it is possible to open covers and separately expose line side and load side energized parts.
 - c. Panelboards – quantity of 1
 - d. Variable frequency drives – quantity of 1 label per section
 - e. Other stand-alone motor starters/controllers – quantity of 1 label per section
 - f. Automatic and manual transfer switches – quantity of 1
 - g. Enclosed circuit breakers – quantity of 1
2. Arc flash labels shall be thermal transfer type that is printed on adhesive backed polyester material. Labels shall be ANSI Z535.4 compliant, 4 inches tall by 6 inches wide, and provided with a 5-year warranty. For incident energy values of

less than 40 cal/cm², the labels shall have an orange-colored header with the word “WARNING”. For incident energy values equal to and above 40 cal/cm², the labels shall have a red-colored header with the word “DANGER”. Each label shall include the following information:

- a. Equipment name
 - b. Date of issue and name of firm performing assessment
 - c. Incident energy
 - d. Working distance
 - e. Arc flash boundary
 - f. Nominal system voltage
3. A generic arc flash label that has a red-colored header with the word “DANGER” and text in large letters that shows “ENERGIZED WORK NOT PERMITTED” shall be provided for the following equipment:
- a. Any equipment that requires an arc flash label (as specified above) that is located within a hazardous area.
 - b. Any equipment found to be in poor working condition, where in the judgement of the engineer performing the study, energized work should not be performed at all, regardless of the outcome of the incident energy analysis at that equipment.

3.08 STUDY REPORTS

- A. The results of the studies shall be documented in a series of reports. A total of three (3) separate reports shall be provided as follows:
1. Preliminary Report – The Preliminary Report shall consist of all power systems studies as specified herein, with the following exceptions:
 - a. NFPA 70E energized electrical work permits shall not be included.
 - b. One (1) WARNING label and one (1) DANGER label shall be printed on plain paper for format review purposes only. Actual adhesive labels with calculated values shall not be included.
 2. Pre-final Report – The Pre-final Report shall incorporate all comments received from the previous report review and shall include specific equipment data from the approved shop drawings of the proposed electrical equipment. The Pre-final Report shall consist of all power systems studies as specified herein, with the following exceptions:

- a. NFPA 70E energized electrical work permits shall not be included.
 - b. Sample arc flash hazard warning labels one (1) WARNING label and one (1) DANGER label) shall be printed on the proposed adhesive material for review purposes.
3. Final Report – The Final Report shall consist of all power systems studies as specified herein, including final adhesive arc flash hazard warning labels. Final report shall incorporate all installed electrical equipment, including any field changes made during construction, and all comments received from the previous report review. All ‘as-left’ protective device settings shall be included in the report. The Final Report shall bear the signature and seal of the professional electrical engineer that performed the study.
- B. Hard copies of reports shall be furnished in the quantities specified herein, neatly organized into properly identified 3-ring binders. Tabs shall clearly separate each section of the report.
 - C. Electronic copies of reports shall be provided in PDF file format. Electronic copies shall have searchable text and bookmarks for each section of the report.
 - D. Each report shall begin with a table of contents followed by an executive summary. The executive summary shall detail the configuration of the electrical system and summarize any concerns or recommendations for the electrical distribution system that resulted from the studies specified herein.
 - E. Reports shall include simplified single line diagrams with only the device name information displayed for all equipment, as well as single line diagrams with specific data displayed as specified herein for each study.
 - F. All data used in the reports such as conductor sizes and lengths, motor sizes, utility contribution information, fault analysis input, fault contributions, and the like shall be included in the appendices of the report.
 - G. All single line diagrams and time current curves shall be provided in the reports on 11x17 paper, properly folded to fit into the report binder. Use of standard 8.5x11 paper for these purposes is not permitted. Single line diagrams shall be appropriately split up between several sheets (if required) to allow the drawing scale to be adjusted in order to make text and symbols legible.

3.09 FIELD ADJUSTMENT

- A. The Contractor shall adjust all relay and other protective device settings according to the recommended settings table provided in the approved Pre-Final Report.
- B. The Contractor shall make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.

3.10 ARC FLASH LABEL PLACEMENT

- A. The Contractor shall place approved adhesive arc flash labels on equipment after the Final Report is reviewed and approved.

3.11 TRAINING

- A. The Contractor shall train the Owner's qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment. The training shall be provided in two (2) separate sessions of no less than two (2) hours each. The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET), or equivalent. Training certificates shall be provided for all attendees.

END OF SECTION

APPENDIX A – SUPPLEMENATRY INFORMATION

REQUIRED DATABLOCK CONTENTS FOR POWER SYSTEM STUDIES

Component Type	Input Data Single-Line	Short Circuit and TCC Single-Lines	Load Flow Single-Line
Utility	Nominal Voltage	Nominal Voltage	Nominal Voltage LF kW and kVAR
Generator	Nominal Voltage Rating (kW) Power Factor	Nominal Voltage	Nominal Voltage LF kW and kVAR
Bus	Voltage	Voltage Fault Magnitude (3P RMS) Fault Magnitude (SLG RMS)	Voltage Percent Voltage Drop
Cable	Size (AWG or kcmil) Parallel Sets Length Type (Cu/Al/Cu-Al)	Total Ampacity	Total Ampacity Percent Voltage Drop LF kW, kVAR, and Amperes
Transformer	Rating (kVA) Impedance (%Z) X/R Ratio	N/A	Percent Voltage Drop LF kW, kVAR, and Amperes
Motor	Rating (hp) Rated Voltage FLA Power Factor	Rating (hp) FLA	Rating (hp) FLA
Non-Motor Load	Rating (A, kW, kVA) Rated Voltage Power Factor	N/A	N/A
Fuse	Manufacturer Model Rating (A)	Same as Input Data	Same as Input Data
Relay*	Manufacturer Model CT Ratio Curve Elements	Same as Input Data	Same as Input Data

Component Type	Input Data Single-Line	Short Circuit and TCC Single-Lines	Load Flow Single-Line
Circuit Breaker** (all others)	Manufacturer Model [SCCR (kA)] Frame/Sensor/Plug Ratings Settings** LTPU [LTD Curve Shape] [LTD] [STPU] [STD and I ² T On/Off] INST [GFPU] [GFD and I ² T On/Off] [AF Maint. Setting/Curve]	Same as Input Data	Same as Input Data
Motor Circuit Protector	Manufacturer Model [SCCR (kA)] Frame/Trip Ratings	Same as Input Data	Same as Input Data
Motor Overload Relay	Manufacturer Model [SCCR (kA)] Frame/Trip Ratings Settings	Same as Input Data	Same as Input Data

* Complex and/or non-overcurrent settings for multifunction relays (e.g. bus/winding differential, motor thermal model parameters, under/overvoltage, RTD alarm and trip setpoints, etc.) are excluded from the model.

** Hide setting elements where not applicable for a given circuit breaker. Recommended settings for non-overcurrent settings for electronic trip circuit breakers (e.g. under/overvoltage, zone-selective interlocking, alarm setpoints, etc.) are excluded from the model.

SECTION 26 09 16
ELECTRIC CONTROLS AND RELAYS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, test, and place in satisfactory operation all electric controls and relays as specified herein and indicated on the Drawings.
- B. Electrical control and relay systems shall be assembled using NEMA rated components. Components designed and built to International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured and labeled in compliance with IEC standards is not acceptable.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 53 – Identification for Electrical Systems.

1.02 CODES AND STANDARDS

- A. Products specified herein shall be in conformance with or listed to the following standards as applicable:
 - 1. NEMA 250 – Enclosures for Electrical Equipment
 - 2. UL 508A – Standard for Industrial Control Panels
 - 3. UL-1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations.
 - 4. ANSI/ISA 12.12.01-2013 – Nonincendive Electrical Equipment for use in Class I and II, Division 2 Hazardous (Classified) locations.

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Spare Parts List
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets.
- D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 SPARE PARTS

- A. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor. In addition to the manufacturer recommended spare parts, the following spare parts shall be provided for the local control stations:
 - 1. One (1) contact block of each type furnished on the project
 - 2. One (1) indicating light lens of each color furnished on the project
 - 3. One (1) LED lamp of each color furnished on the project
- B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
- C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the work, at which time they shall be delivered to the Owner.
- D. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- E. Parts shall be completely identified with a numerical system to facilitate parts control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same part number.

PART 2 – PRODUCTS

2.01 CONTROL COMPONENTS

A. Manufacturers

1. Control components shall be manufactured by Eaton, The Square D Company, General Electric, Allen-Bradley, Siemens Energy and Automation, or Engineer approved equal.

B. Pilot Devices

1. General

- a. All pilot devices shall be provided with a legend plate. Legend plates shall have a white background and black lettering and indicate the function of the respective pilot device. The text shown on the Drawings or indicated in the specifications shall be used as the basis for legend plate engraving (e.g., HAND-OFF-AUTO, ON-OFF, etc.).
- b. All pilot devices shall be selected and properly installed to maintain the NEMA 250 rating of the enclosure in which they are installed. All pilot devices shall be UL 508 Listed.
- c. All pilot devices shall be 30.5mm in diameter, unless otherwise indicated. 22mm devices are not acceptable.
- d. Pilot devices for all electrical equipment under this Contract shall be of the same type and manufacturer unless otherwise specified herein or indicated on the Drawings.
- e. In Class 1 Division 2 hazardous locations, pilot devices shall be the hermetically-sealed type, constructed in accordance with ANSI/ISA 12.12.01.

2. Pushbuttons

- a. Pushbuttons shall be non-illuminated, black in color, and have momentary style operation unless otherwise indicated on the Drawings.
- b. Pushbuttons shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each pushbutton. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.

- c. Pushbuttons shall be provided with a full guard around the perimeter of the button. Where a lockout style pushbutton is specified or indicated on the Drawings, provide a padlockable guard.

3. Selector Switches

- a. Selector switches shall be non-illuminated, black in color, and have the number of maintained positions as indicated on the Drawings and as required. Handles shall be the extended type that provide a greater surface area for operation.
- b. Selector switches shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each selector switch. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.
- c. Where indicated in the Drawings or Specifications, provide spring return positions.
- d. Selector switches shall be provided with an indexing component that fits into the keyed portion of the cutout for the device and prevents the switch from spinning when operated.

4. Indicating Lights

- a. Indicating lights shall be LED type, with the proper voltage rating to suit the application, and push-to-test feature.
- b. Indicating light lens colors shall be as required in equipment specifications and/or as indicated on the Drawings. If lens colors are not indicated, the following colors shall be used:

Color	Designation
Red	"Run", "On", "Open"
Green	"Off", "Closed"
Amber	"Alarm", "Fail"
White	"Control Power On"

5. Emergency Stop and Tagline Switches

- a. Emergency stop switches shall be non-illuminated, red in color, with a minimum 35mm diameter mushroom head. Once activated, switch shall maintain its position and require a manual pull to release/reset.

- b. Tagline switches shall have a plunger that activates upon tension from the associated safety cable. Once activated, switch shall maintain its position and require a manual release/reset.
- c. Emergency stop and tagline switches shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each switch. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.

C. Relays and Timers

1. General

- a. Relays and timers shall be furnished with an integral pilot light for positive indication of coil energization.
- b. Relays and timers shall have tubular pin style terminals with matching 11-pin DIN rail mount socket. Spade or blade style terminals are not acceptable.
- c. Relays and timers for all electrical equipment under this Contract shall be of the same type and manufacturer unless otherwise specified herein or indicated on the Drawings.

2. Control and Pilot Relays

- a. Relays shall have a clear or translucent housing that allows the contacts to be visually inspected without disassembly.
- b. Relays shall have coil voltage as required to suit the application and/or as indicated on the Drawings.
- c. Relays shall be provided with contacts rated for 10A (resistive), minimum, at 120/240 VAC and 28 VDC. Relays shall have 3-pole, double-throw (3PDT) contact arrangement.

3. Time Delay Relays

- a. Timers delay relays shall utilize electronic timing technology. Mechanical timing devices are not acceptable.
- b. Relays shall have coil voltage as required to suit the application and/or as indicated on the Drawings.
- c. Relays shall be provided with contacts rated for 10A (resistive), minimum, at 120/240 VAC and 28 VDC. Relays shall have double-pole double-throw (DPDT) contact arrangement.

- d. Time delay ranges shall be as indicated on the Drawings and/or as required to suit the application. Timing range shall be adjustable from the front of the relay. On delay and off delay timer configurations shall be provided as indicated on the Drawings and/or as required to suit the application.
4. Elapsed Time Meters
- a. Elapsed time meters shall be non-resettable type with no less than a 4 digit display. Coil voltage shall be as required to suit the application and/or as indicated on the Drawings.
- D. Control Terminal Blocks
- 1. Control terminal blocks shall be assembled on non-current carrying galvanized steel DIN mounting rails securely bolted to the enclosure or subpanel. Terminals shall be tubular screw type with pressure plate that will accommodate wire size range of #22 – #8 AWG.
 - 2. Control terminal blocks shall be single tier with a minimum rating of 600 volts and 20A. Separate terminal strips shall be provided for each type of control used (i.e. 120VAC vs. 24VDC). Quantity of terminals shall be provided as required to suit the application. In addition, there shall be a sufficient quantity of terminals for the termination of all spare conductors.
 - 3. Terminals shall be marked with a permanent, continuous marking strip, with each terminal numbered. One side of each terminal shall be reserved exclusively for incoming field conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal.

PART 3 –

PART 3 – EXECUTION

3.01 INSTALLATION

- A. All control components shall be mounted in a manner that will permit servicing, adjustment, testing, and removal without disconnecting, moving, or removing any other component. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required otherwise by the manufacturer to protect equipment from vibration. Component's mounting shall be oriented in accordance with the component manufacturer's and industries' standard practices.
- B. Pilot devices shall be properly bonded to the equipment enclosure door where they are installed. If proper bonding cannot be achieved through the locknuts that affix the device

in place, a green colored bonding screw shall be provided on the pilot device. The device shall be bonded to the equipment enclosure with an insulated green bonding conductor.

- C. Terminal strips, relays, timers, and similar devices shall not be installed on the rear of the panel/cabinet doors. Terminal strips, relays, timers, and similar devices shall not be installed on the side walls of panel/cabinet interiors without written permission from the Engineer.

END OF SECTION

SECTION 26 22 00
LOW-VOLTAGE TRANSFORMERS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, and test transformers for power and lighting distribution systems as specified herein, as indicated on the Drawings, and as required to complete the electrical installations.
- B. All equipment specified in this Section shall be furnished by the transformer manufacturer who shall be responsible for the suitability and compatibility of all included equipment.
- C. Reference Section 26 05 00 – Basic Electrical Requirements.

1.02 CODES AND STANDARDS

- A. Transformers shall conform to all applicable Federal, UL, and NEMA standards. Materials and components shall be new and conform to grades, qualities and standards as specified herein and shown on the Drawings.
- B. Transformers shall comply with the following standards:
 - 1. UL 1561 – Dry Type General Purpose and Power Transformers
 - 2. U.S. Department of Energy 2016 Efficiency
 - 3. National Electrical Code
 - 4. NEMA ST-20 – Dry Type Transformers for General Applications
 - 5. ANSI C57 – Standard General Requirements for Dry Type Distribution and Power Transformers

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Division 01, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings.
 - 2. Operation and Maintenance Manuals.
 - 3. Spare Parts List.

4. Reports of Certified Shop Field Tests.

B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein, and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Product data sheets.

2. Drawings showing clearly marked dimensions and weight for each transformer.

3. Sample equipment nameplate diagram.

D. The submittal information shall reflect the specific equipment identification number as indicated on the Drawings (e.g. TX-LP-3L).

E. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items that the Contractor intends to provide are acceptable and shall be submitted.

1.05 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01.

1.06 SPARE PARTS

A. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor.

B. Spare parts lists, included with the Shop Drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

C. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.07 IDENTIFICATION

- A. Each transformer shall be identified with the equipment item number indicated on the Contract Drawings and the accepted Shop Drawings. A nameplate shall be securely affixed in a conspicuous place on each transformer. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
- B. Dry type distribution transformers shall be Energy Star compliant and manufactured by the Square D Company, the General Electric Company, Eaton, or Siemens Energy and Automation, Inc.

2.02 DRY TYPE TRANSFORMERS

- A. Furnish and install single-phase and three-phase general purpose, dry-type transformers, as specified herein and indicated on the Drawings. The transformers shall be 60 Hz, self-cooled, quiet-design insulated of the two-winding type.
- B. The transformers shall be UL 1561 Listed.
- C. The primary windings shall be rated 480 VAC for use on 3-phase systems and connected delta unless indicated otherwise on the Drawings. KVA ratings shall be as shown on the Drawings. Furnish transformers with two 2-1/2% primary taps above, and four 2-1/2% primary taps below rated voltage for transformers 15 KVA and above, and two 2-1/2% primary taps above, and two 2-1/2% primary taps below rated voltage for transformers less than 15 kVA. All taps shall be full capacity rated.
- D. The ratings of the secondary windings shall be as indicated on the Drawings.
- E. Transformers shall be designed for continuous operation at rated KVA, 24 hours a day, 365 days a year, with normal life expectancy as defined in IEEE 65 and ANSI C57.96. This performance shall be obtainable without exceeding 150 degrees Celsius average temperature rise by resistance or 180 degrees Celsius hot spot temperature rise in a 40 degrees Celsius maximum ambient and 30 degrees Celsius average ambient. The maximum coil hot spot temperature shall not exceed 220 degrees Celsius. All insulating materials shall be flame retardant and shall not support combustion as defined in ASTM Standard Test Method D 635. All insulating materials shall be in accordance with NEMA ST 20 Standard for a 220 degrees Celsius UL component recognized insulation system.

- F. Transformer coils shall be of the continuous wound copper construction and shall be impregnated with non-hygroscopic, thermosetting varnish.
- G. All cores are to be constructed of high grade, non-aging, grain-oriented silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point. The core laminations shall be tightly clamped and compressed with structural steel angles. The completed core and coil shall then be bolted to the base by means of vibration-absorbing mounts to minimize sound transmission. There shall be no metal-to-metal contact between the core and coil assembly and the enclosure.
- H. All transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring. The maximum temperature of the enclosure shall not exceed 90 degrees Celsius. Transformers shall be furnished with lugs of the size and quantity required and suitable for termination of the field wiring.
- I. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.
- J. Transformers shall have core and coil assemblies mounted on rubber isolation pads to minimize the sound levels. Transformers shall not exceed the sound levels listed in NEMA ST-20.
- K. Transformers shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 3R, Painted Steel
Indoor Dry Process Area	NEMA 2, Painted Steel
Indoor Dry Non-Process Area	NEMA 2, Painted Steel
All Outdoor Areas	NEMA 3R, Painted Steel

- L. The enclosure shall be made of heavy gauge steel and shall be degreased, cleaned, primed, and finished with a baked weather-resistant enamel using the manufacturer's standard painting process. Color shall be ANSI 61.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The transformers shall be furnished and installed as shown on the Drawings and as recommended by the equipment manufacturer.

- B. Conduit routed to and from the transformer shall be arranged for easy removal of the transformer access covers.
- C. Where transformers 50 kVA and smaller are shown to be wall mounted, a transformer manufacturer supplied wall mounting kit shall be used. The lowest point of the wall mounting bracket shall be no lower than 7'-0" above the finished floor. Field fabricated mounting hardware is not acceptable unless reviewed and approved in writing by the Engineer.
- D. Prior to final completion of the work, all metal surfaces of the equipment shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same lacquer as used for shop finishing coats.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. Certified Shop Tests
 - a. The transformers shall be given routine factory tests in accordance with the requirements of the ANSI and NEMA standards. Temperature rises may be certified from basic design.
 - b. As a minimum, the following tests shall be made on all transformers:
 - 1) Ratio tests on the rated voltage connection and on all tap connections.
 - 2) Polarity and phase-relation tests on the rated voltage connection.
 - 3) Applied potential tests.
 - 4) Induced potential tests.
 - 5) No-load and excitation current at rated voltage on the rated voltage connection.
 - 2. Field Tests
 - a. Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 01, and NETA Acceptance Testing Specifications, latest edition.
 - b. Insulation between windings shall be tested by 1000 VDC Megaohmmeter for one (1) minute. Resistance value shall be no less than 100 Megaohms.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install panelboards of voltage and current ratings as specified herein and indicated on the Drawings. Panelboards shall be furnished with circuit breaker ratings, number of breakers, number of poles and locations conforming to the panelboard schedules on the Drawings.
- B. Reference Section 26 05 00 – Basic Electrical Requirements; and Section 26 05 53 – Identification for Electrical Systems

1.02 CODES AND STANDARDS

- A. Panelboards shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. Underwriters Laboratories
 - a. UL 50 – Enclosures for Electrical Equipment, Non-environmental Considerations
 - b. UL 67 – Standard for Panelboards
 - c. UL 489 – Molded Case Circuit Breakers, Molded Case Switches, and Circuit Breaker Enclosures
 - d. UL 943 – Ground Fault Circuit Interrupters
 - 2. NEMA PB1 – Panelboards
 - 3. National Electrical Contractors Association (NECA) Standard 407 – Standard for Installing and Maintaining Panelboards

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings.
 - 2. Spare Parts List.

3. Operation and Maintenance Manuals.
 4. Reports of Field Tests.
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
1. Product data sheets.
 2. Complete assembly, layout, and installation drawings with clearly marked dimensions for each panelboard.
 3. Complete panelboard schedules indicating circuit designations as shown on the Drawings for each panelboard.
 4. The submittal information shall reflect the specific equipment identification number as indicated on the Drawings (e.g., LP-3L, etc.).

1.05 OPERATIONS AND MAINTENANCE MANUALS

- A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01. The manuals shall include:
1. Instruction books and/or leaflets.
 2. Recommended spare parts list.
 3. Final as-built construction drawings included in the shop drawings incorporating all changes made in the manufacturing process and during field installation.

1.06 SPARE PARTS

- A. For each panelboard, the Contractor shall furnish to the Owner all spare parts as recommended by the equipment manufacturer. All spaces in the panelboards shall be furnished with a spare breaker as indicated in the panelboard schedules shown on the Drawings.

- B. Spare parts lists shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- C. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size shall have the same parts number.

1.07 IDENTIFICATION

- A. Each panelboard shall be identified with the identification name/number indicated on the Drawings. A nameplate shall be securely affixed in a conspicuous place on each panelboard. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 PANELBOARDS

- A. General

1. Panelboards shall be dead-front type with automatic trip-free, non-adjustable, thermal-overload, branch circuit breakers. Panelboards shall be of the configuration and rating as specified herein and indicated on the Drawings. Panelboards shall be UL 67 Listed and shall be constructed to NEMA PB1 standards. Panelboards shall be service entrance rated where indicated on the Drawings.
2. Panelboards shall be equipped with a main breaker or main lugs complete with branch circuit breakers, as indicated on the Drawings. The panelboards shall be suitable for flush or surface mounting.
3. Panelboards shall be fully rated and shall have a minimum short circuit rating of 22,000 amperes symmetrical for units rated 240VAC and below, and 65,000 amperes symmetrical for units rated above 240VAC, unless otherwise indicated on the Drawings.
4. Panelboards shall be Eaton Pow-R-Line Series, the Square D Company equivalent, the General Electric Company equivalent, or Siemens Energy and Automation, Inc. equivalent.

- B. Enclosures

1. Enclosures shall be UL 50 listed and have a NEMA rating as indicated on the Drawings. An Underwriter's Laboratories, Inc. inspection label shall appear on the interior of the cabinet. Enclosures designated as NEMA 4X shall be constructed of 304 stainless steel. Enclosures with all other NEMA ratings shall be constructed of No. 12 U.S.S. code gauge galvanized steel, painted ANSI #61 light gray. The enclosure shall have wiring gutters on sides and shall be at least 5-3/4 inches deep.
2. The door shall be fastened to the enclosure with concealed hinges and shall be equipped with flush-type catches and locks. The Contractor shall equip cabinet doors exceeding 40 inches in height with vertical bolt three-point locking mechanism. All locks shall be keyed alike. The panelboard trim shall have a removable hinge assembly, in addition to the door hinge, that allows work inside the enclosure without the need to remove the trim.
3. The panelboard shall be provided with an information label. The information label shall include the panelboard designation, voltage, phase, wires, and bus rating.

C. Bus Work

1. Main bus bars shall be of ample size so that a current density of not more than 1000 amperes per square inch of cross section will be attained. This current density shall be based on the application of the full load connected to the panel plus approximately 25% of the full load for spare capacity. The main bus shall be full capacity as based on the preceding for the entire length of the panel so as to provide full flexibility of circuit arrangement. Bus shall be sized in accordance with UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above a maximum ambient temperature of 40 degrees C.
2. Solid neutral bus bars are required, and neutral bus ampacity shall be the same as the main bus bars unless otherwise noted. Ratings shall be in accordance with applicable standards.
3. A separate ground bus shall be provided with lugs for termination of equipment grounding conductors.
4. Branch bus work shall be rated to match the maximum branch circuit breaker which may be installed in the standard space.
5. All bus shall be tin-plated copper and shall extend the entire useable length of the panelboard, including spaces.

D. Circuit Breakers

1. Circuit breakers shall be bolt-on, molded-case type and UL 489 Listed. All circuit breakers shall have quick-make, quick-break, toggle mechanism for manual as

well as automatic operation. Tandem or half-size circuit breakers are not acceptable.

2. Where indicated on the Drawings, or where required by Code, circuit breakers shall be equipped with integrally mounted ground fault interrupters complete with "TEST" push button and shall be of a type which fit standard panelboard spaces for the breaker continuous current rating required. Ground fault circuit interrupter style circuit breakers shall be UL 943 Listed. Circuit breakers used for lighting circuit switching shall be approved for the purpose and shall be marked "SWD". Where required by Article 440 of the NEC, circuit breakers installed for air conditioning units shall be HACR type.
3. Circuit breaker voltage ratings shall meet or exceed the panelboard voltage indicated on the Drawings. The number of poles and trip ratings shall be as indicated on the Drawings. Where a trip rating is not indicated on the Drawings, provide a 20A circuit breaker. Circuit breakers for panelboards rated 240VAC and below shall have an interrupting rating at 240 VAC that matches the panelboard short circuit rating. Circuit breakers for panelboards rated above 240VAC shall have an interrupting rating at 480 VAC that matches the panelboard short circuit rating.
4. Main circuit breakers shall be individually mounted. Branch mounted circuit breakers are not acceptable unless specifically indicated on the Drawings. Coordinate top or bottom mounting of main circuit breaker with incoming conduit location.
5. Branch circuit breakers shall be provided with a padlockable hasp or handle padlock attachment for padlocking in the off position as required to meet the NEC requirement for disconnecting means and/or OSHA lock-out/tagout standard. Locking hardware shall remain in place even when the padlock is removed. Branch circuit breakers shall be provided with a similar lock-on device where indicated on the Drawings.

E. Directories

1. Approved directories with noncombustible plastic cover, and with typewritten designations of each branch circuit, shall be furnished and installed in each panelboard. The Contractor shall maintain in each panel, during the duration of the Contract, a handwritten directory clearly indicating the circuit breakers in service. This directory shall be updated as work progresses, and final, typewritten directories, as specified above, shall be installed at the end of the project. Designations and circuit locations shall conform to the panelboard schedules on the Drawings, except as otherwise authorized by the Engineer.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Panelboards shall be furnished and installed as shown on the Drawings and as recommended by the equipment manufacturer, and as required by NECA 407.
- B. Panelboards shall be set true and plumb in locations as shown on the Drawings. The top of panelboard enclosure shall not exceed six (6) feet above finished floor elevation.
- C. Enclosures shall not be fastened to concrete or masonry surfaces with wooden plugs. Appropriate cadmium plated or galvanized steel bolts shall be used with expansion shields or other metallic type concrete insert for mounting on concrete or solid masonry walls. Cadmium plated or galvanized steel toggle bolts shall be used for mounting on concrete block or other hollow masonry walls. Bolt diameter shall be as required considering the size and weight of the completed panelboard and enclosure to provide adequate structural support.
- D. The Contractor shall not use factory furnished knockouts with surface mounted back boxes. The Contractor shall punch or drill required openings during installation and shall equip flush mounted back boxes with manufacturer's standard pattern of knockouts.
- E. The Contractor shall install cabinets (and other enclosure products) in plumb with the building construction. Flush mounted enclosures shall be installed so that the trim will rest against the surrounding surface material and around the entire perimeter of the enclosure.
- F. Bus loads in all panelboards shall be balanced between phases to within a tolerance of one (1) KVA. Convenience receptacles shall be distributed evenly among all phase buses as much as practical.
- G. Prior to final completion of the work, all metal surfaces of the equipment shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same lacquer as used for shop finishing coats.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. Field Tests
 - a. Prior to termination of any conductors to the circuit breakers, all bus work and circuit breakers shall be tested from phase to phase and phase to ground with a 1000 VDC megaohmmeter for 1 minute in accordance with NECA 407. Resistance values shall be recorded and shall not be less than 100 megohms.

- b. Prior to terminating any wires to the circuit breakers, the resistance of the connection between the bus work and each circuit breaker shall be tested through the use of a low-resistance ohmmeter. Record the resistance values for each circuit breaker.

END OF SECTION

SECTION 26 24 19
LOW VOLTAGE MOTOR CONTROL CENTERS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, test, and place in satisfactory operation, the motor control centers as specified herein and indicated on the Drawings.
- B. The Contractor shall obtain the motor control centers from one manufacturer who shall also manufacture the enclosure and major equipment components, which includes, but is not limited to, combination starters, circuit breakers, power monitoring equipment, and other components of the equipment assembly. Subcontracting of wiring is not acceptable.
- C. The motor control center shall be assembled using NEMA rated components. Components designed and built to International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured and labeled in compliance with IEC standards is not acceptable.
- D. Reference Section 26 05 00 – Basic Electrical Requirements; Section 26 05 53 – Identification for Electrical Systems; Section 26 43 13 – Surge Protective Devices, and Section 26 09 16 – Electric Controls and Relays.

1.02 CODES AND STANDARDS

- A. The assemblies shall meet or exceed the requirements within the following standards for motor control centers:
 - 1. NEMA ICS-18
 - 2. UL845
- B. The motor control center shall be designed, manufactured, and tested in facilities registered to the following quality standards:
 - 1. ISO 9001

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings.

2. Spare Parts List.
 3. Proposed Testing Methods and Reports of Certified Shop and Field Tests.
 4. Manufacturers Startup Certification
 5. Operation and Maintenance Manuals.
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings for each motor control center shall include but not be limited to:
1. A Compliance, Deviations, and Exceptions (CD&E) letter. If the shop drawings are submitted without this CD&E letter, the submittal will be rejected. The letter shall include all comments, deviations and exceptions taken to the Drawings and Specifications by the Contractor AND Equipment Manufacturer/Supplier. This letter shall include a copy of this Specification Section. In the left margin beside each and every paragraph/item, a letter "C", "D", or "E" shall be typed or written in. The letter "C" shall be for full compliance with the requirement. The letter "D" shall be for a deviation from the requirement. The letter "E" shall be for taking exception to a requirement. Any requirements with the letter "D" or "E" beside them shall be provided with a full typewritten explanation of the deviation/exception. Handwritten explanation of the deviations/exceptions is not acceptable. The CD&E letter shall also address deviations, and exceptions taken to each Drawing related to this Specification Section.
 2. Product data sheets.
 3. Example equipment nameplate data sheet.
 4. Approximate total shipping weight of each shipping split.
 5. Plan, front, and side view drawings, including overall dimensions of each motor control center. Identify shipping splits and show conduit stub-up area locations on the Drawings.
 6. Internal schematic and point-to-point wiring diagrams of each motor control unit. Standard wiring diagrams that are not custom created by the manufacturer for the motor control centers for this project are not acceptable. One wiring diagram which

is typical for an equipment group is not acceptable. Each wiring diagram shall include wire identification and terminal numbers. Indicate all devices, regardless of their physical location, on the diagrams. Identify on each respective wiring diagram specific equipment names and equipment numbers consistent with those indicated on the Drawings.

7. Complete single-line diagrams for each motor control center showing circuit breakers, motor circuit protectors, motor controllers, instrument transformers, meters, relays, timers, control devices, dry-type transformers, panelboards, and other equipment comprising the complete assembly. Indicate electrical ratings of equipment and devices on these single-line diagrams. Ratings include starter size and type, motor circuit protector continuous current rating, circuit breaker frame size and trip rating, transformer ratings, panelboard ratings, motor horsepower and full load current, and similar information.
 8. Bill of material list for each motor control center and each motor control unit.
 9. Nameplate schedule for each motor control center.
 10. Manufacturer's installation instructions.
 11. Key interlock scheme drawing and sequence of operations.
 12. Manufacturer's Warranty Statement
 13. Table listing all motor loads connected to the motor control center. Table shall include the full load amps of the APPROVED motors. Final approval of MCC shop drawings cannot be given until all motor loads for MCC have been reviewed, approved, and shown in this table.
- D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.
- E. Prior to completion and final acceptance of the project, the Contractor shall furnish and install "as-built" wiring diagrams for each motor control center unit of each motor control center. These final drawings shall be included in the O&M manuals.

1.05 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01.

1.06 SPARE PARTS

- A. All spare parts as recommended by the equipment manufacturer shall be provided as optional extra for the Owner to consider.
- B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
- C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the work, at which time they shall be delivered to the Owner.
- D. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Term such as "1 lot of packing material" are not acceptable.
- E. Parts shall be completely identified with a numerical system to facilitate parts control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.07 IDENTIFICATION

- A. Each motor control center shall be identified with the identification number indicated on the Drawings (e.g., MCC-2). A nameplate shall be securely affixed in a conspicuous place on each motor control center. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
- B. It is the intent of these specifications that all components of the motor control center be provided by one manufacturer who shall have the sole responsibility of matching all components and providing equipment which functions together as a system. The manufacturer of the motor control center shall also be the manufacturer of the motor controllers. The use of third-party supply and assembly of these components is not acceptable.
- C. Motor control centers shall be Freedom 2100 as manufactured by Eaton using NEMA rated Freedom Series contactors and starters, Model 6 as manufactured by the Square D Company, Centerline 2100 as manufactured by Allen-Bradley, Tiastar as

manufactured by Siemens Energy and Automation Inc., or the General Electric Company Evolution Series E9000. No substitutions allowed.

2.02 MOTOR CONTROL CENTER

A. General

1. The motor control centers shall be 600 VAC class suitable for operation on a three-phase, 60 Hz system. The motor control centers and their components shall conform to the requirements of applicable standards of NEMA Part ICS 2-322 and Underwriters' Laboratories, Inc. UL-845. Wiring shall be NEMA Class II, Type B. Each vertical section shall be a NEMA 1A (gasketed) industrial use enclosure unless otherwise specified or indicated on the Drawings.
2. The enclosures shall be cleaned, primed, and finish coated in accordance with the manufacturer's standard process. The pre-treatment process shall be a zinc chromate primer followed by a "One Coat" paint process that is monitored to meet the manufacturer's specifications for paint color, texture, thickness, and durability. Enclosure interior and exterior finish color shall be ANSI 49 (medium light gray). The color of the back panel/bucket located within the MCC enclosure shall be white.
3. The motor control centers shall be capable of withstanding the fault current available at its line terminals. Minimum bus bracing, withstand, and interrupting ratings are specified herein.
4. Unless otherwise specified or indicated on the Drawings, each vertical section shall be approximately 20 inches wide, and 90 inches high, 20 inches deep, and shall not contain more than six NEMA Size 1 starters. Motor control centers shown "back-to-back" on the Contract Drawings shall be complete motor control assemblies placed back-to-back in the location shown. Motor control center sections with common horizontal and/or vertical bus systems are unacceptable.
5. Continuous horizontal wiring troughs shall be provided at both the top and bottom of each section. These troughs shall line up to form a continuous wireway for the full length of the motor control center. Each section shall be provided with a large, continuous, full height vertical wiring trough in the right side of each section. Each vertical wiring trough shall be furnished complete with tie bars for conductor support.
6. All control wiring shall be No. 14 AWG (minimum) labeled at each end in accordance with the wiring numbers shown on the accepted shop drawings. Power wiring shall be sized to suit the maximum horsepower rating of unit; No. 12 AWG (minimum). Wiring shall be type MTW rated for 105°C. Wire color coding shall be red for control and black for power. Wire numbers shall not be repeated in a motor control center.

7. Starter units shall contain the number of auxiliary contacts, unit-mounted pilot devices and indicating lights, control relays, elapsed time meters, and other devices as shown on the Drawings and required for the applications. A minimum of two (2) normally open (NO) and two (2) normally closed (NC) spare contacts shall be provided for each magnetic starter. These spare contacts shall be shown on the submittal wiring diagrams.
8. The motor control centers shall be furnished with warning signs to notify maintenance personnel of multiple sources of power within the motor control units.

B. Power

1. The motor control centers shall be supplied from a 480V, 3-phase, 3 wire, 60 Hz power source. The incoming power feeders shall be sized as shown on the Drawings. All terminals for incoming and outgoing power cables shall be provided with compression lugs.

C. Bus

1. Power shall be distributed by means of a continuous, tin plated copper horizontal bus, rated as shown on the Drawings. The bus shall be braced for 65,000A rms symmetrical at 480V unless otherwise indicated on the Drawings. The horizontal bus shall be effectively isolated from all wiring troughs and other working areas. Vertical bus extensions shall be tin plated copper, isolated by rigid, glass-polyester moldings so as to be a separate self-supported assembly. Silver plated vertical bus may be provided if specifically accepted by the Engineer. Full height vertical bus shall be installed in all sections including those containing spare units and "prepared" spaces. No extra safety jacks or similar devices shall be required to obtain an essentially dead-front condition. Access shall be provided for inspection and maintenance from the front. Minimum horizontal bus rating shall be 600A. Minimum vertical bus rating shall be 300A.

D. Incoming Line Units

1. Each incoming line unit shall contain buswork and fittings as required with cable lugs for cables of sizes and quantities shown on the Drawings. Cable lugs shall be suitable for their respective conductors.

E. The Unit Compartments

1. Each unit compartment shall be provided with an individual front door hinged to the vertical structure. Each plug-in unit shall be supported and guided by a removable unit support pan, so that the unit rearrangement is easily accomplished. The rearrangement of the unit support pan from one location to the other shall be accomplished without use of tools. After insertion, each plug-in unit shall be held in place by at least one multi-turn latch, located at the front of the unit. The latch shall be located for front accessibility and installation convenience. An additional

mechanical interlock shall be provided to prevent withdrawal of the unit from the stationary structure with the operating mechanism in the ON position.

2. The unit plug in power stabs shall be electromagnetically tin-plated copper to yield a low resistance connection and designed to tighten during heavy current surges and short circuits. The stab shall be backed by spring steel clips to provide and maintain a high pressure, two-point connection to the vertical bus. They shall be free floating and self-loading plug-in. Wiring from the unit disconnecting means to the plug-in stab shall be exposed at the rear of the unit. The power cable terminations at the plug-in stab shall be mounted in a two-piece, glass polyester support assembly. This support assembly shall provide a separate isolated pathway for each phase, minimizing the probability of a unit fault condition reaching the power bus system.
3. NEMA Size 1 through Size 5 non-reversing starters shall be plug-in units. Size 1, 2, and 3 shall utilize stab assembly rated 100A. Stab assemblies for Size 4 and Size 5 starters shall be rated for the starters maximum output current rating.
4. An industrial, heavy-duty flange handle mechanism shall be supplied for the control of each disconnecting means. This mechanism shall be engaged with the disconnect device at all times as an integral part of the unit regardless of the unit door position. The operator handles shall have an up-down motion with the down position as off. The ON-OFF condition of the disconnecting means shall be permanently marked on the handle operator. It shall be possible to lock the handle in the "OFF" position with up to three (3) 3/8-inch diameter shackle padlocks and in the "ON" position with one (1) 3/8 inch diameter shackle padlock.
5. The operator handle of all units shall be interlocked with the door units so that the disconnect means cannot be switched unless the door unit is closed. A means shall be provided for purposely defeating the interlock during maintenance or testing. This interlock shall also prevent opening the unit door unless the disconnecting means is in the off position. An externally operated def eater requiring the use of a screwdriver shall provide access to the unit without interrupting service.
6. The overload relays shall be resettable from the outside of the enclosure by means of an insulated bar or button.

F. Ground Bus

1. The horizontal ground bus shall be tin plated copper and located in the bottom horizontal wireway. The minimum size of the horizontal ground bus shall be ¼-inch x 1 inch (6.35mm x 25.4mm) or 33% of the phase bus ampacity, whichever is greater.
2. Compression lugs shall be mounted on the ground bus in each section, in the size and quantity as required for the termination of system and equipment grounding conductors.

3. The vertical ground bus shall be tin plated copper and solidly connected to the horizontal ground bus. This ground bus, in combination with the unit ground bus stab, establishes unit grounding before the plug-in power stabs engage the power bus, and conversely, as the unit is withdrawn, grounding is maintained until after the plug-in power stabs are disengaged.
4. The vertical load ground bus shall be tin plated copper and solidly connected to the horizontal ground bus. The vertical load ground bus assembly, comprised of the vertical load ground bus and the unit load ground bus connector, shall provide a termination point for the load equipment grounding conductor at the unit. This fixed connection shall not have to be removed when the unit is withdrawn from the motor control center.

G. Isolation and Insulation

1. Horizontal bus access covers and vertical bus covers shall isolate the energized buses to guard against the hazard of accidental contact. These covers shall be molded of a glass polyester material.
2. The horizontal bus shall be isolated from the top horizontal wireway by a grounded steel barrier. This barrier shall be removable to allow access to the bus and connections for maintenance.
3. The vertical bus cover shall provide unit plug-in openings which shall permit unit plug-in stab assemblies to pass through and engage the vertical bus. The unit plug-in openings shall be sized to minimize the probability of inadvertent contact with the vertical bus.
4. Isolation of unused stab openings shall be accomplished by use of a manual shutter to close off the stab opening. These shutters shall be attached to the structure so that when they are removed (to allow a stab connection) they are retained in the structure and are readily accessible for use should a plug-in unit be removed from the motor control center.
5. All units shall be isolated from one another, above and below, by unit support pans or steel barriers, which can remain in place when the units are withdrawn.
6. Incoming line compartments shall be isolated from horizontal and vertical wireways by steel barriers.
7. A molded unit isolating barrier shall be provided to isolate the unit from the vertical wireway.

H. Combination Motor Control Units

1. Motor branch circuits shall be protected by a motor circuit protector (MCP).

2. The motor circuit protector shall be operated by a toggle type handle and shall have a quick make, quick break overcenter switching mechanism that is mechanically trip free from the handle, so that the contacts cannot be held closed against short circuits and abnormal currents. Tripping shall be clearly indicated by the handle automatically assuming a position midway between the manual ON and OFF positions. All latch surfaces shall be ground and polished. All poles shall be so constructed that they open, close, and trip simultaneously.
3. Each pole of these motor circuit protectors shall provide instantaneous short circuit protection by means of an adjustable magnetic only element.
4. The motor circuit protectors in combination with a contactor and overload relay shall have an interrupting rating that matches the motor control center short circuit rating at 480V.
5. Motor circuit protector's ratings, modifications, etc., shall be as specified herein and as indicated on the Drawings.
6. Motor circuit protectors shall be completely enclosed molded case devices with a current sensing coil in each of the 3 poles and have a magnetic trip adjustment located on the front. The motor circuit protector shall be manually operable. The protector shall be designed to meet the NEC requirement concerning motor full load and locked-rotor current. Ampere ratings shall be clearly visible. Contacts shall be of non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes, consisting of metal grids mounted in an insulating support.

I. Motor Starters

1. Motor starters shall conform to NEMA Standard IC1 and shall be for across-the-line starting, unless otherwise indicated. IEC rated equipment is not acceptable and shall be used as a basis for rejection of the equipment. The size of the starter shall be as required for the particular load. Minimum starter size shall be NEMA Size 1. Size 1 and 2 starters shall be completely drawout type, so that units may be withdrawn without disconnecting any wiring. Size 3 and 4 full-voltage, non-reversing starters shall be drawout type after disconnecting power leads only. Starters over three-space units high may be bolt-on type. A positive guidance system shall be provided to assure proper alignment of wedge-shaped power stabs in deadfront openings in vertical power bus.
2. A suitable control disconnect device(s) to comply with the requirements of the NEC shall be provided.
3. Magnetic starters and contactors shall be electromagnetic vertical or horizontal lift design with double break cadmium oxide silver contacts. Design shall meet or exceed the requirements of UL and NEMA Standards. Coils shall be hot molded construction to protect the coils from mechanical and environmental damage.

4. Each starter shall be able to accommodate a minimum of three (3) auxiliary contacts in addition to the hold-in contact.
5. Each starter shall be supplied with a 3-pole, manual reset overload relay. The relays shall be solid state type, with at least one isolated normally open and one isolated normally closed auxiliary contact that operates when a trip condition has occurred. Relays shall be self-powered, have a visible trip indicator, have a trip test function, and have selectable Class 10 or 20 operation. Overload relays shall be set for Class 10 operation unless otherwise directed by the Engineer. Overload relay shall have phase loss protection built in to trip the unit and protect the motor against single phasing. The Contractor shall provide the overload relay model with the correct current range for each application. Overload relay shall have adjustable current range dial. Eutectic alloy or bi-metallic type overload relays are not acceptable.
6. Each motor starter coil shall be equipped with a surge-suppression device for protection of the solid-state equipment wired as part of the control circuit.
7. The Contractor and motor control center manufacturer is advised to review the Contract Documents for additional requirements for space heaters, power factor correction capacitors, and similar equipment which may not be specified in this Division or shown on the Drawings. Control power transformers shall be fused on both the primary and secondary sides. The minimum control power transformer VA requirements are shown below. Control power transformers shall be sized as required for the connected loads, plus 25% spare capacity.
 - a. Size 1-75 VA
 - b. Size 2-75 VA
 - c. Size 3-200 VA
 - d. Size 4-300 VA
 - e. Size 5-500 VA

J. Circuit Breakers

1. Where specified herein, indicated on the Drawings, or required, the main circuit breaker shall be rated for service entrance and bear a service entrance label.
2. Unless otherwise indicated, circuit breakers shall be manually operable and shall provide thermal-magnetic, inverse-time-limit overload, and instantaneous short-circuit protection.
3. Circuit breakers shall be molded case type, rated 480 VAC, 2 or 3 pole and have 100 ampere or larger frames. The interrupting rating shall match that of the motor control center short circuit rating at 480V.

4. Overload protection shall be provided on all poles with trip settings as indicated on the Drawings. Breakers of 225-ampere frames and larger shall have interchangeable trip units and adjustable magnetic trip elements.
5. Horizontally mounted operator handles for feeder circuit breaker units up to 225A are permissible if accepted in writing by the Engineer.
6. Where indicated on the Drawings, shunt trip devices shall be provided to trip a circuit from a remote location by means of a trip coil energized from a separate circuit. A 120V shunt trip shall be capable of operating 55% or more of rated voltage. All other shunt trips shall be capable of operating at 75% or more of rated voltage.

K. Terminal Blocks

1. Terminal blocks associated with removable units within the motor control center shall be provided as follows:
 - a. Terminal blocks shall be mounted within the unit insert and in the front for ease of accessibility.
 - b. Pull-apart style terminal block assemblies shall be provided. Terminal block assembly shall consist of a male and female component held together with captive screws. The terminal block assembly shall be designed to withstand the effects of vibration, yet able to be pulled apart without difficulty. The terminals of the assembly shall be recessed to isolate them from accidental contact. Terminal markings shall be provided for the purpose of identifying terminations. Terminal strips shall be suitable for use as a disconnecting means of foreign interlock voltages.
 - c. For starters Size 2 and smaller, terminate all starter wiring (power and control) and external field wiring on terminal blocks provided in each unit.
 - d. For starters Size 3 and larger, terminate control wiring and external field control wiring on terminal blocks provided in each unit.
2. Terminal blocks associated with non-removable units within the motor control center shall be provided in accordance with Section 26 09 16 – Electric Controls and Relays.
3. Provide a minimum of four (4) spare terminals in each terminal block assembly.

L. Control Devices

1. Furnish and install control devices as required and/or shown on the Drawings. The following control devices shall be provided as specified in Section 26 09 16 – Electric Controls and Relays:

- a. Pilot devices (switches, indicating lights, etc.)
- b. Relays and timers

M. Nameplates

1. Provide engraved plastic nameplates to identify the motor control center, each unit compartment, door mounted devices, and internal components.
2. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems. Equipment names and numbers as indicated on the single line diagrams shall be used as the basis to engrave the nameplates.
3. Provide a master nameplate giving motor control center designation, voltage rating, ampere rating, short circuit rating, manufacturer's name, general order number and item number.
4. Control components mounted as part of the assembly, such as fuse blocks, control relays, pushbuttons, switches, and similar devices, shall be suitably marked for identification corresponding to appropriate designations on the manufacturer's wiring diagrams.

N. Future Space Requirements

1. Provide spaces for future combination starter and other units in the motor control centers. Furnish spaces with hardware to accommodate future plug-in control unit without modification of vertical sections. Provide the number of spaces required for future units as indicated on the Drawings, minimum.
2. Provide additional vertical sections to ensure total number of spaces as indicated on the Drawings. The number of vertical sections is contingent upon specific manufacturer's final proposed and Engineer-accepted configuration of motor control center units.

O. Metering

1. Each motor control center assembly shall be furnished and installed with an Allen-Bradley PowerMonitor 3000 with display module as indicated on the Drawings. A communication expansion card to support Ethernet/IP communication to the plant control system and a 1GB memory card shall be provided with each meter.

P. Surge Protective Devices

1. Surge protective devices (SPD) shall be provided integral to the MCC enclosure. See Section 26 43 13 – Surge Protective Devices for SPD requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The motor control centers shall be installed as shown on the Drawings and in accordance with the manufacturer's installation instructions.
- B. Install motor control centers to allow complete unit door swing required for unit removal. This is specifically required where a vertical section of motor control center is set next to a wall to the left of the motor control center section.
- C. Where motor control center structures are located away from walls to allow bottom conduit entry, the Contractor shall furnish and install sheet metal coverings for openings along the sides and top of the motor control center line-up. The purpose of the coverings is to minimize dust, dirt, and undesirable materials from collecting behind the equipment. The sheet metal coverings shall be of the same material, gauge, and finish as the motor control center.
- D. Motor control centers shall be furnished with anchor bolts as required for aligning and mounting. Floor channels with end covers shall be of type recommended by the manufacturer and shall be furnished for installation in a concrete pad.
- E. All field wiring that is terminated directly to a unit within the motor control center shall be neatly routed in a manner that does not hinder the ability to service, adjust, or replace components within that unit. Field wiring shall be properly anchored to the motor control center and individual unit structures.
- F. Prior to final completion of the work, all metal surfaces of the equipment shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same lacquer as used for shop finishing coats.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. Witnessed Shop Tests
 - a. None required.
 - 2. Certified Shop Tests and Reports
 - a. Submit description of proposed testing methods, procedures, and apparatus. Submit notarized and certified copies of all test reports.

- b. As a minimum, the entire motor control center shall go through a quality inspection before shipment. This inspection shall include, but is not limited to, the following:
 - 1) Physical inspection of the structure and the electrical conductors including bussing, general wiring, and units.
 - 2) General electrical tests including power circuit phasing, control circuit wiring, instrument transformers, meters, ground fault system, and device electrical operation.
 - 3) AC dielectric tests of the power circuits and control circuits.
 - 4) Markings/labels, including instructional type, Underwriters Laboratory (UL), and inspector's stamps.
3. The manufacturer shall use integral quality control checks throughout the manufacturing process to maintain the correctness of the motor control center.

B. Field Tests

1. Field tests shall be performed in accordance with the requirements specified in the General Conditions, Division 01, and NETA Acceptance Testing Specifications, latest edition.

3.03 FIELD ADJUSTMENTS

- A. All adjustable settings of circuit breakers shall be set in the field by a qualified representative of the manufacturer, or an outside testing company retained by the Contractor, in accordance with the settings designated in the coordination study. See Section 26 05 00 – Basic Electrical Requirements.
- B. The settings of the motor circuit protectors and overload relays shall be set based on the coordination study and the motor nameplate data of the motors installed.

3.04 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. The Contractor shall provide the services of a qualified, factory-trained manufacturer's technical representative who shall adequately supervise the installation and testing of all equipment furnished under this Contract. The manufacturer's representative shall certify in writing that the equipment has been installed in accordance with the manufacturer's recommendations. No further testing or equipment startup may take place until this certification is accepted by the Owner.
- B. The manufacturer's technical representative shall perform startup and functional testing of the equipment as specified herein.

- C. The Contractor shall provide training for Owner personnel. Training shall be conducted by the manufacturer's factory-trained representative who shall instruct Owner personnel in operation and maintenance of all equipment provided under this Section. Training shall be provided for two (2) sessions of two (2) hours each. Training shall be at times coordinated with the Owner.

- D. The services of the manufacturer's representative shall be provided for a period of not less than as follows:
 - 1. One (1) trip of one (1) working day during the installation and startup of the equipment.
 - 2. One (1) trip of one (1) working day two (2) months before the warranty expiration to identify any issues to be corrected under warranty.
 - 3. One (1) trip of one (1) working day to perform training as specified herein.

- E. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install all switches, occupancy sensors, and receptacles as shown on the Drawings.
- B. All switches and receptacles shall be furnished and installed in outlet boxes. Reference Section 26 05 33.16 – Boxes for Electrical Systems for outlet box requirements.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 19 – Low-Voltage Conductors and Cables.

1.02 CODES AND STANDARDS

- A. Wiring devices shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. UL 20 – General Use Snap Switches
 - 2. UL 498 – Standard for Attachment Plugs and Receptacles
 - 3. UL 943 – Ground Fault Circuit Interrupters
 - 4. UL 1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations.

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit shop drawings. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include, but not be limited to:

1. Product data sheets.

1.05 SPARE PARTS

- A. The Contractor shall furnish 10% (minimum of 1) spare of each receptacle, switch, and plug furnished and installed for this project.
- B. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- C. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size shall have the same parts number.

1.06 IDENTIFICATION

- A. Each switch and receptacle shall be identified with the equipment item number, manufacturer's name or trademark, and such other information as the manufacturer may consider necessary, or as specified, for complete identification.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by these Specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
- B. The Contractor shall use the products of a single manufacturer for each type of wiring device.
- C. The Contractor shall use the products of a single manufacturer for all device plates. Plate variations are allowed for the following devices:
 1. Where the selected plate manufacturer does not manufacture a suitable finish plate.
 2. For heavy-duty receptacles rated at more than 30A.
 3. Where non-standard plates are required, specified, or shown.
- D. The Contractor shall furnish and install all wiring devices and device plates.
- E. In non-hazardous areas, provide specification grade devices manufactured by Appleton, Crouse-Hinds, Leviton, Hubbell, Pass & Seymour, or Engineer approved equal.

- F. In hazardous areas, provide devices manufactured by Appleton, Cooper Crouse-Hinds, Hubbell-Killark, or Engineer approved equal.

2.02 WIRING DEVICES

- A. Wall switches for non-hazardous areas shall be rated for the current required to suit the application, but not less than 20A. Double pole, three-way, and four-way switches shall be provided where indicated on the Drawings, and as required. Switches shall be rated for 120-277VAC and shall be UL 20 Listed.
- B. Convenience receptacles for non-hazardous areas shall be rated for 20A at 125VAC and shall be UL 498 Listed. Receptacles shall be weather resistant where installed in wet or damp locations.
- C. Special purpose receptacles (welders, lab equipment, etc.) shall be provided with the proper NEMA configuration and ampacity as indicated on the Drawings. The coordinating plug for each special purpose receptacle shall be provided with the equipment which it is serving.
- D. Ground fault circuit interrupter receptacles shall be rated for 20A at 125VAC and shall be UL 943 Listed. Receptacles shall be weather resistant where installed in wet or damp locations.
- E. Wall switches for hazardous areas shall be the factory sealed type, UL 1203 Listed for use in the hazardous area. Wall switches shall be rated for 120-277VAC, and shall be rated for the current required to suit the application, but not less than 20A
- F. Receptacles for hazardous areas shall be rated 20A at 120-240VAC. Receptacles shall be UL 1203 listed for use in the hazardous area, utilizing delayed-action construction.
- G. All wiring devices shall be approved for use with stranded conductors, if stranded conductors are to be used with the device. Reference Section 26 05 19 – Low-Voltage Conductors and Cable for conductor requirements

2.03 DEVICE PLATES

- A. Device plates for indoor flush-mounted receptacles and switches shall be made of Type 304 stainless steel, not less than 0.032 of an inch thick, with beveled edges and milled on the rear so as to lie flat against the wall. Devices plates shall be provided with a gasket.
- B. Device plates for outdoor installations, indoor wet process areas, and chemical storage/transfer areas shall be Appleton Type FSK, Crouse-Hinds #DS185, or equal for wall switches. Device plates for receptacles shall be “in-use” style. “In-use” weatherproof covers shall be rugged, minimum 3 ¼” depth, die-cast aluminum as manufactured by Thomas & Betts "Red Dot," Intermatic International, Inc., or equal.

- C. Device plates for indoor dry process and non-process areas with surface mounted boxes shall be Crouse-Hinds DS32, or equal for switches, and Crouse-Hinds DS23 or equal for receptacles.

2.04 PLUGS

- A. The Contractor shall furnish suitable plugs with equipment furnished under the respective Specification Section. Plugs shall be black rubber or plastic. For waterproof receptacles, the plugs shall be similar in construction to the receptacles and shall be encased in corrosion resistant yellow housing provided with clamping nuts and stuffing gland cable outlets.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Where more than one (1) switch occurs at one (1) location, gang plates shall be used.
- B. All device plates shall be set true and plumb and shall fit tightly against the finished wall surfaces and outlet boxes.
- C. Wiring device box (outlet box) mounting heights shall be as specified in Section 26 05 33.16 – Boxes for Electrical Systems.
- D. When indicated height would place any of the equipment at an unsuitable location such as at a molding or break in wall finish, the Contractor shall bring it to the attention of the Engineer for a decision.
- E. Receptacles installed in toilet, locker, and bathrooms, and within 6 feet of a sink, shall be of ground fault interrupter type. Ground fault circuit interrupter receptacles shall also be furnished and installed in additional locations where indicated on the Drawings, and as required by the NEC.
- F. All receptacles shall have a self-adhesive label installed on the top at the respective device plate that indicates which panel and which circuit number the receptacle is supplied from. Labels shall have a white background and black lettering in 14-point font.

3.02 CIRCUITING

- A. Convenience receptacles shall be grouped on circuits separate from the lighting circuits. A maximum of eight (8) convenience receptacles are permitted per 20A, 120V circuit, unless otherwise indicated on the Drawings.

END OF SECTION

SECTION 26 43 13
SURGE PROTECTIVE DEVICES

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, and place in satisfactory operation, the surge protective devices (SPD) as specified herein and indicated on the Drawings.
- B. Reference Section 26 05 19 – Low-Voltage Conductors and Cables, and Section 26 05 53 – Identification for Electrical Systems.

1.02 CODES AND STANDARDS

- A. The surge protective device shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. Underwriters Laboratories, Inc. (UL)
 - a. UL1449, latest edition: Surge Protective Devices
 - b. UL1283, latest edition: Electromagnetic Interference Filters
- B. American National Standards Institute (ANSI)/Institute of Electrical & Electronic Engineers (IEEE)
 - 1. C62.41.1: 2002 Guide for Surge Voltages in Low-Voltage AC Power Circuits
 - 2. C62.41.2: 2002 Recommend Practice on Characterization of Surges in Low Voltage (100V and Less) AC Power Circuits.
 - 3. C62.45: 2002 IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits
 - 4. C62.62: 2000 IEEE Standard Test Specifications for Surge Protective Devices for Low Voltage (1000V and Less) AC Power Circuits

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Operation and Maintenance Manuals

3. Spare Parts List

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for re-submittal.
- C. Drawings submitted by the manufacturer shall be complete and documented to provide the Owner with operations and maintenance capabilities.
- D. Shop drawings for each SPD shall include but not be limited to:
 - 1. A Compliance, Deviations, and Exceptions (CD&E) letter. If the shop drawings are submitted without this CD&E letter, the submittal will be rejected. The letter shall include all comments, deviations and exceptions taken to the Drawings and Specifications by the Contractor AND Equipment Manufacturer/Supplier. This letter shall include a copy of this Specification Section. In the left margin beside each and every paragraph/item, a letter "C", "D", or "E" shall be typed or written in. The letter "C" shall be for full compliance with the requirement. The letter "D" shall be for a deviation from the requirement. The letter "E" shall be for taking exception to a requirement. Any requirements with the letter "D" or "E" beside them shall be provided with a full typewritten explanation of the deviation/exception. Handwritten explanation of the deviations/exceptions is not acceptable. The CD&E letter shall also address deviations, and exceptions taken to each Drawing related to this Specification Section.
 - 2. Product Data Sheets.
 - 3. Detailed drawings showing weights and dimensions.
 - 4. Wiring diagrams showing field connections.
 - 5. Proof that all products provided under this Section are UL listed and labeled by Underwriters Laboratories to UL1449, latest Edition. This proof shall be a copy of the data listed under the UL File Number for the manufacturer, which may be obtained from the UL Online Certification Directory. No other means of proving compliance (such as manufacturer data sheets, marketing material, etc) will be considered acceptable.
 - 6. Proof of Short Circuit Current Ratings (SCCR), Voltage Protection Ratings (VPRs) for all modes, Maximum Continuous Operating Voltage rating (MCOV), Nominal Discharge Current (In), and device listing Type shall be submitted using the same means as described in the paragraph above.

7. Proof that all products provided under this Section are UL listed and labeled by Underwriters Laboratories to UL 1283, latest Edition. This proof shall be a copy of the data listed under the UL File Number for the manufacturer, which may be obtained from the UL Online Certification Directory. No other means of proving compliance (such as manufacturer data sheets, marketing material, etc) will be considered acceptable.

8. Manufacturer's Warranty Information

E. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "Soft Cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are to provide are acceptable and shall be submitted.

1.05 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01.

1.06 SPARE PARTS

A. All spare parts as recommended by the equipment manufacturer shall be furnished by the Contractor to the Owner.

B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.

C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the Work, at which time they shall be delivered to the Owner.

D. Spare parts lists, included with the shop drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

E. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same part number.

1.07 IDENTIFICATION

A. Each SPD shall be identified by the circuit number and equipment name as indicated on the Drawings. A nameplate shall be securely affixed in a conspicuous place on each SPD. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

1.08 WARRANTY

- A. All SPDs, associated hardware, and supporting components shall be warranted to be free from defects in materials and workmanship, under normal use and in accordance with the instructions provided, for a period of five (5) years after acceptance of the equipment by the Owner.
- B. Any component or subassembly contained within the surge protection system that shows evidence of failure or incorrect operation during the warranty period, shall be replaced by the manufacturer at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 GENERAL

- A. The SPD units shall be UL 1449 Listed and must bear the UL mark. Units that are “manufactured in accordance with” UL 1449 or tested by other testing agencies “in accordance with” UL 1449 are not acceptable and will be rejected.
- B. Type II SPD units shall be UL 1283 Listed and must bear the UL mark. Units that are “manufactured in accordance with” UL 1283 or tested by other testing agencies “in accordance with” UL 1283 are not acceptable and will be rejected. Further, SPD units using UL 1283 capacitors but not tested to UL 1283 will be rejected.

2.02 PRODUCTS

- A. Type I surge protective devices (SPD) shall be furnished and installed when shown without upstream overcurrent protection on the Drawings. Type II SPDs shall be provided in all other locations. Type II SPDs shall not require the use of a specific upstream overcurrent device. SPDs shall be provided in the location and quantity as shown on the Drawings.
- B. Each SPD shall be rated for the voltage and configuration of the equipment to which it is connected.
- C. Each Type II SPD shall have UL 1283 EMI/RFI filtering with minimum attenuation of -50dB at 100kHz.
- D. The short circuit current rating of each SPD shall match or exceed the rating of the equipment to which it is connected. The Contractor shall reference the Drawings for short circuit current rating of each piece of equipment.
- E. Each SPD system shall provide surge protection in all possible modes. Surge protection shall be as follows:

System Configuration	Modes of Protection	Number of Modes
3-Phase Wye	L-N, L-G, N-G	7
3-Phase Delta	L-L, L-G	6
3-Phase Impedance Grounded	L-L, L-G	6
Single-Phase	L-N, L-G, N-G	3

- F. Each SPD shall have a Maximum Continuous Operating Voltage (MCOV) of at least 115% of the nominal voltage of the equipment to which it is connected.
- G. The Nominal Discharge Current (In) of each SPD shall be 20kA. Peak surge current ratings shall not be used as a basis for applying the SPD to the system.
- H. The Voltage Protection Rating (VPR) of each SPD shall not exceed the following:

System Voltage	L-N	L-G	L-L	N-G
208Y/120	800V	800V	1200V	800V
480Y/277	1200V	1200V	1800V	1200V
480 DELTA	N/A	1800V	1800V	N/A
240 DELTA	N/A	1200V	1200V	N/A
120/240	800V	800V	1200V	800V

- I. The surge current rating for each SPD shall be as indicated on the Drawings. Surge current ratings are indicated on single line diagrams and in panel schedules. Surge current rating indicated is on a per phase basis.
- J. SPDs which are indicated to be installed externally mounted from the equipment that they protect shall be provided within a separate enclosure. The enclosure shall match or exceed the NEMA rating of the enclosure for the equipment that it is serving (i.e. NEMA1, NEMA 12, NEMA 4X, etc).
- K. Each SPD shall be provided with the following accessories:
 1. Each individual module shall feature an LED indicating the individual module has all surge protection devices active. If any single component is taken off-line, the LED shall turn off and another LED shall illuminate, providing individual module as well as total system status indication.
 2. Surge counter and audible alarm with reset/silence switch.
 3. One set of Form C (SPDT) dry contacts rated for at least 5A at 120VAC.

- L. SPDs which are indicated to be installed integral within the equipment that they protect shall be fabricated by the same manufacturer as the equipment that they serve. SPDs which are indicated to be installed externally mounted from the equipment that they serve shall be manufactured by Eaton, ASCO/Emerson Network Power, Current Technologies, General Electric, or Square D.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The SPD units shall be furnished and installed as shown on the Drawings and in accordance with the manufacturer's installation instructions
- B. SPDs which are indicated to be integral with the equipment that they protect shall be installed within the enclosure for that equipment.
- C. Prior to energizing, the following shall be performed for each SPD:
 - 1. Verify that the SPD unit voltage and configuration is suitable for the system to which it is connected.
 - 2. Verify that any Neutral to Ground bonding jumpers are installed as required.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. Shop Tests
 - a. Standard factory tests shall be performed on the equipment under this Section. All tests shall be in accordance with the latest version of NEMA, ANSI, and UL standards.
 - b. All surge protective devices, subassemblies, and components shall be 100% tested and certified by the manufacturer to meet their published performance parameters.
 - 2. Field Tests
 - a. None required.

END OF SECTION

SECTION 26 50 00

LIGHTING

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install all lighting fixtures, labor, and material, in accordance with the preceding Specifications, the requirements of this Section, and as shown on the Drawings.
- B. Lighting shall be in accordance with the latest requirements of the Illuminating Engineering Society.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 26 – Grounding and Bonding for Electrical Systems.

1.02 CODES AND STANDARDS

- A. The equipment specified herein shall comply with the following codes and standards, where applicable.
 - 1. Underwriter's Laboratories, Inc. (UL):
 - a. UL 924 – Emergency Lighting and Power Equipment
 - b. UL 935 – Fluorescent Lamp Ballasts
 - c. UL 844 – Luminaires for Use in Hazardous (Classified) Locations
 - d. UL 916 – Standard for Energy Management Equipment
 - e. UL 1029 – High Intensity Discharge Lamp Ballasts
 - f. UL 1598 – Luminaires
 - 2. American National Standards Institute (ANSI):
 - a. ANSI C82.11 – High Frequency Fluorescent Lamp Ballasts
 - b. ANSI C62.41 – Guide for Surge Voltages in Low-Voltage AC Power Circuits
 - 3. National Electrical Code (NEC), latest edition.
- B. Where equipment herein is specified as being Listed to a particular UL standard, that equipment shall be tested for compliance with the UL standard by either UL itself, Factory Mutual (FM), or the Canadian Standards Association (CSA). Testing to UL standards by any other testing agencies is not acceptable.

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Operation and Maintenance Manuals
 - 3. Spare Parts Lists
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible submittals will be returned to the Contractor for resubmittal without review.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets.
 - 2. Catalog cuts for each fixture type showing performance and construction details of standard fixtures, and complete working drawings showing all proposed construction details of special or modified standard fixtures.
 - 3. Photometric curves.
 - 4. LED data including efficiency (Efficacy lumens/watt) information.
 - 5. LED Driver information
 - 6. Catalog data including applicable coefficients of utilization tables, isolux chart of illumination on a horizontal plane, beam efficiency, horizontal and vertical beam spread, and beam lumens.
 - 7. Manufacturer's warranty information
 - 8. Custom wiring diagrams for each individual lighting contactor application. Standard wiring diagrams that are not custom created by the manufacturer for the individual lighting contactors for this project are not acceptable. One wiring diagram which is typical for all lighting contactors is not acceptable. Each wiring diagram shall include wire identification and terminal numbers. Indicate all devices, regardless of their physical location, on the diagrams. Identify on each respective wiring diagram

specific equipment names and equipment numbers consistent with those indicated on the Drawings.

9. System (entire fixture assembly) efficiency data.
- D. Shop drawings shall be submitted to the Engineer for review and acceptance for all fixtures before fixtures and poles are manufactured. Substitutions will be permitted only if acceptable to the Engineer.
- E. Manufacturer's model/series and description in the fixture schedule on the Contract Documents establishes a level of quality, style, finish, etc. The use of a model/series describing the various types of fixtures shall be used as a guide only and does not exclude all the required accessories or hardware that may be required for a complete installation.

1.05 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall submit Operation and Maintenance Manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01.

1.06 SPARE PARTS

- A. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor. The following additional spare parts shall be furnished:
 1. A minimum of one (1) LED driver for every ten (10) drivers (of the same type) installed.
- B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
- C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the work, at which time they shall be delivered to the Owner.
- D. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- E. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.07 LIGHTING CONTROLS

- A. The lighting systems shall be controlled as specified herein and indicated on the Drawings.

1.08 WARRANTY

- A. The manufacturer's warranty shall in no event be for a period of less than five (5) years from date of delivery of fixtures to the project site and shall include repair labor, travel expense necessary for repairs at the jobsite, shipping costs, expendables used during the course of repair, or complete replacement of the failed lighting unit.
- B. Warranty for LED fixtures shall be provided for the entire fixture and shall include all parts and accessories. Submittals received without written warranties as specified shall be rejected in their entirety.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 FIXTURES

- A. All lighting fixtures shall be furnished complete w all fittings and hardware necessary for a complete installation. Lighting fixtures shall have all accessories, characteristics, and functionality as specified.
- B. Fixture leads shall be as required by NEC. Fixtures shall be grounded by the equipment grounding conductor in the conduit.
- C. All glassware shall be high quality, homogeneous in texture, uniform in quality, free from defects, of uniform thickness throughout, and properly annealed. Edges shall be well rounded and free from chips or rough edges.
- D. HID fixture housings shall be finished with a seven-stage phosphate pretreatment and thermal-set, electrostatically applied polyester paint. Color shall be as indicated in the fixture schedule or as selected by the Engineer.
- E. Emergency fixtures shall be UL 924 listed and have a minimum 90 minutes battery back-up.
- F. Fixtures for use in hazardous locations shall be UL 844 Listed.
- G. Fixtures specified to be damp or wet locations rated shall be UL 1598 listed.
- H. Fixtures shall be as specified in the fixture schedules on the Drawings.

2.03 LED DRIVERS

- A. Drivers shall have a voltage range of 347-480V or 120-277 (as required) +/- 10% at a frequency 60Hz.
- B. All drivers shall be designed to a power factor >90% with a total harmonic distortion THD <20% at full load.
- C. Case temperature shall be rated for -40°C through +80°C.
- D. Drivers shall have overheat protection, self-limited short circuit protection and overload protected.
- E. Drivers shall be furnished with a fused primary.
- F. Drivers shall have an output current ripple <30%
- G. Drivers shall be manufactured by Advance, Universal or equal.
- H. Drivers shall be UL Listed for damp location, UL1012, UL935, ROHS.
- I. Drivers shall meet FCC 47 Sub Part 15.
- J. All drivers shall be provided with ANSI/IEEE C62.41 Category C (10kV/5kA) surge protection.

2.04 LEDS

- A. Luminaires provided with LED technology shall utilize high brightness LEDs with a group binning code of P and/or Q.
- B. Color Temperature: as specified in fixture schedule.
- C. Junction point shall be designed and manufactured to allow adequate heat dissipation.
- D. LEDs shall be rated for 50,000 hours of life, minimum (based on IESNA L70).

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Lighting fixtures shall be located symmetrically with building lines as shown on the Drawings. The Contractor shall furnish and install the lighting fixtures to allow "convenient" access for maintenance. The Contractor shall install fixtures at mounting heights indicated on the Drawings or as instructed by the Engineer. In areas with exposed ducts and/or piping, installation of lighting fixtures shall be adapted to field conditions as determined by the Engineer. Where fixtures are shown in locations on the

Drawings where maintenance would be difficult, the Contractor shall notify the Engineer for direction.

- B. The Contractor shall provide and install all inserts, conduit, structural supports as required, lamps, ballasts, poles, wiring, and any other items required for a complete system. Contractor shall properly adjust and test, to the satisfaction of the Engineer, the entire lighting system. The Contractor shall provide pigtails and flexible conduit connected to an outlet box where necessary or required resulting in a neat and complete installation.
- C. The Contractor shall protect all fixtures at all times from damage, dirt, dust, and the like. Upon completion of work, and after the building area is broom clean, all fixtures shall be made clean and free of dust and all other foreign matter both on visible surfaces, and on surfaces that affect the lighting performance of the fixture including diffusers, lenses, louvers, reflectors, and lamps.
- D. The Contractor shall furnish and install all pendant trapezes and pendant stem hangers with durable swivel or equivalent trapeze hanger permitting normal fixture motion and self-alignment. Fixture pendants shall be Appleton Type UNJ ball type flexible hanger at the fixture and supports from an Appleton JBLX junction box with JBLX hub cover, or equal. Pendant lengths shall be adequate and adjusted to provide uniformity of installation heights above the reference datum. Stems shall be one-piece, with matching canopies and fittings.
- E. All wiring/cables associated with lighting equipment shall be installed in conduits or other raceways as specified. Installing wiring/cables exposed is not acceptable, unless specifically shown otherwise on the Drawings.
- F. The Contractor shall furnish and install recessed fixtures with a separate junction box concealed and located as to be accessible when fixture is removed.
- G. The Contractor shall furnish and install all boxes for lighting fixtures such that the box is not the sole support of the fixture. The boxes shall be offset to allow maintenance such that access to wiring within the box can be attained without having to consider supporting (holding) the fixture.
- H. All lighting fixtures, when installed, shall be set true and be free of light leaks, warps, dents, and other irregularities. All hangers, cables, supports, channels, and brackets of all kinds for safely erecting this equipment in place, shall be furnished and erected in place by the Contractor.
- I. The Contractor shall support each fixture securely. The Contractor shall not secure fixtures to the work of other trades, unless specified or noted otherwise, and shall not support fixtures from plaster. The Contractor shall furnish and install all members and supports as required to fasten and suspend fixtures from the structure.

- J. In all mechanical equipment areas, the Contractor shall install lighting fixtures after all piping and equipment therein has been installed. Exact locations for such fixtures may be determined by the Engineer on the site during the course of the work.
- K. All fixtures that require physical adjustment shall be so adjusted in accordance with the directions of the Engineer. The Contractor shall also adjust angular direction of fixtures and/or lamps, as directed.
- L. No special tools shall be required for re-lamping of fixtures. All optical control surfaces such as lenses and reflectors shall be safely and securely attached to fixtures and shall be easily and quickly removed and replaced for cleaning without the use of special tools.
- M. Lighting contactors shall be provided in the enclosure type and material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein, and the area designations indicated on the Drawings.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. Certified Shop Tests
 - a. The lighting fixtures shall be given routine factory tests in accordance with the requirement of ANSI, NEMA and Underwriters Laboratories standards.
 - 2. Field Tests
 - a. Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 01, and NETA Acceptance Testing Specifications, latest edition.

END OF SECTION

SECTION 31 00 01
EARTHWORK

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all labor, equipment and materials required to complete all work associated with excavation, including off-site borrow excavation, dewatering, backfill, drainage layers beneath and around structures, foundation and backfill stone, filter fabric, embankments, stockpiling topsoil and any excess suitable material in designated areas, in place compaction of embankments, backfill and subgrades beneath foundations and roadways, excavation support, disposing from the site all unsuitable materials, providing erosion and sedimentation control grading, site grading and preparation of pavement and structure subgrade, and other related and incidental work as required to complete the work shown on the Drawings and specified herein
- B. All excavations shall be in conformity with the lines, grades, and cross sections shown on the Drawings or established by the Engineer.
- C. It is the intent of this Specification that the Contractor conduct the construction activities in such a manner that erosion of disturbed areas and off-site sedimentation be absolutely minimized.
- D. Earthwork performed under this Contract shall be done in conformance with these specifications. Items and activities not addressed herein shall be subject to the limitations of the latest editions of the California Department of Transportation (Caltrans) Standard Plans and Standard Specifications (Caltrans Standard Specifications). If there is a conflict between this specification and the Caltrans Standard Specifications, the more conservative of the two shall take precedent.
- E. Erosion and Sediment Control shall be performed in accordance with the latest edition of the California Stormwater Quality Association (CASQA) Construction Best Management Practices Handbook. If there is a conflict between this specification and the CASQA BMP Handbook, the more conservative of the two shall take precedent.
- F. All fill materials (soil, aggregate, topsoil, etc.) imported to the site and onsite materials to be reused as fill, backfill, or embankment shall be subjected to the testing requirements contained in Part 3.0 of this Section. The Contractor shall retain a Materials Testing Consultant who shall perform all testing. The test results shall be used to determine if a material meets the requirements included herein. The Contractor shall furnish all necessary samples for laboratory testing and shall provide assistance and cooperation during field tests. The Contractor shall plan their operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction.

- G. Any costs for re-testing required as a result of failure to meet compaction requirements shall be borne solely by the Contractor.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Requirements of related work are included in Divisions 31 and 32 of these Specifications.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced Specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. California Department of Transportation Standard Plans and Specifications, latest edition.
2. California Department of Transportation Construction Manual, latest edition.
3. California Stormwater Quality Association (CASQA) Construction Best Management Practices Handbook, latest edition.
4. Existing Geotechnical Reports provided by Owner.
5. American Society for Testing and Materials (ASTM):
 - a. ASTM C 127 – Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - b. ASTM C 136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - c. ASTM D 698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³ (600 kN-m/m³))
 - d. ASTM D 1140 – Standard Test Method for Determining the Amount of Material Finer than 75- μ m (No. 200) Sieve in Soils by Washing
 - e. ASTM D 1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand Cone Method.
 - f. ASTM D 1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/lb³ (2,700 kN-m/m³)).
 - g. ASTM D 1883 – Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils.

- h. ASTM D 2216 – Test for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
- i. ASTM D 2487 – Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- j. ASTM D 4253 – Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
- k. ASTM D 4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- l. ASTM D 6913 - Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- m. ASTM D 6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil Aggregate by Nuclear Methods (Shallow Depth).

1.04 SUBSURFACE CONDITIONS

- A. Information on subsurface conditions is referenced under Division 01, General Requirements.
- B. Attention is directed to the possible location of water pipes, sanitary pipes, storm drains, and other utilities located in the area of proposed excavation. In the event excavation activities disrupt service, the Contractor shall perform all repairs at no additional cost to the Owner. The Contractor shall contact Dig Alert.org, 811, and/or 1-800-422-4133 to request underground utility location mark-out at least three (3) working days, not including the day the request is called in, but no more than ten (10) working days prior to the beginning of excavation. The Contractor shall also contact and request utility location mark-out from buried utility owners with utilities on the project site that are not participants of Digalert.org.

1.05 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in Section 01 33 00 – Submittal Procedures, the Contractor shall submit the following:
 - 1. Evidence the Contractor has a minimum of five (5) years of experience performing excavation and backfill in treatment plants similar in size and location to the work for this project.
 - 2. Name and location of all material suppliers.
 - 3. Certificate of compliance with the standards specified herein for each source of each material, including gradation curves.

4. List of disposal sites for waste and unsuitable materials and all required permits for use of those sites.
5. Plans and cross sections of open cut excavations showing side slopes and limits of the excavation at grade.
6. Procedures for dewatering proposed by the Contractor shall be submitted to the Engineer for review and approval prior to any earthwork operations.
7. Samples of synthetic filter fabric and reinforced plastic membrane with manufacturer's certificates or catalog cuts stating the mechanical and physical properties. Samples shall be at least one (1) foot wide and four (4) feet long taken across the roll with the warp direction appropriately marked.
8. Construction drawings and structural calculations for any types of excavation support required. Drawings and calculations shall be sealed by a currently registered Professional Engineer in the in the State of California.
9. Monitoring plan and pre-construction condition inspection and documentation of all adjacent structures, utilities, and roadways near proposed installation of excavation support systems and near areas where dewatering is required to facilitate construction.
10. A representative sample of the on-site or off-site source of each class of fill material weighing approximately 50 lbs. The sample shall be delivered to a location designated by the Engineer.
11. The Contractor shall be required to submit plans of open cut excavation for review by the Engineer before approval is given to proceed.
12. Submit excavation support installer qualifications with installation history.
13. Drawings and calculations on proposed excavation support systems sealed by a Professional Civil Engineer currently registered in the in the State of California.
14. Contractor shall also submit a monitoring plan developed by the excavation support design engineer.
15. Earthwork contractor qualifications.
16. All required permits and a list of disposal sites for unsuitable materials within thirty (30) consecutive days after Notice to Proceed. If the disposal site is located on private property, the submittal shall also include written permission from the owner of record.
17. Except where borrow is to be obtained from a commercial source, a borrow source development, use, and reclamation plan jointly developed by the Contractor and the property owner prior to engaging in any land disturbing activity on the

proposed source (other than material sampling that may be necessary). The Contractor's plan shall address the following

- a. Drainage: The source shall be graded to drain such that no water will collect or stand and a functioning drainage system shall be provided. If drainage is not practical, and the source is to serve as a pond, the minimum average depth below the water table shall be 4 feet or the source graded so as to create wetlands as appropriate, or as agreed to with the property owner
- b. Slopes: The source shall be dressed and shaped in a continuous manner to contours which are comparable to and blend in with the adjacent topography, but in no case will slopes steeper than 3:1 be permitted.
- c. Erosion Control: Except where borrow is to be obtained from a commercial source, the Contractor and the property owner shall jointly submit a Borrow Source Development, Use, and Erosion Control Plan to the appropriate State or Local permitting authority for approval and provide evidence of such to the Engineer for their approval prior to engaging in any land disturbing activity on the proposed source other than material sampling that may be necessary.

1.06 PRODUCT HANDLING

- A. Soil and rock material shall be excavated, transported, placed, and stored in a manner so as to prevent contamination, segregation and excessive wetting. Materials which have become contaminated or segregated will not be permitted in the performance of the work and shall be removed from the site.

1.07 USE OF EXPLOSIVES

- A. The use of explosives will not be allowed for the prosecution of this work.

PART 2 – PRODUCTS

2.01 FILL MATERIALS

- A. The contractor shall be responsible for providing fill materials meeting the gradation requirements included herein.
- B. Existing fill materials are not considered suitable to support the new digester but may be reused provided it is removed and placed as engineered, compacted fill.
- C. All fill materials shall be free of organic material, environmental contaminants, snow, ice, frozen soil, or other unsuitable material.
- D. Crushed stone installed above and below the water table shall meet the requirements of the California Department of Transportation Standard Plans and Specifications.

- E. Below-grade walls shall be backfilled with Select Fill, unless Engineered Fill is required for Subgrade Reconstruction.
- F. When the excavated material from required excavations meets the requirements of Select Fill, Engineered Fill, or Common Fill, but is replaced with off-site borrow material for the Contractor's convenience, the costs associated with such work and material shall be borne by the Contractor.
- G. Where excavated material does not meet requirements for Select Fill, Engineered Fill, or Common Fill, the Contractor shall furnish off-site borrow material meeting the specified requirements herein. Determination of whether the borrow material will be paid for as an extra cost will be made based on the contract documents.
- H. Contractor may stockpile excavated material to be used as Select Fill, Engineered Fill, Common Fill, Drainage Fill or Topsoil on site in areas designated in the Contract Documents. Soil materials may be stockpiled as necessary to sort, segregate, test, and transfer the materials. Excess material and materials considered unsuitable for reuse by the Engineer shall be removed from the site for off-site disposal. No stockpiling of excavated material is allowed in a manner or location that would permit erosion and its subsequent sedimentation in wetlands or other natural areas.

2.02 SELECT FILL

- A. Select fill shall be used where shown on the Contract Drawings or as directed in the Specifications.
- B. Select fill shall not include particles or lumps larger than 3 inches.
- C. Select fill used as backfill against walls shall not contain any rock larger than 1½ -inches.
- D. Select fill shall consist of non-plastic materials classifying as GW, GW-GM, GP, SW, SW-SM, SP-SM, or SP per ASTM D-2487. Select fill shall be free of organic material, environmental contaminants, snow, ice, frozen soil, or other unsuitable material.
- E. Open-graded and dense-graded CalTrans Aggregate Base meeting the gradation requirements above may be used as Select Fill.
- F. Select Fill to be used as pavement subbase material shall be Caltrans Class 2 Aggregate Base.
- G. Select Fill shall be placed in 6-inch-thick lifts.
- H. Select Fill shall be compacted to not less than 95 percent of the maximum dry density obtainable by ASTM D 698 and does not contain unsuitable material.
- I. Select Fill shall be compacted at a moisture content within 20 percent of the optimum moisture content of the fill material in accordance with the ASTM D 698, Standard Proctor.

- J. All materials used as Select Fill are subject to approval by the Engineer.

2.03 DRAINAGE FILL

- A. Drainage Fill shall be used where shown on the Contract Drawings.
- B. Drainage Fill shall consist of CalTrans Pervious Backfill Material (19-3.02D).

2.04 COMMON FILL

- A. Common Fill shall be used where shown on the Contract Drawings.
- B. Common Fill shall consist of non-organic on-site soils classifying as CH, MH, CL, ML, SC, SM, SP, SW, GC, GM, GP, or GW according to ASTM D 2487.
- C. Common Fill shall be placed in 8-inch-thick loose lifts.
- D. Common Fill shall be compacted to not less than 95 percent of the maximum dry density obtainable by ASTM D 698 and does not contain unsuitable material.
- E. Common Fill shall be compacted at a moisture content within 20 percent of the optimum moisture content of the fill material in accordance with the ASTM D 698, Standard Proctor.
- F. All material used as common fill is subject to approval by the Engineer. If there is insufficient suitable material onsite, import whatever additional material is required which conforms to the specifications, at no additional cost to the Owner.
- G. Select Fill may be used as Common Fill, subject to approval by the Engineer. Select fill may be used as Common Fill at no change in the Contract Price.

2.05 ENGINEERED FILL

- A. Engineered fill shall be used for Subgrade Reconstruction where shown on Contract Drawings.
- B. Engineered Fill shall have an organic content of less than three percent by weight and shall be free of any hazardous or deleterious materials. Engineered fill shall not contain any rocks or lumps larger than 3 inches in greatest dimension, shall not contain more than 15 percent of material larger than 1 ½ inches, and should contain at least 20 percent material passing the No. 200 sieve. Engineered Fill shall have a low expansion potential, as indicated by a plasticity index of 15 or less, or an expansion index of less than 20.
- C. All import material to be used for Engineered Fill shall be approved by the Engineer prior to delivery to the site. At least 5 working days prior to importing material to the site, a representative sample shall be provided for approval.

2.06 TOPSOIL

- A. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, clay loam). It shall be free of debris, trash, stumps, rocks, roots, and noxious weeds, and shall give evidence of being able to support health vegetation. It shall contain no substance potentially toxic to plant growth. All topsoil shall be tested by a recognized laboratory for the following criteria: Organic matter content shall not be less than 1.5% by weight. pH range shall be from 6.0 -7.5. If pH is less than 6.0, lime shall be added in accordance with test results or in accordance with the recommendations of the vegetative establishment practice being used. Soluble salts shall not exceed 500 ppm. If additional topsoil is needed, it must meet the standards stated above.

2.05 GEOTEXTILES

- A. The Contractor shall provide geotextiles as indicated on the Contract Drawings and specified herein. The materials and placement shall be as indicated on Drawings.

PART 3 – EXECUTION

3.01 STRIPPING OF TOPSOIL

- A. In all areas to be excavated, filled, or paved, the topsoil shall be stripped to its full depth. The site shall be cleared of existing debris, vegetation, and loose or otherwise unsuitable soils prior to starting excavation. Obstructions that extend below the finished grade shall be removed and the resulting holes filled with compacted soil.
- B. Topsoil may be stockpiled for subsequent reuse on site at locations shown on the Contract Drawings or designated by the Owner or Engineer. Topsoil shall be kept separated from other excavated materials and shall be piled free of roots and other undesirable materials. Topsoil shall not be stored in areas where it will interfere with surface drainage or with the conservation of trees, shrubs, and other vegetation to remain. No stockpile shall be placed within 50-feet of a pond, stream, wetland, or stormwater inlet.

3.02 EXCAVATION

- A. All material excavated, regardless of its nature or composition, shall be classified as UNCLASSIFIED EXCAVATION. Excavation shall include the removal of all soil, rock, weathered rock, rocks of all types, boulders, conduits, pipe, all other obstacles encountered, and all other obstacles shown to be removed within the limits of excavation shown on the Contract Drawings or specified herein. The cost of excavation shall be included in the Lump Sum Bid Price and no additional payment will be made for the removal of obstacles encountered within the excavation limits shown on the Drawings and specified herein.
- B. Additional excavation shall be performed such that all undocumented fill and loose surficial soils at excavation sites are removed to expose competent native materials.

This additional excavation shall extend at least 5 feet beyond the perimeter of the required excavation.

- C. All suitable material removed in the excavation shall be used as far as practicable in the formation of embankments, subgrades, and shoulders, and at such other places as may be indicated on the Drawings or indicated by the Engineer. No excavation shall be wasted except as may be permitted by the Engineer. Refer to the drawings for specific location and placement of suitable excavated materials in the formation of embankments, backfill, and structural and roadway foundations. THE ENGINEER AND/OR MATERIALS TESTING CONSULTANT WILL DESIGNATE MATERIALS THAT ARE UNSUITABLE. The Contractor shall furnish off-site disposal areas for the unsuitable material. Where suitable materials containing excessive moisture are encountered above grade in cuts, the Contractor shall construct above grade ditch drains prior to the excavation of the cut material when in the opinion of the Engineer and/or materials testing consultant such measures are necessary to provide proper construction.
- D. All excavations shall be made in the dry and in such a manner and to such widths as will give ample room for properly constructing and inspecting the structures and/or piping they are to contain and for such excavation support, pumping and drainage as may be required. Excavation shall be made in accordance with the grades and details shown on the Drawings and as specified herein.
- E. Excavation slopes shall be flat enough to avoid slides that will cause disturbance of the subgrade or damage of adjacent areas. Excavation requirements and slopes shall be as indicated in the Drawings.
- F. The Contractor shall intercept and collect surface runoff both at the top and bottom of cut slopes. The intersection of slopes with natural ground surfaces, including the beginning and ending of cut slopes, shall be uniformly rounded as shown on the Drawings or as may be indicated by the Engineer. Concurrent with the excavation of cuts the Contractor shall construct intercepting berm ditches or earth berms along and on top of the cut slopes at locations shown on the Drawings or designated by the Engineer. All slopes shall be finished to reasonably uniform surfaces acceptable for seeding and mulching operations. No rock or boulders shall be left in place which protrude more than 1 foot within the typical section cut slope lines, and all rock cuts shall be cleaned of loose and overhanging material. All protruding roots and other objectionable vegetation shall be removed from slopes.
- G. It is the intent of these Specifications that all structures shall bear on an aggregate base, crushed stone or screened gravel bedding placed to the thickness shown on the Drawings, specified in these Specifications, or not less than 6 inches. Bedding for process piping shall be as specified as shown on the Drawings.
- H. The bottom of all excavations for structures and pipes shall be examined by the Engineer and/or materials testing consultant for bearing value and the presence of unsuitable material. If, in the opinion of the Engineer and/or materials testing consultant,

additional excavation is required due to the low bearing value of the subgrade material, or if the in place soils are soft, yielding, pumping or wet, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted select fill, and/or crushed stone or screened gravel as indicated by the Engineer. Payment for such additional work ordered by the Engineer shall be made as an extra by a Change Order in accordance with the General Conditions and Division 01. No payment will be made for subgrade disturbance caused by inadequate dewatering or improper construction methods.

- I. All cuts shall be brought to the grade and cross section shown on the Drawings, or established by the Engineer, prior to final inspection and acceptance by the Engineer.
- J. Slides and over-breaks which occur due to negligence, carelessness or improper construction techniques on the part of the Contractor shall be removed and disposed of by the Contractor as indicated by the Engineer at no additional cost to the Owner. If grading operations are suspended for any reason whatsoever, partially completed cut and fill slopes shall be brought to the required slope and the work of seeding and mulching or other required erosion and sedimentation control operations shall be performed.
- K. Where the excavation exposes sludge, sludge contaminated soil or other odorous materials, the Contractor shall cover such material at the end of each workday with a minimum of 6 inches and a maximum of 24-inches of Common fill. The work shall be an odor abatement measure and the material shall be placed to the depth deemed satisfactory by the Engineer for this purpose.

3.03 EXCAVATION SUPPORT

- A. The Contractor shall furnish, place, and maintain such excavation support which may be required to provide safe working conditions and support sides of excavation or to protect structures, pipes, and utilities from possible. The Contractor shall be exclusively responsible for maintaining safe working conditions and structure integrity without overstressing or damaging existing structures, pipes, and utilities resulting from the Contractor temporarily placing, moving, or removing loads on or adjacent to existing structures, pipes, and utilities. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, the Engineer may order additional supports put in at the expense of the Contractor. The Contractor shall be responsible for the adequacy of all supports used and for all damage resulting from failure of support system or from placing, maintaining and removing the support system. Contractor shall be responsible for selection of and design of means for sealing gaps in excavation support system for dewatering, in accordance with requirements of Owner.
- B. The selection of and design of any proposed excavation support systems is exclusively the responsibility of the Contractor. Contractor shall submit drawings and calculations to the Engineer on the proposed systems sealed by a Professional Civil Engineer currently registered in the in the State of California.

- C. The excavation support system shall be installed by a specialized contractor with a minimum of five (5) years' experience installing the type of excavation support system proposed.
- D. The Contractor shall exercise caution in the installation and removal of supports to ensure no excessive or unusual loadings or vibrations are transmitted to any new or existing structure. The Contractor shall promptly repair at their expense any and all damage that can be reasonably attributed to installation or removal of excavation support system.
- E. Contractor shall monitor movement and vibration in the excavation support systems as well as movement and vibration at adjacent structures, utilities and roadways near excavation supports. Contractor shall submit a monitoring plan developed by the excavation support design engineer. All pre-construction condition assessment and documentation of adjacent structures on-site and off-site shall be performed by the Contractor. If any sign of distress such as cracking or movement occurs in any adjacent structure, utility or roadway during installation of supports, subsequent excavation, service period of supports, subsequent backfill and construction, or removal of supports, Engineer shall be notified immediately. The Contractor shall be exclusively responsible for repair of any damage to any roadway, structure, utility, pipes, etc. both on-site and off-site, as a result of their operations.
- F. All excavation supports shall be removed upon completion of the work except as indicated herein. The Engineer may permit supports to be left in place at the request and expense of the Contractor. The Engineer may order certain supports left permanently in place in addition to that required by the Contract. The cost of the materials so ordered left in place, less a reasonable amount for the eliminated expense of the removal work omitted, will be paid as an extra by a Change Order in accordance with the General Conditions and Division 01. Vibrations of new and existing structures shall be considered when the Contractor decides whether to remove excavation supports or leave them in place. Any excavation supports left in place shall be cut off at least two (2) feet below the finished ground surface or as directed by the Engineer.

3.04 PROTECTION OF SUBGRADE

- A. To minimize the disturbance of bearing materials and provide a firm foundation, the Contractor shall comply with the following requirements:
 - 1. Use of heavy rubber tired construction equipment shall not be permitted on the final subgrade unless it can be demonstrated that drawdown of groundwater throughout the entire area of the structure is at least 3 feet below the bottom of the excavation (subgrade). Even then, the use of such equipment shall be prohibited should subgrade disturbance result from concentrated wheel loads.
 - 2. Subgrade soils disturbed through the operations of the Contractor shall be excavated and replaced with compacted select fill or crushed stone at the Contractor's expense as indicated by the Engineer.

3. The Contractor shall provide positive protection against penetration of frost into materials below the bearing level during work in winter months. This protection can consist of a temporary blanket of straw or salt hay covered with a plastic membrane or other acceptable means.

3.05 PROOF-ROLLING

- A. The subgrade of all structures and all areas that will support pavements or select fill shall be proof-rolled. After stripping of topsoil, excavation to subgrade and prior to placement of fills, the exposed subgrade shall be carefully inspected by probing and testing as needed. Any topsoil or other organic material still in place, frozen, wet, soft, or loose soil, and other undesirable materials shall be removed. The exposed subgrade shall be proof-rolled with a heavily loaded tandem-wheeled dump truck to check for pockets of soft material hidden beneath a thin crust of better soil. Any unsuitable materials thus exposed shall be removed and replaced with an approved compacted material, as directed by the Materials Consultant.

3.06 DEWATERING

- A. The Contractor shall do all dewatering as required for the completion of the work. Procedures for dewatering proposed by the Contractor shall be submitted to the Engineer for review prior to any earthwork operations.
- B. All water removed by dewatering operations shall be disposed of in accordance with the California Nonpoint Source (NPS) Pollution regulations.
- C. The dewatering system shall be of sufficient size and capacity as required to control groundwater or seepage to permit proper excavation operations, embankment construction and reconstruction, subgrade preparation, and to allow concrete to be placed in a dry condition. The system shall include a sump system or other equipment, appurtenances and other related earthwork necessary for the required control of water. The Contractor shall drawdown groundwater to at least 2 feet below the bottom of excavations (subgrade), over the entire excavation area, at all times in order to maintain a dry and undisturbed condition. Groundwater shall be drawn down to the elevation indicated on Contract Drawings during specific stages of construction to protect existing structures from buoyancy during modifications.
- D. The Contractor shall control, by acceptable means, all water regardless of source. Water shall be controlled, and its disposal provided for at each berm, structure, etc. The entire periphery of the excavation areas shall be ditched and diked to prevent water from entering the excavation. The Contractor shall be fully responsible for disposal of the water and shall provide all necessary means at no additional expense to the Owner. The Contractor shall be solely responsible for proper design, installation, proper operation, maintenance, and any failure of any component of the system.
- E. The Contractor shall be responsible for and shall repair without cost to the Owner, any damage to work in place and the excavation, including damage to the bottom due to

heave and including removal of material and pumping out of the excavated area. The Contractor shall be responsible for damages to any other area or structure caused by their failure to maintain and operate the dewatering system proposed and installed by the Contractor.

- F. The Contractor shall be responsible for and shall repair, without cost to the Owner, any damage to work in place and nearby structures, roadways, and utilities which can be reasonably attributed to dewatering operations. This includes settlement of structures, roadways, and utilities due to dewatering of soils supporting the structures, roadways, and utilities.
- G. The Contractor shall take all the steps that they consider necessary to familiarize himself with the surface and subsurface site conditions, and shall obtain the data that is required to analyze the water and soil environment at the site and to assure that the materials used for the dewatering systems will not erode, deteriorate, or clog to the extent that the dewatering systems will not perform properly during the period of dewatering. Copies of logs of borings and laboratory test results are available to the Contractor. This data is furnished for information only, and it is expressly understood that the Owner and Engineer will not be held responsible for any interpretations or conclusions drawn therefrom by the Contractor.
- H. Prior to the execution of the work, the Contractor, Owner and Engineer shall jointly survey the condition of adjoining structures. Photographs and records shall be made of any prior settlement or cracking of structures, pavements, and the like, that may become the subject of possible damage claims.

3.07 FILL OR EMBANKMENTS

- A. Contractor shall perform the construction of fill or embankments in such a manner that cut and fill slopes will be completed to final slopes and grade in a continuous operation. The operation of removing excavation material from any cut and the placement of embankment in any fill shall be a continuous operation to completion unless otherwise permitted by the Engineer.
- B. Subgrades upon which fill or embankments are to be constructed shall be stripped of topsoil, organic material, rubbish and other extraneous materials. After stripping and prior to placing fill or embankment material, the Contractor shall compact the top 12inches of in place soil as specified under Paragraph 3.09, COMPACTION.
- C. Any soft or unsuitable materials revealed before or during placement fill or embankment placement shall be removed as indicated by the Engineer and/or materials testing consultant and replaced with select fill and compacted as required.
- D. Fill subgrades on which fill or embankment is to be placed, shall be scarified or stepped in a manner which will permit bonding of the embankment with the existing surface. The fill or embankment soils shall be as specified under Part 2 - Products, and shall be deposited and spread in successive, uniform, approximately horizontal layers. The loose

thickness of each lift shall not exceed the thickness for each fill type noted in Paragraph 3.09, COMPACTION.

- E. Hauling shall be distributed over the full width of the embankment, and in no case will deep ruts be allowed to form during the construction of the embankment. Fill or embankment subgrades shall be properly drained at all times and kept free of flowing or ponding water, snow, ice and frozen soils. Saturated soils, snow, ice, or frozen soils shall be removed as recommended by the Engineer.
- F. Each layer of the embankment shall be thoroughly compacted to the density specified under Paragraph 3.09, COMPACTION.
- G. The embankment or fill material in the layers shall be of the proper moisture content before rolling to obtain the prescribed compaction. Moisture conditions and manipulation of the fill or embankment material, when necessary, shall be performed to maintain a uniform moisture content throughout the layer. Should the material be too wet or too dry to permit proper compaction, earthwork operations shall be delayed until the material is adequately moisture conditioned. Samples of all fill or embankment materials for testing, both before and after placement and compaction, will be taken at frequent intervals. From these tests, corrections, adjustments, and modifications of methods, materials, and moisture content will be made to construct the embankment.
- H. Where fill or embankments materials are to be placed and compacted on sloped subgrades steeper than 4:1 shall be benched. Benches shall be at least 6-feet wide.
- I. When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portions of the embankments and the other material which meets the requirements for select fill shall be incorporated into the formation of the embankments. Stones or fragmentary rock larger than 4 inches in their greatest dimension will not be allowed within the top 6 inches of the final grade. Stones, fragmentary rock, or boulders larger than 12 inches in their greatest dimension will not be allowed in any portions of embankments and shall be disposed of by the Contractor as indicated by the Engineer. When rock fragments or stone are used in embankments, the material shall be brought up in layers as specified or directed and every effort shall be exerted to fill the voids with finer material to form a dense, compact mass which meets the densities specified for embankment compaction.

3.08 BACKFILLING

- A. All structures and pipes shall be backfilled with the type of materials shown on the Drawings and specified herein. Fill placed as structure or utility backfill shall be deposited in successive, uniform, approximately horizontal lifts. The thickness of each lift shall not exceed the requirements of Paragraph 3.09, COMPACTION.
- B. Each lift of fill placed backfill shall be thoroughly compacted to the density specified for each type of fill included in Paragraph 3.09, COMPACTION.

- C. Where excavation support is used, the Contractor shall take all reasonable measures to prevent loss of support beneath and adjacent to pipes and existing structures when supports are removed. If significant volumes of soil cannot be prevented from clinging to the extracted supports, the voids shall be continuously backfilled as rapidly as possible. The Contractor shall thereafter limit the depth below subgrade that supports will be installed in similar soil conditions or employ other appropriate means to prevent loss of support.
- D. Backfill against concrete or masonry structure shall not be performed until the Work has been reviewed and backfilling permitted. Backfill against walls shall also be deferred until the structural slab for floors above the top fill line have been placed and attained design strength or earlier at the discretion of the Engineer. Partial backfilling against adequately braced wall may be considered by the Engineer on an individual situation basis. Where walls are to be waterproofed, all Work shall be completed and membrane materials dried or cured according to the manufacturer's instructions before backfilling.
- E. Backfill against tanks and other structures which are to retain liquids shall not be performed until leakage tests are completed and accepted by the Engineer in accordance with the Section entitled "Water Tightness Testing".

3.09 SUBGRADE RECONSTRUCTION

- A. Subgrade Reconstruction shall be provided as noted on the Drawings to a depth of 3 feet below existing grade.
- B. Engineered Fill used for Subgrade Reconstruction shall meet requirements of Section 2.06.
- C. Engineered fill shall be placed in horizontal lifts not exceeding 8 inches in thickness and mechanically compacted to a minimum of 90 percent relative compaction with moisture content between 1 and 3 percent above the laboratory optimum value. 3/4-inch crushed rock shall be compacted by placement in 12-inch lifts and vibrated in place with a minimum of 3 passes of a vibratory plate. The crushed rock shall be separated from the adjacent soil by a non-woven geotextile, such as MIRAFI 140N or equivalent.

3.10 COMPACTION

- A. The Contractor shall compact embankments, backfill, crushed stone, aggregate base, and in place subgrade in accordance with the requirements of this Section. The densities specified herein refer to percentages of maximum density as determined by the noted test methods. Compaction of materials on the project shall be in accordance with the following schedule:

B. Compaction Near Existing Structures

	Density % Standard Proctor (D 698)	Density % Mod. Proctor (D 1557)	Max. Lift Thickness as Compacted Inches
Embankments Beneath Structures, Roadways, and Sidewalks*	98	92	8
Common Fill Areas	95	90	8
Backfill Around Structures	95	90	8
Backfill in Pipe Trenches	95	90	8
Crushed Stone Beneath Structures	**	**	12
Select Sand	98	92	8
Aggregate Base Course (ABC) Beneath Structures, Roadways, and Sidewalks	**	**	8
Crushed Stone Backfill	**	**	12
Crushed Stone Pipe Bedding	**	**	12
In Place Subgrade Beneath Structures, Roadways, and Sidewalks	98	92	Top 12-inches

* Embankments beneath structures shall be considered to include a zone 10 feet out from the foundation of the structure extending down to the natural ground on a 45° slope.

** The aggregate shall be compacted to a degree acceptable to the Engineer by use of a vibratory compactor and/or crawler tractor.

1. Vibratory equipment shall not be used with 25 feet of any existing structure.
2. Within 25 feet of any existing structure, non-vibratory compaction equipment such as a drum roller with a maximum weight of 4 tons should be used. Within 5 feet of any existing structure, a walk behind vibratory sled or roller shall be used.

C. Field density tests will be made by the Materials Testing Consultant to determine if the specified densities have been achieved, and these tests shall be the basis for accepting or rejecting the compaction. In-place density tests will be performed in accordance with ASTM D 1556, ASTM D 1557, or ASTM D 6938. The Engineer, in conjunction with the Materials Testing Consultant, will be the judge as to which test method will be the most appropriate. Failure to achieve the specified densities shall require the Contractor to recompact the material or remove it as required. The Contractor shall, if necessary, increase the compactive effort by increasing the number of passes, using heavier or more suitable compaction equipment, or by reducing the thickness of the layers. The Contractor shall adjust the moisture contents of the soils to bring them within the optimum range by drying them or adding water as required.

- D. Testing will be performed as frequently as deemed necessary by the Engineer and/or Materials Testing Consultant. As a minimum, one in place density test shall be performed for each 1000 cubic yards of embankment placed and 500 cubic yards of backfill placed or one test performed each day for either or as directed by the Engineer or recommended by Material Testing Consultant.

3.11 VIBRATION MONITORING

- A. Vibration monitoring shall be performed at nearby structures when compaction work is ongoing. A single monitoring point using vibration monitoring equipment capable of detecting velocities of 0.1 inch/second or less and survey measurements shall be used for vibration monitoring at each of the nearest structures. An elevation measurement on nearby structures shall be taken before compaction work starts, and then at least twice a day during the work with one reading taken at the conclusion of the day's operations. Elevation measurements shall be recorded to an accuracy of 0.005 foot. If at any time the Contractor detects settlement or heave of 0.005-feet or more, or vibration levels of 1.0 inch/second or more, the vibratory compaction shall be stopped immediately, and the Engineer notified.

3.12 REMOVAL OF EXCESS AND UNSUITABLE MATERIALS

- A. The Contractor shall remove and dispose of off-site all excess and unsuitable materials. Within thirty (30) consecutive days after Notice to Proceed, the Contractor shall submit to the Engineer for review all required permits and a list of disposal sites for the unsuitable materials. If the disposal site is located on private property, the submittal shall also include written permission from the owner of record.
- B. All excess and unsuitable materials shall be disposed of in locations and under conditions that comply with federal, state/commonwealth and local laws and regulations.
- C. The Contractor shall obtain an off-site disposal area prior to beginning demolition or excavation operations.
- D. When all excess and unsuitable material disposal operations are completed, the Contractor shall leave the disposal sites in a condition acceptable to the Owner and Owner(s) of the disposal site(s).

3.13 BORROW EXCAVATION

- A. Description
 - 1. The work covered by this section consists of the excavation of approved material from borrow sources and the hauling and utilization of such material as required on the Drawings or directed by the Engineer. It shall also include the removing, stockpiling, and replacement of topsoil on the borrow source; the satisfactory disposition of material from the borrow source which is not suitable for use; and the satisfactory restoration of the borrow source and haul roads to an acceptable condition upon completion of the work.

2. Borrow excavation shall not be used before all available suitable unclassified excavation has been used for backfilling and incorporated into the embankments.

B. Borrow Materials

1. All material shall meet the requirements of Section 2 for Select Fill or shall meet the requirements of Common Fill and classify as SM or coarser according to ASTM D 2487.

C. Construction Methods

1. General

- a. The surface of the borrow area shall be thoroughly cleared and grubbed and cleaned of all unsuitable material including all organics, topsoil, etc., before beginning the excavation. Disposal of material resulting from clearing and grubbing shall be in accordance with Owner requirements.
- b. Each borrow operation shall not be allowed to accumulate exposed, erodible slope area in excess of 1 acre at any one given time without the Contractor's beginning permanent seeding and mulching of the borrow source or other erosion control measures as may be approved by the Engineer.
- c. The topsoil shall be removed and stockpiled at locations that will not interfere with the borrow operations and that meet the approval of the Engineer. Temporary erosion control measures shall be installed as necessary to prevent the erosion of the stockpile material. Once all borrow material has been removed from the source or portion thereof, the stockpiled topsoil shall be spread uniformly over the source.
- d. Where it is necessary to haul borrow material over existing roads, the Contractor shall use all necessary precautions to prevent damage to the existing roads. The Contractor shall also conduct hauling operations in such a manner as to not interfere with the normal flow of traffic and shall always keep the traffic lanes free from spillage.

2. Owner Furnished Sources

- a. Where borrow sources are furnished by the Owner the location of such sources will be as designated on the Drawings or as directed by the Engineer.
- b. The Owner will furnish the necessary haul road right-of-way at locations designated by the Engineer. All haul roads required shall be built, maintained, and when directed by the Engineer, obliterated, at no cost to the Owner. Where the haul road is to be reclaimed for cultivation the Contractor shall plow or scarify the area to a minimum depth of 8 inches, or to the depth requested by the property owner.

- c. The borrow sources shall be left in a neat and presentable condition after use. All slopes shall be smoothed, rounded, and constructed not steeper than 3:1. Where the source is to be reclaimed for cultivation the source shall be plowed or scarified to a minimum depth of 8 inches, disc harrowed, and terraces constructed. The source shall be graded to drain such that no water will collect or stand, and a functioning drainage system shall be provided.

3. Contractor Furnished Sources

- a. Prior to the approval of any off-site borrow source(s) developed for use on this project, the Contractor shall obtain certification from the State/Commonwealth Historic Preservation Officer of the State/Commonwealth Department of Cultural Resources certifying that the removal of the borrow material from the borrow source(s) will have no effect on any known district, site building, structure, or object that is included or eligible for inclusion in the National Register of Historic Places. A copy of this certification shall be furnished to the Engineer prior to performing any work on the proposed borrow source.
- b. The approval of borrow sources furnished by the Contractor shall be subject to the following conditions:
 - 1) The Contractor shall be responsible for acquiring the right to take the material and any rights of access that may be necessary; for locating and developing the source; and any clearing and grubbing and drainage ditches necessary.
 - a) Such right shall be in writing and shall include an agreement with the Owner that the borrow source may be dressed, shaped, seeded, mulched, and drained as required by these Specifications after all borrow has been removed.
 - 2) The Contractor and the property owner shall jointly submit a borrow source development, use, and reclamation plan to the Engineer, as described in Paragraph 1.05, for approval prior to engaging in any land disturbing activity on the proposed source other than material sampling that may be necessary.

4. Maintenance

- a. During construction and until final acceptance the Contractor shall use any methods approved by the Engineer which are necessary to maintain the work covered by this Section so that the work will not contribute to excessive soil erosion.

END OF SECTION

SECTION 33 71 19
UNDERGROUND ELECTRICAL

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install underground duct systems, electric manholes, and electric handholes as specified herein and as indicated on the Drawings. The work shall be complete and shall include excavation, concrete construction, backfilling, and all materials, items, and components required for a complete system.
- B. The provisions of this Section are applicable to all underground conduit work. All work shall be coordinated with that of the various utility companies and other Contractors. The Contractor shall adhere to all utility company requirements including the serving electric utility.
- C. Reference Section 26 05 00 – Basic Electrical Requirements; Section 26 05 33.13 – Conduit for Electrical Systems; Section 26 05 26 – Grounding and Bonding for Electrical Systems; the applicable sections of Division 31, Earthwork; Section 03 21 00 – Reinforcing Steel; and 03 30 00 – Cast-In-Place Concrete.

1.02 CODES AND STANDARDS

- A. Products specified herein shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. AASHTO H20
 - 2. ANSI/SCTE 77-2010 – Specification for Underground Enclosure Integrity

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit Shop Drawings. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

- C. Shop drawings shall include but not be limited to, the following:
 - 1. Product data sheets.
 - 2. Outline and dimensional drawings including detailed sections of the manholes and/or handholes.
 - 3. Materials specifications and structural calculations for the manholes sealed by a Professional Engineer licensed in the State or Commonwealth in which the project is located.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The material covered by this Specification is intended to be standard material of proven performance as manufactured by reputable concerns. Material shall be fabricated, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as specified herein and indicated on the Drawings.

2.02 DUCT SYSTEM

- A. The underground duct system shall be comprised of conduits, conduit bends, and conduit fittings as specified in Section 26 05 33.13 – Conduit for Electrical Systems. Conduits shall be encased in reinforced concrete envelopes, unless otherwise specified herein or indicated on the Drawings.
- B. Base and intermediate conduit spacers shall be furnished to provide a minimum of two-inch (2”) separation between conduits. Conduit spacers shall be provided in the proper size as required for the conduit that they secure. For example, a 4” conduit spacer shall not be used to secure a 2” conduit. Conduit spacers shall be as manufactured by Carlon Electrical Products Company, Aeroquip Corporation, Underground Devices, Incorporated, or equal.

PART 3 – EXECUTION

3.01 GENERAL

- A. The underground duct system, manholes, and handholes shall be installed as specified herein, indicated on the Drawings, and in accordance with manufacturers’ instructions.

3.02 DUCT SYSTEM

- A. All underground conduit shall be encased in concrete and shall be reinforced. Encasement and reinforcement shall be as indicated in the standard details. Concrete shall be furnished and installed in accordance with Section 03 30 00 – Cast-In-Place

Concrete. Reinforcing steel shall be furnished and installed in accordance with Section 03 21 00 – Reinforcing Steel.

- B. Concrete pours shall be complete from handhole to handhole and from manhole to manhole where practicable. Partial pours in general shall not be permitted. Where a complete pour is impractical, written authorization shall be obtained from the Engineer for the partial pour.
- C. Conduit ductbank elevations at the manholes and handholes shall be based on minimum ductbank cover as indicated in the standard details, or deeper to avoid conflicts with other obstacles. Where deviation is necessary to clear unforeseen obstacles, the elevations may be changed after authorization by the Engineer.
- D. Slope all conduits continuously away from structures and buildings with a minimum slope of 3" per 100' unless otherwise indicated on the Drawings.
- E. The minimum clearance from the top of the concrete encasement and finished grade shall be as indicated in the standard details, except where otherwise accepted in writing by the Engineer or shown on the Drawings.
- F. Care shall be exercised during excavation for the duct banks to prevent digging too deep. Backfilling of low spots with earth fill will not be permitted unless thoroughly compacted and acceptable to the Engineer.
- G. If a specific ductbank arrangement is shown on the Drawings, the conduits in that ductbank shall be arranged as shown. Where no specific ductbank arrangement is shown on the Drawings, the Contractor shall arrange conduits within each ductbank based on field conditions. Spare conduits shown going from ductbanks into buildings or structures shall be stubbed up in the location(s) as indicated on the Drawings.
- H. A minimum of one (1) ground rod, furnished in accordance with Section 26 05 26 – Grounding and Bonding for Electrical Systems, shall be driven adjacent to each manhole, handhole, or other concrete box. A No. 4/0 AWG bare copper ground cable shall be connected between this rod and the copper ground strap using a silicon bronze connector. All ground rods shall be interconnected by means of the No. 4/0 AWG bare copper ground cable located within each duct bank. The ends of these cables shall also be connected to substation and/or building ground buses where the conduits terminate.
- I. Care shall be exercised and temporary plugs shall be installed during installation to prevent the entrance of concrete, mortar, or other foreign matter into the conduit system. Conduit spacers shall be utilized to support conduit during the pouring of concrete to prevent movement and misalignment of the conduits. Conduit spacers shall be installed in accordance with manufacturer's instructions unless otherwise noted. Horizontal spacing of conduit spacers along ductbank shall be as indicated on the Standard Details.
- J. Where connections to existing underground conduits are indicated, excavate to the maximum depth necessary. After addressing the existing conductors, cut the conduits and remove loose concrete from the conduits before installing new concrete encased

ducts. Provide a reinforced concrete collar, poured monolithically with the new duct line, to take the shear at the joint of the duct lines.

- K. Construct concrete-encased conduits connecting to underground structures to have a flared section adjacent to the manhole to provide shear strength. Construct underground structures to provide shear strength. Construct underground structures to provide for keying the concrete encasement of the duct line into the wall of the structure. Use vibrators when this portion of the encasement is poured to ensure a seal between the encasement and the wall of the structure.
- L. Six (6) inches above all duct banks, the Contractor shall furnish and install a two (2) inch wide red plastic electrical hazard tape. Tapes shall be metallic detectable type and shall have a continuous message in bold black letters: "ELECTRIC LINE BURIED BELOW." Tape shall be Detectable Identoline by Brady, or equal.
- M. The Contractor shall perform all earthwork including excavation, backfill, bedding, compaction, shoring and bracing, grading and restoration of surfaces and seeded areas disturbed during the execution of the work.
- N. All conduit joints in the duct system shall be staggered such that adjacent conduits do not have joints in the same location.

3.03 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. Field tests
 - a. Field tests for all completed duct systems shall consist of pulling a swab through each conduit followed by a mandrel equal in size to 85% of the conduit inside diameter.
 - b. After testing, all conduits shall be capped after installation of a suitable pull rope. All field tests shall be witnessed by the Engineer.

END OF SECTION

SECTION 40 61 93
PROCESS CONTROL SYSTEM INPUT / OUTPUT LIST

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, test, install and place in satisfactory operation all control system inputs and outputs as herein specified and as shown on the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 40 61 96 – Process Control Descriptions

PART 2 – CONTROL SYSTEM INPUT / OUTPUT SCHEDULE

Tag Number	Service Description	State/Span	I/O Type	Remarks
	DIGESTER CONTROL ROOM GAS TRANSMITTER	0-100%	AI	LEL
	DIGESTER CONTROL ROOM GAS TRANSMITTER HIGH	ON/OFF	DI	INITIALLY SET AT 10% LEL (METHANE)
	PRIMARY DIGESTER RECIRCULATION PUMP RUNNING	ON/OFF	DI	
	PRIMARY DIGESTER RECIRCULATION PUMP REMOTE	ON/OFF	DI	
	PRIMARY DIGESTER RECIRCULATION PUMP FAIL	ON/OFF	DI	
	PRIMARY DIGESTER RECIRCULATION PUMP RUN COMMAND	ON/OFF	DO	
	SECONDARY DIGESTER RECIRCULATION PUMP RUNNING	ON/OFF	DI	
	SECONDARY DIGESTER RECIRCULATION PUMP REMOTE	ON/OFF	DI	
	SECONDARY DIGESTER RECIRCULATION PUMP FAIL	ON/OFF	DI	
	SECONDARY DIGESTER RECIRCULATION PUMP RUN COMMAND	ON/OFF	DO	
	SLUDGE LIQUOR PUMP RUNNING	ON/OFF	DI	
	SLUDGE LIQUOR PUMP REMOTE	ON/OFF	DI	
	SLUDGE LIQUOR PUMP FAIL	ON/OFF	DI	
	SLUDGE LIQUOR PUMP RUN COMMAND	ON/OFF	DO	
	MCC-2 Power Monitor Voltage L-L	0-1,000 Volts	NAI	
	MCC-2 Power Monitor Current Per Phase	0-1,000 Amps	NAI	
	MCC-2 Power Monitor Power (Real)	0-1,000 kW	NAI	

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Tag Number	Service Description	State/Span	I/O Type	Remarks
	MCC-2 Power Monitor Power (Reactive)	0-1,000 kVAR	NAI	
	MCC-2 Power Monitor (Apparent)	0-1,000 kVA	NAI	
	MCC-2 Power Monitor Power Factor (pf)	0.0-1.0	NAI	
	MCC-2 Power Monitor Frequency	0-100 Hz	NAI	

1. NOTES: Input/Output types are as follows:
 - a. DI – Discrete Input
 - b. DO – Discrete Output
 - c. AI – Analog Input
 - d. AO – Analog Output
 - e. NAI – Networked Analog Input
2. All I/O shown in the above schedule shall be connected to Marinwood Pump Station PLC Control Panel located in MCC-5.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 40 61 96
PROCESS CONTROL DESCRIPTIONS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, test, install and place in satisfactory operation all equipment as herein specified and as shown on the Drawings. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING COMPLETE FUNCTIONING SYSTEMS AS DESCRIBED HEREIN.
- B. Together with the control system input/output schedule, the equipment specifications (including functional descriptions for local equipment control panels), and the Drawings, the functional control descriptions describe the required operation, monitoring, and control of the facilities included in this Contract.
- C. THE FUNCTIONAL DESCRIPTIONS CONTAIN REQUIREMENTS FOR FURNISHING AND INSTALLING LABOR AND MATERIALS THAT MAY NOT APPEAR ELSEWHERE IN THE CONTRACT DOCUMENTS.
- D. All equipment and services required in equipment local control panels provided to implement the monitoring and control functions described herein or in the process input/output schedules shall be provided by the Contractor through individual equipment suppliers.
- E. Unless specifically stated otherwise, all interconnected wiring between all instruments, panels, controls, and other devices listed in the functional descriptions as required to provide all functions specified herein shall be furnished by the electrical subcontractor under Division 26. The electrical subcontractor shall provide all cable and conduit required to carry all signals listed in the process input/output schedules. Special cables that are required for interconnection between sensors or probes and transmitters or signal conditioners shall be furnished with the instrumentation devices by the equipment supplier.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 40 61 93 – Process Control System Input/Output List

PART 2 – FUNCTIONAL CONTROL DESCRIPTIONS, GENERAL

2.01 DEFINITIONS

- A. RUNNING status signals shall be from auxiliary contacts provided with the motor control equipment (i.e., starter, VFD, SCR, etc.).

- B. AUTO status signals shall be defined as HAND-OFF-AUTO switch in the AUTO position or process control system in AUTO (versus MANUAL).
- C. FAIL status signals shall be defined as motor overload and/or any other shut down mode such as overtorque, overtemperature, low oil pressure, high vibration, etc.
- D. READY status signal shall be defined as all conditions, including equipment control power, satisfied to permit remote control of the equipment.

2.02 CONVENTIONS

- A. Operator workstation graphic display symbols shall conform to District SCADA programming standards. A brief synopsis of the associated color conventions are shown below:
 - 1. Running/On/Open: Green
 - 2. Auto/Ready: Blue text
 - 3. Stopped/Off/Closed: Gray
 - 4. Transition State: Purple
 - 5. Fail/Alarm: Yellow Halo
 - 6. Generic Status: Shades of gray (no animation)

2.03 PROCESS CONTROL

- A. Where setpoints, operating limits, and other control settings are provided by the functional descriptions, these settings shall be initial settings only and shall be used for assistance in the initial startup of the plant. All such settings shall be fully adjustable and, based on actual operating conditions, the instrumentation subcontractor shall make all necessary adjustments to provide smooth, stable operation at no additional cost to the Owner.
- B. Provision shall be made in PLC logic to suppress nuisance alarms and control actions by the following means:
 - 1. For alarms and control actions derived from analog input signals, use adjustable time delays and deadbands.
 - 2. For alarms and control actions derived from discrete input signals, use adjustable time delays.
 - 3. Initial settings for time delays shall be 10 seconds (range 0-120 seconds). Initial settings for deadbands shall be 5% of span (range 0-100%).

4. Equipment that is started or stopped manually by the operator shall start or stop immediately, with no time delay.
- C. All setpoint control shall be by PID control algorithms. Where only proportional control is specified, tuning constants shall be used to reduce the Integral and Derivative functions to zero. All setpoints, sequence times, sequence orders, dead bands, PID tuning parameters, PLC delay timers, variable speed operating range limits, and similar control constants shall be accessible and alterable from the operator workstations.
- D. Unless otherwise specified, all equipment shall automatically restart after a power failure utilizing adjustable start delay timers in PLC control logic. Unless otherwise specified, all PLC control strategies shall be based upon automatic restart after a power failure and shall return to a normal control mode upon restoration of power.
- E. The PLC shall be capable of receiving initial run-time values for existing and proposed equipment. Initial run-time shall not automatically be assumed to be zero.
- F. A control discrepancy alarm shall be generated through the PLC for any drive, motor, etc. for which a command has been issued, but for which the PLC is not receiving a confirming status signal (e.g., start command with no run feedback). The failure shall be logged.
- G. An instrument failure alarm shall be generated for any instrument which is generating a signal that is less than 4 mA or greater than 20 mA.
- H. Unless otherwise specified in an individual control description, an instrument failure or control discrepancy alarm shall cause the control strategy to maintain last values and to generate an alarm. Manual initiation of the automatic control strategy shall be required.
- I. A control program that controls multiple pieces of equipment shall not be prevented from running because not all of the equipment is in AUTO. If equipment within an equipment chain is required to be running for program operation and it is running in HAND or MANUAL, then the program shall run and control the other equipment that is in AUTO.
- J. All PLC wait states (internal time delays, etc.) after an operator action shall be displayed on the operator workstation.

PART 3 – FUNCTIONAL CONTROL DESCRIPTIONS

3.01 PRIMARY AND SECONDARY DIGESTER RECIRCULATION PUMPS (E.G. – SCUM BUSTERS)

- A. Process Overview
- B. The primary and secondary digester recirculation pumps transfer digester sludge and recirculate sludge from and to the digester respective digester.

C. Control Operation

1. Local Control

- a. When the L-O-R selector switch at the MCC is in the Local position
 - 1) The pump shall run when the Start/Stop selector switch is in the Start position.
 - 2) The pump shall stop when the Start/Stop selector switch is in the Stop position.
- b. When the L-O-R selector switch at the MCC is in the Off position, the pump shall not run

2. Remote (PLC) Control

- a. When the L-O-R selector switch at the MCC is in the Local position, the pump shall be controlled by the PLC as described below
- b. Remote Manual control.
 - 1) The pump shall be started and stopped by the start/stop selector on the HMI graphic screen
- c. Remote Auto control
 - 1) When controlled automatically, the recirculation pumps shall operate on a timer. Each recirculation pump shall have an operator adjustable RUNNING TIME TIMER (0 to 90 minutes) and OFF TIMER (0 to 24 hours).

3.02 SLUDGE LIQUOR PUMP

A. Process Overview

- 1. The sludge liquor pump circulates digester contents through the spiral heat exchanger to maintain the elevated temperature needed for efficient methane production.

B. Control Operation

1. Local Control

- a. When the L-O-R selector switch at the MCC is in the Local position

- 1) The pump shall run when the Start/Stop selector switch is in the Start position.
 - 2) The pump shall stop when the Start/Stop selector switch is in the Stop position.
- b. When the L-O-R selector switch at the MCC is in the Off position, the pump shall not run
2. Remote (PLC) Control
- a. When the L-O-R selector switch at the MCC is in the Local position, the pump shall be controlled by the PLC as described below
 - b. Remote Manual control.
 - 1) The pump shall be started and stopped by the start/stop selector on the HMI graphic screen
 - c. Remote Auto control
 - 1) N/A

3.03 HMI SCREEN CONFIGURATION

- A. Contractor shall configure a screen and associated pop-up windows for the PLC OIT which facilitates controls described in this specification as well as displays newly monitored I/O shown in Specification Section 40 61 93 – Process Control System Input/Output.
- B. The Contractor shall configure a screen in the SCADA HMI which mirrors the information and functionality of the PLC OIT screen.

END OF SECTION

SECTION 40 76 22
PACKAGED GAS AND SAFETY MONITORING SYSTEM

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish, test, install and place in satisfactory operation the gas and safety monitoring system including, but not limited to, the single point gas monitoring instrumentation and monitoring control panel, with all spare parts, accessories, and appurtenances as required for a fully functional system. Provide components as shown and provide components as specified.
- B. Quantity and type of gas instrumentation shall be as scheduled herein and number of systems along with the number of annunciation devices shall be per the Drawings.

1.02 TOOLS, SUPPLIES AND SPARE PARTS

- A. One spare sensor of each type, except for IR types, used shall be furnished as spare. For sensors with a limited shelf life, manufacturer shall hold spare sensor and shall furnish at the sooner of when requested or 12 months after order.
- B. Calibration equipment, including nonintrusive handheld terminal for calibration and setup, and the actual calibration gas (zero and span), for each gas measured, shall be furnished to field calibrate the gas monitoring systems at start-up. Additionally, a one year supply, assuming monthly calibration, of each gas that does not have a shelf life of less than one year shall be provided.
- C. Two spare relays for each type of relay used in the gas monitoring system.

1.03 QUALITY ASSURANCE

- A. Gas safety and monitoring system design and panel construction shall be in compliance with Sections 40 61 93 through 40 76 22, inclusive and where included, of these specifications, UL 508A, and panel drawings/design shall be signed and sealed by a Professional Engineer registered in the state or commonwealth in which this project is being constructed. Control panel shall bear the UL mark. Submittals without a PE stamp will be rejected and returned without review. Stamping the final submittal version at a later date shall be unacceptable.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Gas monitoring instrumentation shall include a sensor to monitor the specified or shown gas, and a microprocessor-based transmitter that is capable of accepting, converting and transmitting signals from the sensor. The complete gas monitoring instrumentation including sensor, transmitter, and accessory equipment shall be supplied by a single manufacturer. One instrument shall be provided per gas per location.

2.02 GAS SENSORS

- A. All sensors shall sample and monitor the atmosphere without the aid of pumps or other mechanical devices, unless otherwise indicated. Sensors and associated enclosures shall be rated for installation in a Class I, Division 1 environment. Sensors shall be mounted with non-corrosive hardware.
- B. Provide a combustible gas sensor. Sensors shall be provided according to the requirements herein.
 - 1. Combustible Gas (CG or CGD) Sensor: The combustible gas sensor shall be the infrared (IR) type and shall carry a 10-year warranty on sensor light source. It shall be immune to poisoning by hydrogen sulfide and silicone. The IR sensor shall allow detection of an above 100% LEL condition (over-range). The IR sensor shall not contain a flashback arrestor or frit.
- C. Sensors shall be contained in modules mounted externally to the transmitter's enclosure. All sensor modules shall have the capability of replacement while the unit is under power in a hazardous area with declassifying the space and without the need for special tools.
- D. Sensor modules shall contain all relevant sensor information within the module so that the module may be calibrated off site. This information shall include sensor manufacturer date, gas type, gas range, calibration data, and default relay parameters. The sensor module shall not require a battery or power source to store this data.
- E. The sensor shall be capable of being mounted remotely from the transmitter. The allowable distance from the remote mounted sensor to the transmitter shall be a minimum of 100 feet.

2.03 GAS TRANSMITTER

- A. The transmitter shall be rated for installation in a Class I, Division 1 environment. The transmitter shall have a digital readout to indicate, sequentially, the gas type being monitored and the concentration of gas present. The transmitter shall have normal,

alarm, and fault indicating lights. Alarm level set points shall be adjustable by means of an intrinsically safe hand held controller/device.

- B. Transmitter in conjunction with the appropriate sensor shall have the following specifications:
1. Rated temperature range shall include, at a minimum -40°C to 60°C.
 2. Calibration drift shall be less than 5 percent per year, for zero setting and less than 10 percent per year for span setting.
 3. Accuracy, plus or minus, shall be as follows:
 - a. The lesser of two percent scale or two ppm for oxygen and monoxides of carbon.
 - b. Two percent full scale for less than 50 percent LEL and three percent full scale for greater than 50 percent LEL for combustibles.
 - c. The lesser of 10 percent full scale or 2ppm for toxic gases.
 - d. The lesser of one percent full scale or two ppm for all others.
 4. Response times shall be as follows:
 - a. Less than 12 seconds for a 20 percent change in concentration and less than 30 percent for a 50 percent change in concentration for oxygen and toxic gas sensors.
 - b. Less than eight seconds for a 50 percent change in concentration and less than 20 seconds for a 90 percent change in concentration for combustible gas sensors.
 5. Humidity rating shall be 15 to 95 percent relative humidity, non-condensing.
 6. Sensor life shall be rated for three years for combustibles and two years for all others.
 7. Power and signal shall be 24 VDC via 3-wire 4-20 mA current source.
 8. Transmitter shall have three programmable normally closed or failsafe relay contacts rated at least 5A @ 24VDC.
- C. Calibration shall be performed by a hand held infrared controller. It shall not be necessary to open the monitor enclosure to perform calibration or adjustment of the unit. With the exception of a monthly check and recalibrations, no periodic maintenance shall

be necessary. To facilitate one-person calibration of remote-mounted sensors, provide clear and flexible hose for the delivery of calibration gas to the sensor from near the transmitter. Provide all accessories necessary for installing hose.

- D. Gas monitoring instrumentation shall be the Ultima X Series as manufactured by MSA Instruments, or equal.

2.04 GAS AND SAFETY MONITORING CONTROL PANEL

- A. Provide wall-mount stainless steel rated gas and safety monitoring control panel. Panel shall carry a dual NEMA 4X and NEMA 7 rating. Control panel shall be capable of monitoring all connected gas monitoring instrumentation and relaying that information to the closest PLC panel or as indicated. Provide a fan driven panel-heater with thermostat for the purpose of elevating internal temperature sufficiently to avoid condensation.
- B. The control panel shall be capable of receiving a single 120VAC power feed. A main circuit breaker shall be provided followed by a surge protection device and two 24VDC power supplies feeding a 24VDC UPS. UPS shall be sized for at least 110% of connected load (i.e., gas monitors and logic) and shall provide backup power for at least 15 mins with the panel power source disconnected. With the exception of the panel heater, all power, wiring, signals, relay logic, etc. shall be designed for 24VDC. Power supplies and UPS shall be manufactured by Puls, or equal.
- C. All signals received at panel shall be relayed or retransmitted for output. Common input and output loops are not acceptable. Hardwired logic shall be designed fail-safe and shall use safety type control relays. No programmable controllers or similar devices shall be acceptable. Safety type control relays shall be manufactured by Allen-Bradley, Eaton, or equal.
- D. Terminals for failsafe alarms wired in series shall be looped through the control panel. Shorting terminals shall be provided for easily taking an instrument offline for service. Each instrument shall also have its own fuse or circuit breaker on its power feed.
- E. See Specification 40 61 93 for list of I/O points.
- F. Provide the following front panel mounted devices:
 - 1. Control Power-On LED indicating lamp
 - 2. Gas Alarm push-to-test LED type indicating lamp
 - 3. Gas Fault push-to-test LED type indicating lamp
 - 4. HVAC Fault push-to-test LED type indicating lamp

5. Silence pushbutton
6. Test pushbutton
7. Gas level digital display readout, per gas sensor
8. Audible horn.
9. Red Strobe beacon.
10. Nameplate to read, "DIGESTER ROOM GAS AND SAFETY MONITORING CONTROL PANEL."
11. Nameplate to read, "This panel provides critical NFPA 820 life safety monitoring and alarming and shall remain energized at all times. This system will provide notification of dangerous environments; however, user is still responsible for ensuring that he/she is entering a safe environment."

G. Functional Description

1. Gas instrumentation shall be powered from the gas and safety monitoring control panel and the gas level, for each sensor, shall be displayed at the panel. Gas level shall also be re-transmitted to the plant PLC.
2. Upon receipt of a gas alarm from any gas sensor connected to the system, the alarm contact shall close, the indicating lamp shall illuminate, the panel mounted horn and remote mounted horns shall sound and the panel mounted strobe beacon and remote mounted strobe beacons shall flash.
3. Upon receipt of a gas failure, fault or trouble signal from any gas sensor connected to the system, the gas fault contact shall close, the indicating lamp shall illuminate, the panel mounted horn and remote mounted horns shall sound and the panel mounted strobe beacon and remote mounted strobe beacons shall flash.
4. Upon receipt of an HVAC loss of air signal, the respective HVAC fault contact shall close, the indicating lamp shall illuminate, the panel mounted horn and remote mounted horns shall sound and the panel mounted strobe beacon and remote mounted strobe beacons shall flash.
5. When the alarm horns are sounding and the strobes are flashing, pressing any silence button or sending the signal remotely, shall silence the horn. The strobes shall continue to flash until the alarm or fault condition has cleared.

- H. Panel shall be factory assembled and tested prior to shipment. Designer of record shall be present for factory testing.

2.05 ANNUNCIATION DEVICES

A. Alarm Strobe

1. Strobes located within the same room, or otherwise visible from any shared frame of view, shall be synchronized per the requirements of NFPA 72. Strobes shall be synchronized by the strobe manufacturer's synchronization module. Strobe circuits shall not exceed the continuous duty current rating of the synchronization module. Synchronization module shall be Federal Signal Model SSM, Edwards Signaling Model EG1M-RM, or equal.
2. For Class I, Division 1 areas
 - a. Provide red explosion proof dome covered strobe unit rated NEMA 4X and Factory Mutual certified for a Class I, Division 1, Group D area. Unit shall be UL listed. Strobe shall be powered from 24VDC.
 - b. Alarm strobe shall be Federal Signal Model 27XST, Edwards Signaling Model 116DEGEX-FJ, or equal. Compatible mounting hardware by the strobe manufacturer shall be furnished.

B. Alarm Horn

1. For Class I, Division 2 areas and non-hazardous areas
 - a. Provide NEMA 4X and Class I, Division 2 rated alarm horn capable of 32 selectable warning tones. Coordinate tone selection with Owner. Volume shall be field adjustable between 0 and 114 dBA measured at 10 feet.
 - b. Alarm horn shall be the SelecTone 302GCX series with UTM tone module as manufactured by Federal Signal Corporation, or equal.
2. For Class I, Division 1 areas
 - a. Provide NEMA 4X and Class I, Division 1 rated alarm horn capable of 32 selectable warning tones. Coordinate tone selection with Owner. Volume shall be field adjustable between 0 and 114 dBA measured at 10 feet.
 - b. Alarm horn shall be the SelecTone 302X series with UTM tone module as manufactured by Federal Signal Corporation, or equal.

**PART 3 –
EXECUTION**

3.01 REQUIREMENTS

- A. Gas instrumentation and monitoring panel shall be mounted as shown on the Drawings. Calibration gas delivery hose shall be installed neatly with zip-ties on the conduit between the transmitter and the sensor.

END OF SECTION

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**VOLUME 4
DRAWINGS**

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LIGHTING:

- X DENOTES FIXTURE TYPE (TYP.)
SEE SPECIFICATION 26 50 00 FOR FIXTURE SCHEDULE
DENOTES CIRCUIT NUMBER (TYP.)
RECTANGULAR FIXTURE
LEFT: CEILING MOUNTED FIXTURE
RIGHT: WALL MOUNTED FIXTURE
EMERGENCY WALL-MOUNTED FIXTURE:
LEFT: STANDARD
RIGHT: REMOTE-HEAD
LEFT: CEILING MOUNTED EXIT SIGN
RIGHT: WALL MOUNTED EXIT SIGN
SHADED PORTION DENOTES SIGN FACE
POLE-MOUNTED FIXTURE
PHOTOCELL
LEFT: CEILING MOUNTED OCCUPANCY SENSOR
RIGHT: WALL MOUNTED OCCUPANCY SENSOR
X DENOTES TYPE

RECEPTACLES:

- X DENOTES RECEPTACLE TYPE (TYP.)
GFCI DENOTES GROUND FAULT CIRCUIT INTERRUPT
UPS DENOTES UNINTERRUPTIBLE POWER SUPPLY
WPCR DENOTES WEATHERPROOF CORROSION RESISTANT
DENOTES CIRCUIT NUMBER (TYP.)
RECEPTACLES:
LEFT: SIMPLEX
MIDDLE: DUPLEX
RIGHT: QUADRUPLX
MULTI-OUTLET RECEPTACLE:
LEFT: SIMPLEX
RIGHT: DUPLEX
OTHER RECEPTACLES:
LEFT: 240 VOLT
RIGHT: SPECIAL PURPOSE
FLOOR-MOUNTED RECEPTACLES:
LEFT: SIMPLEX
MIDDLE: DUPLEX
RIGHT: QUADRUPLX

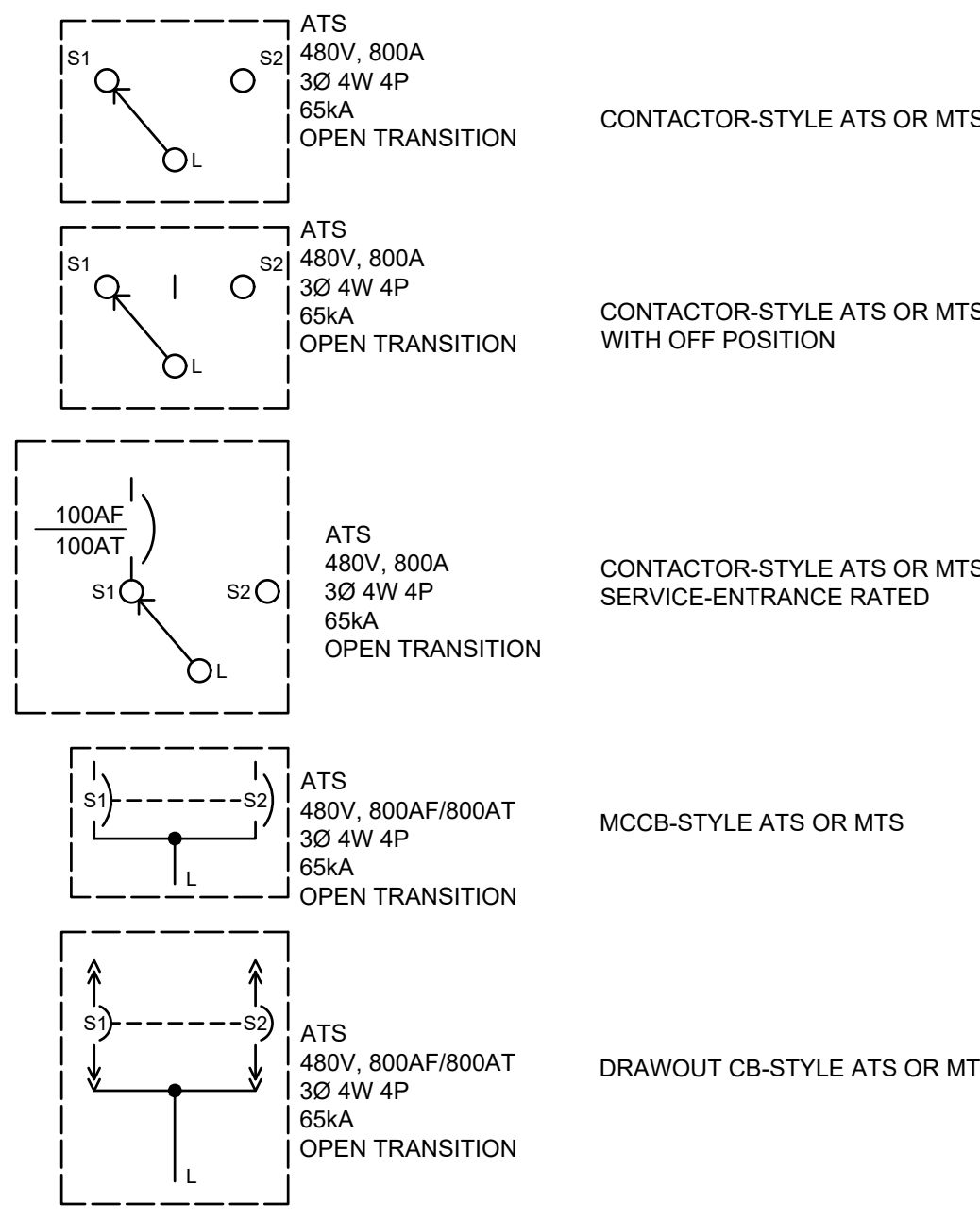
HVAC AND FIRE ALARM

- FIRE ALARM CONTROL PANEL
FIRE ALARM ANNUNCIATOR PANEL
FIRE ALARM PULL STATION
FIRE ALARM INDICATOR:
X DENOTES ALERT TYPE (TYP.)
A DENOTES AUDIBLE
V DENOTES VISIBLE (# DENOTES STROBE INTENSITY)
FIRE ALARM INDICATOR MOUNTED ABOVE A FIRE ALARM PULL STATION
DUCT DETECTOR
SMOKE DETECTOR:
X DENOTES TYPE:
Z DENOTES IONIZATION
P DENOTES PHOTOELECTRIC
T DENOTES THERMAL
HEAT DETECTOR
THERMOSTAT
AMBIENT TEMPERATURE TRANSMITTER

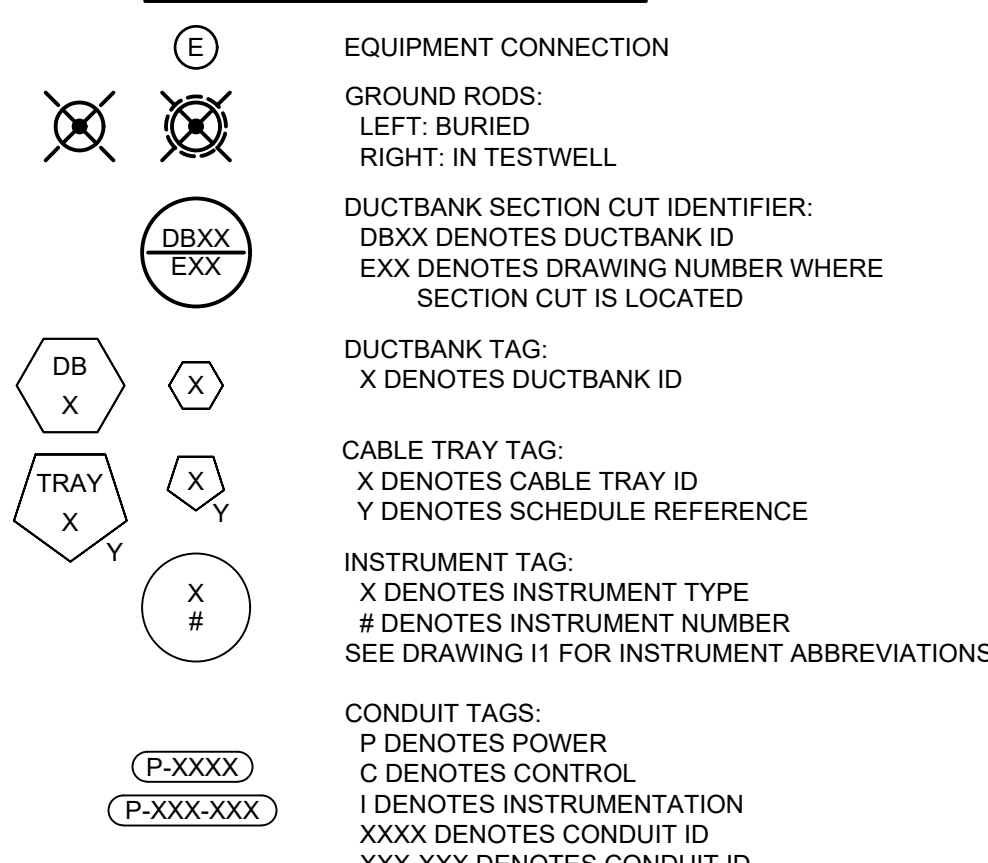
SWITCHES

- WALL SWITCH:
X DENOTES TYPE:
NO SUBSCRIPT DENOTES SINGLE-POLE SWITCH
3 DENOTES 3-WAY SWITCH
4 DENOTES 4-WAY SWITCH
M DENOTES MANUAL MOTOR STARTER
DENOTES CIRCUIT NUMBER
WPCR DENOTES WEATHERPROOF CORROSION RESISTANT
COMBINATION MOTOR STARTER
DISCONNECT SWITCH
LOCAL CONTROL STATION
LOCAL CONTROL STATION WITH LOCKABLE COVER

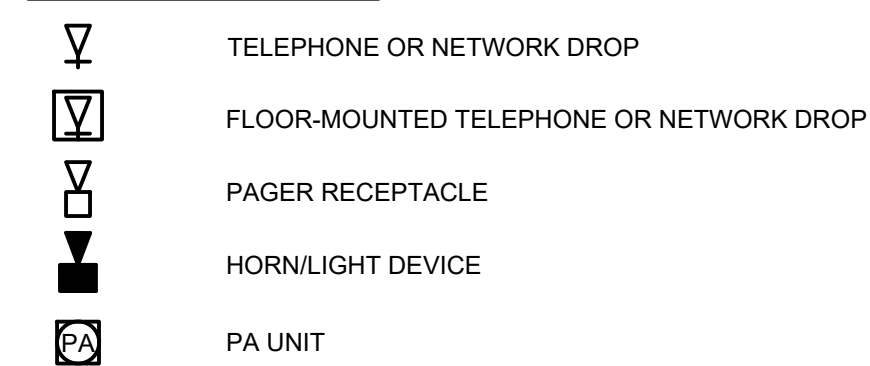
SINGLE-LINE DIAGRAMS



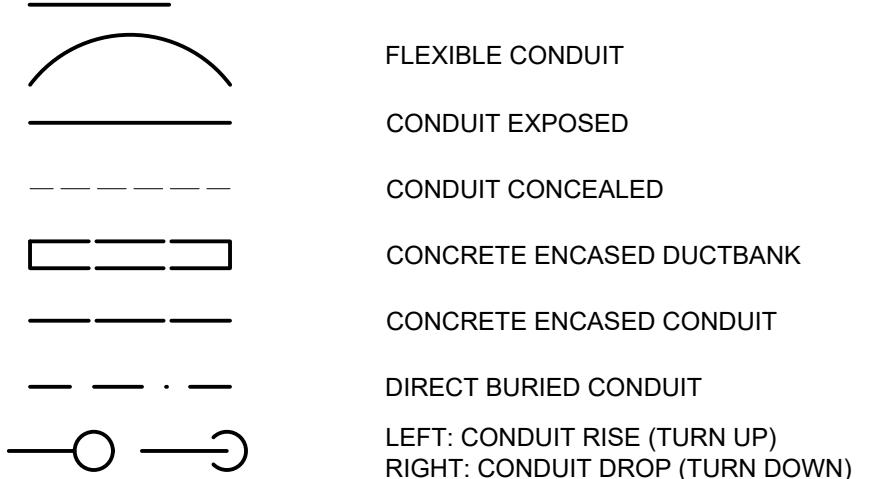
MISC PLAN VIEW SYMBOLS



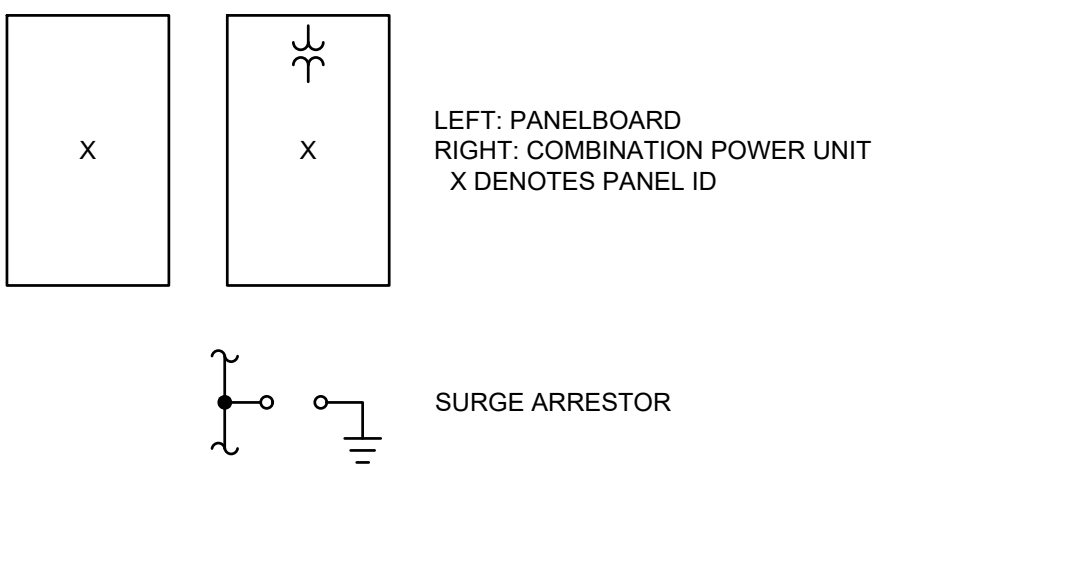
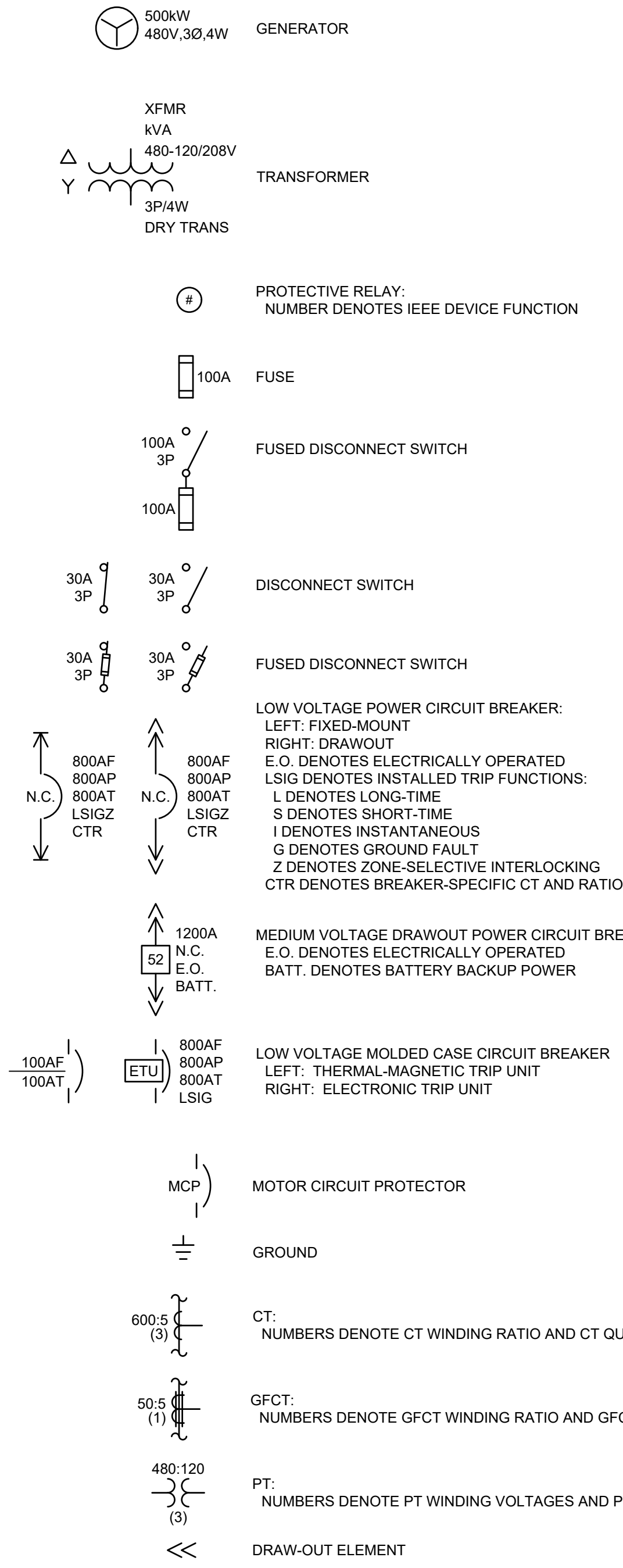
COMMUNICATIONS



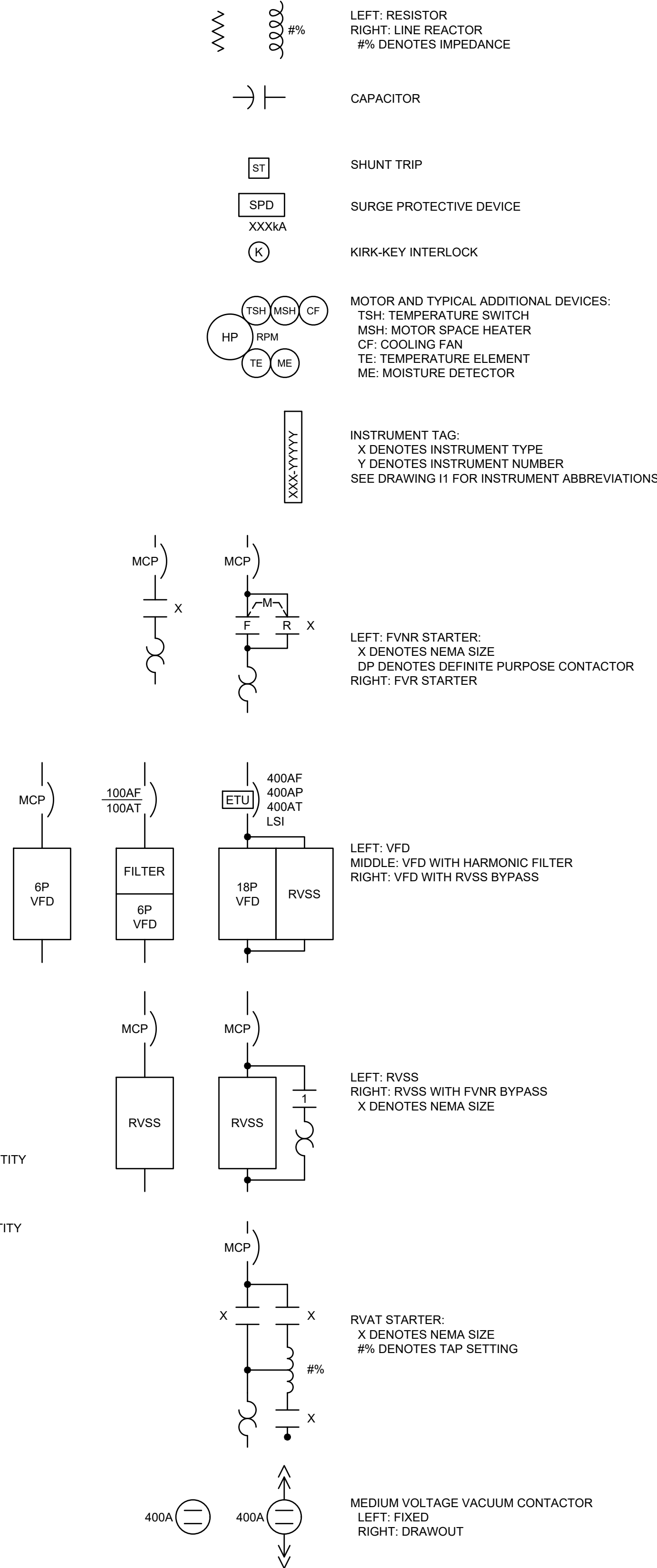
WIRING



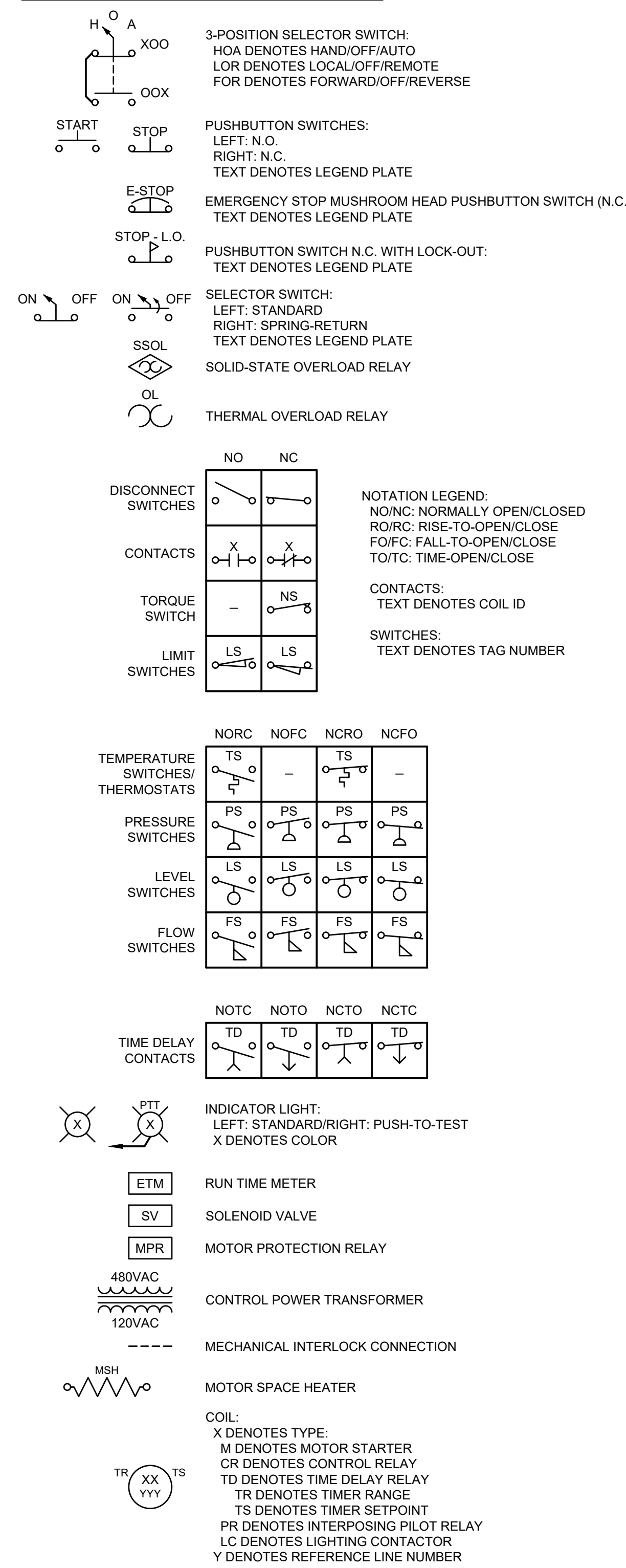
SINGLE-LINE DIAGRAMS, CONT'D.



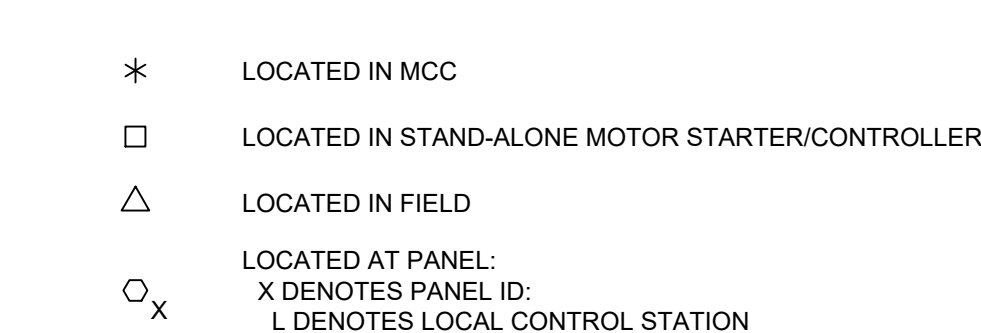
SINGLE-LINE DIAGRAMS, CONT'D.



ELEMENTARY CONTROL SCHEMATICS



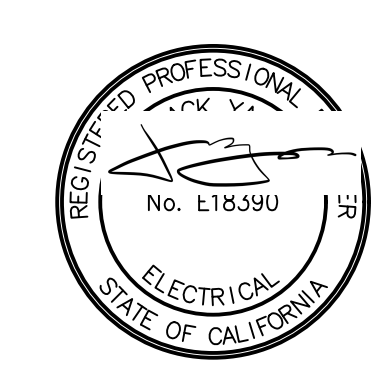
EQUIPMENT/DEVICE LOCATION SYMBOLS



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PLOT DATE: 3/12/2023 2:06 PM BY: SDAO

Table with columns: PROJECT ENGINEER (G. CUMMINGS), DESIGNED BY (J. YAO), DRAWN BY (A. LAU), CHECKED BY (C. THUNHORST), and a scale bar (0, 1/2", 1").

100% DRAWING DO NOT USE FOR CONSTRUCTION



LAS GALLINAS VALLEY SANITARY DISTRICT SAN RAFAEL, CA
LAS GALLINAS VALLEY SANITARY DISTRICT DIGESTER ROOM MCC-2 UPGRADES

DATE: FEBRUARY 2022
HAZEN NO.: 20148-003
CONTRACT NO.: 1
DRAWING NUMBER: E01

ABBREVIATIONS

AE	ANALYSIS ELEMENT
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CAPACITY
AIT	ANALYSIS INDICATING TRANSMITTER
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AF	AMPERE FRAME
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
BC	BYPASS CONTACTOR
BKR	BREAKER
(L/V)CP	(LOCAL/VENDOR) CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
DB	DUCTBANK
DSW	DISCONNECT SWITCH
(*J)HH	HAND HOLE*
(*J)MH	MANHOLE*
EO	ELECTRICALLY OPERATED
ETM	ELAPSED TIME METER
ETU	ELECTRONIC TRIP UNIT
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FS	FLOW SWITCH
FSL	FLOW SWITCH LOW
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFCT	GROUND FAULT CURRENT TRANSFORMER
GNG	GO-NO GO
GND	GROUND
HOA	HAND-OFF-AUTO
HPU	HYDRAULIC POWER UNIT
IC	INPUT CONTACTOR
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
ISO	INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
(*J)JB	JUNCTION BOX*
LCS	LOCAL CONTROL STATION
LP	LIGHTING PANEL
LS	LEVEL SWITCH
LSL	LEVEL SWITCH LOW
LSLL	LEVEL SWITCH LOW-LOW
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH-HIGH
LT	LEVEL TRANSMITTER
MFR	MULTI-FUNCTION RELAY
MH	MANHOLE
MOD	MOTOR OPERATED DAMPER
MOG	MOTOR OPERATED GATE
MOL	MOTOR OPERATED LOUVER
MOV	MOTOR OPERATED VALVE
MPR	MOTOR PROTECTION RELAY
MTD	MOUNTED
MTS	MANUAL TRANSFER SWITCH
MWTS	MOTOR WINDING TEMPERATURE SWITCH
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSN
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OC	OUTPUT CONTACTOR
OL	OVERLOAD

ABBREVIATIONS, CONT.

(*J)PB	PULLBOX*
PC	PHOTOCELL
PCC	POINT OF COMMON COUPLING
PE	PRESSURE ELEMENT
PIT	PRESSURE INDICATING TRANSMITTER
PLC	PROGRAMMABLE LOGIC CONTROLLER
PP	POWER PANEL
PST	PHASE SHIFTING TRANSFORMER
PT	POTENTIAL TRANSFORMER
PTT	PUSH TO TEST
RCS	REMOTE CONTROL STATION
RECP	RECEPTACLE
RIO	REMOTE I/O
RM	ROOM
RTD	RESISTANCE THERMAL DEVICE
RTU	REMOTE TELEMETRY UNIT
RVAT	REDUCED VOLTAGE AUTO TRANSFORMER
RVSS	REDUCED VOLTAGE SOLID STATE
SA	SUPPLY AIR
S.E.	SERVICE ENTRANCE
SP. C.	SPARE CONDUIT
SPD	SURGE PROTECTIVE DEVICE
SSOL	SOLID STATE OVERLOAD
SST	STAINLESS STEEL
TB	TEST BLOCK
TC	TIMED CLOSE
TO	TIMED OPEN
TSH	TWISTED SHIELDED
TX	TRANSFORMER
TYP	TYPICAL
UPS	UNINTERRUPTIBLE POWER SUPPLY
VFD	VARIABLE FREQUENCY DRIVE
WPCR	WEATHER PROOF CORROSION RESISTANT
WT	WALK THROUGH
XFMR	TRANSFORMER

*DESIGNATED ABBREVIATIONS CAN HAVE THE FOLLOWING PREFIXES:

E	ELECTRIC
P	POWER
C	CONTROL
I	INSTRUMENTATION
F	FIBER

Fixture Type	Lamp/Fixture Wattage	Description	Basis of Design MFR. and Model
LP1	94W (max)	Pendant-mounted, 120-277VAC, LED light fixture, color temperature of 5000K, lineal ribbed frosted acrylic lens, general distribution, gasketed fiberglass housing, stainless latches, 4ft, 7000 lumen minimum. Class I, Division 1, Group D Listed, amd wet location Listed.	Crouse Hinds MLL4 or Engineer approved equal.

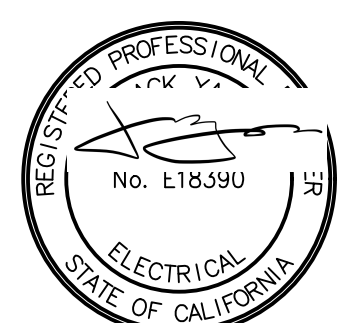
NOTES:

- UNLESS SPECIFICALLY NOTED OTHERWISE, ALL UNDERGROUND CONCRETE ENCASED ELECTRICAL CONDUITS SHALL BE PER STANDARD DETAIL E-33-0101.
- BOND ALL NEW CONCRETE ENCASED GROUND CONDUCTORS TO EXISTING GROUND CONDUCTORS IN ALL MANHOLES, PULL BOXES, CABLE TRAYS, AND SIMILAR LOCATIONS WHERE APPLICABLE.
- UNLESS OTHERWISE SPECIFIED OR NOTED, ALL WALL MOUNTED ELECTRICAL PANELS, ENCLOSURES, AND SIMILAR EQUIPMENT SHALL BE MOUNTED 6'-6" (MAX) FROM THE TOP OF THE PANEL TO FINISHED FLOOR OR GRADE.
- UNLESS OTHERWISE NOTED, ALL LIGHTING SWITCHES, CONTROL SWITCHES, AND SIMILAR EQUIPMENT SHALL BE MOUNTED WITH THEIR CENTERLINE APPROXIMATELY 4'-0" ABOVE FINISHED FLOOR, SLAB, OR GRADE.
- A SEPARATE EQUIPMENT GROUNDING CONDUCTOR SHALL BE PROVIDED FOR EACH CIRCUIT (SEPARATE CONDUCTOR IN THE CONDUIT). THE CONDUCTOR SHALL BE TERMINATED AT THE PROPER DEVICE, TERMINAL, OR LUG AT THE POWER SOURCE (MCC, GROUND BUS, PANELBOARD GROUND BUS, ETC.). GROUND CONDUCTOR SIZE SHALL BE PER THE LATEST EDITION OF THE NEC.
- ELECTRICAL SYSTEMS INSTALLED IN HAZARDOUS LOCATIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CHAPTER 5, ART. 500 OF THE LATEST EDITION OF THE NEC. CONTRACTOR SHALL SEAL ALL CONDUITS LEAVING HAZARDOUS AREAS. WALL AND FLOOR OPENINGS SHALL BE SEALED WITH FIREPROOF COMPOUND.
- ALL EQUIPMENT LOCATED IN HAZARDOUS AREAS SHALL BE SUITABLE FOR THE CLASS, DIVISION, AND GROUP RATING OF THE LOCATION.
- UNLESS SPECIFICALLY NOTED OTHERWISE, EXISTING PAVEMENT SHALL BE SAW CUT AND REMOVED TO ALLOW FOR THE INSTALLATION OF NEW ELECTRICAL DUCTBANKS. AFTER INSTALLATION, REPLACE PAVEMENT WITH NEW TO MATCH ORIGINAL CONDITIONS.

File: C:\BMSHAZEN\PROJECTS\2014\20140215\20140215E02.dwg Saved by: ALAU Save date: 6/7/2022 5:02 PM Plot Date: 3/2/2023 2:06 PM BY: SDOO

PROJECT ENGINEER:	G. CUMMINGS
DESIGNED BY:	J. YAO
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	
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LAS GALLINAS VALLEY SANITARY DISTRICT SAN RAFAEL, CA
LAS GALLINAS VALLEY SANITARY DISTRICT DIGESTER ROOM MCC-2 UPGRADES

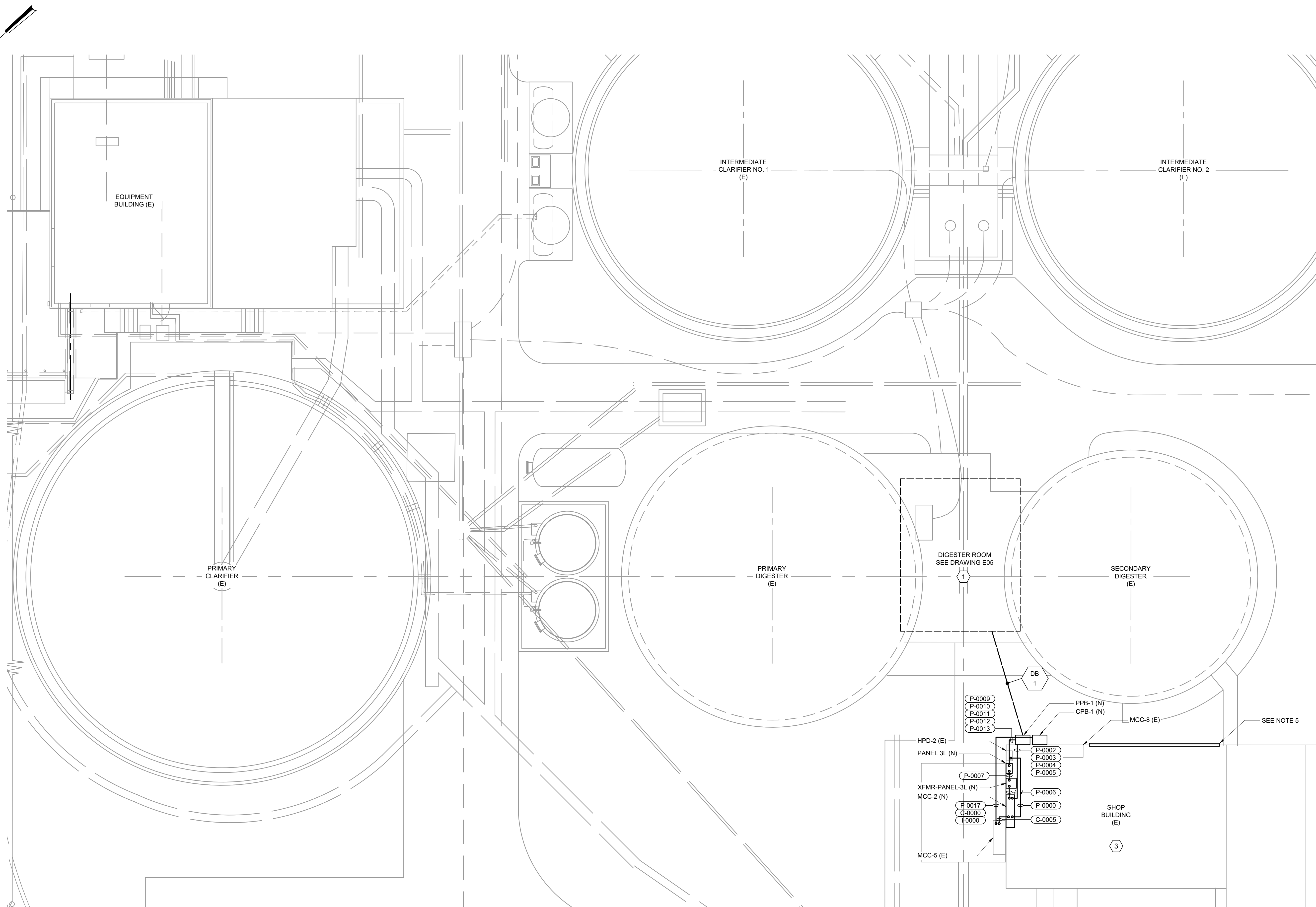
ELECTRICAL GENERAL NOTES AND ABBREVIATIONS	
DATE:	FEBRUARY 2022
HAZEN NO.:	20148-003
CONTRACT NO.:	1
DRAWING NUMBER:	E02

NOTES:

- CONTRACTOR SHALL USE GREEN INSULATED GROUND WIRE TO BOND NEW ELECTRICAL EQUIPMENT TO THE EXISTING GROUND GRID. GROUNDING ELECTRODE CONDUCTOR SIZE SHALL BE PER NEC 250.66.
- THE EXISTING DIGESTER ROOM SHALL BE CONSIDERED CLASS I, DIVISION 1 HAZARDOUS AREA PER NFPA 820-2020, TABLE 6.2.2(A), ROW 17A.
- THE EXISTING DIGESTER TANK INTERIOR AREAS ABOVE AND AROUND DIGESTER COVER, ENVELOPE 10 FT ABOVE THE HIGHEST POINT OF COVER, AND 5 FT FROM ANYWAY SHALL BE CONSIDERED CLASS I, DIVISION 1 HAZARDOUS AREA PER NFPA 820-2020, TABLE 6.2.2(A), ROW 16A.
- ENVELOPE 15 FT ABOVE DIVISION 1 AREA OVER COVER AND 5 FT BEYOND DIVISION 1 AREA AROUND TANK WALLS SHALL BE CONSIDERED CLASS I, DIVISION 2 HAZARDOUS AREA PER NFPA 820-2020, TABLE 6.2.2(A), ROW 16B.
- CONTRACTOR SHALL COORDINATE WITH OWNER TO CLOSE OFF THE EXISTING SHOP BUILDING DOOR AND WINDOWS FACING THE DIGESTERS TO ACHIEVE A GAS-TIGHT PHYSICAL BARRIER PREVENTING HAZARDOUS GAS AND VAPOR FROM ENTERING THE SHOP BUILDING.

AREA DESIGNATIONS:

- ① INDOOR WET PROCESS AREA
- ② INDOOR DRY PROCESS AREA
- ③ INDOOR DRY NON-PROCESS AREA
- ④ INDOOR TYPE 1 CHEMICAL AREA
- ⑤ INDOOR TYPE 2 CHEMICAL AREA



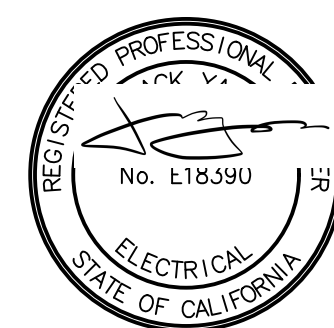
PARTIAL SITE PLAN
1" = 10'

1" = 10'-0"

File: C:\BMS\HAZEN\PROJECTS\156\E03 Saved by: SDAO Save date: 3/30/2023 5:58 PM
PLOT DATE: 3/17/2023 2:05 PM BY: SDAO

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DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
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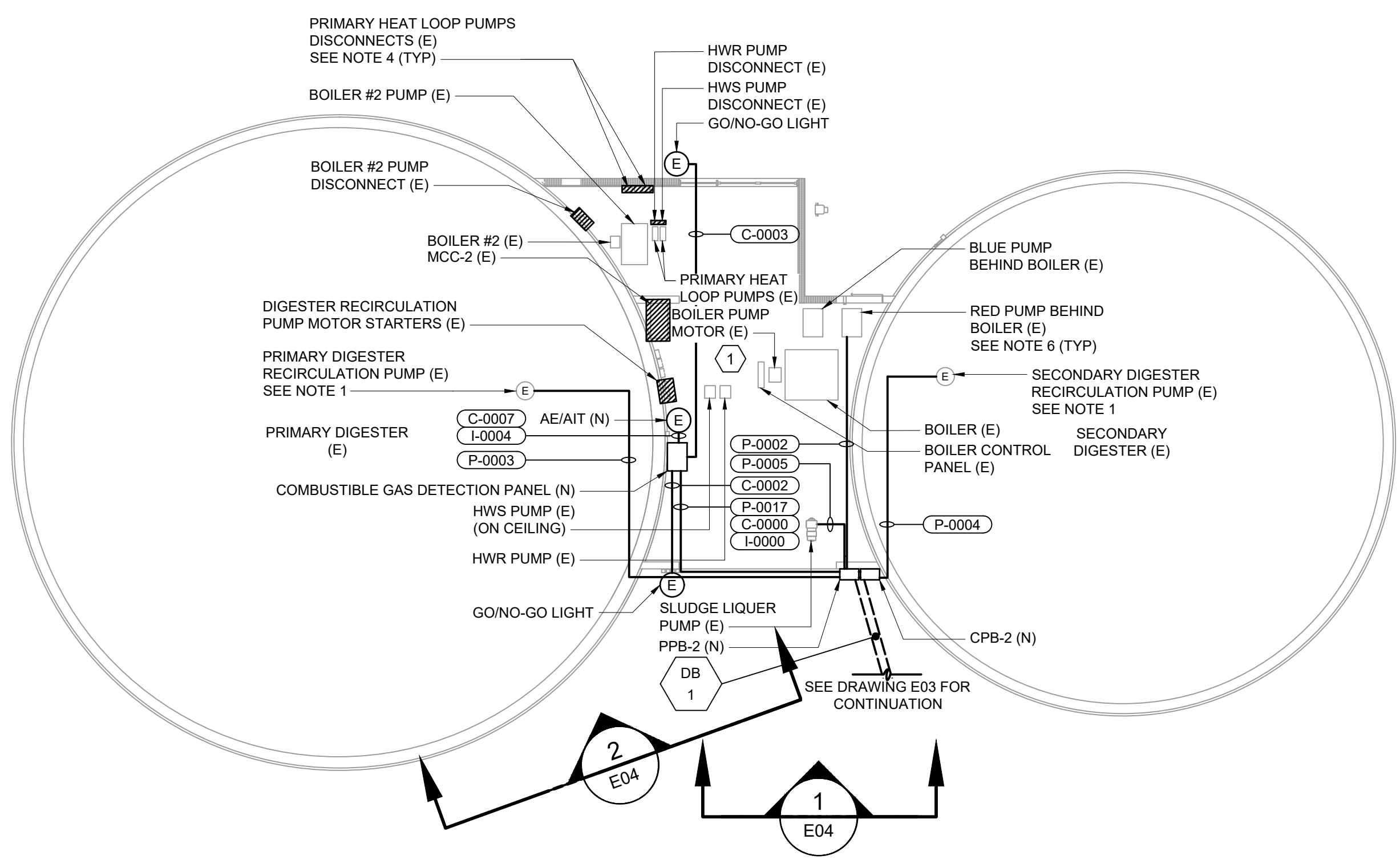
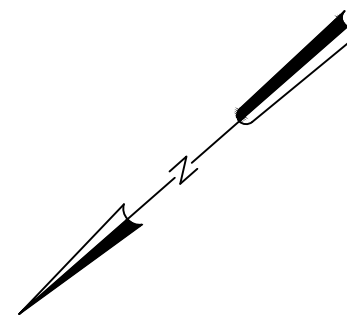
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SAN RAFAEL, CA

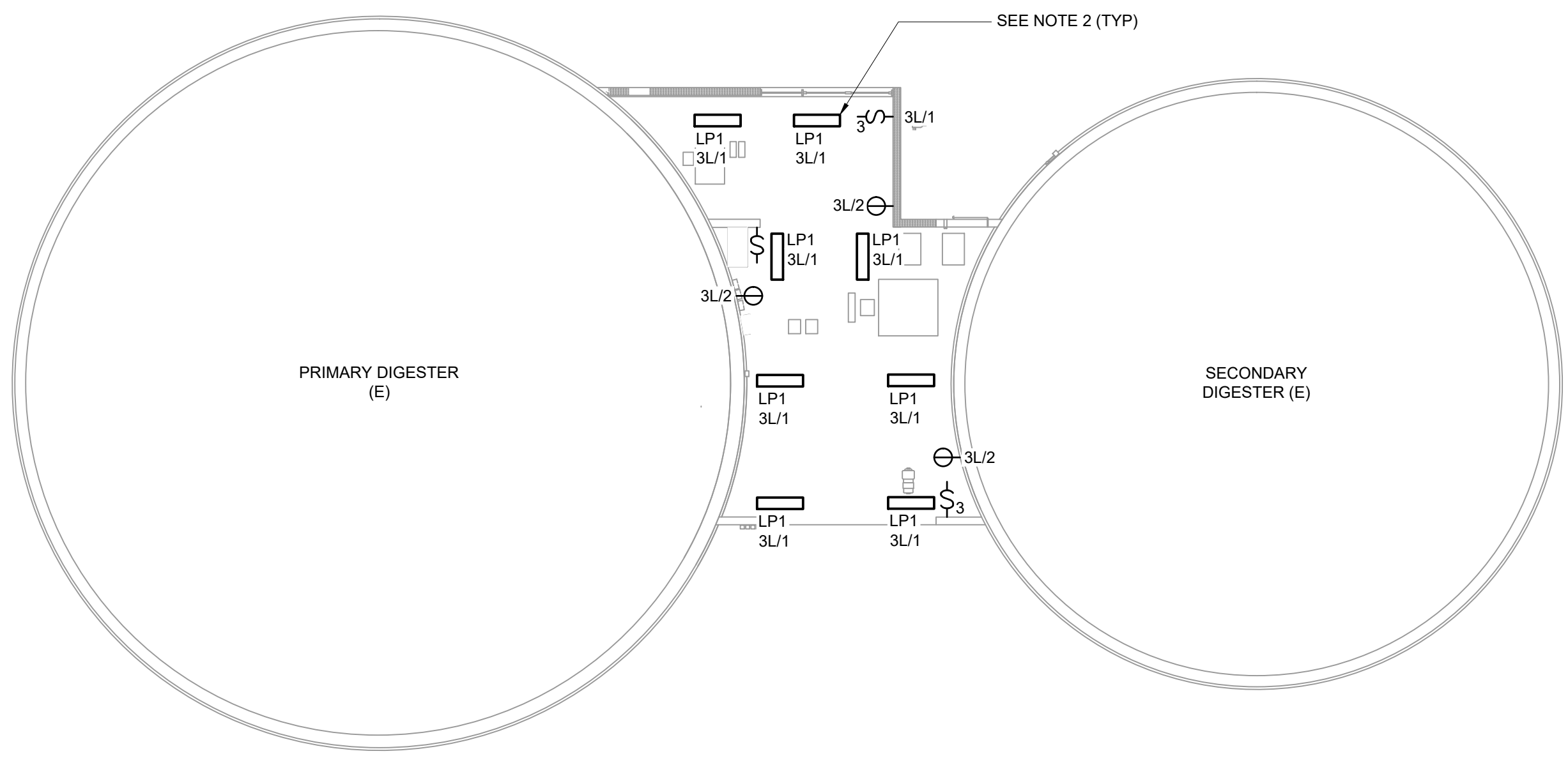
LAS GALLINAS VALLEY SANITARY DISTRICT
DIGESTER ROOM MCC-2 UPGRADES

**ELECTRICAL
PARTIAL SITE PLAN**

DATE:	FEBRUARY 2022
HAZEN NO.:	20148-003
CONTRACT NO.:	1
DRAWING NUMBER:	E03



DIGESTER ROOM - POWER PLAN
3/32" = 1'-0"



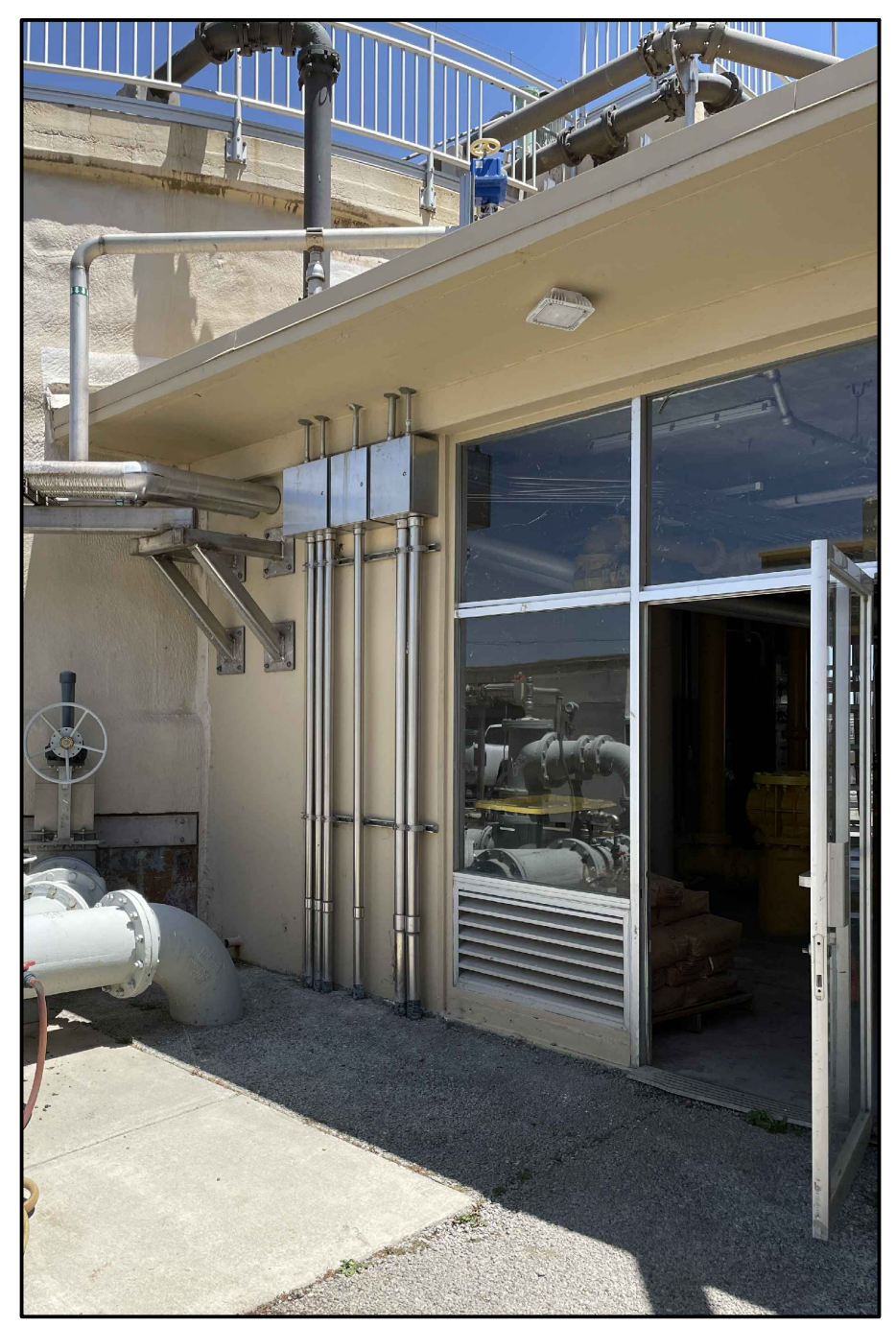
DIGESTER ROOM - LIGHTING PLAN
3/32" = 1'-0"

- NOTES:**
1. THE PRIMARY DIGESTER AND SECONDARY DIGESTER RECIRCULATION PUMPS ARE LOCATED ON TOP OF THE DIGESTER ROOF.
 2. CONTRACTOR SHALL REPLACE ALL EXISTING LIGHTING FIXTURES, LIGHT SWITCHES AND RECEPTACLES WITH DEVICES APPROVED FOR CLASS I, DIVISION 1 HAZARDOUS AREA CLASSIFICATION. NEW LIGHTING FIXTURES, LIGHT SWITCHES, AND RECEPTACLES SHALL BE WIRED TO NEW PANEL 3L. REFER TO PANEL SCHEDULE FOR CIRCUIT ASSIGNMENT.
 3. CONTRACTOR SHALL REPLACE ALL EXISTING LIGHT SWITCHES ON TOP OF THE DIGESTERS WITH DEVICES APPROVED FOR CLASS I, DIVISION 1 HAZARDOUS AREA CLASSIFICATION. EXISTING LIGHTING CIRCUITS ON TOP OF THE DIGESTERS SHALL BE WIRED TO NEW PANEL 3L CKT 10.
 4. CONTRACTOR SHALL DEMOLISH ALL EXISTING MOTOR DISCONNECT SWITCHES INSIDE THE DIGESTER ROOM AND REROUTE MOTOR FEEDERS TO DIRECTLY TERMINATE AT THE MOTOR TERMINAL BOXES.
 5. CONTRACTOR SHALL RETROFIT CONDUIT SEALS TO ALL EXISTING CONDUIT STUB-UPS ALONG THE OUTSIDE WALL OF THE DIGESTER ROOM AS SHOWN IN SECTION 1 AND 2 IN ACCORDANCE TO NOTE 6 ON DRAWING E02.
 6. CONTRACTOR SHALL DEMO AND REMOVE ALL EXISTING MOTORS INSIDE THE DIGESTER ROOM AND REPLACE WITH TEFC-XP TYPE OF THE SAME SIZE. NEW MOTOR CONNECTION INSTALLATIONS SHALL COMPLY WITH NEC ARTICLE 500 REQUIREMENTS FOR A CLASS I DIVISION 1 LOCATION.

- AREA DESIGNATIONS:**
- 1 INDOOR WET PROCESS AREA
 - DEMOLITION SCOPE



CONDUIT STUB-UP SEALS (NOTE 5)
SECTION 1
NTS E04

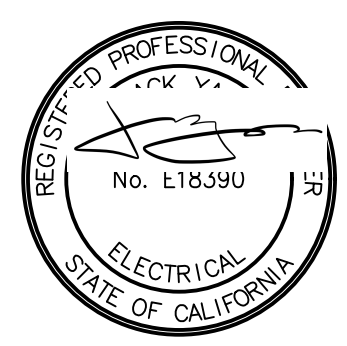


CONDUIT STUB-UP SEALS (NOTE 5)
SECTION 2
NTS E04

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DESIGNED BY:	J. YAO
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
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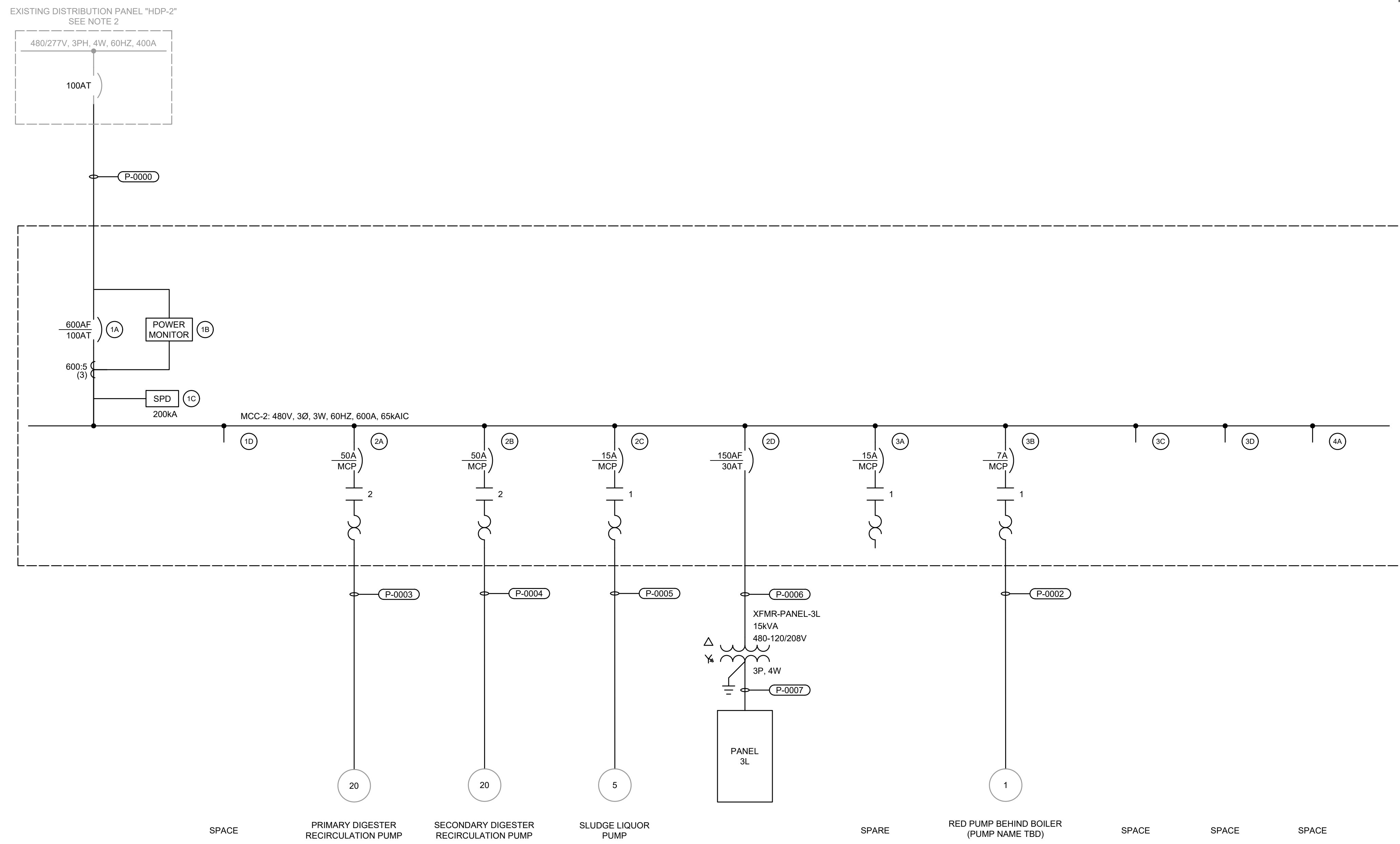
LAS GALLINAS VALLEY SANITARY DISTRICT
SAN RAFAEL, CA

LAS GALLINAS VALLEY SANITARY DISTRICT
DIGESTER ROOM MCC-2 UPGRADES

ELECTRICAL
DIGESTER ROOM PLANS

DATE:	FEBRUARY 2022
HAZEN NO.:	20148-003
CONTRACT NO.:	1
DRAWING NUMBER:	E04

- NOTES:**
1. THIS SINGLE LINE DIAGRAM SHOWS THE NEW MCC-2 TO BE INSTALLED IN THE EXISTING SHOP BUILDING.
 2. CONTRACTOR SHALL USE THE 100A SPARE BREAKER IN THE EXISTING DISTRIBUTION PANEL "HDP-2" TO PROVIDE POWER TO NEW MCC-2.



SECTION 1	SECTION 2	SECTION 3	SECTION 4
(1A)	(2A)	(3A)	(4A)
(1B)	(2B)	(3B)	
(1C)	(2C)	(3C)	
(1D)	(2D)	(3D)	

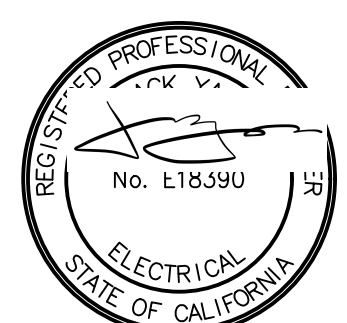
NEW MCC-2 ELEVATION

NEW MCC-2 SINGLE LINE DIAGRAM

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DESIGNED BY:	J. YAO
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
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LAS GALLINAS VALLEY SANITARY DISTRICT
DIGESTER ROOM MCC-2 UPGRADES

ELECTRICAL
NEW MCC-2 SINGLE LINE DIAGRAM

DATE:	FEBRUARY 2022
HAZEN NO.:	20148-003
CONTRACT NO.:	1
DRAWING NUMBER:	E05

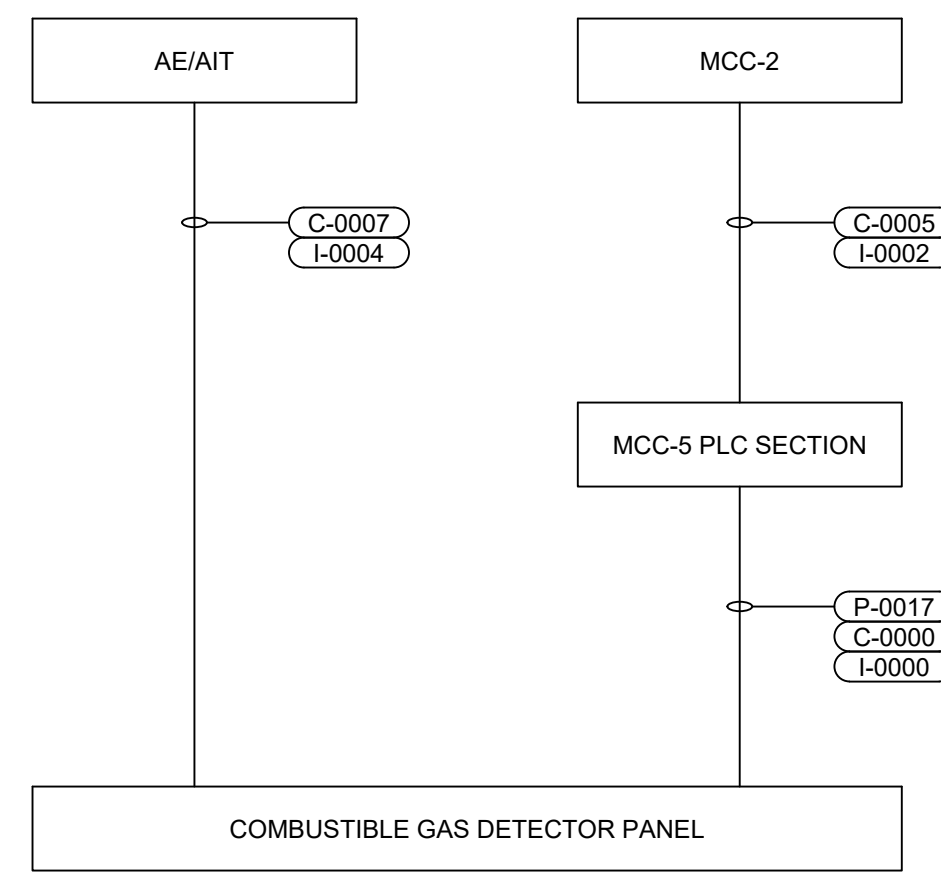
NOTES:
 1. CONTRACTOR SHALL COORDINATE WITH OWNER TO LOCATE EXISTING LOADS CONNECTED TO THE EXISTING LIGHTING PANEL. DEMOLISH EXISTING CONDUIT AND WIRES, AND REROUTE CIRCUITS FROM THE EXISTING LOADS TO THE NEW LIGHTING PANEL 3L.

208/120 VOLTS 3 PHASE, 4 WIRE				PANEL 3L MAIN BREAKER 60A 3P				TYPE: NEMA 1 MOUNT: SURFACE						
MODS	DESCRIPTION	WIRE	TRIP	POLE	CKT No.	VOLT-AMPERES			CKT No.	POLE	TRIP	WIRE	DESCRIPTION	MODS
						A	B	C						
-	LIGHTS AND EXHAUST FAN	P-0009	20	1	1	-	-	-	2	1	20	P-0010	OUTLETS	-
-	DIGESTER FEED FLOW METER	P-0011	20	1	3	-	-	-	4	1	20	P-0012	BOILER CONTROLS/HOT WATER PUMP	-
-	FM-3 PLANT FLOW METER	P-0011	30	1	5	-	-	-	6	1	20	P-0013	DIGESTER GAS CHART RECORDER	-
-	SPARE		20	1	7	-	-	-	8	1	20	P-0010	OUTLET BELOW FM-3	-
-	SPARE		20	1	9	-	-	-	10	1	20	P-0009	TOP OF DIGESTER LIGHTS	-
-	DIGESTER GAS FLOW METER (OUTSIDE)	P-0011	20	1	11	-	-	-	12	1	20		SPARE	-
-	SPARE		20	1	13	-	-	-	14	1	20		SPARE	-
-	SPARE		20	1	15	-	-	-	16	1	20		SPARE	-
-	SPARE		20	1	17	-	-	-	18	1	20		SPARE	-
-	SPARE		20	1	19	-	-	-	20	1	20		SPARE	-
-	SPARE		20	1	21	-	-	-	22	1	20		SPARE	-
-	SPARE		20	1	23	-	-	-	24	1	20		SPARE	-
TOTAL						0	0	0	TOTAL					
PHASE TOTAL						TOTAL LOAD (VA)			0					
						TOTAL LOAD (A)			0					

MODIFICATION (MODS) LEGEND:
 EPD - GROUND FAULT CIRCUIT INTERRUPTER (30mA)
 GFCI - GROUND FAULT CIRCUIT INTERRUPTER (5mA)
 LOD - LOCK-ON DEVICE
 LFD - LOCK-OFF DEVICE

NOTES:
 22kAIC
 100KA SPD

PANEL SCHEDULE

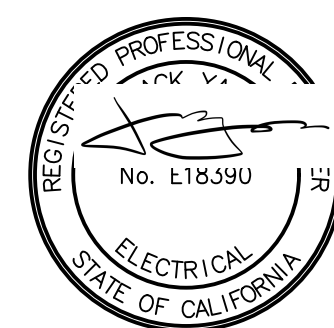


CONTROL ONE-LINE DIAGRAM

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 PLOT DATE: 3/21/2023 2:08 PM BY: SDOO

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DESIGNED BY:	J. YAO
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
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LAS GALLINAS VALLEY SANITARY DISTRICT
 SAN RAFAEL, CA
 LAS GALLINAS VALLEY SANITARY DISTRICT
 DIGESTER ROOM MCC-2 UPGRADES

ELECTRICAL
 PANEL SCHEDULE AND
 CONTROL ONE-LINE
 DIAGRAMS

DATE:	FEBRUARY 2022
HAZEN NO.:	20148-003
CONTRACT NO.:	1
DRAWING NUMBER:	E06

CONDUIT NO.	SIZE	FROM	TO	CONDUCTORS	REMARKS
P-0000	2"	HDP-2	MCC-2	(3) #4/0, #4GND	VIA PPB-1 AND PPB-2
P-0001				NOT USED	
P-0002	1"	MCC-2	RED PUMP BEHIND BOILER (PUMP NAME TBD)	(3) #12, #14GND	VIA PPB-1 AND PPB-2
P-0003	1"	MCC-2	PRIMARY DIGESTER RECIRCULATION PUMP	(3) #8, #10GND	VIA PPB-1 AND PPB-2
P-0004	1"	MCC-2	SECONDARY DIGESTER RECIRCULATION PUMP	(3) #8, #10GND	VIA PPB-1 AND PPB-2
P-0005	1"	MCC-2	SLUDGE LIQUOR PUMP	(3) #12, #14GND	VIA PPB-1 AND PPB-2
P-0006	1"	MCC-2	15KVA XFMR	(3) #10, #10GND	
P-0007	1"	15KVA XFMR	PANEL 3L	(4) #6, #10GND	
P-0008				NOT USED	
P-0009	1"	PANEL 3L	LIGHTING FIXTURES & EXHAUST FAN	(4) #12, #12GND	VIA PPB-1 AND PPB-2
P-0010	1"	PANEL 3L	RECEPTACLES	(4) #12, #12GND	VIA PPB-1 AND PPB-2
P-0011	1"	PANEL 3L	FLOW METERS	(6) #12, #12GND	VIA PPB-1 AND PPB-2
P-0012	1"	PANEL 3L	BOILER CONTROL/HOT WATER PUMP	(2) #12, #12GND	VIA PPB-1 AND PPB-2
P-0013	1"	PANEL 3L	DIGESTER CHART RECORD	(2) #12, #12GND	VIA PPB-1 AND PPB-2
P-0014	2"	PPB-1	PPB-2	EMPTY W/ PULL STRING	
P-0015	2"	PPB-1	PPB-2	EMPTY W/ PULL STRING	
P-0016				NOT USED	
P-0017	1"	MCC-5 (PLC UPS POWER)	COMBUSTIBLE GAS DETECTOR PANEL	2 #12, #12GND	VIA PPB-1 AND PPB-2
P-0018				NOT USED	

CONDUIT NO.	SIZE	FROM	TO	CONDUCTORS	REMARKS
C-0000	1"	MCC-5 (PLC SECTION)	COMBUSTIBLE GAS DETECTOR PANEL	2 #14, #14GND	VIA CPB-1 AND CPB-2
C-0001	3/4"	COMBUSTIBLE GAS DETECTOR PANEL	COMBUSTIBLE GAS DETECTOR	4 #14, #14GND	
C-0002	3/4"	COMBUSTIBLE GAS DETECTOR PANEL	GO/NO-GO LIGHTS	12 #14, #14GND	
C-0003	3/4"	COMBUSTIBLE GAS DETECTOR PANEL	GO/NO-GO LIGHTS	12 #14, #14GND	
C-0004				NOT USED	
C-0005	1"	MCC-2	MCC-5 (PLC SECTION)	2 #14, #14GND	
C-0006				NOT USED	
C-0007	3/4"	AE/AIT	COMBUSTIBLE GAS DETECTOR PANEL	2 #14, #14GND	
C-0008				NOT USED	

CONDUIT NO.	SIZE	FROM	TO	CONDUCTORS	REMARKS
I-0000	1"	MCC-5 (PLC SECTION)	COMBUSTIBLE GAS DETECTOR PANEL	2/C#16TSH, #14GND	VIA CPB-1 AND CPB-2
I-0001				NOT USED	
I-0002	1"	MCC-2	MCC-5 (PLC SECTION)	2/C#16TSH, #14GND	
I-0003				NOT USED	
I-0004	1"	AE/AIT	COMBUSTIBLE GAS DETECTOR PANEL	2/C#16TSH, #14GND	
I-0005				NOT USED	

CONDUIT AND WIRE SCHEDULE

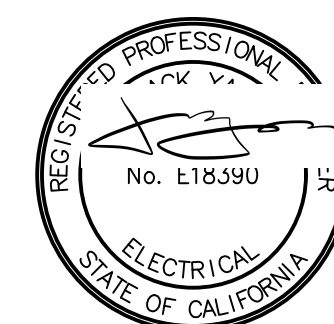
DUCTBANK ID	CONDUIT	SIZE	FROM	TO
DB-1	P-0002	1"	PPB-1	PPB-2
	P-0003	1"	PPB-1	PPB-2
	P-0004	1"	PPB-1	PPB-2
	P-0005	1"	PPB-1	PPB-2
	P-0009	1"	PPB-1	PPB-2
	P-0010	1"	PPB-1	PPB-2
	P-0011	1"	PPB-1	PPB-2
	P-0012	1"	PPB-1	PPB-2
	P-0013	1"	PPB-1	PPB-2
	P-0014	1"	PPB-1	PPB-2
	P-0015	1"	PPB-1	PPB-2
	P-0017	1"	PPB-1	PPB-2
	C-0000	1"	CPB-1	CPB-2
	I-0000	1"	CPB-1	CPB-2

DUCTBANK SCHEDULE

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DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
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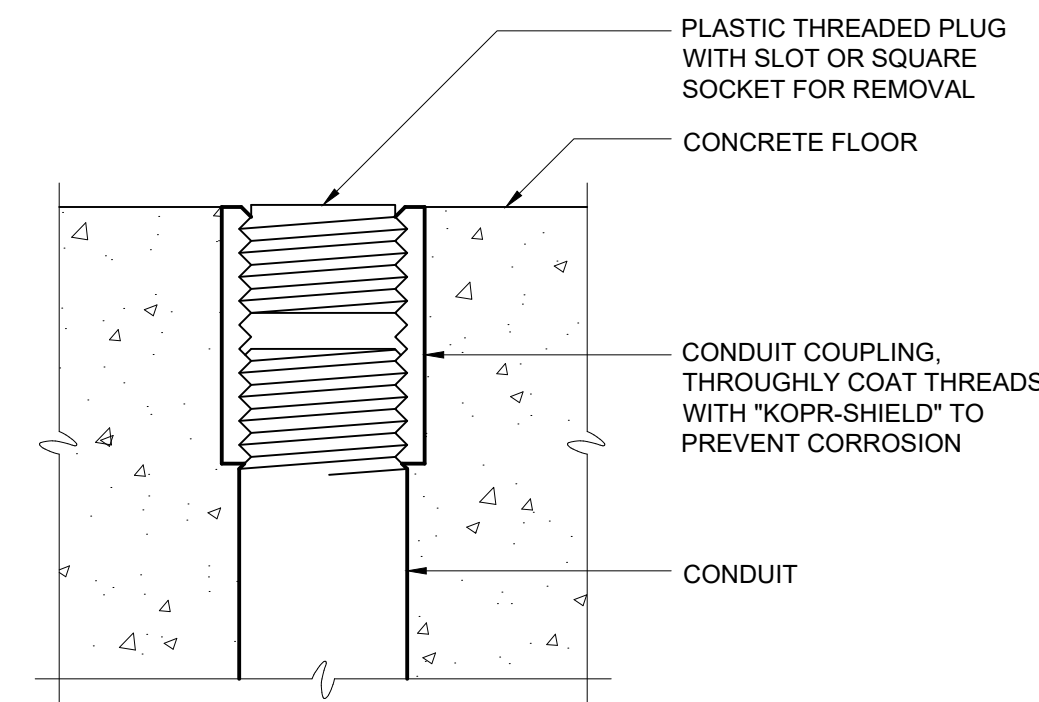
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LAS GALLINAS VALLEY SANITARY DISTRICT
SAN RAFAEL, CA

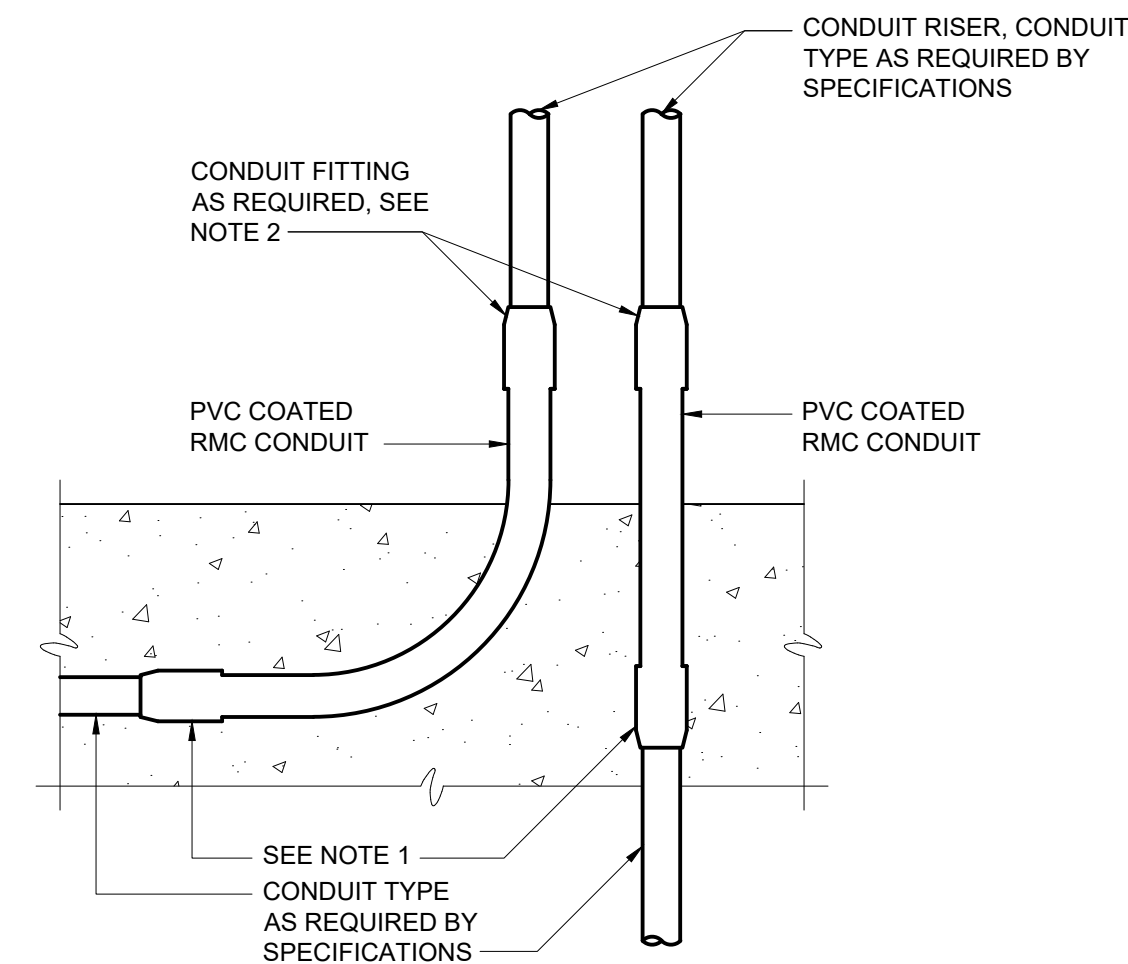
LAS GALLINAS VALLEY SANITARY DISTRICT
DIGESTER ROOM MCC-2 UPGRADES

ELECTRICAL
CONDUIT AND WIRE AND
DUCTBANK SCHEDULES

DATE:	FEBRUARY 2022
HAZEN NO.:	20148-003
CONTRACT NO.:	1
DRAWING NUMBER:	E08

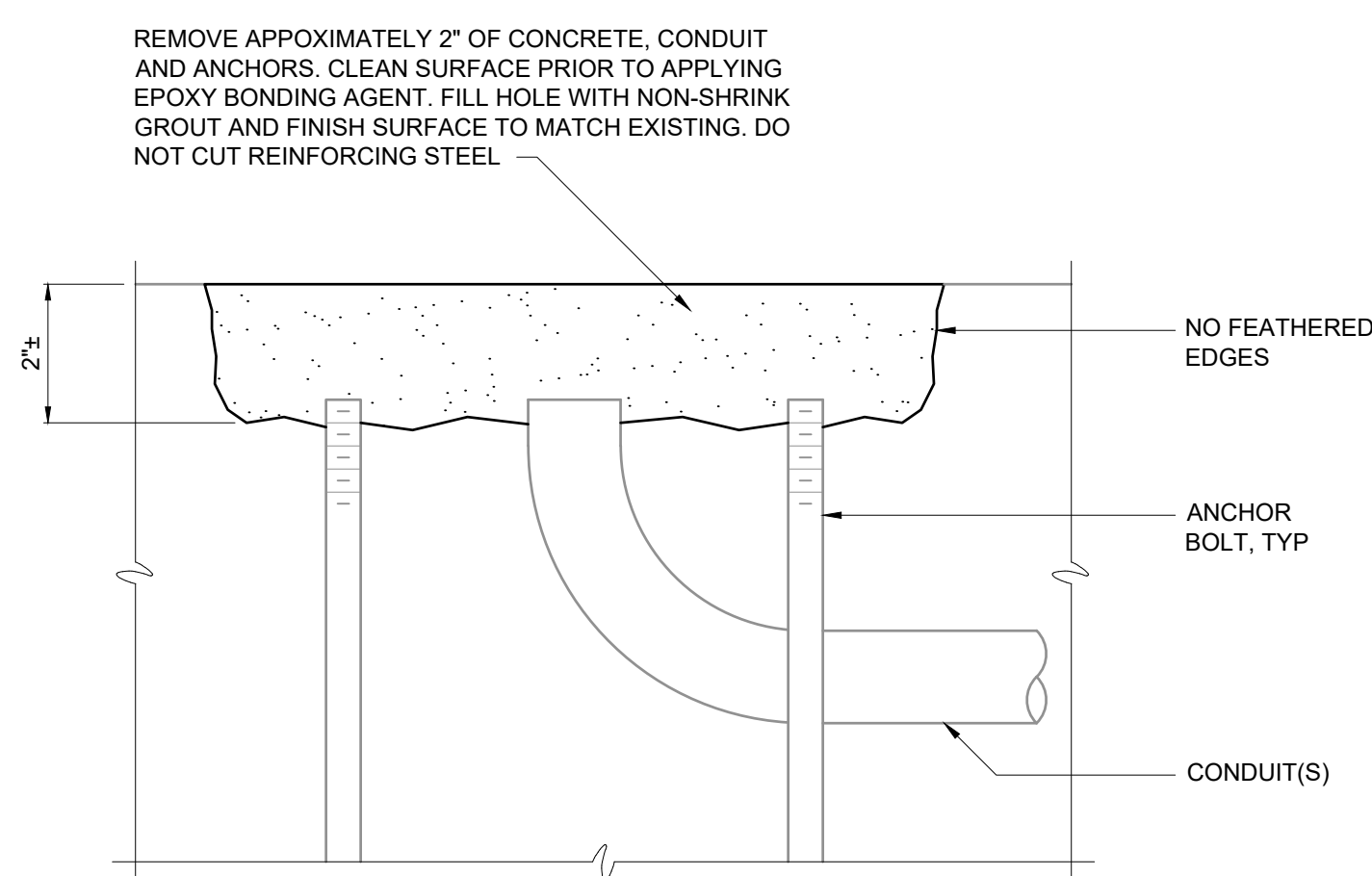


FLOOR STUB-UP FOR FUTURE CONDUIT
E-26-0101

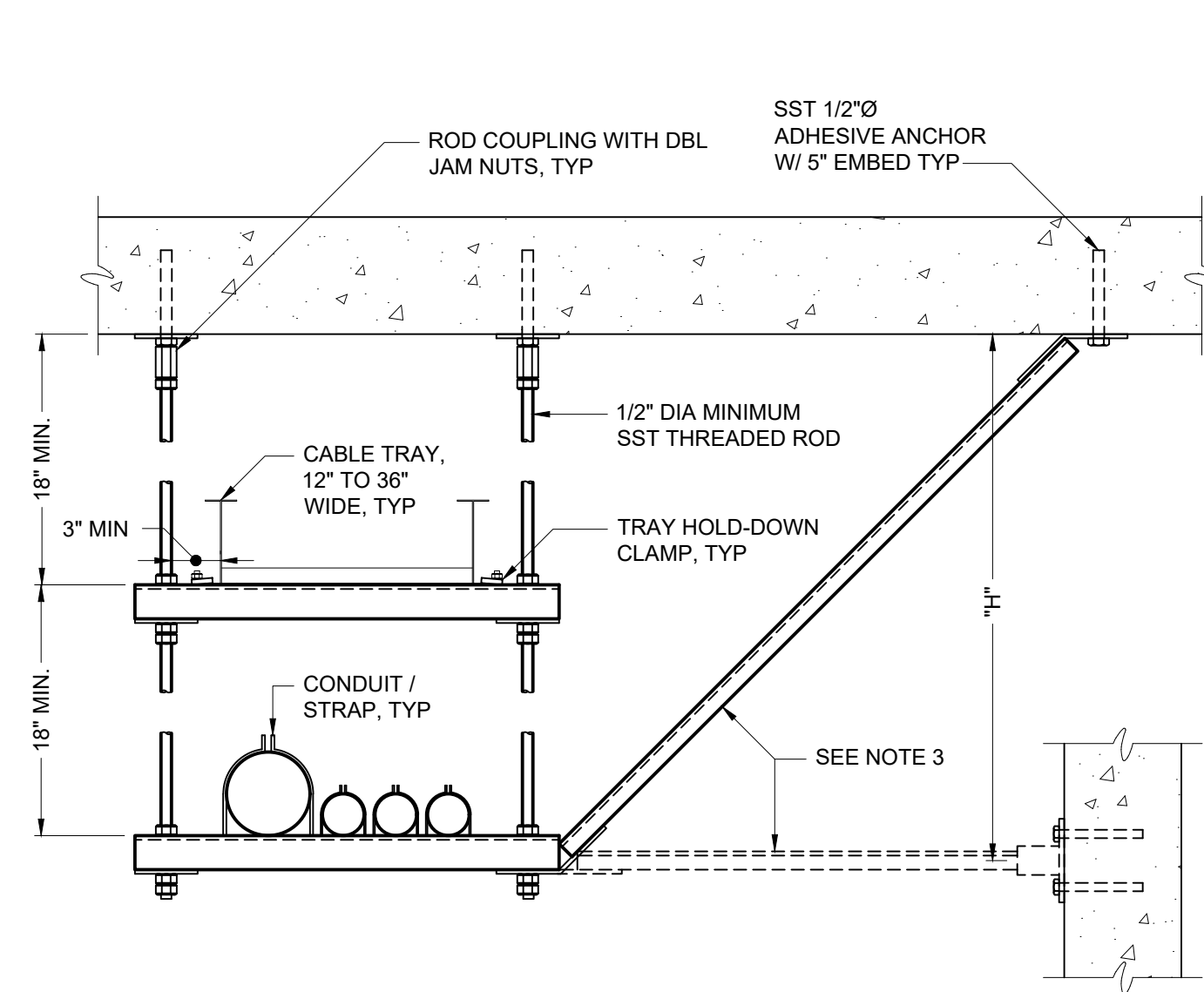


- NOTES:
- FOR ENCASED PVC CONDUIT USE PVC TERMINAL ADAPTER. FOR ALL OTHER CONDUIT TYPES, USE PVC COATED RMC COUPLINGS.
 - IF ANY THREADS OF THE PVC COATED RMC CONDUIT ARE EXPOSED AFTER INSTALLATION OF THE CONDUIT FITTING, THE CONDUIT FITTING SHALL BE PVC COATED TYPE WITH APPROPRIATE PVC SKIRTS. IF THE THREADS OF THE PVC COATED RMC CONDUIT ARE PROPERLY CUT SO THAT THEY ARE NOT EXPOSED AFTER INSTALLATION OF THE CONDUIT FITTING, THE CONDUIT MATERIAL SHALL BE AS REQUIRED BY THE SPECIFICATIONS, BASED ON THE MATERIAL OF THE CONDUIT RISER.

CONDUIT EXITING CONCRETE ENCASEMENT
E-26-0102



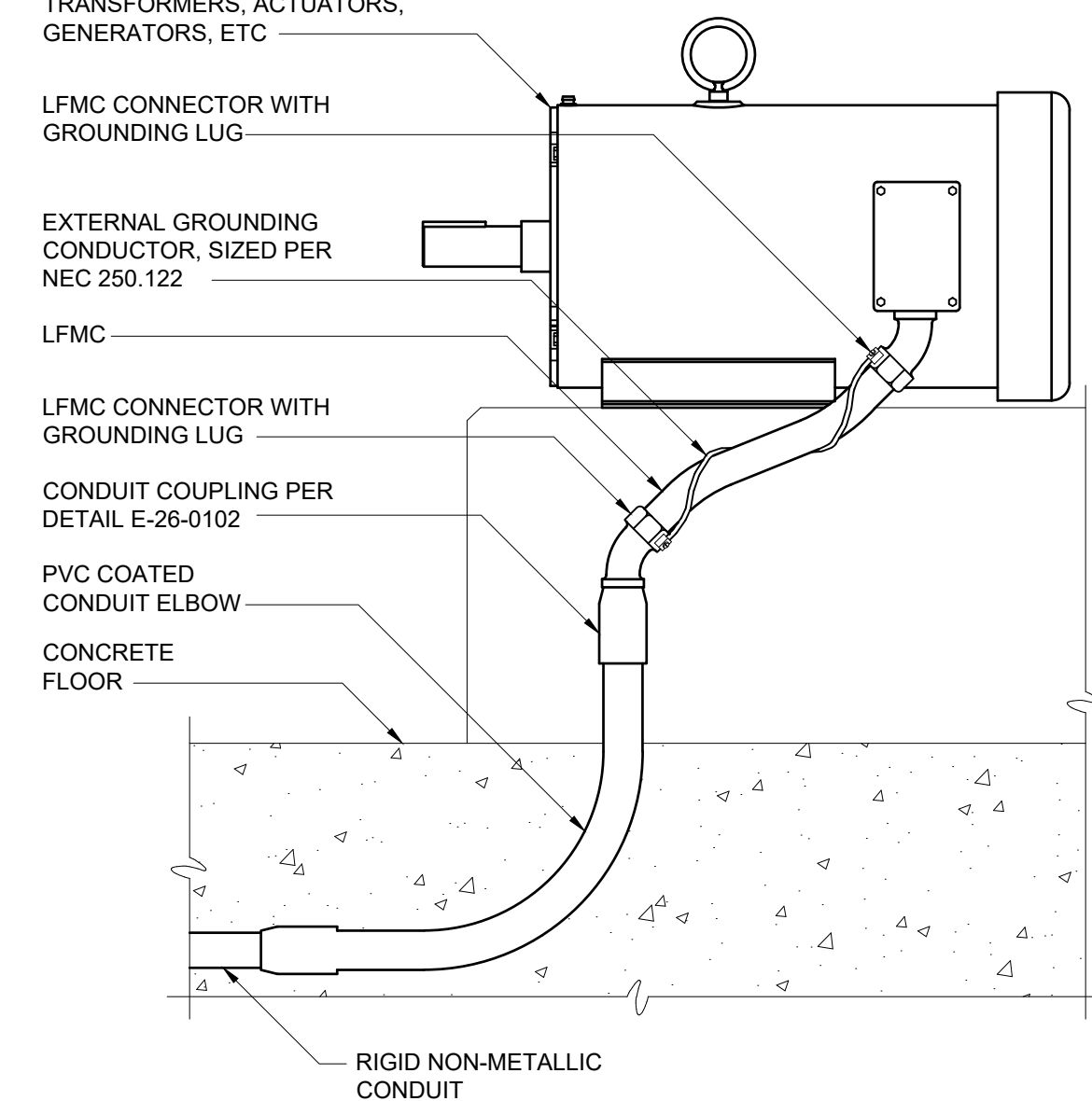
SEALING ABANDONED CONDUIT AND ANCHOR BOLTS
E-26-0103



- NOTES:
- SPACE SUPPORTS AT 5'-0" MAXIMUM. HANGER SPACING SHALL BE BASED ON MAXIMUM LOAD.
 - REFER TO AREA DESIGNATION DRAWINGS AND SPECIFICATIONS FOR REQUIRED MATERIALS OF CONSTRUCTION.
 - PREFORMED BRACING CHANNEL AT 30'-0" SPACING MAX. BRACE AT INTERMEDIATE LEVEL WHEN "H" DIMENSION EXCEEDS 6'-0".
 - STRUT SHALL BE 12 GAUGE MINIMUM.

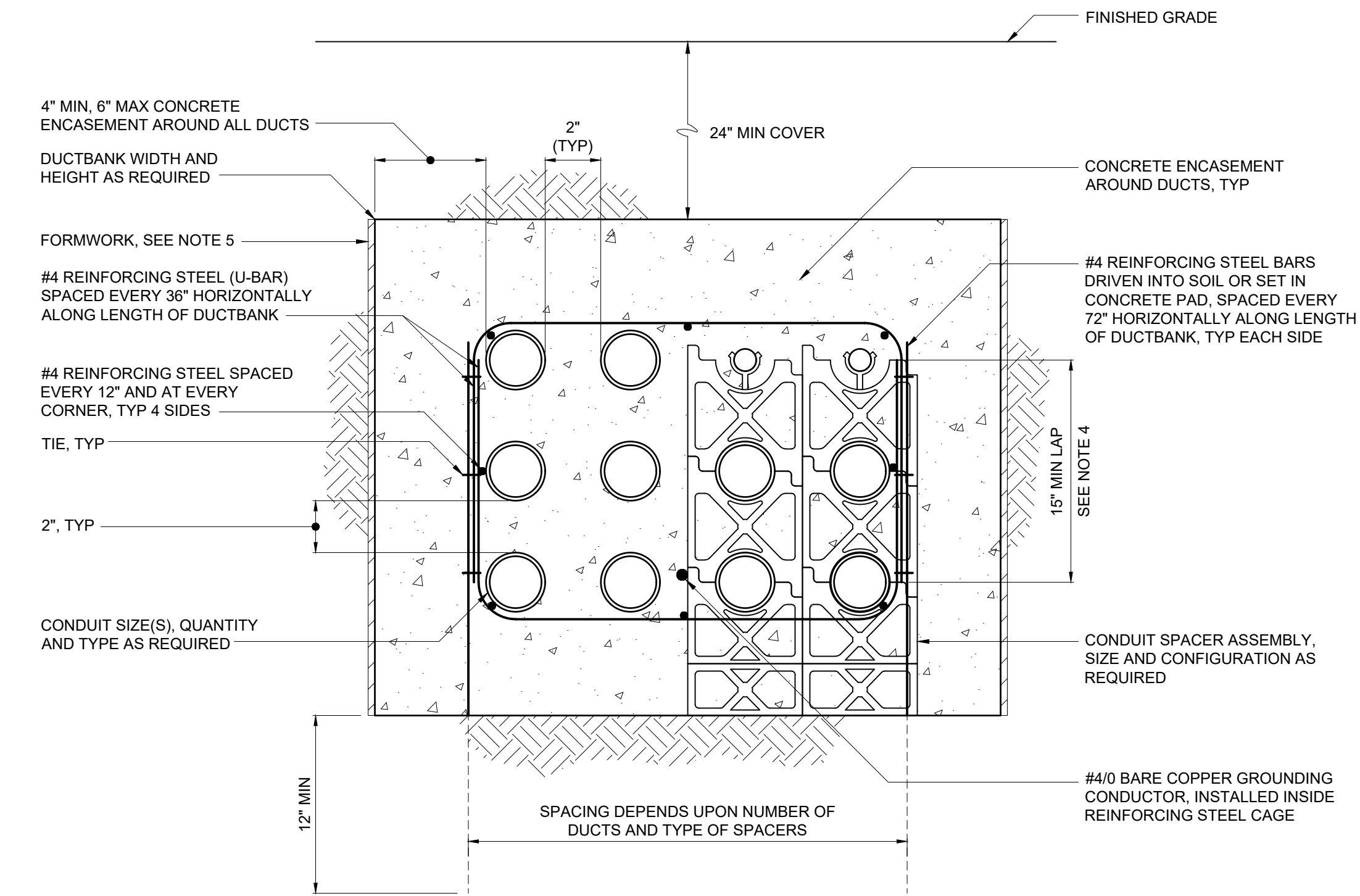
SUSPENDED RACEWAY SUPPORT RACK
E-26-0201

"VIBRATING EQUIPMENT" REQUIRING FLEXIBLE RACEWAYS SUCH AS MOTORS, TRANSFORMERS, ACTUATORS, GENERATORS, ETC



- NOTES:
- WHERE NON-METALLIC CONDUIT TRANSITIONS TO RIGID METALLIC CONDUIT AND / OR LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT, (LFMC), TO FEED VIBRATING TYPE LOADS, THE CONTRACTOR SHALL FURNISH AND INSTALL AN EXTERNAL BARE COPPER GROUNDING CONDUCTOR AND APPROVED GROUNDING LFMC CONNECTORS TO ENSURE GROUND CONTINUITY TO THE RIGID METALLIC CONDUIT AS SHOWN. THE GROUNDING CONDUCTOR SHALL BE SIZED ACCORDING TO NEC 250.122 AND BE NEATLY WRAPPED AROUND LFMC AS SHOWN. LFMC INSTALLED IN THIS MANNER CANNOT BE USED FOR A CONTINUOUS GROUND PATH PER NEC 350.60.

LFMC CONDUIT GROUND STRAP
E-26-0104

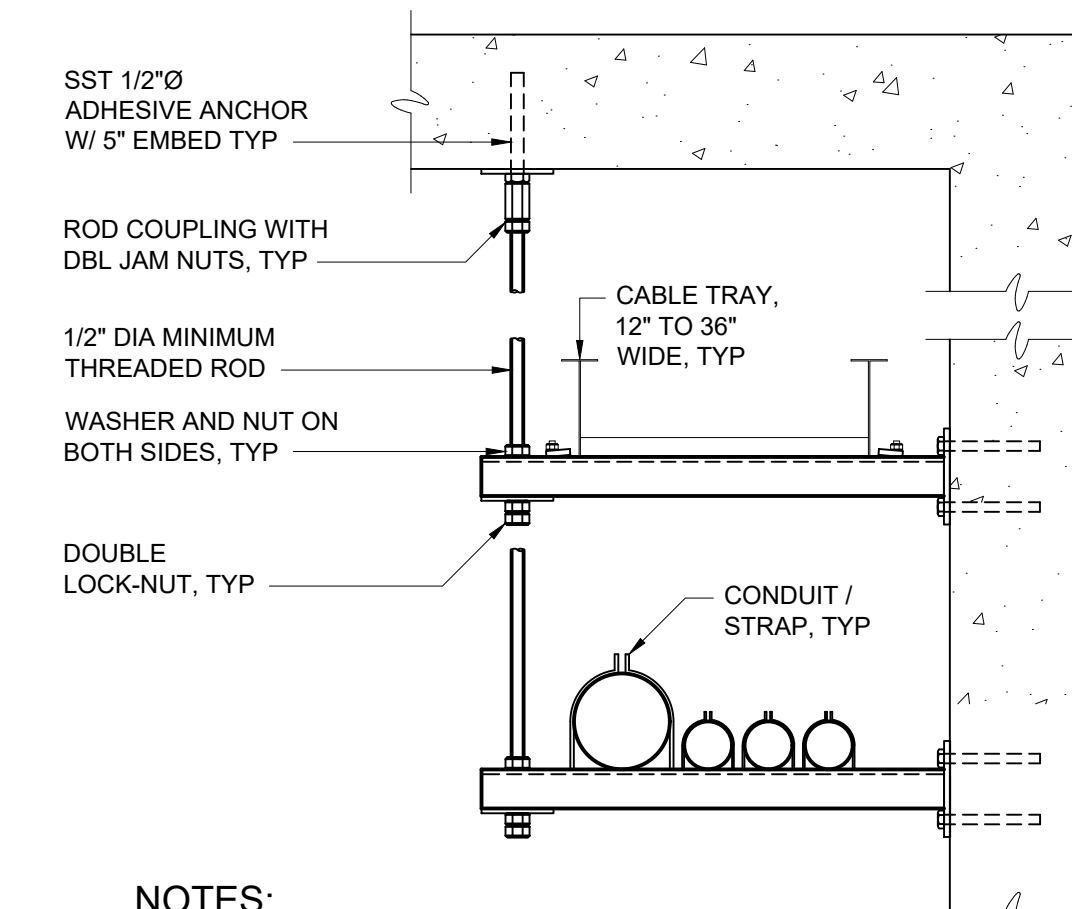


- NOTES:
- CONCRETE SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION SECTION 03 30 00.
 - REINFORCING STEEL AND TIES SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION SECTION 03 21 00. OVERLAP FOR REINFORCING STEEL SPLICES ALONG THE DUCTBANK LENGTH SHALL BE 15", MINIMUM.
 - CONDUIT SPACERS ARE REQUIRED IN ACCORDANCE WITH SPECIFICATION SECTION 33 71 19. HORIZONTAL SPACING OF CONDUIT SPACER ASSEMBLIES ALONG LENGTH OF DUCTBANK SHALL BE AS SHOWN IN THE TABLE.
 - FOR DUCTBANKS LESS THAN 15" IN HEIGHT, THE LAP SHALL BE THE HEIGHT OF THE DUCTBANK.
 - IN POOR SOIL CONDITIONS, DUCTBANKS SHALL BE FORMED WITH FORMING MATERIALS TO MAINTAIN 4" MINIMUM ENCASEMENT. WHERE SOIL CONDITIONS PERMIT AND THE EXCAVATION IS MAINTAINED FOR A 4" MINIMUM TO 10" MAXIMUM ENCASEMENT, THE FORMWORK CAN BE OMITTED.

MAX SPACING BETWEEN CONDUIT SPACER ASSEMBLIES

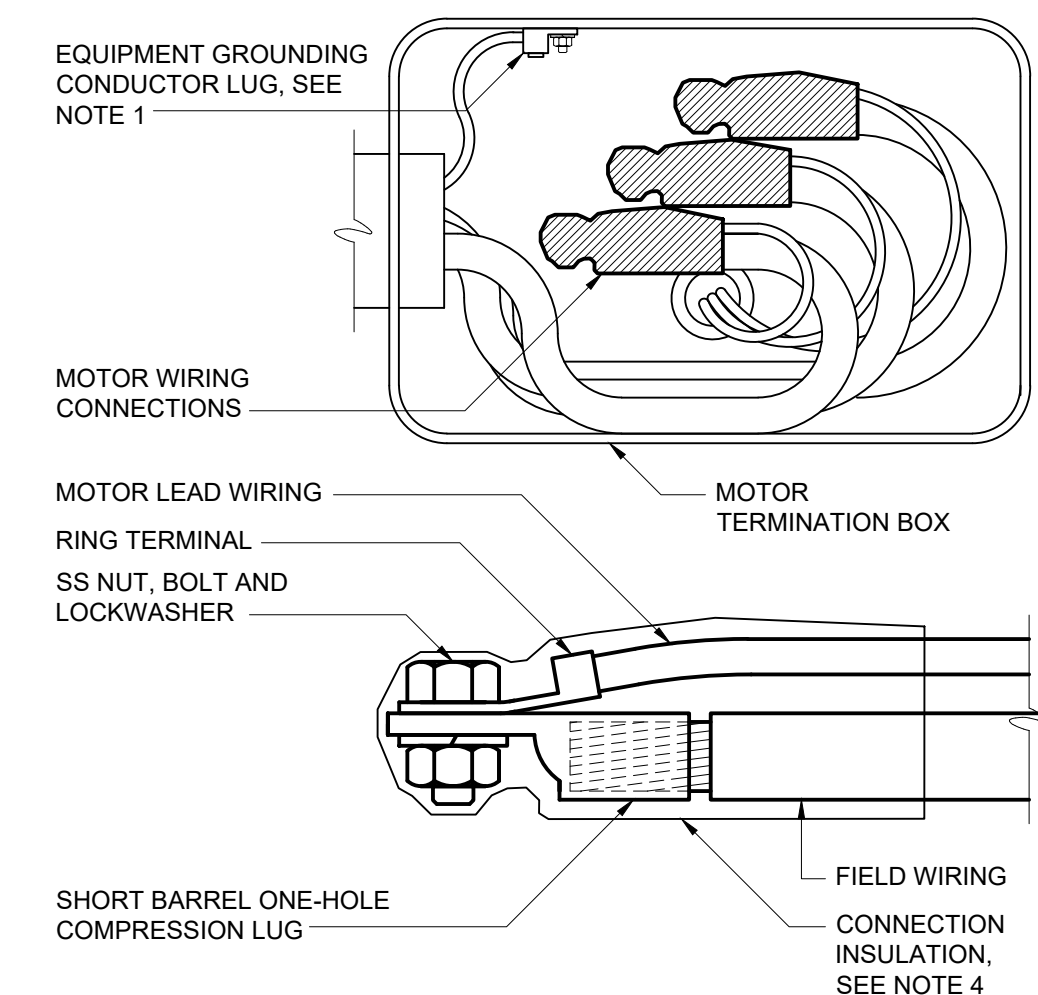
CONDUIT SIZE	SPACING
1"	3 FT
1 1/4-2"	5 FT
2 1/2-3"	6 FT
3 1/2-5"	7 FT
6"	8 FT

TYPICAL DUCTBANK SECTION
E-33-0101



- NOTES:
- SPACE SUPPORTS AT 5'-0" MAXIMUM. HANGER SPACING SHALL BE BASED ON MAXIMUM LOAD.
 - REFER TO AREA DESIGNATION DRAWINGS AND SPECIFICATIONS FOR REQUIRED MATERIALS OF CONSTRUCTION.
 - STRUT SHALL BE 12 GAUGE MINIMUM.

WALL MOUNTED RACEWAY SUPPORT RACK
E-26-0202



- NOTES:
- EQUIPMENT GROUNDING CONDUCTOR LUG SHALL BE ATTACHED WITH NUT AND LOCKWASHER TO THE MOTOR GROUNDING STUD. WHERE PROVIDED, FACTORY INSTALLED EQUIPMENT GROUNDING CONDUCTOR LUGS ARE ACCEPTABLE IN LIEU OF THE FIELD INSTALLED EQUIPMENT GROUNDING CONDUCTOR LUG.
 - RING TERMINALS ON MOTOR LEADS SHALL BE FACTORY INSTALLED BY THE MOTOR MANUFACTURER.
 - INSTALL SHORT BARREL COMPRESSION CONNECTOR ON FIELD WIRING WITH MANUFACTURER'S RECOMMENDED COMPRESSION TOOL AND CRIMPING DIE. CONNECTORS SHALL HAVE SMOOTHLY ROUNDED EDGES.
 - HEAT SHRINK OR COLD APPLIED CONNECTOR INSULATION LISTED FOR THE PURPOSE AND AS SPECIFIED.

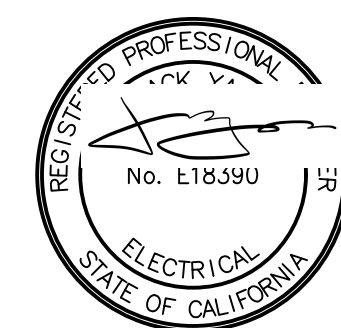
LOW VOLTAGE MOTOR TERMINATION
E-26-0301

File: C:\BMS\HAZEN\PROJECTS\2021\156\ED-01_Saved by ALAU Save date: 3/16/2022 5:46 PM PLOT DATE: 3/16/2022 2:06 PM BY: SDND

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	G. CUMMINGS
DESIGNED BY:	J. YAO
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

100% DRAWING DO NOT USE FOR CONSTRUCTION



Hazen

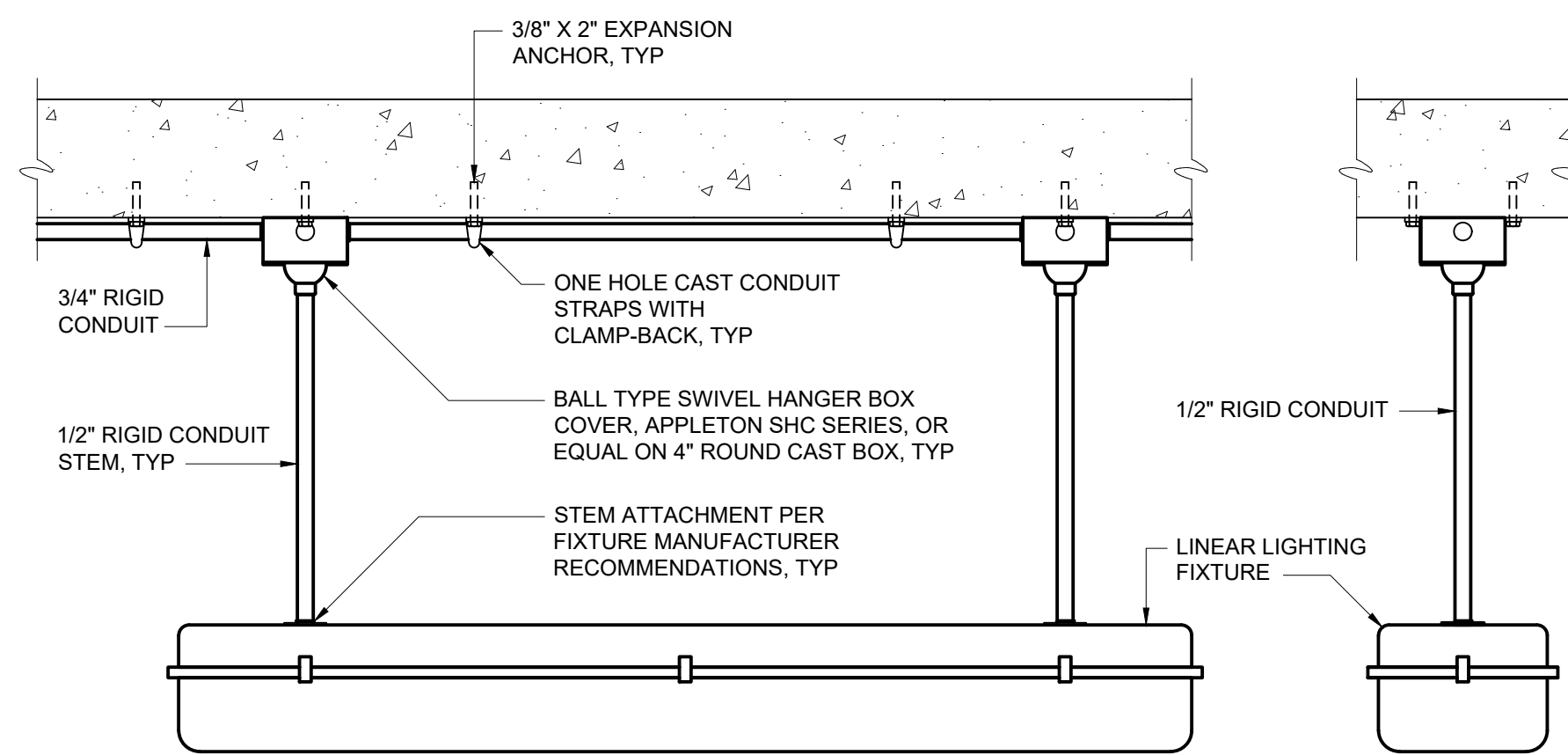
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE, SUITE 200
IRVINE, CALIFORNIA 92618

LAS GALLINAS VALLEY SANITARY DISTRICT
SAN RAFAEL, CA

LAS GALLINAS VALLEY SANITARY DISTRICT
DIGESTER ROOM MCC-2 UPGRADES

ELECTRICAL
STANDARD DETAILS - I

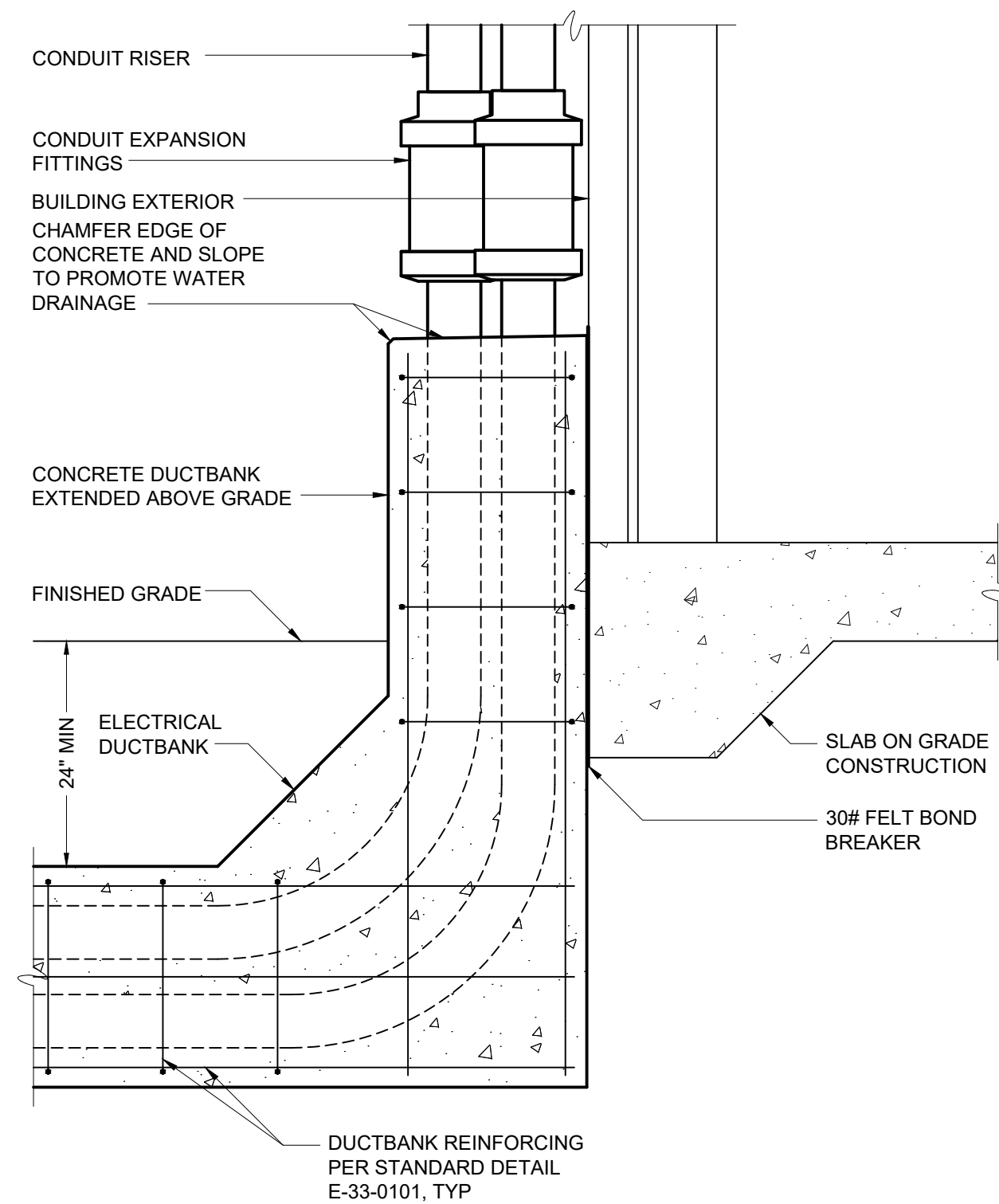
DATE:	FEBRUARY 2022
HAZEN NO.:	20148-003
CONTRACT NO.:	1
DRAWING NUMBER:	ED-01



NOTES:

1. ADDITIONAL SEISMIC SUPPORTS MAY BE REQUIRED, SEE CODE SUMMARY DRAWING AND DRAWING E1 FOR SEISMIC CLASSIFICATIONS.
2. CONDUIT TYPE AND MATERIALS OF CONSTRUCTION FOR SUPPORTS AND HARDWARE SHALL BE AS REQUIRED FOR THE AREA IN WHICH THE FIXTURE IS INSTALLED AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH THE SPECIFICATIONS.
3. REFER TO AREA DESIGNATION DRAWINGS AND SPECIFICATIONS FOR REQUIRED MATERIALS OF CONSTRUCTION.

**INDIVIDUAL PENDANT MOUNTED LINEAR FIXTURE
E-26-0605**

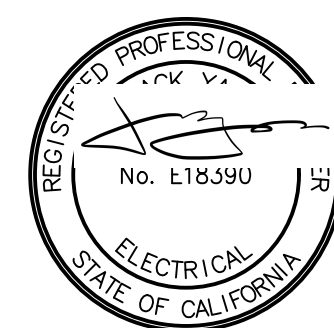


**DUCTBANK ABUTMENT (FLOATING) TO STRUCTURE
E-33-0108**

File: C:\BMS\HAZEN\PROJECTS\1566\ED-02_Saved by ALAU Save date: 6/8/2022 5:14 PM
PLOT DATE: 3/17/2023 2:08 PM BY: SDNO

PROJECT ENGINEER:	G. CUMMINGS		
DESIGNED BY:	J. YAO		
DRAWN BY:	A. LAU		
CHECKED BY:	C. THUNHORST		
IF THIS BAR DOES NOT MEASURE 1\"/>			
REV	ISSUED FOR	DATE	BY

100% DRAWING
DO NOT USE FOR
CONSTRUCTION



Hazen

HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE, SUITE 200
IRVINE, CALIFORNIA 92618

LAS GALLINAS VALLEY SANITARY DISTRICT
SAN RAFAEL, CA

LAS GALLINAS VALLEY SANITARY DISTRICT
DIGESTER ROOM MCC-2 UPGRADES

ELECTRICAL
STANDARD DETAILS - II

DATE:	FEBRUARY 2022
HAZEN NO.:	20148-003
CONTRACT NO.:	1
DRAWING NUMBER:	ED-02