Wastewater Treatment Plant Upgrade Project
City Project No. 2018-01
April 11, 2018

DESIGNER
HDR Engineering, Inc.
2365 Iron Point Road, Suite 300
Folsom, CA 95630
(916) 817-4700
(916) 817-4747 (Fax)

OWNER
Fort Bragg
Municipal Improvement District No. 1
416 North Franklin Street
Fort Bragg, CA 95437

GENERAL
Scope

A. This Addendum forms a part of the Bidding and Contract Documents and modifies the Project Specifications and Drawings described below.

B. This Addendum consists of 4 pages and the following attachments:
1. Mandatory Pre-Bid Conference Sign-In-Sheet (3 pages) attached.
2. Reissued Specification Section 00410 - Bid Form (8 pages) attached.
3. Reissued Specification Section 00440 - Compliance Statement (2 pages) attached.
4. Reissued Specification Section 00450 - U.S. Department of Agriculture (2 pages) attached.
5. Reissued Specification Section 00460 - Certification for Contracts, Grants and Loads (1 page) attached.
6. Reissued Specification Section 00480 - List of Subcontractors (1 page) attached.
7. Reissued Specification Section 00490 - Contractors Qualification State and References (1 page) attached.
9. New Specification Section 40 42 00 - Pipe, duct and Equipment Insulation (3 pages) attached.
10. Reissued Specification Section 46 51 38 - Biological Treatment Facility (14 pages) attached.
11. Reissued Specification Section 46 76 21 - Belt Filter Press (15 pages)
12. Reissued Sheet P01 - Package Biological Treatment Facility Process Piping Connection Location Plan.
13. Reissued Sheet P02 - Package Biological Treatment Facility Process Piping Connection Location Plan.
14. Reissued Sheet P03 - Electrical and Dewatering Building Floor Plan.
15. Reissued Sheet P04 - Electrical and Dewatering Building Sections I.
17. Reissued Appendix A - Package Biological Treatment Facility Manufacturer Drawings (39 sheets). NOT PART OF THE CONTRACT DOCUMENTS

Acknowledgment
A. Acknowledge receipt of this Addendum in the space provided on the Bid Form.

REVISIONS TO SPECIFICATIONS

Section 03 09 00 - Concrete

Article 3.2 B.1.c.
ADD
"c. Entire inside face of perimeter walls in watertight tanks/basins."

Section 04 22 00 - Concrete Masonry

Article 2.3 C
CHANGE TO READ
"C. Ground-face Masonry Units (GFMU 8 IN x 8 IN x 16 IN):"

Section 40 05 00 - Pipe and Pipe Fittings: Basic Requirements

Article 2.1 A.7.
ADD
"7. Flanged expansion joints:
   a. HOLZ series 320 EZ.
   b. Or equal."

Article 3.2 J.
ADD
"a. Provide expansion joint at 40 FT on center for 6 IN and larger LPA piping within the PBTF structure."
REVISIONS TO DRAWINGS

C02 - Site Grading and Paving Plan I

Notes:
ADD
"2. CONTRACTOR SHALL RESURFACE ASPHALT PAVEMENT IN EXISTING PAVEMENT AREAS TO BE REMOVED FOR NEW UNDERGROUND UTILITIES OR MODIFICATIONS TO EXISTING UNDERGROUND UTILITIES. ASPHALT PAVEMENT RESURFACING SHALL BE A MINIMUM OF 3 INCHES THICK OR MATCH EXISTING IF THE EXISTING IS THICKER THAN 3 INCHES."

C03 - Site Grading and Paving Plan II

Notes:
ADD NOTES
"1. CONTRACTOR SHALL RESURFACE ASPHALT PAVEMENT IN EXISTING PAVEMENT AREAS TO BE REMOVED FOR NEW UNDERGROUND UTILITIES OR MODIFICATIONS TO EXISTING UNDERGROUND UTILITIES. ASPHALT PAVEMENT RESURFACING SHALL BE A MINIMUM OF 3 INCHES THICK OR MATCH EXISTING IF THE EXISTING IS THICKER THAN 3 INCHES."

C06 - Yard Piping Profiles I

Grid 1 C
ADD TO EXISTING NOTE
"6 IN SLUDGE PIPE TO BE ABANDONED AFTER CONSTRUCTION."

C13 - Existing Structures Modifications II

Grid 3 B
CHANGE
256' - 0"
TO READ
"8' - 0"

S10 - Typical CMU Details

Table located at Grid 6, 7, 8 D
DELETE
"HORIZ JOINT REINF AT 16" VERT SPACING BETWEEN BOND BEAMS
9 GAGE WIRE, JOINT REINF AT 16" VERT SPACING BETWEEN BOND BEAMS"
Addendum No. 3

S16 - Package Biological Treatment Facility Top Plan

Notes:

ADD
"4. CONTRACTOR TO DESIGN AND INSTALL ALUMINUM STAIRS ON EAST AND WEST SIDES OF PBTF PER SPECIFICATIONS.
5. ALUMINUM STAIRS SHALL HAVE A MINIMUM CLEARANCE OF 3' - 6"
BETWEEN RAILINGS.
6. CONCRETE STAIR LANDING ON WEST SIDE OF PBTF TO BE 6' X 5' X 8" THICK PER DETAILS 2 AND 5 ON SHEET S05."

A02 - Electrical and Dewatering Building Exterior Elevations

Notes:

ADD
"1. ALL MASONRY UNITS SHALL BE "GROUND-FACE" MASONRY UNITS PER SPEC. SECTION 04 22 00."

P02 - Package Biological Treatment Facility Piping Connection Sections

Note: at Grid 5 A
DELETE
"ALL ITEMS SHOWN WITHIN PBTF TO BE PROVIDED BY PBTF MFR"

End of Addendum
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<th>Signature</th>
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PRE-BID SIGNATURE SHEET

MANDATORY PRE-BID CONFERENCE: THURSDAY, MARCH 14, 2019
WASTEWATER TREATMENT PLANT UPGRADE PROJECT
CITY OF PORT BRAGG
BID FORM
Wastewater Treatment Plant Upgrades project

TABLE OF CONTENTS

Article 1 - Bid Recipient
Article 2 - Bidder’s Acknowledgments
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Article 4 - Bidder’s Certification
Article 5 - Basis of Bid
Article 6 - Time of Completion
Article 7 - Attachments to Bid
Article 8 - Defined Terms
Article 9 - Bid Submittal
ARTICLE 1 - BID RECIPIENT

1.1 This Bid is submitted to:

City of Fort Bragg
416 Franklin Street
Fort Bragg, California 95437

1.2 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 - BIDDER’S ACKNOWLEDGEMENTS

2.1 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

2.2 BIDDER will sign and deliver the required number of counterparts of the AGREEMENT with the Bonds and other documents required by the Bidding Requirements within (15) days after the date of OWNER's Notice of Award.

ARTICLE 3 - BIDDER’S REPRESENTATIONS

3.1 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

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<th>Addendum Date</th>
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B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.
C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress and performance of the Work, including all American Iron and Steel Requirements.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder’s safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of the Work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 - BIDDER’S CERTIFICATION

4.1 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any
undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. “corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process.

2. “fraudulent practice” means an intentional misrepresentation of facts made to (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 - BASIS OF BID

5.1 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):
<table>
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<tr>
<th>Item</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sheeting, shoring and bracing, or equivalent method, for the protection of life and limb in trenches and open excavation, which shall conform to applicable safety orders per Section 6707 of the California Labor Code</td>
<td>$__________________________ (in figures)</td>
</tr>
<tr>
<td>2</td>
<td>Main Wastewater Treatment Plant work</td>
<td>$__________________________ (in figures)</td>
</tr>
<tr>
<td></td>
<td>TOTAL BASE BID AMOUNT (Sum of Bid items 1, 2)</td>
<td>$__________________________ (in figures)</td>
</tr>
</tbody>
</table>

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

**ARTICLE 6 - TIME OF COMPLETION**

6.1 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.2 Bidder accepts the provisions of the Agreement as to liquidated damages.

**ARTICLE 7 - ATTACHMENTS TO THIS BID**

7.1 The following documents are attached to and made a condition of this Bid:
   A. Required Bid security;
   B. List of Proposed Subcontractors;
   C. Contractor Qualification Statement and references;
   D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;
   E. Contractor’s License No.
F. Non-Collusion Affidavit;
G. Workers Compensation Certification;

H. If Bid amount exceeds $10,000, signed Compliance Statement (RD 400-6). Refer to specific equal opportunity requirements set forth in the Supplementary Conditions;

I. If Bid amount exceeds $25,000, signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tiered Covered Transactions (AD-1048);

J. If Bid amount exceeds $100,000, signed RD Instruction 1940-Q, Exhibit A-1, Certification for Contracts, Grant, and Loans.

K. Manufacturer’s Certification Letter of Compliance with American Iron and Steel Requirements for all equals and substitutes approved by Addenda. (if applicable);

L. Disadvantaged business Enterprise requirements completed, SWRCB form 4500-3 and 4500-4;

M. Contractor DIR Registration Number.

ARTICLE 8 - DEFINED TERMS

8.1 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 - BID SUBMITTAL

Bidder Name: 

Submittal Date: 

Address for giving notices: 

Telephone Number: Fax Number: 

Contact Name and e-mail address: 

State Contractor’s License Number: 

Employer’s Tax ID No.: 

Contractor DIR Registration No.: 

00410-6
If Bidder is:

**An Individual**

Name (typed or printed): __________________________________________

By: ____________________________________________________________

*(Individual’s signature)*

Doing business as: ________________________________________________

**A Partnership**

Partnership Name: ________________________________________________ *(SEAL)*

By: ____________________________________________________________

*(Signature of general partner – attach evidence of authority to sign)*

Name (typed or printed): __________________________________________

**A Corporation**

Corporation Name: ________________________________________________ *(SEAL)*

State of Incorporation: ________________

Type (General Business, Professional, Service, Limited Liability): ________________

By: ____________________________________________________________

*(Signature – attach evidence of authority to sign)*

Name (typed or printed): __________________________________________

Title: ____________________________________________________________

Attest: ____________________________________________________________

*(Signature of Corporate Secretary)*

Date of Qualification to do business in California is ______ / ______ / ________.
A Joint Venture

Name of Joint Venture Partner: ____________________________________________________

First Joint Venturer Name: ______________________________________________________

By: ____________________________________________

(Signature of first joint venture partner – attach evidence of authority to sign)

Name (typed or printed): _________________________________________________________

Title: ________________________________________________________________________

Second Joint Venturer Name: ___________________________________________________

(SEAL)

By: ____________________________________________

(Signature of second joint venture partner – attach evidence of authority to sign)

Name (typed or printed): _________________________________________________________

Title: ________________________________________________________________________

(Each joint venture partner must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)
COMPLIANCE STATEMENT  
(RD - 400-6)

This statement relates to a proposed contract with ________________________________

__________________________________________________________

(Name of borrower or grantee)

who expects to finance the contract with assistance from either the Rural Housing Service (RHS), Rural Business-Cooperative Service (RBS), or the Rural Utilities Service (RUS) or their successor agencies, United States Department of Agriculture (whether by a loan, grant, loan insurance, guarantee, or other form of financial assistance). I am the undersigned bidder or prospective contractor. I represent that:

1. I [ ] have, [ ] have not, participated in a previous contract or subcontract subject to Executive Order 11246 (regarding equal employment opportunity) or a preceding similar Executive Order.

2. If I have participated in such a contract or subcontract, I [ ] have, [ ] have not, filed all compliance reports that I have been required to file in connection with the contract or subcontract.

If the proposed contract is for $50,000 or more and I have 50 or more employees, I also represent that:

3. I [ ] have, [ ] have not, previously had contracts subject to the written affirmative action program requirements of the Secretary of Labor.

4. If I have participated in such a contract or subcontract, I [ ] have, [ ] have not, developed and placed on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor.

I understand that if I have failed to file any compliance reports that have been required or me, I am not eligible and will not be eligible to have my bid considered or to enter into the proposed contract unless and until I make an arrangement regarding such reports that is satisfactory to either the RHS, RBS, or RUS, or to the office where the reports are required to be filed.

I also certify that I do not maintain or provide for my employees any segregated facilities at any of my establishments, and that I do not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I certify further that I will not maintain or provide for my employees any segregated facilities at any of my establishments, and that I will not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I agree that a breach of this certification is a violation of the Equal Opportunity clause in my contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. I further agree that (except where I have obtained identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that I will retain such certifications in my files; and that I will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods): (See Reverse).
NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS FOR CERTIFICATIONS OF NON-SEGREGATED FACILITIES

A certification of Non-segregated Facilities, as required by the May 9, 1967, order (32F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually)

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Date: ________________________________

Signature of Bidder or Prospective Contractor

Address (including Zip Code)
U.S. DEPARTMENT OF AGRICULTURE

(AD - 1048)

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transactions.

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 7 CFR Part 3017.510, Participants' responsibilities. The regulations were published as Part IV of the January 30, 1989, Federal Register (pages 4722-4733). Copies of the regulations may be obtained by contacting the Department of Agriculture agency with which this transaction originated.

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS ON REVERSE)

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name

PR/Award Number or Project Name

Name(s) and Title(s) of Authorized Representative(s)

Signature(s) Date
Instructions for Certification

1. By signing and submitting this form, the prospective lower tier participant is providing the certification set out on the reverse side in accordance with these instructions.

2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

4. The terms “covered transaction,” “debarred,” “suspended,” “ineligible,” “lower tier covered transaction,” “participant,” “person,” “primary covered transaction,” “principal,” “proposal,” and “voluntarily excluded,” as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

6. The prospective lower tier participant further agrees by submitting this form that it will include this clause titled “Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transactions,” without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principles. Each participant may, but is not required to, check the Nonprocurement List.

8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly entered into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS
(1940-Q Exhibit A-1)

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant or Federal loan, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant or loan.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant or loan, the undersigned shall complete and submit Standard Form – LLL, “Disclosure of Lobbying Activities,” in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including contracts, subcontracts, and subgrants under grants and loans) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

(Name) (Date)

(Title)
# LIST OF SUBCONTRACTORS

**NOTE:** In accordance with Supplementary Condition SC-7.06.A the Contractor shall not award work valued at more than fifty percent (50%) of the Contract Price to Subcontractors without prior written approval of the Owner.

<table>
<thead>
<tr>
<th>Work to be Performed</th>
<th>Percent of Total Contract</th>
<th>Subcontractor’s Name and Location of Business</th>
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(Add additional sheets if necessary)

**BIDDER:** ________________________________

**Date:** __________
SECTION 00490
CONTRACTORS QUALIFICATION STATEMENT AND REFERENCES

1.1 QUALIFICATIONS

A. The Bidder must demonstrate a minimum of four (4) years experience in projects similar in nature and scope to this project. At least two Key Personnel employed by the Bidder must have completed at least three (3) projects, similar in scope and nature to the project being bid as an employee of the company bidding this project (or as the employee of a similarly qualified company) within the last five (5) years. The Bidder must demonstrate Successful Completion during the last five (5) years of at least one project comparable in nature and scope to this project and one project with a dollar value of at least 60 percent of the value bid for this project. The Bidder must have an employee, to be dedicated to this project, who is experienced in scheduling, with demonstrated ability in employing scheduling techniques similar to those to be used for this project.

1.2 DEFINITIONS

A. Key Personnel: Defined as individual who will be directly assigned to this project. Includes, but is not limited to, the Owner, the Principals of the Bidder, the Project Manager the Project Superintendent, the Scheduler, the Bidder’s Construction Engineer, and Supervisory personnel such as the Foremen who will be directly assigned to this project. Resumes of Key Personnel must be submitted and accepted by the Owner in order for Bidder to receive the Award. (Resumes are not due at bid time.)

B. Successful Completion: Defined as completion of a project on time, which generally means no more than thirty (30) days later than the original contract time allocated. It also means within budget, which generally means within 5 percent of the original contract price. If there is any project submitted by the Bidder as qualifying, but which does not meet these requirements, in order to be fully responsive the Bidder is required to submit detailed information on that project demonstrating what caused the increases to cost or time. The name and telephone numbers of the Design Engineer and the Client are to be provided for evaluation to determine whether the project may be considered successful. For any project where liquidated damages were assessed, the Bidder will not be considered to have been on time.

1.3 PROJECT EXPERIENCE AND REFERENCES

A. List three projects of this type recently completed.

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Owner’s Name, Address and Phone Number</th>
<th>Design Engineer’s Name, Address and Phone Number</th>
<th>Date Completed</th>
<th>Contract Amount</th>
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END OF SECTION
AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

THIS AGREEMENT is by and between

______________________________________________ (“Owner”) and
______________________________________________ (“Contractor”).

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows:

The Project includes installation of a new Packaged Biological Treatment Facility. Modification of existing clarifiers to equalization basins and the existing trickling filter concrete slabs to biosolids storage. Construct two new pump stations at the treatment plant site for onsite storm water capture and treatment and an additional pump station for influent flows. A new building to house the blowers and a belt filter press. Include all piping and related appurtenances as contained in the Contract Documents.

ARTICLE 3 – ENGINEER

3.01 The part of the Project that pertains to the Work has been designed by HDR Engineering, Inc.

3.02 The Owner has retained {____________} (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 Time of the Essence

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Contract Times: Days

A. The Work will be substantially completed within 520 working days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 563 working days after the date when the Contract Times commence to run.
4.03 **Liquidated Damages**

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. **Substantial Completion:** Contractor shall pay Owner one thousand five hundred dollars ($1500) for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.

2. **Completion of Remaining Work:** After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner one thousand dollars ($1000) for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

4.04 **Special Damages**

A. In addition to the amount provided for liquidated damages, Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor’s failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.

B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

**ARTICLE 5 – CONTRACT PRICE**

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

A. For all Work other than Unit Price Work, a lump sum of: ${__________}.

   All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

B. For all Work, at the prices stated in Contractor’s Bid, attached hereto as an exhibit.
ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments
   A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 Progress Payments; Retainage
   A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor’s Applications for Payment on or about the {____} day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

   1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
      a. 95 percent of Work completed (with the balance being retainage).
      b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

   B. Upon Substantial Completion of the entire construction work to be provided under the Contract Documents, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 100 percent of Engineer’s estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 Final Payment
   A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

7.01 All amounts not paid when due as provided in the General Conditions shall bear interest at the maximum legal rate

ARTICLE 8 – CONTRACTOR’S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:

   A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

   B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the
general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor’s safety precautions and programs.

F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

J. Contractor’s entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:
   1. This Agreement (pages 1 to {___}, inclusive).
   2. Performance bond (pages {___} to {___}, inclusive).
   3. Payment bond (pages {___} to {___}, inclusive).
   4. Other bonds.
      a. {___} (pages {___} to {___}, inclusive).
   5. General Conditions (pages {___} to {___}, inclusive).
6. Supplementary Conditions (pages ___ to ___, inclusive).
7. Specifications as listed in the table of contents of the Project Manual.
8. Drawings (not attached but incorporated by reference) consisting of ___ sheets with each sheet bearing the following general title: ___ [or] the Drawings listed on the attached sheet index.
9. Addenda (numbers ___ to ___, inclusive).
10. Exhibits to this Agreement (enumerated as follows):
   a. Contractor's Bid (pages ___ to ___, inclusive).
11. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
   a. Notice to Proceed.
   b. Work Change Directives.
   c. Change Orders.
   d. Field Orders.
B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
C. There are no Contract Documents other than those listed above in this Article 9.
D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 Terms
   A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 Assignment of Contract
   A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successors and Assigns
   A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Severability
   A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that
the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 Contractor's Certifications

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

1. “corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

10.06 Other Provisions

A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or “track changes” (redline/strikeout), or in the Supplementary Conditions.
IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on {______} (which is the Effective Date of the Contract).

OWNER: 

__________________________________________

By: ________________________________________

Title: _______________________________________

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____________________________________

Title: _______________________________________

Address for giving notices: 

__________________________________________

__________________________________________

__________________________________________

License No.: _____________________________ (where applicable)

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

NOTE TO USER: Use in those states or other jurisdictions where applicable or required.
CERTIFICATE OF
OWNER’S ATTORNEY

Owner’s Name: ____________________________________________

Contractor’s Name: ____________________________________________

Contract Work Description: ____________________________________________

Contract Date: ______________

I, the undersigned, ____________________________________________ the duly authorized
and acting legal representative of ____________________________________________,
do hereby certify as follows:

I have examined the attached Contract(s) and performance and payment bond(s) and the
manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is
adequate and has been duly executed by the proper parties thereto acting through their duly
authorized representatives; that said representatives have full power and authority to execute
said agreements on behalf of the respective parties named thereon; and that the foregoing
agreements constitute valid and legally binding obligations upon the parties executing the
same in accordance with terms, conditions, and provisions thereof. I also am of the opinion
that the Contractor’s insurance coverage(s) complies with the requirements of the Contract.

__________________________________________
(Attorney’s Signature)

DATE: ______________
AGENCY CONCURRENCE

OWNER Name: ________________________________

CONTRACTOR Name: __________________________

CONTRACT Work Description: ________________________________

CONTRACT Date: __________________________

This CONTRACT shall not be effective for USDA funding unless and until concurred with by a delegated representative of USDA Rural Development in accordance with the Letter of Conditions for this project.

As lender and/or grantor of funds to OWNER to defray the costs of this CONTRACT, and not a party to this contract and without liability for any payments thereunder, USDA Rural Development hereby concurs in the form, content, and execution of this CONTRACT.

United States Department of Agriculture
Rural Development

BY: ________________________________

DATE: ______________________________

TITLE: ______________________________

00520-9
SECTION 40 42 00
PIPE, DUCT AND EQUIPMENT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Insulation:
      a. Piping insulation.
      2. Adhesives, mastics, sealants, and finishes.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.
   3. Section 40 05 07 - Pipe Support Systems.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. ASTM International (ASTM):
         Transmission Properties by Means of Guarded-Hot-Plate Apparatus.
      b. C411, Standard Test Method for Hot-Surface Performance of High-Temperature
         Thermal Insulation.
      c. C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients
         by the Reverberation Room Method.
         Commercial and Industrial Applications.

   2. National Fire Protection Association (NFPA):

   3. Underwriters Laboratories, Inc. (UL):

      a. Published by Midwest Insulation Contractors Association (MICA).
      b. Endorsed by National Insulation Association (NIA).
      c. MICA plate numbers listed in this specification reference this document.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01 33 00 for requirements for the mechanics and administration of
      the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
      c. Submit complete specification of insulation materials, adhesives, cement, together with
         manufacturer's recommended methods of application and coverage for coatings and
         adhesives.
   3. Submit itemized schedule by building of proposed insulation systems showing density,
      thermal conductivity, thickness, adhesive, jackets and vapor barriers.
   4. Certifications: Products will meet the requirements of the Contract Documents.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Fiberglass insulation:
   a. CertainTeed Corporation.
   b. Johns Manville.
   c. Owens Corning.
   d. Knauf.

2. PVC jacket:
   a. Ceel-Co.
   b. PIC Plastics.

3. High density perlite:
   b. Industrial Insulation Group (LIC).

4. Adhesives, mastics, sealants, and finishes:
   a. Foster Products.
   b. Childers.
   c. Dow Corning.
   d. Johns Manville.
   e. Knauf.

B. Submit request for substitution in accordance with Specification Section 01 25 13.

2.2 PIPING INSULATION - FIBERGLASS

A. Pipe and Fitting Insulation:

1. Preformed fiberglass pipe insulation:
   a. Density: 4 LBS/CF.
   b. Temperature rated: 650 DEGF.
   c. Average thermal conductivity not to exceed 0.23 (Btu-IN)/(HR-FT²-DegF) at mean temperature of 75 DEGF.
   d. Fire hazard rating:
      1) UL 723, ASTM E84, NFPA 255.
      2) Flame spread not exceeding 25 and smoke developed not exceeding 50.

2. Moisture adsorption:
   a. ASTM C553.
   b. Not greater than 0.5 PCT moisture by volume when exposed to moisture laden air at 120 DEGF and 96 PCT RH.

3. Fungi and bacteria resistance:
   a. ASTM C665.
   b. Does not breed or promote growth.
   c. Flame attenuated glass fibers bonded with thermosetting resin.

4. Piping jackets (general applications):
   a. PVC: Preformed 0.028 IN thick PVC jackets fabricated from B.F. Goodrich PVC sheeting V-66 with proven resistance to ultraviolet degradation when temperatures do not exceed the limits of PVC.
   b. Piping jacket not required on concealed piping.

5. Provide minimum insulation thickness conforming to schedules or as shown on the Drawings.

2.3 PIPE INSULATION INSERTS AT HANGERS/SUPPORTS

A. High Density Perlite:

1. Pre-formed.

2. Fire hazard rating:
   a. UL 723, ASTM E84, NFPA 255.
b. Flame spread: Zero (0).
c. Smoke developed: Zero (0).
3. Average density: 13 LBS/CF.
4. Compressive strength: 80 PSI to produce 5 PCT compression.
5. Maximum surface temperature: 1,200 DEGF.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. General:
   1. Piping below ground covered with earth will not be insulated except as specified in Specification Section 40 05 25.
   2. Consider piping as exposed, except as otherwise indicated.
   3. Consider piping in walls, partitions, floors, pipe chases, pipe shafts and duct shafts as concealed.
      a. Consider piping above ceilings as concealed.
   4. Provide release for insulation application after installation and testing is complete.
      a. Apply insulation on clean, dry surfaces after inspection.
   5. Provide insulation continuous through wall, roof and ceiling openings, pipe hangers, supports and sleeves.
   6. Apply specified adhesives, mastics and coatings at the manufacturer's recommended coverage per unit volume.
C. Piping Insulation - Fiberglass:
   1. Apply over clean dry pipe.
      a. Butt all joints together firmly.
   2. Seal joints, slits, miter-cuts and other exposed edges of insulation as recommended by the insulation manufacturer.
   3. Insulate fittings, valves, and flanges with insulation thickness equal to adjacent pipe.
   4. PVC pipe jacket:
      a. Apply jacketing with a minimum of 1 IN overlap.
         1) Weld longitudinal and circumferential seams with adhesives as recommended by manufacturer.
      b. Provide slip-joints every 30 FT and between fittings if distance exceeds 8 FT.
         1) Construct slip-joints by overlapping jacket sections 6 to 10 IN.
      c. Provide pre-molded PVC covers of same material and manufacturer as jacket for fittings, valves, flanges, and related items in insulated piping systems.

3.2 REPAIR

A. Whenever any factory applied insulation or job-applied insulation is removed or damaged, replace with the same quality of material and workmanship.

3.3 SCHEDULES

A. Pipe, Fittings and Valves:
   1. Fiberglass.

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<th>PIPE SIZE</th>
<th>THICKNESS</th>
<th>JACKET</th>
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<td>Personnel protection insulation @ LPA/HPA piping</td>
<td>Over 1-1/2 IN</td>
<td>2 IN</td>
<td>PVC</td>
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END OF SECTION
SECTION 46 51 38
BIOLOGICAL TREATMENT FACILITY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes an extended aeration activated sludge treatment plant and all controls and electrical panels.

B. PBTF: Packaged biological Treatment Facility.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   3. Underwriters Laboratories Inc. (UL).
   5. The National Electrical Code.

1.3 SYSTEM DESCRIPTION

A. This work includes providing and installing all operating equipment and special materials complete with accessories and appurtenances required for a complete extended aeration activated sludge treatment system designed to achieve nitrification and denitrification reliably and consistently. The principal items of the system include:
   1. Aeration system (including blowers).
   2. Air distribution system.
   3. Anaerobic zone (optional).
   4. Cyclic aeration for pre- and post-nitrification.
   5. Means for loading anoxic zone with nitrified mixed liquor.
   6. Clarifier equipment.
   7. Scum control system.
   8. Clarifier sludge collector mechanism.
   9. Return sludge and waste activated sludge system.
  10. Sludge digester tank supernatant return.
  11. Access bridges and stairways.
  12. Walkways.
  13. High and low pressure air supply systems, including VFD's for each low pressure blower.
  15. Local control panel with dissolved oxygen (DO) control system for aeration system.
  16. Processing of other plant status and alarm points as indicated.
  17. Data link to plant computer including all hardware and software to allow this windows based computer to read treatment facility operator interface screens and data.
  18. Compressed air supply system as required.

B. The package plant shall include two (2) parallel trains; each train shall be able to operate independently. Each of the basins shall be able to independently perform nitrification and denitrification.

C. The package plant shall be designed and constructed in modular arrangement so that future expansion can be done by adding additional independent treatment trains.
1.4 DESIGN CRITERIA

A. All components supplied shall conform to the size requirements as set forth in the Drawings, to the requirements included in other referenced sections of this specification, and to the following design criteria specified herein.

B. The extended aeration activated sludge plant shall be designed based on the following site and raw wastewater characteristics:

- Annual Dry Weather Flow (ADWF): 0.80 mgd
- Peak Design Hydraulic Flow: 4.9 mgd
- Influent Ammonia Maximum Load: 500 lbs/day
- Influent BOD₅ Maximum Load: 3,560 lbs/day
- Influent TSS Maximum Load: 2,800 lbs/day
- Wastewater temperature: 9 DegC, minimum

C. Effluent quality shall meet the following requirements:

- Effluent BOD₅: 30 mg/l, monthly average
- Effluent Suspended Solids: 30 mg/l, monthly average
- Effluent NH₃-N: 2 mg/l monthly average
- Effluent total inorganic Nitrogen (TIN): 8 mg/l monthly average

D. Process Characteristics:

- Design MLSS: 3,500 mg/l, approximate
- Design system SRT: 14 day aerobic, minimum
- Aeration Basin tankage required: 1,000,000 gallons, minimum
- Alpha (fine bubble): 0.45, maximum
- Alpha (coarse bubble): 0.70, maximum
- Oxygen transfer capacity (with largest aeration unit out of service), minimum
- Secondary clarifier side water depth: 16 FT, minimum
- Secondary clarifier side water overflow rate: 1,000 gpd/sf, (maximum) at peak flow
- Waste Activated Sludge (WAS) storage period: 30 days, minimum
- Waste Activated Sludge (WAS) storage aeration: 25 mg/L/hr, minimum
- Waste Activated sludge (WAS) storage volume: 400,000 gallons (minimum)
- Dewatering feed sludge concentration: 1-2 percent, allow nominal decant (does not apply for AeroMod process)

E. Operations Requirements (one of two trains):

- RAS rate: 2.2 MGD, minimum firm capacity
- Dissolved Oxygen at Peak Flow: 0.5 - 2 mg/l
- Secondary clarifier side water depth: 16 FT, minimum
- Secondary clarifier surface overflow rate: 1,000 gpd/sf, (maximum) at peak flow
- Waste Activated Sludge (WAS) storage period: 30 days, minimum
- Waste Activated Sludge (WAS) storage aeration: 25 mg/L/hr, minimum
- Waste Activated sludge (WAS) storage volume: 400,000 gallons (minimum)
- Dewatering feed sludge concentration: 1-2 percent, allow nominal decant (does not apply for AeroMod process)

F. The treatment plant shall be designed to fit within the space limitations of approximately 170 FT by 130 FT.

G. The treatment plant shall be designed to fit within the hydraulic profile shown on the plans.

1.5 QUALIFICATIONS

A. The equipment furnished shall be as manufactured by the two listed in 2.1, or equal as detailed in pre-bid submittal requirements.

B. The Contractor shall prepare his bid on the basis of the specific design criteria, specified for purposes of determining the low bid.
C. The manufacturer of specified equipment must have a minimum of ten (10) years’ active experience in the design and manufacture of similar wastewater treatment equipment, and upon request, furnish supporting evidence.
   1. Manufacturer required to have a minimum of two (2) similar installations in California.

D. Consideration will be given only to products of manufacturers who can demonstrate that their treatment plant fully complies with all performance and design requirements. The equipment shall be supplied by a firm which has been regularly engaged in the design, fabrication, assembly, testing, start-up and service of full scale treatment systems, of the same model and size as proposed, with similar characteristics, and upon request, furnishing list with minimum of ten (10) similar installations.

1.6 SUBMITTALS

A. Shop Drawings:
   1. See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Complete description of the equipment, system, process, or function, including a list of system components and features, drawings, catalog information and cuts, Manufacturer’s specifications, including materials description.
      b. Performance data and curves, and horsepower requirements.
      c. Outside utility requirements, such as water, power, air, etc.
      d. Functional description of any internal instrumentation and control supplied including list of parameters monitored, controlled, or alarmed.
      e. Addresses and phone numbers of nearest service centers and a listing of the Manufacturers or Manufacturer’s representatives services available at these locations, including addresses and phone numbers of the nearest parts warehouses capable of providing full parts replacement and/or repair services.
      f. A list of ten (10) installations where similar equipment by the Manufacturer is currently in similar service; include contact name, telephone number, and mailing address.
      g. Detailed information on site, architectural, structural, mechanical, plumbing, electrical, and control, and all other changes or modifications to the design and construction work necessary to adapt the equipment or systems to the arrangement shown and/or functions described on the Drawings and in the technical specifications. This shall include plan view and section illustrating any additional space requirements necessary to provide the minimum adequate clear space within and around the equipment for operation and maintenance, as shown on the Drawings and specified.
      h. All differences and exceptions between the specifications and the proposed substitute equipment shall be clearly stated in writing under a heading of “Exceptions”.
      i. Performance criteria statement:
         1) On Manufacturer’s letterhead.
         2) Signed by officer of the company.
         3) Restate specified design and operating parameters in 1.4 of this section and equipment ability to meet same.
         4) Provide process modeling results from BioWin (or equal) demonstrating that performance requirements can be met over the full calendar year.
      j. Other specific submittal requirements listed in the detailed equipment and material specifications.
      k. Seismic design requirements per Section 01 81 10.
   l. Complete information on coatings to be used and surface preparation methods.
   m. Complete drawings, material lists and wiring diagrams for electrical and control panels.
   n. Details on data connection to plant computer for display of screens.
   o. Complete details on treatment unit pre-wiring.
B. Substitution Submittals:
   1. Any manufacturer not named in these specifications who wants to bid shall submit a minimum of three (3) copies of data to the engineer not later than 14 days prior to the bid date. Any manufacturer determined by the Engineer to meet the requirements listed in these specifications, will be listed by addendum prior to the bid date. Submission of inadequate information will be cause for rejection.
   2. Each set of data shall include all information in 1.6 A. to enable the Engineer to determine whether the proposed equipment meets the specified requirements.

C. Operation and Maintenance Manuals:
   1. See Section 01 33 04 for requirement for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.
         1) Requirements for routine maintenance required prior to plant start-up.
         2) List of special tools required for checking, testing, parts replacement, and maintenance (special tools are those that have been specially designed or adapted for use on parts of the equipment and that are not routinely carried by maintenance mechanics).
         3) List of special tools furnished with the equipment.
         4) List of maintenance materials required for the equipment prior to and during operation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers and their systems are acceptable:
   1. AeroMod, Manhattan, Kansas.
   3. Or approved equal.

B. The layout of the equipment on the Contract Drawings is based on AeroMod equipment. Any deviations from this layout (including any additional equipment or appurtenances) is the sole responsibility of the Contractor. The Contractor must submit complete drawings, structural calculations and other information detailing all changes to the Contract Drawings.

2.2 COMPONENTS AND DESIGN REQUIREMENTS

A. Anaerobic Chamber (Optional):
   1. If an anaerobic zone is to be provided, the tank shall have mixing provided. Wastewater shall be introduced into the tank from the flow split box, from the return activated sludge airlift from the clarifier, and from a recycle system located in the aeration tank.
   2. The anaerobic zone shall feed the anoxic tank by means of an adjustable flat weir, to maintain the same weir setting as that of the clarifier outlet trough.
   3. The anaerobic zone shall have mixing to assist in suspension of solids. The mixing shall operate continuously.
   4. All piping, valves, and gates under the water and/or within 12 IN above the water in the anaerobic chambers shall be fabricated of stainless steel, PVC, or fiberglass.
   5. Monitoring devices for suspended solids (HACH Solitax ts-line sc suspended solids analyzer, or equal) and pH (HACH pHD sc series pH digital sensor, or equal) measurement shall be provided.

B. Anoxic Chamber:
   1. Anoxic Volume:
a. Provide sufficient anoxic volume to denitrify the wastewater. Any proven method for achieving denitrification will be acceptable. The Manufacturer shall provide technical justification for the method to be used. This justification shall include, at a minimum, references from five (5) facilities that have been in operation for a minimum of five (5) years using the method. The justification shall also include process modeling using BioWin to demonstrate technical viability under specified worst-case operating conditions.

b. All piping, valves and fittings 12 IN below the normal water surface elevation and higher shall be stainless steel. Piping, valves and fittings below this level shall be stainless steel, PVC or fiberglass.

c. Tank isolation gates, such as slide and sluice gates, shall be fabricated of stainless steel or fiberglass.

d. All piping, valves, and gates under the water and/or within 12 IN above the water in the anoxic chambers shall be fabricated of stainless steel, PVC, or fiberglass.

e. Monitoring devices for dissolved oxygen measurement (HACH 5790000 LDO probe, or equal) shall be provided

C. Aeration System:

1. The aeration system shall be designed to provide oxygen distribution to the entire basin. It shall also ensure mixing to promote biological suspension of all solids in the basin. The velocity and mixing in the basin shall be sufficient to ensure complete biological solids suspension and dispersion.

2. The aeration system for the aeration basins shall be capable of providing mixing such that when operated under any combination of design conditions in this specification, it shall suspend all biological floc and mixed liquor suspended solids throughout the liquid mass in each basin. The system shall further be capable of maintaining complete aerobic conditions with minimum dissolved oxygen (DO) concentration of 2mg/L, and suspension of all biological floc and suspended solids throughout the liquid mass in each basin.

3. Tanks requiring fine bubble aeration shall use fine bubble diffusers of a perforated flexible membrane type (EPDM or equal).

4. Tanks requiring coarse bubble aeration shall use coarse bubble diffusers fabricated of Type 304 or 316 stainless steel. The diffusers shall be of a non-clog multi-vent design.

5. Oxygen transfer efficiency shall be guaranteed and substantiated by submission of test data compiled by a nationally recognized independent testing laboratory.

6. The air distribution system shall consist of the main air header, diffuser drop pipes, and diffuser assembly. The air header shall be mounted on a tank wall and shall be supported adequately from the wall, including properly restraining the header from vibration and providing strain relief for minor expansion/contraction. Diffuser drop pipe assemblies shall connect to the air header such that they are easily accessible for removal. The air header shall be fabricated of 304L stainless steel or schedule 40 PVC. The main air header shall be designed to minimize head loss and provide an even distribution of air to all compartments.

7. Each diffuser drop pipe assembly shall consist of a union to allow ease of removal; a lever operated valve accessible from the walkway for shut off and regulation of air flow, and the necessary pipe and fittings. The submersible portion of the drop pipe assembly shall be removable for inspection or service by one person without the aid of a mechanical hoist.

8. A diffuser header shall be provided to attach to the bottom of the drop pipe assembly. The diffuser headers shall be fabricated with a sufficient number of outlet connections to receive the air diffusers specified and in quantity as required for proper plant operation. The bracket support system shall be designed for ease in removal and installation of the diffuser assembly without draining the aeration tanks. The diffuser bracket shall automatically position and hold the drop pipe assembly in place.

9. The fine bubble diffuser unit shall be fully capable of operating under continuous or intermittent conditions and shall be designed with check valves to prevent entry of mixed liquor into the diffuser unit or air piping on air shutdown or interruption of air supply.
10. All piping, fittings and valves 12 IN below the normal liquid level and above shall be stainless steel. Piping, fittings and valves 12 IN below the normal liquid level and lower may be stainless steel, PVC or fiberglass. Isolation gates and other control devices may be stainless steel, PVC or fiberglass and shall be designed for the maximum hydrostatic condition.

11. Monitoring devices for dissolved oxygen measurement (HACH 5790000 LDO, InsiteIG Model 10, or equal) shall be provided.

D. Low Pressure Air Supply System:
1. Air supply blower units shall be furnished and installed at the location shown on the Drawings. All units shall be completely factory assembled and tested before shipping to the project site.
2. Blower units shall be furnished for supplying the air requirements of the entire package treatment system. The blower set shall be designed to meet the specified oxygen transfer requirements with the largest blower out of service. The system shall be designed such that any combination of blowers can operate in parallel.
3. Each blower shall be mounted on a self-contained base. The base structure shall be adequately reinforced to support the blower and motor unit.
4. The blowers shall include sound enclosures (factory installed) that allow access to the blowers from the front of the blower.
5. The blower discharge shall be fitted with a check valve, isolation valve and a flexible rubber discharge coupling.
6. To help reduce blower vibration and noise, the blower base shall be mounted on vibration dampeners. For purposes of determining the blower performance, and/or diffuser condition, a pressure relief valve and pressure gauge shall be mounted in the air discharge manifold.
7. An inlet filter/silencer shall be installed on the inlet end of the blower.
8. A discharge silencer shall be installed on the discharge end of the blower.
9. Blowers shall operate on 480V, 3 phase supply.
10. Blower package shall include a 480 volt, 3 phase, 6 pulse VFD for each blower for wall or floor mounting.
   a. VFD shall include power supply for any fans within the blower housing.
   b. VFD shall communicate with the system local control panel with a data link such as Ethernet/IP.

E. High Pressure Air Supply System:
1. If high pressure air is needed furnish and install a system consisting of dual compressors, compressor controls including starter and disconnect, receiver, controls, dryer, low pressure alarm and pressure regulation.
2. Provide system with adequate capacity with 1 compressor operating.
3. Compressors shall operate on 120 volt, single phase supply.
4. Provide local control panel or panels set up for a single 120 volt power feeder to each.

F. Clarifiers:
1. The clarifier shall be designed to meet the following requirements:
   a. For rectangular concrete basin with minimum side water depth of 16 FT and mixed liquor distribution points at multiple locations across the length and width of the clarifier, the surface over flow rate shall not be greater than 1,000 gpd/sf at peak flow.
   b. For circular steel tank with minimum side water depth of 16 FT, the surface over flow rate shall not be greater than 400 gpd/sf at peak flow.
2. The clarifier shall consist of a clarifier influent assembly, sludge collector mechanism, effluent launderer and scum removal system.
3. The clarifier influent piping shall be designed to prevent settling out of solids.
4. The sludge collector mechanism shall consist of all mechanical equipment required for operation.
G. Internal Mixed Liquor Recycle ((IMLR) System (if used for process):
1. The recycle pump shall be mounted in the aeration tank, on slide rails for maintenance or an air lift shall be used. The return shall be a minimum of 200 percent of the system design flow back to the anaerobic or anoxic zone. It shall be hard piped with diversion valving back into the aeration tank to allow adjustment of the return from above the tank. The recycle discharge piping shall be below the normal water level in the anaerobic zone to reduce splashing and turbulence. The MLE recycle shall operate continuously.

H. Return and Waste Sludge System:
1. The return/waste sludge system shall have a capacity ranging from 0 percent to 100 percent of the design flow. If airlift pumps are used, the airlift pump shall be firmly supported and designed for easy operation and maintenance.

I. Scum Recirculation System:
1. The clarifiers shall have scum collection systems. The scum collection system shall be designed to collect the floating material from the surface of the clarified liquid and shall be accessible from the bridge.

J. Aerobic Sludge Digester:
1. An aerated digester tank shall be provided as specified and shown on the plans. It shall be designed to hold sludge for a minimum of 30 days with a minimum volume of 400,000 gallons.
2. Diffused air shall be supplied by the plant blower system sufficiently to aerate the sludge digester tank.
3. Equipment shall be provided for the purpose of decanting supernatant from the sludge digester tank.
4. All piping, fittings and valves 12 IN above the maximum liquid level and above shall be stainless steel. Piping, fittings and valves 12 IN below the maximum liquid level and lower may be stainless steel, PVC or fiberglass. Isolation gates and other control devices may be stainless steel, PVC or fiberglass and shall be designed for the maximum hydrostatic condition.

K. Instrumentation and Control:
1. All instrumentation and controls for the units shall be incorporated into a single local control panel.

L. Local Control Panel:
1. Local control panel will be mounted indoors (NEMA 4/12). Panel may be free standing or wall mounted. Panel shall comply with Specification Section 40 98 00.
2. Provide panel with all controls, solenoid valves, power supplies and other appurtenances needed for control of both treatment units.
3. Set up for single 120 volt, 1 phase, 60 Hz feeder with main circuit breaker disconnect and external operating handle.
4. Provide on-off and speed controls for each blower with a dissolved oxygen aeration control system that can turn on and off blowers as well as regulate the output of the blower(s) for efficient aeration.
5. Each blower to have local control panel which includes disconnect, fan power supply and all controls appurtenances for that blower.
6. Communications to plant computer.
   a. Provide port in the LCP for an Ethernet data link to the existing plant computer in the Administration Building for viewing access to the HMI data and screens from the plant computer.
   b. City will provide a spare USB port in the plant computer. Manufacturer shall install a USB to Ethernet adapter in this port for the network.
   c. Provide all configuration and any hardware necessary for viewing access to the LCP HMI. Provide and install viewing software in the plant computer.
7. Treatment unit PLC shall be Allen Bradley Compact Logix with Ethernet switch connected to PLC with spare port or a spare Ethernet port on PLC. Operator interface for use with PLC shall be Panelview Plus 1250 or equal Operator Touch Terminal.

8. Monitor all treatment unit data including low air pressure alarms for high and low pressure systems, low pressure air pressure and alarm on loss of pressure.

9. Provide for input of treatment unit raw sewage flow signal, 4-20 ma, from FIT-101. Flow meter is furnished by plant control integrator.

10. The following plant input points shall be processed by the treatment plant PLC and displayed on HMI graphic screens in addition to those needed by the treatment process.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ATS, Utility Source</td>
<td>DI</td>
<td>Change of Status</td>
</tr>
<tr>
<td>b. ATS, generator Source</td>
<td>DI</td>
<td>Change of Status</td>
</tr>
<tr>
<td>c. Generator, Run</td>
<td>DI</td>
<td>Change of Status</td>
</tr>
<tr>
<td>d. Generator, Auto</td>
<td>DI</td>
<td>Change of Status</td>
</tr>
<tr>
<td>e. Generator, Fail</td>
<td>DI</td>
<td>Alarm</td>
</tr>
<tr>
<td>f. Generator, Fuel Low</td>
<td>DI</td>
<td>Alarm</td>
</tr>
<tr>
<td>g. Generator, Fuel Leak</td>
<td>DI</td>
<td>Alarm</td>
</tr>
<tr>
<td>h. Stormwater P.S., Auto</td>
<td>DI</td>
<td>Change of Status</td>
</tr>
<tr>
<td>i. Stormwater P.S., Fail</td>
<td>DI</td>
<td>Alarm</td>
</tr>
<tr>
<td>j. Influent P.S., Auto</td>
<td>DI</td>
<td>Change of Status</td>
</tr>
<tr>
<td>k. Influent P.S., Fail</td>
<td>DI</td>
<td>Alarm</td>
</tr>
<tr>
<td>l. Shower, Activated</td>
<td>DI</td>
<td>Alarm</td>
</tr>
<tr>
<td>m. Treatment unit Influent, FE/FIT101, Flow</td>
<td>AI</td>
<td>Analog Flow</td>
</tr>
<tr>
<td>n. Main diesel fuel tank, low level</td>
<td>DI</td>
<td>Alarm</td>
</tr>
<tr>
<td>o. Stormwater PS, wetwell level</td>
<td>AI</td>
<td>Analog Level</td>
</tr>
<tr>
<td>p. Influent PS, wetwell level</td>
<td>AI</td>
<td>Analog Level</td>
</tr>
<tr>
<td>q. Sludge feed, Flow</td>
<td>AI</td>
<td>Analog Flow</td>
</tr>
<tr>
<td>r. Dewatering system, Run</td>
<td>DI</td>
<td>Change of Status</td>
</tr>
<tr>
<td>s. Dewatering system, General Alarm</td>
<td>DI</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

M. Biological treatment facility Process Control:

1. Furnish a completely automatic control system for unattended biological treatment facility operation once control parameters are preset by operator. The system shall be capable of controlling and monitoring the plant functions and activities including but not limited to:
   a. Low pressure aeration (NDN).
   b. Solids wasting (WAS).
   c. Solids return (RAS).

2. Process control valves shall be pneumatically actuated for automatic operation. Electric motor drives shall be automatically started and stopped as needed for process control.

2.3 ACCESSORIES

A. Access Walkway/Stairway:

1. Walkways shall be provided for access to and maintenance of the clarifier weir and all air diffuser drop pipes and regulating valves. Additional walkways shall be provided in locations as shown on the Drawings or as needed to service the equipment.

2. The access walkway shall be made of fiberglass or aluminum. The walkway shall extend across the tanks as shown on the Drawings.

3. Access to the walkway shall be provided by a 45 degree stairway as located on the Drawings. Access stairway shall be provided with steel or aluminum pipe handrails. The steps shall be fabricated of fiberglass grating or aluminum checker plate.

4. The walkway shall have grating and shall be designed to withstand a uniform live load of 75 pounds per square foot plus the dead load of the structure.

5. All walkways and stairways shall be provided with handrails and guardrails. Handrails and guardrails shall be fabricated of aluminum.
2.4 CORROSION PROTECTION

A. All steel surfaces shall be prepared and coated per Section 09 91 00.
   1. Coat as “highly corrosive” environment.
B. Stainless steel, aluminum and other corrosion-resistant surfaces equipment with factory applied coatings shall not be coated.
C. Furnish 1 gallon of each type coating and primer used for field touch up.

2.5 MATERIALS AND FABRICATION REQUIREMENTS (STEEL ALTERNATIVE)

A. All steel bulkheads designated as hydrostatic on the plans and the inner circular wall shall be designed to withstand full hydrostatic forces from either side of the bulkhead or wall. The design of all walls shall be such that any isolated compartment may be individually dewatered. The minimum thickness shall be 1/4 IN ASTM A36 carbon steel for all plates and structural shapes.
   1. No carbon steel shall be in contact with soil or buried.
   2. Any steel in contact with soil or buried to be 316 stainless steel and designed to withstand lateral loads.
B. Bulkheads shall be reinforced and designed as fixed connections at the inner and outer walls. All bulkheads and walls shall have reinforcing structural members at the top of the section. These members will be designed to maintain the required shape of the item while under any combination of load applications that could be encountered under actual field conditions.
C. The circular clarifier wall shall be designed per AISC with reinforcing calculated on the basis of a free standing tank under internal or external pressure. Since future modifications or relocation of the unit could result in the deletion of bulkheads, any method of design other than a freestanding tank will not be accepted. The full wall height shall be developed utilizing no more than two vertical steel sheets to assure the ease of field installation and to avoid aesthetically any extra weld seams.
D. All shop welds shall have burrs, spatter, etc. removed prior to blasting. No skip welding is allowed.
E. All reinforcing on the bulkheads and circular walls shall be gusseted to develop the full strength of the reinforcing.
F. The outer circular steel wall shall be of a minimum thickness of 1/4 IN and designed to withstand a full hydrostatic internal loading causing a hoop stress of less than 24,000 psig with a weld efficiency of 75 percent.
G. The method used in initially fill the plant with liquid may be selected by the Engineer to test the hydrostatic design. Any failure or excessive deflection shall be remedied and all costs shall be borne by the manufacturer.”

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation and Operating Instructions:
   1. The equipment manufacturer shall provide detailed operating and installation instructions. Each set of manuals shall be prepared specifically for the type of equipment delivered, and all operating instructions shall refer only to that particular equipment.
   2. The equipment manufacturer shall provide the services of a factory-trained representative as specified in Section 3.3. The manufacturer's representative performing this service shall be a direct employee of the equipment manufacturer, normally engaged in this type of service work.
   3. List of recommended spare parts.
4. Requirements for storage and protection prior to installation.
5. Detailed plans for the Field Performance Tests, that shall satisfy the requirements specified herein.

B. Field Erection:
1. Manufacturers providing a package stainless steel plant shall erect the plant, including the items listed below. This requirement shall not apply to manufacturers supplying fabricated stainless steel plant components to be installed within concrete tanks.
   a. Erection of steel tank treatment plant shall include the following:
      1) Complete field erection and painting of steel structures.
      2) Unloading of treatment plant equipment.
      3) All standard on-plant items installed, including bridge and walkway, sludge collector mechanism and clarifier skimming system.
   b. Erection of steel tank treatment plant shall not include the following:
      1) Excavation, any concrete or grout work, including grout forming the bottom of the digester, backfilling or grading, electrical wiring or installation of conduit, installation of power pole or main disconnect switch, or installation of remote disconnect switches of any type in any location.
      2) Installation of blowers, motors, controls and appurtenances.
      3) Installation of any furnished equipment which is not mounted on, or part of, the treatment plant structure.
      4) Leveling of clarifier effluent weir plate.

C. Steel tanks and equipment anchoring shall conform to the seismic requirements of Section 01 81 10.

3.2 FIELD QUALITY CONTROL

A. Manufacture’s Field Services:
   1. Provide services of supplier’s field representative.
   2. Supplier’s representative to check out equipment, assists in start-up, demonstrate its operation and train Owner’s personnel, and submit a certification of proper installation and satisfactory operation.

3.3 PLANT START-UP AND TRAINING

A. The manufacturer shall provide the services of one or more factory-trained field representative(s) as follows:
   1. A total of four (4) site visits, as further described below.
   2. One site visit following installation of the equipment to inspect the installation, test equipment operation and identify any necessary corrections ("dry inspection").
   3. One site visit following filling of the tanks with water and completion of leak testing to inspect the installation and provide initial functional testing ("wet inspection").
   4. One site visit during implementation of the start-up plan for the assist in start-up, to provide final functional testing and to provide initial training of plant staff.
   5. One site visit following approximately one month of operation, to review operating procedures and provide additional on-site training of the operators.
   6. The total time on site for all site visits, combined, shall not be required to exceed ten (10) person-days. This time is exclusive of travel time.

B. The Contractor shall notify the Manufacturer a minimum of twenty working days prior to the time that the field services are desired. The Contractor shall confirm that the plant is ready for the relevant site visit as described above.

C. If the Manufacturer's field representative determines that the plant is not ready for the services to be provided during any trip described above the, the field representative will terminate the trip and request the Contractor to reschedule when the necessary preparations are complete. The Manufacturer shall be compensated by the Contractor for any such repeat trips at the Manufacturer's prevailing field service rate (including time and travel expenses).
D. Upon completion of each site visit, the manufacturer shall provide a written report of findings and identifying any corrections or adjustments that are required for the PBTF.

E. Following approximately three (3) months of operation of the PBTF by the plant staff, the manufacturer shall provide two (2) days of operator training at the manufacturer's home office for up to three (3) operators. All travel expenses and lodging shall be provided by the manufacturer.

3.4 WARRANTY

A. The package biological treatment facility manufacturer shall design and provide the Facility such that after completion of installation, the Facility has the capacity to treat the influent specified in 1.4 B of this section and to produce Effluent meeting the Effluent Specification in 1.4 C of this section.

1. Manufacturer shall provide written process and equipment warranty signed by authorized person representing manufacturer. Example warranty is attached to this specification section as Appendix “A”.

B. Process Warranty:

1. The Biological Treatment Facility manufacturer ("Manufacturer") shall warrant the process for a period of twelve (12 months from the date the process is placed into service.

2. This warranty shall state that the process will meet the performance requirements specified in 1.4 C of this section subject to the flow and load parameters specified in 1.4 B of this section. This warranty shall be based on the system being operated and maintained in accordance with guidelines and requirements as defined by the Manufacturer in training and O&M Manuals.

3. In the event that the Owner is unable to achieve the performance objectives the Manufacturer shall have the right to take over operation and maintenance of the Biological Treatment Facility for a period not to exceed ninety (90) days. The Owner shall make all reasonable accommodations and efforts to assist the Manufacturer during this period.

4. If the Manufacturer brings the plant into compliance with the performance objectives then the Owner shall reimburse the Manufacturer for all costs (not to exceed $30,000) incurred by the Manufacturer for operation and maintenance of the biological Treatment Facility during the Manufacturer's operating period. If the Manufacturer fails to bring the plant into compliance with the performance objectives during this period then all payments made by the Owner to the Manufacturer shall be returned to the Owner. These payments shall be the invoice price from the Manufacturer and shall not include installation costs or any other indirect costs.

C. Equipment Warranty:

1. The Manufacturer shall warrant the equipment supplied by the Manufacturer against all defects in materials and workmanship for a period of eighteen (18) months from the date of delivery or twelve (12) months from the date the equipment is placed into service, whichever occurs first.

2. In the event a component fails to perform as specified or is proven defective in service during the warranty period, excluding items of supply normally expended during operation, the Manufacturer shall provide a replacement component without cost to the Owner.

3. Warranties and guarantees by the suppliers of various components in lieu of a single source responsibility by the Manufacturer shall not be accepted. The Manufacturer shall be solely responsible for the warranty of the equipment.

D. The Manufacturer shall maintain the insurance coverages such as are normal and appropriate for providing the goods and services described in this section. Specific required coverages are listed in the Supplementary Conditions.

END OF SECTION
APPENDIX “A”

PROCESS & EQUIPMENT WARRANTY

For

City of Fort Bragg

__________ __, 20__

PROCESS WARRANTY

________________ guarantees the process performance of the above-named wastewater and absolves the contractor and engineer from any warranty issues regarding the treatment plant subject to the following conditions:

1) This guarantee applies solely to ______________ supplied equipment.

2) This guarantee applies after ______________ has certified that the plant has been started up and commissioned and is operating as intended through the required 30 day demonstration period.

<table>
<thead>
<tr>
<th>Influent Wastewater Quality</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Dry Weather Flow (ADWF)</td>
<td>0.80 mgd</td>
</tr>
<tr>
<td>Peak Design Hydraulic Flow</td>
<td>4.9 mgd</td>
</tr>
<tr>
<td>Influent Ammonia Maximum Load</td>
<td>500 lbs/day</td>
</tr>
<tr>
<td>Influent BOD5 Maximum Load</td>
<td>3,560 lbs/day</td>
</tr>
<tr>
<td>Influent TSS Maximum Load</td>
<td>2,800 lbs/day</td>
</tr>
<tr>
<td>Wastewater Temperature</td>
<td>9 DegC, minimum</td>
</tr>
</tbody>
</table>

3) Influent wastewater characteristics shall be as given in the table “Influent Wastewater Quality.”

4) The plant shall be operated and maintained in strict accordance with the operating and maintenance guidelines and instructions provided by ______________. Specific operating requirements include, but are not limited to, the following (additional operating instructions will be provided in written O&M Procedures that ______________ will supply to operating staff as well as in training that ______________ will provide in accordance with the Scope of Services):

   a. Solids Retention Time (SRT) greater than or equal to 15 days.
   b. All tankage in service and operating with the design flow distribution.
5) No toxic materials shall be present in the influent wastewater in concentrations sufficient to be harmful to the healthy production of bacterial growth.

6) Electrical power shall be continuously available and all required equipment shall be available for service.

7) All sampling on which this guarantee is based shall be conducted in accordance with best practices of the industry. All wastewater analyses on which this guarantee is based shall be conducted in accordance with the latest edition of Standard Methods for the Analysis of Water and Wastewater.

8) When operated in accordance with the above conditions, ______________ guarantees that the ____________ effluent quality will be as given in the table “Guaranteed ____________ Effluent Quality.”

<table>
<thead>
<tr>
<th>Guaranteed __________ Effluent Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>Effluent BOD5</td>
</tr>
<tr>
<td>Effluent suspended Solids</td>
</tr>
<tr>
<td>Effluent NH3-N</td>
</tr>
<tr>
<td>Effluent total in organic Nitrogen (TIN)</td>
</tr>
</tbody>
</table>

In the event that the foregoing conditions are met and the plant does not produce the guaranteed effluent quality, ______________ reserves the right to take over operation of the plant, for a period not to exceed ninety (90) calendar days, in order to bring the plant into compliance with the guaranteed effluent quality. ______________ may, at its sole discretion, perform this operation with its own staff or by employing an independent wastewater treatment plant operator. The staff that ______________ provides shall have complete access to all plant facilities and full rights to take over its operation.

In the event that ______________ is able to bring the plant into compliance with the guaranteed effluent limits through operational and maintenance actions only, then the Owner shall pay all costs up to $30,000 incurred by ______________ for this operation. These costs may include, but are not necessarily limited to, travel, living expenses, analytical services and equipment rental.

In the event that ______________ is unable to bring the plant into compliance with the guaranteed effluent limits through its operation and maintenance efforts described above, and further that the Owner and ______________ agree that the fault lies with ____________ supplied process and/or equipment components, then ______________ will take all necessary steps to determine and provide necessary physical modifications to the facilities. These steps may include, but are not necessarily limited to, retaining consulting engineering services, purchasing and installing equipment and making structural modifications to the facilities. The total investment that the Owner may require
from _________________ for such modifications shall not exceed 150% of the equipment purchase order value.

**EQUIPMENT WARRANTY**

_______________ shall warrant all equipment in the Packaged Biological Treatment Facility to be free from defects in material and/or workmanship for a period of eighteen (18) months from the date of delivery or twelve (12) months from the date the equipment is placed into service, whichever occurs first. The blowers have a 2 year warranty from start-up. All electrical components have a 1 year warranty from date of start-up.

Signed _______________________________  Title ________________________
SECTION 46 76 21
BELT FILTER PRESS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. A skid mounted belt filter press package, including belt filter press, polymer feed system, sludge feed pump, screw conveyors, washwater booster pump, if required, ancillary equipment, control/power panel and accessories necessary for supplying a complete and operable dewatering system.

1.2 QUALITY ASSURANCE
A. Referenced Standards:
   1. Anti-Friction Bearing Manufacturers Association (AFBMA).
   3. ASTM International (ASTM):
      a. A36, Steel, Sheet, Carbon, Cold-Rolled Commercial Quality.
   4. Steel Structures Painting Council (SSPC):
      a. SP-10, Near-White Blast Cleaning.

B. Miscellaneous:
   1. Layout of belt filter press is a generic arrangement only to show general location and orientation in the Dewatering Building. The contractor/manufacturer shall provide complete design and anchorage details and dimensions as required to install their equipment in the space shown. Some Supplier's belt filter press systems require alternative layouts of auxiliary systems such as polymer, feed pump and sludge cake conveying to that shown on the Drawings which bidders must consider in preparing a bid. Suppliers whose equipment varies from the arrangement shown on the Drawings shall make these variations known to bidders so bidders may prepare an accurate bid.
   2. Press manufacturer shall have single source responsibility for coordination of all variable speed drive units utilized with press motors.
   3. Belt press manufacturer shall coordinate all components of booster wash water system to assure completely functional wash system is provided.
   4. Belt press manufacturer is to coordinate all components of the polymer make up and metering system to insure it is properly sized and controls are integrated.
   5. Coordinate placement of manually operated equipment and appurtenances to locations easily accessible to operator following installation of all systems and equipment included in this Contract. Manually operated equipment and appurtenances include but are not limited to valves, reservoirs, grease zerks and other lubricating devices, handwheels for wash tube assemblies, and electrical control devices.
   6. Provide belt press, ancillary equipment, control/power panel and accessories through single manufacturer.

1.3 SUBMITTALS
A. Shop Drawings:
   1. See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. See Section 01 61 03.
   3. Certification of compatibility of all variable speed drives with the drive motor.
4. Utility utilization rates and pressures.
5. Performance criteria statement:
   a. On manufacturer's letterhead.
   b. Signed by officer of the company.
   c. Restate specified operating parameters and equipment ability to meet same.
6. Technical data defining all components of the hydraulic system.
7. Certification of bearing life.
8. Belt fabric specifications including material type, seam closure design and weave.
   a. Include certification that belt material is completely compatible with Owner’s sludge.
9. Certified, delivered cost per pound for polymer(s) to be used in performance test.
11. Seismic design requirements per Section 01 61 03, Paragraph 1.5.

B. Operation and Maintenance Manuals:
   1. See Section 01 33 00 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

C. Samples:
   1. 1 SF of belt material.

1.4 PROJECT/SITE CONDITIONS

A. Feed sludge Characteristics:
   1. Waste activated sludge from an extended aeration activated sludge process.
   2. Solids content: 0.5 to 1.5 percent solids.
   3. Temperature: 20 - 25 DegC.
   4. Volatile solids: 75 - 90 percent.

1.5 WARRANTY

A. Belt press manufacturer to provide guarantee that supplied equipment will meet performance requirements listed in Subsection 2.3 A.

B. Damages from failure to meet performance requirements during specified performance testing are as follows:
   1. Sludge Feed Capacity: Modify or replace equipment including installation and modifications of facility and accessory equipment as needed at no additional cost to the Owner.
   2. Dewatered Solids Concentration:
      a. For each 0.1 percentage point less that minimum specified value of 15 percent: $2,500.
   3. Solids Capture
      a. For each 0.1 percentage point less that specified value: $900.
         b. If below 90 percent modify or replace equipment at no additional cost to the Owner.
   4. Belt Life:
      a. Belt life to be based on Owner’s actual experience with new belt replacement and determined from manufacturer installed ET meter.
         b. For each hour of belt life less than 2,500 hours without replacement: $2.00.

1.6 SYSTEM RESPONSIBILITY

A. All equipment specified in this section shall be designed and furnished by the equipment manufacturer who is also responsible for component compatibility and suitability to the application. Manufacturer shall be responsible to ensure that equipment performance requirements listed in Section 2.3 are equaled or exceeded.
PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
   1. Belt filter press package:
      a. BDP Industries.
      b. Andritz Group.
      c. Komline-Sanderson.
      e. Aero-Mod.
      f. Or approved equal.

2.2 MATERIALS

A. Belt Filter Press:
   2. Rollers:
      a. Drive rollers:
         1) Perforated: 316 stainless steel.
         2) Non-perforated: ASTM A36 steel.
         3) Coating: Rilsan nylon, Buna-N or chlorinated rubber.
      b. Other Rollers:
         1) Perforated: 316 stainless steel.
         2) Non-perforated: ASTM A36 steel.
         3) Coating: Thermo plastic nylon, Buna-N, or Teflon coating.
   3. Roller shafts:
      a. Drive rollers: 17 - 4 PH stainless steel.
      b. All others: 4140 HT.
   4. Plows and sludge mixing equipment: 316 stainless steel with high-density polyethylene blade.
   5. Gravity grid: High-density polyethylene.
   7. Scraper blades:
      a. High-density polyethylene or
      b. Laminated fiberglass.
      c. Springs: 316 stainless steel.
   8. Belt filter cloth: Combination of continuous weave monofilament polyester and 316 stainless steel material.
   9. Belt seam closures: Type 316 stainless steel.
   10. Spray headers and nozzles: Type 316 stainless steel.
   11. Spray headers housing: Type 316 stainless steel and high-density polyethylene.
   13. Drainage pans:
   14. Internal piping: Schedule 80 PVC.
   15. Miscellaneous hardware and anchor bolts: Type 316 stainless steel.
   16. Polymer injection ring:
      a. High-density polyethylene or
      b. PVC.
   17. Variable orifice mixer:
      a. 316 stainless steel.
22. Hydraulic cylinders:
   a. 316 stainless steel.
26. All other parts in contact with belt:
   a. Stainless steel or;
   b. Nylon-coated or;
   c. Rubber-coated steel.
27. Control/power panel: 304 stainless steel, NEMA 4X.

2.3 EQUIPMENT

A. Performance and Configuration Requirements.
   1. Belt filter press (BFP01):
      a. Capacity (dry weight solids): 400 LB/HR, minimum.
      b. Hydraulic capacity: 55 gpm per meter of belt, average; 80 gpm per meter of belt, maximum.
      c. Dewatered cake solids: 15 percent, minimum as defined by Method 2540B of Standard Methods.
      d. Solids capture rate: 95 percent, minimum, at discharge of gravity drainage section.
      e. Dimensional limitations: Approximately 24 FT long, 8 FT wide and as shown on Drawings.
      f. Layout configuration: As shown on Drawings.
      g. Minimum belt width shall be 1 meter.
   2. Flocculation tank, if needed:
      a. Shape: Vertical cylinder.
      b. Volume: 65 GAL.
   3. Liquid polymer makeup and metering unit shall be Stranco, Norchem Industries, or equal.
      a. The liquid make-up module shall be capable of mixing semi-dilute polymers up to 0.5 percent concentration.
         1) Materials.
            a) Mixing chamber: PVC, Buna-N, acrylic, stainless steel, Teflon, kynar, TFE.
            b) Turbine mixer: 316 stainless steel.
            c) Structural framework: 316 stainless steel.
            d) Piping: PVC Schedule 80, ASTM D1785; nylon; or 316 stainless steel.
            e) Valving: PVC.
         2) The liquid polymer injection and blending unit shall incorporate the following:
            a) Mixing/blending:
               (1) The liquid polymer makeup and metering unit shall be an integrated equipment module to automatically and precisely meter, dilute, activate, and feed liquid concentrate polymer and water. Unit shall minimize damage to the polymers long molecular chain but still provide sufficient mixing energy.
               (2) Mixing provided by variable speed, motor-driven impeller.
               (3) Mixing done within transparent chamber.
               (4) Mixing chamber dilution water rotometers:
                  (a) Integral rate adjusting valve.
                  (b) Direct reading indicator.
                  (c) Rotometer type flow meters with built-in low flow switch.
                  (d) Adjustable.
               (5) Mixing chamber shall be easily disassembled and reassembled to allow access to all parts exposed to neat polymer.
(6) Mixing impeller:
   (a) Motor to be direct-coupled to impeller shaft.
   (b) 3,450 RPM minimum.
   (c) Direct reading indicator.

(7) Mixer motor provided with a manually resettable thermal overload protector.

b. Emulsion polymer metering pump:
   1) Integral with unit, pre-piped, and pre-wired.
   2) Positive displacement, progressive cavity type.
   3) Pump shall deliver neat polymer from 55 gallon neat polymer drum to the mixing chamber.
      a) See Drawings for location of polymer drum.
      b) Supply water pressure: 60 psig.
      c) System discharge pressure: 40 psig.
      d) Socket welded piping with unions at valving and appurtenances.
      e) 120 VAC, 60 Hz, single phase.

c. Accessories
   1) Adapter for 55 gallon drum, Siemens Drum Stik or equal.
   2) Mixer with air dryer for 55 gallon drum.
      a) Siemens Drum-Stir Bayonet-Mount Drum Mixer or equal.
      b) Motor: Maximum 1/2 HP, TEFC, 1725 RPM, 115VAC, 1 phase, 60Hz.
      c) Shaft and Impeller: Type 304 stainless steel.
      d) Air dryer shall attach to mixer with ¾ IN NPT bushing. Siemens Air Dryer (Drum Dryer) or approved equal.

3) Provide Y-Strainer upstream of polymer pump.

4. Sludge feed pump:
   a. Pump type: Positive displacement progressing cavity shall be Seepex (Model 35-6L), Moyno, Netzch or approved equal.
   b. Design condition: 100 gpm at 50 psi and 300 rpm (maximum).
   c. Nameplate driver horsepower: 7.5 HP (maximum).
   d. Drive type: Variable frequency, constant torque.
   e. Drive configuration: Overhead “in-line” arrangement.
   f. Minimum solids passage: 0.86 IN.
   g. Suction 5 IN DIA minimum, discharge 4 IN DIA minimum.
   h. High stator temperature monitoring and shutdown.

5. Screw Conveyors:
   a. Equipment:
      1) One (1) “Shaftless Load-Out Screw Conveyor”.
         a) Trough to be 10 gauge type 304 stainless steel of 260 mm (10.25 IN) diameter.
         b) Spiral size shall be 233 mm (9 IN) diameter, 2 IN wide minimum and 3/4 IN thick minimum, approximately 24 FT - 3-1/4 IN long inclined at approximately 15 degrees.
         c) Conveyor shall have one (1) 12 IN x 15 IN flanged cake discharge opening for a 12 IN drop hose.
         d) Screw conveyor drive to be 3 HP, 460 volt, 3 phase, 1.15 SF, TEFC motor and V belt assembly. Maximum drive output shall be 15 rpm.
         e) Screw conveyor to have emergency shutdown switch with cord actuator and zero speed switch.
      2) One (1) 9 IN diameter by 3FT - 7 IN long “Discharge Cake Centering Conveyor”.
         a) Screw to have 6 IN pitch with flights 3/16 IN thick welded to 2 IN diameter schedule 40 pipe, construction type 304 stainless steel.
         b) Trough to be 6 IN diameter 10 gauge 304 stainless steel with one 10 IN x 10 IN square discharge opening in the center with flanged connection to the 9 IN diameter “Inclined Load-out Conveyor”.
         c) Screw conveyor drive to be 1 HP, 460 volt, 3 phase, 1.15 SF, TEFC motor with V belt assembly.
d) Screw conveyor to have emergency shutdown switch with cord actuator and zero speed switch.

6. Washwater Booster Pump:
   a. Pump type: Horizontal end suction centrifugal.
   b. Number of units: 1.
   c. Drive type: Constant speed.
   d. Suction: 2 IN.
   e. Discharge: 1 IN.
   f. Design condition: 42 gpm at 120 psi.
   g. Pump/drive configuration: Horizontal close-coupled.
   h. Motor: 7.5 HP, 460 volt, 3 phase TEFC, 1.15 SF, minimum.
   i. Pump shall be Model 3656 S Group as manufactured by Goulds Pump Company or equal.

7. Skid Assembly:
   a. Skid assembly is to be provided with all the equipment mounted on the skid and interconnecting plumbing installed.
   b. Electrical conduit and plumbing is to be PVC material.
   c. The entire sludge dewatering system, including belt press, washwater pump, centering conveyor; feed pump, and polymer system shall be mounted on a fabricated stainless steel skid (316L).
   d. Inside the channel frame a filtrate collection pan or sump is to be constructed of 14 gauge Type 316 stainless steel with 4 IN outlet flanges on both sides.
   e. Fiberglass or aluminum grating shall be provided over the entire area of skid, except where equipment is present. Walkways shall be on both sides of unit as shown on Drawings.
   f. All walking surfaces shall be non-slip grating.
   g. Provide all required guards for moving parts.
   h. The skid system and all components included on the skid and in this Section shall be pre-piped and electrically wired. Electrical conduit, boxes and fittings shall be stainless steel or fiberglass.
   i. The sludge screw conveyor may be shipped separately for field assembly but the skid shall have provisions for this conveyor. All indoor and outdoor supports and hardware for mounting the conveyor shall be furnished.

2.4 ACCESSORIES

A. See Section 01 61 03.

B. Provide one set of all tools required to change belts and rollers.

C. Controls:
   1. General:
      a. Control/power panel for belt filter press dewatering system, NEMA 4X stainless steel mounted to belt filter press skid and prewired to all belt filter press components and drives on the skid.
      b. Panel shall include all power components including main breaker, external handle, nameplates, voltage and arc flash warning placards, PLC, external connection terminal strips, wire labeling, operator interface, controls, control power transformer, power supplies, circuit breakers, starters, VFD’s and all required accessories for a fully operational system, interlocks, relays and contacts required to interface with related panels.
      c. Panel construction and components per Specification Section 40 98 00.
      d. Panel face instruments:
         1) HOA switch running time meter, and indicating lights for each system component; green-run, red-off/ready.
         2) Alarm lights per paragraph C.7.
         3) Belt speed indication and monitoring.
4) Operator interface (HMI).
5) Panel nameplate.
6) Others in accordance with manufacturer’s standard.

2. Automatic start-up sequence:
   a. Place all individual components in auto mode.
   b. Activate single master switch to initiate automatic sequence.
      1) Start belt drives and hydraulic (or pneumatic) system.
      2) After field adjustable time interval, open associated belt spray valve and start
         associated spray water booster pump.
   c. Start sludge and polymer feed pumps and conveyors.

3. Automatic shutdown sequence:
   a. Stop sludge and polymer feed pump and conveyors.
   b. Activate single master switch to initiate automatic sequence.
      1) Stop sludge feed and polymer.
      2) After adjustable timed cycle to wash belts and clear screw conveyor.
         a) Stop associated spray water booster pump.
         b) Close spray water valve.
      3) Shut down belt drives and hydraulic or pneumatic system.
      4) Shut down conveyors after time to clear sludge.

4. Interlock controls such that shutdown of belt press, screw conveyors, feed pump or polymer
   system for any reason shuts down the system and initiates alarm.


6. Special functions:
   a. Emergency shut-off system:
      1) Pull cable system surrounding press and load out screw conveyors which shall stop
         all equipment associated with the belt press system.
   b. Gravity section sensors:
      1) High liquid level before sludge overflows side bars.
   c. Belt speed indication and monitoring.

7. Shutdown alarms:
   a. Belt alignment failure.
   b. Tensioning systems failure.
   c. Hydraulic or pneumatic system low pressure, if applicable.
   d. Spray water system low pressure.
   e. Broken belt.
   f. Belt speed low.
   g. Emergency stop.
   h. High liquid level in gravity drainage zone.
   i. Loss of cake.
   j. Feed pump high stator temperature.
   k. System shutdown and alarm generation if any component shuts down.

8. Remote monitoring:
   a. Provide isolated general alarm and system running contacts for SCADA system.
   b. Provide Ethernet switch connected to PLC with spare port for data link to the packaged
      biological treatment unit local control panel for monitoring. See Specification Section
      46 51 38.
   c. Provide sludge feed flow analog output or include as part of data available on data link.

9. Power:
   a. Set up panel for single 480 volt, 3 phase feeder and main breaker with front panel
      handle.
   b. NEMA rated starter or VFD for each drive as required with disconnect.
   c. Constant torque VFD and disconnect for sludge feed pump.
   d. Provide power for all components of the dewatering system to include belt filter press,
      sludge feed pump, water booster pump, sludge conveyors, polymer system and any
      other components.
2.5 **FABRICATION**

A. **General:**
   1. Fabricate continuous belt filter having gravity, wedge and pressure zones.
   2. Gravity zone must be independent from the other zones with separate drive assembly to allow belt speed control independent of the other zones.
   3. Design access points, especially those requiring frequent cleaning (drainage pans in particular) with ample room for access with hand held spray nozzle, shovel, scoop, or brush etc.

B. **Frame:**
   1. Welded and/or bolted tubular steel or I-beam construction.
   2. Maximum deflection of frame member at belt tension of 50 LB/ linear inch: 0.025 IN.
   3. Construct to allow removal of any roller without removal of other rollers or disassembly of frame.
   4. Maximum stress at any point at belt tension of 50 LB/linear inch: 10 percent of member's yield strength.
   5. Provide appropriate lifting lugs to permit ready removal of pieces with overhead monorail for maintenance or access.
   6. Chamfer all fixed edges along belt operating surfaces.
   7. Minimum frame member moment of inertia: 17.4 IN\(^4\) in the x-direction and 5.8 IN\(^4\) in the y-direction.

C. **Rollers:**
   1. Provide minimum of one perforated drum immediately following dewatering zone.
      a. Perforations 1/2 IN DIA minimum. Perforated roll shall be a minimum of 20 IN in diameter and constructed of 316 stainless steel.
   2. Utilize minimum of seven drum rollers of solid shell design following the perforated roll in the shear-pressure zone with a roll-to-filter belt contact area of 45 FT\(^2\).
   3. Assure belts in contact with roller for minimum of 200 degrees average of all of the pressure rollers.
   4. Maximum deflection at belt loading/tension of 50 LB/linear inch: 0.05 IN.
   5. Apply minimum 1/4 IN thick coating vulcanized rubber or equivalent nylon coating to drive rollers and 30 mil thermoplastic nylon coating on all others.
   6. Coat all rollers to point of insertion into pillow block. Assure coating does not extend into bearing flat seal.

D. **Roller Bearings:**
   1. Externally mounted, pillow block, self-aligning roller bearings for all pressure section rolls. Other bearings can be ball type.
   2. Locate in cap-sealed, splashproof pillow block housings.
   3. Minimum AFBMA B-10 life: 1,000,000 HRS at 50 LB/linear IN and at 15 FT minimum belt speed.
   4. Include grease seals and zerks extended to face of frame.
   5. Fabricate to assure all bearings greaseable while press is running.
   6. Utilize four-bolt mounting.

E. **Roller Shafts:**
   1. Safety factor for bending stress on shaft: 4.0

F. **Sludge Flocculator Tank if needed to meet specified criteria:**
   1. Fabricate one unit per belt press.
   2. Bottom feed, top discharge.
   4. Designed to gravity feed to press.
   5. Provide 3 IN drain with plug valve.
G. Liquid Polymer Makeup and Metering Equipment:
   1. Variable orifice mixer:
      a. One unit per belt press.
   2. Injection rings:
      a. Number and size: 4 at 3/8 IN DIA.
      b. Solid PVC block fabricated to same ID and OD of pipe flange.
      c. Split polymer flow into four feed points around periphery of pipe.

H. Sludge Inlet Distributor Box:
   1. Design to distribute sludge evenly over entire working width of belt ahead of gravity
      drainage section.
   2. Provide skirt around perimeter to prevent leakage or splashing.
   3. Slurry discharge must be uniform thickness being no more than ± 1/16 IN from the average
      across the full belt width. An overflow weir design with paddle wheel distributor.

I. Gravity Dewatering Section:
   1. Horizontal gravity belt system:
      a. Belt supported by 316 stainless steel support and grid assembly rolls across entire
         width. Provide grid support, roll shell and journals in 316 stainless steel.
      b. Contain sludge on belt with flexible seals.
      c. Sludge plows:
         1) Provide plows or similar devices to promote dewatering and to distribute sludge
            across belt.
         2) Minimum of six rows.
         3) Stagger positions of plows between adjacent rows.
         4) Minimum of seven plows per row.
         5) Provide lifting handles or similar mechanism on each row to permit lifting of plows
            with means to lock in retracted position.
      d. Minimum effective area: 23 SF.
      e. Horizontal section configuration only, inclined section not acceptable.
      f. Must have independent belt drive to allow speed control independent of the pressure
         zone.

J. Curved Wedge Zone:
   1. Provide gradually increased application of pressure to sludge through wedge-shaped section.
   2. Wipers to remove water from both sides of belt.
   3. Minimum effective area: 15 SF.
   4. Adjustable while press is operating.

K. Pressure Zone:
   1. Provide increased compression of cake by passing over rolls to alternate pressure from one
      side to the other.
   2. Eight S-wrap rollers.
   3. Four different roll diameters, minimum 20, 16, 12 and 10.
   4. Minimum effective area: 45 SF.

L. Belt Alignment System:
   1. Provide continuous proportional activated tracking and correction of belt alignment for both
      the gravity and pressure zone belts.
   2. Hydraulic or pneumatic belt alignment devices.
   3. System to provide smooth and slow adjustments without sharp or sudden movement.
   4. Provide backup limit switches to stop drives and sound alarm upon detecting belt overtravel.
   5. Anchor hydraulic or pneumatic piping rigidly and securely to frame.
   6. System allowing tracking rollers to oscillate from full deflection one direction to full
      deflection in the opposite direction are not acceptable.
M. Belt Tensioning:
1. Hydraulic or pneumatic tensioning system to maintain tension in the gravity dewatering
   pressure zones.
2. Manually adjustable tension setpoint with automatic setpoint maintenance.
3. Individual control station for each tension control point located by press control panel
   a. Provide pressure gage to read out directly in pounds/linear inch and to indicate normal
      operating limits.
5. Furnish one tensioning roller for each belt.
6. System to accommodate at least 3.0 percent increase in belt length.
7. Furnish sensing devices to stop press in case of tensioning system failure.

N. Belt Drives, Gravity and Pressure Zone:
1. Adjustable speed gear motor rigidly attached to frame or variable frequency drive.
2. Size:
   a. Gravity zone: 1 HP.
   b. Pressure zone: 2 HP.
3. Operating range: 3 to 15 FT per minute for pressure zone and 15 to 75 ft/min for the gravity
   zone.
4. TEFC chemical duty enclosure.
5. See Section 01 61 03.

O. Belt Washing Systems:
1. Provide washing stations for upper and lower belts.
2. Enclosure boxes:
   a. 16 GA, 316 stainless steel.
   b. Completely enclose spray system.
   c. Replaceable seals at belt entrance and exit.
   d. Provide continuous hinged door to allow access to spray system.
   e. Latch to hold access door closed.
3. High-pressure spray header with flat spray nozzles.
4. Include handwheel-operated brush, operable from center platform, to permit nozzle cleaning
   without disassembly or interrupting operation.
5. Provide in-line strainer ahead of inlet to nozzles.
6. Solenoid valves:
   a. Provide at inlet to each spray header.
   b. Enclosure: Rated for wet area.
   c. 115 V/1 PH/60 HZ power.

P. Drainage System:
1. Provide drainage pans for gravity and pressure dewatering zones.
2. Mount drain system securely to frame in such a way as to prevent vibration noise and allow
   cleaning.
3. Provide sampling points for each stream.
4. Drainage pans: Minimum 14 GA 316 stainless steel for gravity and pressure dewatering
   zones.

Q. Belts:
1. Width: 1 meter (minimum).
2. Seams:
   a. Strength equal to or greater than belt.
   b. Readily repairable and replaceable.
   c. Closures to not interfere with scraper blades or other equipment.
   d. Provide protective flap for seam.
3. Manufacturer to determine type and mesh size.
4. Belt replaceable without requiring removal of machine components or changes in tension
   adjustments.
5. Tensile strength at least three times maximum belt tension.
6. Minimum guaranteed operating life: 3,000 HRS.

R. Scraper Blades:
   1. Furnish to separate cake from top and bottom belts across entire width.
   2. Dual edges.
   3. Mount on spring-loaded counter-weighted assembly.
   4. Blades adjustable and field replaceable.
   5. Provide means to retract and lock blades in single motion.

S. Air Supply for Pneumatic Powered Systems (if required):
   1. Furnish air supply system as part of skid if required.

T. Press Connections:
   2. Polymer: 1 IN NPT.
   3. Belt spray: 1-1/2 IN NPT.
   4. Hydraulics/pneumatics: 3/8 IN.

U. Washwater Booster Pump:
   1. Casing:
      a. Spiral volute type, back pull-out design.
      b. NPT threaded suction and discharge connections up to 2-1/2 IN size and shall be constructed of cast iron, ASTM A48 CL20 or Bronze ASTM B584.
      c. The pump discharge nozzle shall be tangentially oriented.
      d. A pump casing drain shall be provided with a steel or brass pipe plug.
   2. Wear ring:
      a. A replaceable suction wear ring of Bronze ASTM B584 shall be provided and held securely by means of an interference fit in the casing suction.
   3. Impeller:
      a. Enclosed design, constructed of Bronze ASTM B584 material and key driven.
      b. A stainless steel cap screw and washer shall provide positive attachment of the impeller to the motor shaft.
   4. Seal housing:
      a. Cast Iron ASTM A48 CL20 or Bronze ASTM B584 material and shall hold the stationary seat of the mechanical shaft seal.
      b. The seal housing shall be held in place in a machined fit on the pump casing to maintain component alignment and “O-ring” sealed to insure against leakage.
   5. Mechanical seal:
      a. The pump shaft seal shall be a John Crane Type 21 mechanical seal or equal constructed of the following materials.

<table>
<thead>
<tr>
<th>Seal Type</th>
<th>Stationary Face</th>
<th>Rotating Face</th>
<th>Elastomers</th>
<th>Metal Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>Ceramic</td>
<td>Carbon</td>
<td>BUNA-N</td>
<td>18-8 SS</td>
</tr>
</tbody>
</table>

6. Shaft sleeve:
   a. The pump shaft sleeve shall be constructed of AISI Type 303 stainless steel and shall be of the hook type design, locked in place by the impeller without necessity of other mechanical locking devices.

7. Motor mounting adapter:
   a. A rigid motor adapter of ASTM A48 CL20 cast iron construction shall support the pump liquid end and maintain pump to motor alignment.
   b. A bottom port shall be provided to allow condensation or seal leakage to drain and not be retained within the adapter.
   c. The power frame adapter shall be an integral 1-piece design with the seal housing when all cast iron or bronze fitted construction is specified.
8. Electric motor:
   a. The drive motor shall be non-overloading of NEMA standard design with JM shaft
      extension and C-Face mounting suitable for close-coupled pump mounting.
   b. Motor rating shall be 7.5 HP, 1760 RPM maximum, 3 phase, 60 Hz, 460 volts.
   c. Totally enclosed fan cooled.
   d. 1.15 service factor.
   e. Premium efficiency, inverter duty.

V. Sludge Feed Pump:
   1. Pump body:
      a. Provide body containing two inspection ports 180 degrees apart.
      b. Cradle mount pump to permit suction port to be rotated at 90 degree increments
         perpendicular to pump centerline.
   2. Rotor:
      a. Harden to minimum Rockwell C-57.
      b. Plate with a layer of hard chrome to a minimum hardness of Rockwell C-70.
   3. Stator:
      a. Construct by bonding rubber-type material to inside of a steel tube.
      b. Minimum 65 durometer hardness (Shore A).
   4. Drive train:
      a. Include crown gear-type universal joints, seals, connecting rod, driveshaft, and shaft
         bearings.
      b. Connect rotor drive shaft by a connecting rod equipped with two crowned gear-type
         factory grease lubricated and sealed universal joints.
      c. Use universal joints to transmit thrust and torque while allowing the rotor to move
         through an eccentric path.
      d. Clamp gear joint seals at both outside and inside diameters and recess within heavy
         walled steel tubing.
      e. Connecting rods:
         1) Operating angle not to exceed 1-1/2 degrees off center.
      f. Mount drive shaft in two ball or tapered roller bearings.
      g. Bearing B-10 life: 50,000 HRS at design operating conditions specified.
      h. Provide fittings for grease lubrication of bearings.
      i. Stuffing box:
         1) Design for water seal.
      2) Permit gland adjustment and repacking without dismantling pump.
   5. Suction and discharge:
      a. Provide ANSI, Class 150, 125 LB rated flanged.
   7. Electric motor:
      a. TEFC.
      b. 1.15 service factor.
      c. Premium efficiency, inverter duty.
      d. 7.5 HP maximum, 460 V, 60 Hz, 3 phase.
   8. Provide pump stator temperature monitoring switch and shutdown on high temperature.

W. Screw Conveyors:
   1. Design Requirements:
      a. Conveyors shall be manufactured by Parkson Corporation, Spirac, Custom Conveyors
         Corp., or equal.
      b. Conveyor liner and spiral shall be warranted for a period of 17,500 hours from factory
         start-up against wear.
      1) Liner: Excessive wear shall be indicated by appearance of the bottom indicator
         layer (second color) along more than 30 percent of the conveyor length during the
         first three years of service. If excessive wear occurs, the manufacturer shall
         provide new formed and banded liner to replace all the liner in the conveyor.
2) Spiral: Excessive wear on the spiral screw shall be indicated by loss of more than 50 percent of the height of the main outer screw section over 30 percent of the total length of the screw. If excessive screw wear is found the conveyor supplier shall provide new screw to replace the screw in the conveyor.

c. Start-up Load Torque: The torque capacity of the drive unit and the spiral strength shall be sufficient to start the conveyor with 100 percent loading after standing for a minimum of five (5) days.

d. Design Load Conditions: Maximum trough fill: 50 percent.

e. Conveyor system shall be designed to operate functionally without any structural vibrations noticeable to personnel.

f. Hinges and covers shall be designed to allow free insertion of spiral lifting tool and removal and replacement of wear liner segments with cover open.

g. Maximum lifting weight per section of cover: 40 LBS.

h. Minimum two (2) lifting handles per cover section.

i. Maximum safe working load: Horizontal conveyor load exerted by 100 percent trough fill with conveyed material at a density of 1.5 x normal density (90 LB/CF) to compensate for stiffening of material in conveyor.

2. Materials of Construction:

a. Conveyor trough, tubes and chutes: Type 304 Stainless Steel.

b. Gasketed Access Covers and Hinges: Type 304 Stainless Steel. Covers to be provided with hinges along entire length of conveyor and bolts along entire length of opposite side. Individual hinged sections shall have stops to prevent the cover form swinging beyond 30 degrees past vertical.

c. Drive and End Plates: Type 304 Stainless Steel.

d. Spiral Flights:
   2) Brinell hardness: 225 minimum after cold forming.
   3) Yield strength: 80,000 psi minimum after cold forming.

e. Wear liner segment: Dura Slide Xylethon, Spirac Duraflow SPX, or equal. Wear liner sections shall be maximum 4 FT long.

f. Hardware and Fasteners: Type 304 Stainless Steel.

g. Drive Shaft: AISI 1045 Steel or A572 G50.

h. Structural Supports: Type 304 Stainless Steel.

2.6 MAINTENANCE MATERIALS

A. Furnish Owner the following extra materials:

1. Filter belts: One complete set.

2. Two sets of doctor blades.

3. Two sets of each type of bearing and housing.

4. Two steering sensors used for belt alignment.

5. One repair kit for each size hydraulic or pneumatic cylinder or diaphragm.

6. Two hydraulic or pneumatic belt tensioning and steering valves.

7. Spare drive belt of each type used.

8. One set of spray header housing seals to replace one complete belt press housing seal.

9. Two sets of replaceable seals, gaskets, and wearing parts for drive.

10. For sludge feed pump:
   a. One rotor.
   b. One stator.

11. For conveyors:
   a. Spiral lifting tool:
      1) Designed to allow one person to lift and lock a segment of spiral a minimum of 1 IN above trough liner. Length of lifted spiral segment shall be long enough to allow removing one existing liner segment and replacing with new segment.
      2) Number: One (1) each.
b. Wear liner segments: A full set of replacement liners for complete replacement cut to exact size with protective metal strips and banded to maintain the formed shape.
c. Gear reducer: One (1) of each size (HP, rpm, and torque) supplied.
d. Stuffing box seals: Two (2) each.
e. Bearings: One (1) set for screw.

B. Replacement parts for equipment and accessories shall be readily available from the belt filter press manufacturer or individual component manufacturer and not require a lead-time of greater than 10 calendar days to be received at the Owner’s facility following the placement of an order, except belts, which shall not exceed 30 calendar days. Every attempt shall be made to include only components that do not have unique and difficult to get OEM replacement parts, but have generic parts that can generally be obtained locally.

PART 3 - EXECUTION

3.1 INSTALLATION

A. See Section 01 61 03.

B. Securely fasten all hydraulic control tubing to press frame or other structural members.

C. Controls for hydraulic system located on press shall be accessible from operating platform of press.

D. Mount emergency stop cable system around periphery of press, away from moving parts. Assure cable is easily reachable from all platforms adjacent to press.

E. Drainage System Piping:
   1. Interconnect, allowing space for sampling.
   2. Interconnect drains for belt wash sprays.
   3. Terminate all drain lines within 6 IN of floor drain vertically and horizontally.
   4. Provide connections for flushing water with easy access.

F. Use maximum 1 FT of hydraulic hose to make connection from equipment to stainless steel tubing.

G. Equipment anchoring shall conform to the seismic requirements of Section 01 61 03.

3.2 FIELD QUALITY CONTROL

A. Employ and pay for services of equipment manufacturer's field service representative(s) to:
   1. Inspect equipment covered by these Specifications.
   2. Supervise adjustments and installation checks.
   3. Conduct startup of equipment and perform operational checks. Provide for minimum of 16 HRS startup over two days.
   4. Provide Owner with a written statement that manufacturer's equipment has been installed properly, started up, and is ready for operation by Owner's personnel.
   5. Instruct Owner's personnel for 24 HRS at jobsite on operation and maintenance.
   6. A minimum of three trips to site and a total of 7 days on site is required to cover completing the above items and performance testing.

B. Performance Test:
   1. Test performed by representative of manufacturer in presence of Engineer and/or Owner.
   2. Run test over continuous 6 HR period.
   3. Results from test will be used to verify compliance with requirements in PART 1 and PART 2 of this Section.
   4. Samples taken one per HR (six total).
   5. Tests conducted:
      a. Sludge feed percent solids (total residue).
      b. Sludge feed flow rate.
c. Total suspended solids of beltwash and filtrate (combined sample) from discharge of drainage section.
d. Polymer solution feed rate.
e. Polymer solution concentration.
f. Wash water consumption.
g. Dewatered sludge solids (total residue).
6. Test will be run at press capacity listed under Article 2.3.

END OF SECTION
APPENDIX A

PACKAGE BIOLOGICAL TREATMENT FACILITY MANUFACTURER DRAWINGS
FOR INFORMATION ONLY
NOT PART OF THE CONTRACT DOCUMENTS
City of Fort Bragg
Wastewater Treatment Plant
Upgrades Project

FILENAMES: C:\pwworking\sac\d0701789\260093_6P01.dwg, 4/6/2018 5:49:00 PM, PVANMEU

PROCESS
PACKAGE BIOLOGICAL TREATMENT FACILITY
PROCESS PIPING CONNECTION LOCATION PLAN

ISSUE DESCRIPTION
PROJECT MANAGER
PROJECT NUMBER
FILENAME
SCALE
SHEET
DATE

City of Fort Bragg
Wastewater Treatment Plant
Upgrades Project

DESIGNED: 3/01/18
ISSUED FOR BIDS: 4/10/18
ADDENDUM NO. 3

DESIGNED CHECKED: 4/10/18

DRAWN: 4/10/18

PROCESS
PACKAGE BIOLOGICAL TREATMENT FACILITY
PROCESS PIPING CONNECTION LOCATION PLAN
City of Fort Bragg Wastewater Treatment Plant Upgrades Project

PROCESS
PACKAGE BIOLOGICAL TREATMENT FACILITY PIPING CONNECTION SECTIONS

SCALE 1/8" = 1'-0"

DRAWN DATE DESCRIPTION PROJECT NUMBER
B 3/01/18 ISSUED FOR BIDS B 4/10/18 ADDENDUM NO. 3

City of Fort Bragg Wastewater Treatment Plant Upgrades Project

PROCESS
PACKAGE BIOLOGICAL TREATMENT FACILITY PIPING CONNECTION SECTIONS

SCALE 1/8" = 1'-0"

DRAWN DATE DESCRIPTION PROJECT NUMBER
B 3/01/18 ISSUED FOR BIDS B 4/10/18 ADDENDUM NO. 3
EXISTING GENERATOR BUILDING ELECTRICAL PLAN

NOTES:

A. Handicap accessible on 1st floor. See viewpoint on.
B. Egress from existing generator electrical plan must be shown to ensure accessibility. See viewpoint on.
C. Provide 3D model of existing generator for planning purposes. See viewpoint on.
D. Ingress from existing generator for planning purposes. See viewpoint on.
E. Existing generator for planning purposes. See viewpoint on.

EXISTING GENERATOR BUILDING ELECTRICAL PLAN

City of Fort Bragg
Wastewater Treatment Plant
Upgrades Project

ELECTRICAL

EXISTING GENERATOR BUILDING ELECTRICAL PLAN

- Sheet E06
- Scale 1/8"=1'-0"
- Designed: 3/01/18
- Designed Checked: 4/10/18
- Addendum No. 3

- C:\pwworking\sac\d0701791\260093_8E06.dwg, 4/10/2018 10:24:44 AM, PVANMEU

- PROJECT MANAGER: [Name]
- DESIGNER: [Name]
- REVISIONS: [Details]
- DATE: [Date]
- DRAWN: [Name]
- SHEET: [Number]

- City of Fort Bragg
- Wastewater Treatment Plant
- Upgrades Project

- NOTE:
- Handicap accessible on 1st floor. See viewpoint on.
- Egress from existing generator electrical plan must be shown to ensure accessibility. See viewpoint on.
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- Ingress from existing generator for planning purposes. See viewpoint on.
- Existing generator for planning purposes. See viewpoint on.

- NOTES:
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- Egress from existing generator electrical plan must be shown to ensure accessibility. See viewpoint on.
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- Handicap accessible on 1st floor. See viewpoint on.
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- Ingress from existing generator for planning purposes. See viewpoint on.
- Existing generator for planning purposes. See viewpoint on.
### Function Identification Table

<table>
<thead>
<tr>
<th>FIRST LETTER</th>
<th>SECOND LETTER</th>
<th>MEASURED VALUE</th>
<th>MODIFIER</th>
<th>READOUT/PASSIVE FUNCTION</th>
<th>OUTPUT FUNCTION</th>
<th>MODIFIER</th>
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<td>Analysis</td>
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<td>Transmit</td>
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<td>T</td>
<td></td>
<td>Multivariable</td>
<td>Multifunction</td>
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<tr>
<td>U</td>
<td></td>
<td>Vibration</td>
<td>Value of signal</td>
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<tr>
<td>V</td>
<td></td>
<td>Weight, Force</td>
<td>Wet or Probe</td>
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<td></td>
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<td>W</td>
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<td>X Axis</td>
<td>Accessory Device</td>
<td>Compute, Correct, Rate</td>
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<td>X</td>
<td></td>
<td>Y Axis</td>
<td>Y Axis</td>
<td>Driver, Actuator, Final</td>
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<td>Y</td>
<td></td>
<td>Z Axis</td>
<td>Z Axis</td>
<td>Control Element</td>
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</tr>
</tbody>
</table>

### Instrument and Control Symbols

1. Located in field
   - Not panel, cabinet or console mounted
   - Visible at field location
   - Normally operator accessible

2. Located on or front of central or main panel
   - Located in cabinet behind panel
   - Not visible on front panel or on video display
   - Not normally operator accessible at panel or console

3. Located in rear of central or main panel
   - Located in cabinet behind panel
   - Not visible on front panel or on video display
   - Not normally operator accessible at panel or console

4. Located on or front of secondary or local panel
   - Located in cabinet behind panel
   - Not visible on front panel or on video display
   - Normally operator accessible at panel front or console

### Example of Instrument Letter Identification

1. **DO-A1**
2. **DO-PROBE**
3. **DO PROBE**
4. **DO PROBE**

---

**INSTRUMENT AND CONTROL GUIDE**

Aero - Mod, Inc.

7927 U.S. Highway 24
Manhattan, Kansas 66502

PHONE: (785) 537-4855
FAX: (785) 537-0813

INSTRUMENT AND CONTROL GUIDE
## Line Symbols

- MAIN PROCESS LINE
- TWISTED SHIELDED
- TWISTED SHIELDED (TWO PAIR)
- ETHERNET CABLE
- ELECTRICAL
- DRY AIR
- DO PROBE CABLE
- AIR PIPING

## Valve Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>TS</td>
<td>Manual Butterfly Valve</td>
</tr>
<tr>
<td>BUT</td>
<td>Angle Valve</td>
</tr>
<tr>
<td>CHECK</td>
<td>Three Way Valve (Ball Valve Shown)</td>
</tr>
<tr>
<td>CHECK</td>
<td>Pressure Relief Valve</td>
</tr>
<tr>
<td>TS2</td>
<td>Pressure Reducing Valve (External Sensor)</td>
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<tr>
<td>TS2</td>
<td>Pressure Reducing Valve (Internal Sensor)</td>
</tr>
<tr>
<td>GATE</td>
<td>Hand Wheel Adjust, Set Point</td>
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<tr>
<td>TS2</td>
<td>Pressure Relief Valve, Vacuum Relief</td>
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<tr>
<td>PINCH</td>
<td>Solenoid Valve</td>
</tr>
<tr>
<td>PLUG</td>
<td>Ball Valve</td>
</tr>
</tbody>
</table>

## Control Valve Actuator Symbols

- SINGLE ACTING PISTON
  - SPRING RETURN
  - NC NORMALLY CLOSED
  - NO NORMALLY OPEN
- DOUBLE ACTING PISTON
  - DOUBLE ACTING PISTON
  - SPRING RETURN
  - NC NORMALLY CLOSED

## Typical I/O Symbols

- DI Digital Input to PLC
- DO Digital Output from PLC
- AI Analog Input to PLC
- AO Analog Output from PLC
- MB Modbus Communication
- R Reset
- I Interlock
- V Voltage
- P Purge

## Aeromod Guide

- XX - X: YEAR
- YY: WEEK
- ZZ: CYCLE/STAGE
- A: INDICATES CYCLE/STAGE
- B: INDICATES CYCLE/STAGE
- C: INDICATES CYCLE/STAGE
- D: INDICATES CYCLE/STAGE
- E: INDICATES CYCLE/STAGE
- F: LOCATION
- G: LOCATION
- H: LOCATION
- I: LOCATION
- J: LOCATION
- K: LOCATION
- L: LOCATION
- M: LOCATION
- N: LOCATION
- O: LOCATION
- P: LOCATION
- Q: LOCATION
- R: LOCATION
- S: LOCATION
- T: LOCATION
- U: LOCATION
- V: LOCATION
- W: LOCATION
- X: LOCATION
- Y: LOCATION
- Z: LOCATION

- RAS = RETURN ACTIVATED SLUDGE
- SEQ = SEQUOX VALVE
- FER = FERMENTER TANK
- DIG = DIGESTER
- CLR = CLARIFIER
- WAS = WASTE ACTIVATED SLUDGE
- SH = SLUDGE HOLDING
- FER = FERMENTER TANK
- SEL = SELECTOR TANK
- EQ = EQUALIZATION TANK

---

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FAX: (785) 537-0813

TYPICAL I/O SYMBOLS

- DI Digital Input to PLC
- DO Digital Output from PLC
- AI Analog Input to PLC
- AO Analog Output from PLC
- MB Modbus Communication
- R Reset
- I Interlock
- V Voltage
- P Purge

---

VALVES, LINES, INPUT & OUTPUT GUIDE
ADDED ALGAE TRANSDUCERS TO CLARIFIER TANKS, UPDATED NOTES AND DETAILS
1. STAINLESS STEEL WALL BRACKETS AND ANGLE WALL BRACKETS ARE TYPICALLY SPACED 6'-0" APART (SUPPLIED BY AERO MOD). UNLESS NOTED PIPE IS SECURED TO WALL BRACKETS WITH A STAINLESS STEEL L-CLIP.

2. EXPANSION JOINTS AND LOCATIONS TO BE DETERMINED AND SUPPLIED BY GC.
CLARIFIER TANK A

11'-0" TYP
8'-6" TYP

8" PVC EFFLUENT LINE
12" PVC EFFLUENT LINE
12" x 12" x 8" PVC TEE
20" ANGLE WALL BRACKET (PART #20-AWB), TYP.

SECTION B-B

Aero - Mod, Inc.
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Manhattan, Kansas 66502
PHONE: (785) 537-4986
FAX: (785) 537-0813

SECTION VIEW B-B
W.W.T.P.
FORT BRAGG, CALIFORNIA
AERATION TANK B2

(2) 8" PVC 45° ELBOW
(2) 8" PVC ELBOW (PIVOT)
INLET SCREEN, TYP. REF.
NOTCH DETAIL #2 REF
1 1/4" ACTUATED STAINLESS STEEL BALL VALVE (2) REQ'D
(2) NYLON TUBE TO EACH ACTUATOR
FLEX HOSE, TYP.
INLET SCREEN, TYP. REF.
8" PVC AIR LINE
1-1/2" CONDUIT TEE
1-1/2" CONDUIT LINE
HANDRAIL, TYP.
24" REF.
WA-PS4-2, REF.
2" GLOBE VALVE
FLEX HOSE, TYP.
8" X 2" PVC CLAMP-ON SADDLE, TYP.
8" PVC AIR LINE
1 1/2" CONDUIT LINE
TOP OF TANK WALL
INLET SCREEN, TYP. REF.
52" REF.
13" WALL BRACKET (PART #13SSWB), TYP.
1-1/2" CONDUIT LINE
18'-0"
154"
79", TYP. REF.
8" PVC 45° ELBOW
8" PVC ELBOW (PIVOT)
8" PVC AIR LINE

SECTION C-C

Aero - Mod, Inc.

7627 U.S. Highway 24
Manhattan, Kansas 66502
PHONE: (785) 537-4995
FAX: (785) 537-0813

REVIEWED
REMOVED PIPING TO CLARIFIER AND UPDATED CLARIFIER PIPING

11/29/17
REV.
REMARKS
1
REMOVED PIPING TO CLARIFIER AND UPDATED CLARIFIER PIPING
2
UPDATED 8" X 1-1/2" CLAMP-ON SADDLE TO 8" X 2" CLAMP-ON SADDLE, CHANGED WALL AERATOR REF.

12/8/15
WAD-HSS2, REF.
4" X 2" PVC CLAMP-ON SADDLE
6" PVC ELBOW
10" WALL BRACKET (PART #10SSWB), TYP.
SLIDEGATE, TYP.
HANDRAIL TYP.
SELECTOR TANK
CLARIFIER TANK B
CLARIFIER TANK A
WALKWAY
SECTION H-H
125"
18'-0"
W.W.T.P.
FORT BRAGG, CALIFORNIA
Aero - Mod, Inc.
7927 U.S. Highway 24
Manhattan, Kansas 66502
PHONE: (785) 537-6886
FAX: (785) 537-0813
3/21/16
12/07/16
12/13/17
12/13/17
12/13/17
12/13/17
ADDED A REDUCTION FROM 6" PVC AIR LINE TO A 4" PVC AIR LINE.
UPDATED SLIDEGATE TO SHOW TALLER RAILS.
10" AIR LINE, WELDED STEEL OVER WALL (BY G.C.)
SUPPORTED (BY G.C.)

8" ELECTRICAL POSITIONING VALVE

APPROXIMATE GRADE (DETERMINED BY OTHERS)

10" PVC ELBOW

10" PVC FLANGE CONNECTION (MUST BE MADE BELOW WATER)

10" WALL BRACKET (PART #10SSWB)

10" PVC AIR LINE

DIGESTER TANK B

2" PVC AIR LINE

6" PVC AIR LINE

10" PVC CLAMP-ON SADDLE

6" X 2" PVC CLAMP-ON SADDLE

VERTICAL AIR BRACKET (PART #VA-9.5)

10" WALL BRACKET (PART #10SSWB), TYP.

10" PVC ELBOW

10" EXPANSION JOINT (BY G.C.)

6" PVC AIR LINE
10" AIR LINE WELDED STEEL OR DIP OVER WALL (BY G.C.) SUPPORTED (BY G.C.)

8" PNEUMATIC ACTUATED BUTTERFLY VALVE

SS HEADER SPOOL (SUPPLIED BY AERO-MOD)

72" APPROX.

8" ELECTRICAL POSITIONING VALVE

2" NYLON TUBE TO ACTUATOR

SECTION M-M

APPROXIMATE GRADE (DETERMINED BY OTHERS)

2" CONDUIT LINE

2" CONDUIT C

AIR FLOW SENSOR

Aero - Mod, Inc.

7627 U.S. Highway 24
Manhattan, Kansas 66502
PHONE: (785) 537-4985
FAX: (785) 537-0813

FORT BRAGG, CALIFORNIA
NOTE:
1. WATER LEVEL FROM DOWNSTREAM TREATMENT CAN NOT BACK UP ABOVE 40" BELOW TOP OF WALL.

Aero - Mod, Inc.
7627 U.S. Highway 24
Manhattan, Kansas 66502

PHONE: (785) 537-4885
FAX: (785) 537-0813

CLARATOR MODEL #28616
EQUIPMENT DETAIL
2" DIA CLEAN OUT WITH PVC CAP

TO TOP VIEW

2" AIR ESCAPE
2" DIAMETER CLEANOUT
6" STAINLESS STEEL ELBOW
DIAPHRAGM VALVE
GLOBE VALVE
(FOR THROTTLING)
1 1/2" X 12" LG.
STAINLESS STEEL NIPPLE
1 1/2" FLEX HOSE
1 1/2" STAINLESS STEEL PIPE
6" STAINLESS STEEL PIPE

FRONT VIEW

2" AIR ESCAPE
(2" STAINLESS STEEL
ELBOW, ROTATED 45°)

SPLASH DEFLECTOR
SPLASH DEFLECTOR

BACK VIEW

NOTCH
TOP OF TANK WALL

1/2" X 12" LG.
STAINLESS STEEL NIPPLE

SIDE VIEW

Aero - Mod, Inc.
7927 U.S. Highway 24
Manhattan, Kansas 66502
PHONE: (785) 537-4995
FAX: (785) 537-0813

AL-600 SOLIDS WASTING AILIFT
EQUIPMENT DETAIL
NOTE:
1. POWER SUPPLY BOX HAS A 6' PIGTAIL - PLUGS INTO 115V OUTLET.
2. POWER CORD IS 50' LONG.

POWER CORD TO POWER SUPPLY BOX

WALKWAY

TOP OF TANK WALL

ALGAE TRANSDUCER

HANDLE OF SUPPORT ROD

HANDRAIL ON WALKWAY

PLAN VIEW

ALGAE TRANSDUCER IN CLARIFIER TANK

POWER CORD TO POWER SUPPLY BOX

WALKWAY

TOP OF TANK WALL

ALGAE TRANSDUCER

HANDLE OF SUPPORT ROD

MANUFACTURER SUPPLIED CONNECTION TO SUPPORT ROD

POWER CORD TO POWER SUPPLY BOX

SUPPORT ROD

ROD GUIDE INSERTION SLOT

ADJUSTABLE HANDRAIL FITTING (#1700)

2. POWER CORD IS 50' LONG.

NOTE:
1. POWER SUPPLY BOX HAS A 6' PIGTAIL - PLUGS INTO 115V OUTLET.
2. POWER CORD IS 50' LONG.
SUPERNATANT RETURN WEIR BAFFLE

MAT'L: 1/2" PVC

5/8"x 2 1/2" SLOT (5) PCS

DIGESTER TANK SIDE OF WALL

DIGESTER SUPERNATANT RETURN WEIR
(INSTALL ON DIGESTER SIDE OF WALL)

(5) 1/2"x 3 3/4" STAINLESS STEEL WEDGE ANCHOR BOLTS. CENTER IN SLOT FOR MAX ADJUSTMENT.
(BOLTS SUPPLIED BY AERO-MOD)

12/8/15
CKC

Aero - Mod, Inc.

7927 U.S. Highway 24
Manhattan, Kansas 66502

PHONE: (785) 537-4966
FAX: (785) 537-0813

TITLE: SUPERNATANT RETURN WEIR BAFFLE

DRAWING BY: Aero - Mod, Inc.
Manhattan, Kansas 66502

DATE: 12/8/15

REVISION:

SUPERNATANT RETURN WEIR BAFFLE EQUIPMENT DETAIL

REVISION

DATE

REV

By

DATE

SCALE

REV'SD. BY

NTS

SUPERINTENDENT

CONTRACTOR

EQUIPMENT DETAIL

SUPERNATANT RETURN WEIR BAFFLE

MAT'L: 1/2" PVC

5/8"x 2 1/2" SLOT (5) PCS

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(INSTALL ON DIGESTER SIDE OF WALL)

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SCALE

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NTS

WEIR PLATE REF

WEIR PLATE REF

DIGESTER TANK SIDE OF WALL

WEIR PLATE REF

BAFFLE

BAFFLE

TOP OF TANK WALL

TOP OF TANK WALL

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"

12" 18" 14"
SIDE VIEW

DO PROBE MANUFACTURER SUPPLIED BRACKET (MOUNTED TO TOP RAIL)

PVC PIPE SUPPLIED BY GENERAL CONTRACTOR (APPROX. LENGTH 7'-6")

NOTE 1: FOR BEST ACCURACY OXYGEN MEASUREMENTS SHOULD BE TAKEN 2'-0" BELOW THE WATER SURFACE AND 3'-0" AWAY FROM THE TANK WALL.

PROBE MUST BE BELOW WATER LEVEL

3'-0" (NOTE 1)

NOTE:
1) FOR BEST ACCURACY OXYGEN MEASUREMENTS SHOULD BE TAKEN 2'-0" BELOW THE WATER SURFACE AND 3'-0" AWAY FROM THE TANK WALL.
2) FOR ADDITIONAL INFORMATION REFER TO THE DO PROBE MANUFACTURER'S LITERATURE.
31 3/16" 6"
31 3/16" 97/8"
18 3/8"

END VIEW

TYPICAL SUCTION HOOD

NOTE:
1. MATERIAL 1/4" NOMINAL THICKNESS MOLDED RTM WITH REINFORCED POLYESTER RESIN.

2" SLOT WITH 1" RADIUS TYP.
1. MATERIAL IS .038 NOMINAL THICKNESS, PRESSURE MOLDED TELENE.

- 1 1/2" DIA. LIFTING HOLE (2)
- 1/2" WIDE x 22" LONG SLOTS (24) TOTAL
- FLANGE IS 1/2" THICK
- 3/4" DIA. HOLES ON A 11 3/4" BOLT CIRCLE

NOTE:
TYPICAL WALL AERATOR, WAD-HSS2

- AIR SUPPLY TO WALL AERATOR (4" AND LARGER) REQUIRES AN AERO-MOD SUPPLIED SADDLE
- STAINLESS STEEL WALL BRACKET (BY AERO-MOD)
- STAINLESS STEEL BALL VALVE
- STAINLESS STEEL UNION
- STAINLESS STEEL PIPE (SCH. 5)
- 1 ½" FLEX HOSE
- TOP OF TANK WALL
- AIR SUPPLY (BY CONTRACTOR)
- STAINLESS STEEL WALL BRACKET (BY AERO-MOD)
- STAINLESS STEEL (SCH. 5) PIPE
- GUIDE RAIL SLIDES OVER GUIDE RAIL SUPPORT
- FLOOR SUPPORT (REF DETAIL A)
- GUIDE RAIL SUPPORT (REF DETAIL A)
- 2" PVC DROP PIPE
- THIS ASSEMBLY IS CONNECTED TO THE DROP PIPE PRIOR TO SHIPPING
- THIS ASSEMBLY IS SENT BOXED AND LABELED
- STAINLESS STEEL UNION (CONNECTED IN FIELD)
- 2" DROP PIPE
- STAINLESS STEEL PIPE (SCH. 5)
- GUIDE RAIL SUPPORT
- BOLTS TO FLOOR (2) FLCS
- 1 ½" STAINLESS STEEL WEDGE ANCHOR BOLTS (BY AERO-MOD)
NOTE:
1. ACCESS TBD (BY OTHERS)
#3 ELBOW
#12 SHORT BARREL CROSS
#60 PLUG
#3 ELBOW
#3 ELBOW
5'-6" MAXIMUM
L
C
L
C
L
C
L
C
C
L
C
L
C
25 1/2"
30 3/4"
34 1/2"
1/4" x 4" STRAP
1/4" x 4" STRAP
1/4" GUSSET
3/4" x PLATE x 2" x 3 1/4" TYP
5" x 3" x 1/4" ANGLE
5'-6" MAXIMUM
1/4" PLUG
#12 SHORT BARREL CROSS
#12 SHORT BARREL CROSS
SLIP-ON FITTINGS. MATERIAL IS ALUMINUM ALLOY
A
TOP VIEW
A
SIDE VIEW
LENGTH VARIES
30 3/4"
30 3/4"
30 3/4"
1/4" PLUG

SECTION A-A

HANDRAIL FITTING DETAILS
FITTING COMBINATIONS VARY PER JOB
Aero - Mod, Inc.
7927 U.S. Highway 24
Manhattan, Kansas 66502
PHONE: (785) 537-4995
FAX: (785) 537-0813
THREE RAIL WALKWAY
EQUIPMENT DETAIL
REV
Rev
B
Date
3/6/15
NTS
NTS
NTS
NTS
NOTE:
1. IT IS IMPORTANT THAT CONCRETE BASE DIMENSIONS ARE WITHIN ±1/4" TOLERANCE. FOR A CONTRACTOR TO MEET THIS TOLERANCE AERO-MOD WILL SUPPLY FORM ANCHOR BRACKETS AS PER SCOPE OF SERVICES.