ST. TAMMANY PARISH

MICHAEL B. COOPER
PARISH PRESIDENT

NOTICE TO BIDDERS

ST. TAMMANY PARISH

Sealed bids will be received by the Department of Procurement, until **2:00 p.m., Thursday, September 30, 2021,** and then opened and read publicly at that time by the Procurement Staff for the following project:

Bid # 21-21-2 – West St. Tammany WWTP Expansion

Each paper bid must be submitted in a sealed envelope. The outside of the envelope shall show the Name and Address of the Bidder, the State Contractor's License Number of the Bidder (if the work is estimated at $50k or more), the Bid Name and the Bid Number.

The project classification is:

Municipal and Public Works Construction

This bid package is available online at http://www.stpgov.org/ or at www.bidexpress.com.

It is the Bidder's responsibility to check the Parish website frequently for any possible addenda that may be issued. The Parish is not responsible for a Bidder's failure to download any addenda documents required to complete a submission.

A MANDATORY Pre-Bid Conference will be held at the project site (LA 1085 west of the intersection of LA 1085 and Windward Drive) on Thursday, September 16, 2021 at 10:00 A.M. All bidders must attend the Mandatory pre-bid meeting and will be required to sign in and out as evidence of attendance. Any prospective bidder who fails to attend the conference or remain for the duration shall be prohibited from submitting a bid for this project.

Bids will be received at 21454 Koop Dr., Suite 2F, Mandeville, LA 70471 from each bidder or his agent and given a written receipt, by certified mail with return receipt requested, or electronically at www.bidexpress.com.

Procurement Department

BID PROPOSAL

ST. TAMMANY PARISH
GOVERNMENT

BID PACKAGE FOR

West St. Tammany WWTP Expansion

BID NO.: 21-21-2

July 30, 2021

Section 01

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Section 02

Instructions to Bidders

Bidders are urged to promptly review the requirements of this specification and submit questions for resolution as early as possible during the bid period. Questions or concerns must be submitted in writing to the Procurement Department no later than 2:00 CST seven (7) working days prior to the bid opening date. Otherwise, this will be construed as acceptance by the bidders that the intent of the specifications is clear and that competitive bids may be obtained as specified herein. Protests with regard to the specification documents will not be considered after bids are opened.

1. Bid security is required. Be sure that your bid includes such security as is necessary to meet Parish requirements and is properly signed. The bid must be fully completed. All applicable Louisiana license numbers must be affixed.

2. The Owner is the St. Tammany Parish Government (the "Parish").

3. The terms "he/his" and "it/its" may be used interchangeably.

4. The terms "Owner," the "Parish," and "St. Tammany Parish" may be used interchangeably.

5. The successful Bidder understands the limited contract time in the contract is **Three Hundred Sixty five (365) Calendar Days**, and shall submit any request for an extension of time in accordance with the General and Supplementary Conditions. Said request will reflect the days requested and the reason for same. No extension request is guaranteed or absolute.

6. Bidder specifically understands that acknowledgment of the General Conditions is required. Bidder specifically understands that signature of receipt of the General Conditions is mandated. **The Bidder's signature on the "Louisiana Uniform Public Work Bid Form" will serve as acknowledgment of the Bidder's receipt and understanding of the General Conditions as well as any Supplementary Conditions.**

7. ***If any additional work*** **is performed by the contractor without *written approval* by owner, the cost of the work will be borne by the contractor and will not be reimbursed by the Parish.**

8. **Only** the Louisiana Uniform Public Bid Form, the Unit Price Form (if necessary), the bid security, and written evidence of authority of person signing the bid shall be submitted on or before the bid opening time and date provided for in the Bid Documents. Necessary copies of the Louisiana Uniform Public Work Forms and Unit Price Forms (if necessary) will be furnished for Bidding. Bound sets of the Contract Documents are for Bidder's information and should not be used in submitting Bids.

9. All other documents and information required are to be submitted by the low Bidder within ten (10) days after the opening of the bids, and at the same time of day and location as given for the opening of the bids in the Bid Documents.

10. Each Bid must be submitted in a sealed envelope, unless submitted electronically. The outside of the envelope shall show the name and address of the Bidder, the State Contractor's License Number of the Bidder (if work requires contractor's license), and the Project name and the Bid number. In the case of an electronic bid proposal, a contractor may submit an authentic digital signature on the electronic bid proposal accompanied by the contractor's license number, Project name and the Bid number.

11. The price quoted for the Work shall be stated in words and figures on the Bid Form, and in figures only on the Unit Price Form. The price in the Bid shall include all costs necessary for the complete performance of the Work in full conformity with the conditions of the Contract Documents, and shall include all applicable Federal, State, Parish, Municipal or other taxes. The price bid for the items listed on the Unit Price Form will include the cost of all related items not listed, but which are normally required to do the type of Work bid.

12. The Bid shall be signed by the Bidder. The information required on the Louisiana Uniform Public Work Bid Form must be provided. Evidence of agency, corporate, or partnership authority is required and shall be provided in conformance with LSA-R.S. 38:2212(B).

13. Only a Contractor licensed by the State to do the type of Work as indicated on the Notice to Bidders can submit a Bid. The Bidder's signature on the Bid Form certifies that he holds an active license under the provisions of Chapter 24 of Louisiana Revised Statutes Title 37. Failure to be properly licensed constitutes authority for the Owner to reject the Bid.

14. Bidders shall not attach any conditions or provisions to the Bid. Any conditions or provisions so attached may, at the sole option of the Owner, cause rejection of the Bid.

15. A Bid Guarantee of five percent (5%) of the amount of the total Bid, including Alternates, must accompany the Proposal and, at the option of the Bidder, may be a cashier's check, certified check or a satisfactory Bid Bond. The Bid Guarantee must be attached to the Louisiana Uniform Public Work Bid Form. No Bid will be considered unless it is so guaranteed. Cashier's check or certified check must be made payable to the order of the Owner. Cash deposits will not be accepted. The Owner reserves the right to cash or deposit the cashier's check or certified check. Such guarantees shall be made payable to the Parish of St. Tammany. In accordance with LSA-R.S. 38:2218(C), if a bid bond is used, it shall be written by a surety or insurance company currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register, or by a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best's Key Rating Guide to write individual bonds up to ten percent of policyholders' surplus as shown in the A.M. Best's Key Rating Guide or by an insurance company in good standing licensed to write bid bonds which is either domiciled in Louisiana or owned by Louisiana residents. It is **not** required to be on any AIA form.

16. Bid securities of the three (3) lowest Bidders will be retained by the Owner until the Contract is executed or until final disposition is made of the Bids submitted. Bid securities of all other Bidders will be returned promptly after the canvas of Bids. Bids shall remain binding for forty-five (45) days after the date set for Bid Opening. The Parish shall act within the forty-five (45) days to award the contract to the lowest responsible bidder or reject all bids. However, the Parish and the lowest responsible bidder, by mutual written consent, may agree to extend the deadline for award by one or more extensions of thirty (30) calendar days. In the event the Owner issued the Letter of Award during this period, or any extension thereof, the Bid accepted shall continue to remain binding until the execution of the Contract.

17. A Proposal may be withdrawn at any time prior to the scheduled closing time for receipt of Bids, provided the request is in writing, executed by the Bidder or its duly authorized representative and is filed with the Owner prior to that time. When such a request is received, the Proposal will be returned to the Bidder unopened. A bid withdrawn under the provisions of LSA-R.S. 38:2214(C) cannot be resubmitted.

18. Written communications, over the signature of the Bidder, to modify Proposals will be accepted and the Proposal corrected in accordance therewith if received by the Owner prior to the scheduled closing time for receipt of Bids. Oral, telephonic or telegraphic Modifications will not be considered.

19. No oral interpretation obligating the Owner will be made to any Bidder as to the meaning of the Drawings, Specifications and Contract Documents. Every request for such an interpretation shall be made in writing and addressed and forwarded to the Owner. Inquiries received within seven (7) days prior to the day fixed for opening of the Bids may not be given consideration. Every interpretation made to the Bidder shall be in the form of an addendum to the Specifications. All such Addenda shall become part of the Contract Documents. Failure of the Owner to send or failure of Bidder to receive any such interpretation shall not relieve any Bidder from any obligation under this Bid as submitted without Modification. All Addenda shall be issued in accordance with the Public Bid Law, LSA-R.S. 38:2212(O).

20. The Owner reserves the right to reject any or all Bids for just cause in accordance with the Public Bid Law, LSA-R.S. 38:2214(B). Incomplete, informal, illegible, or unbalanced Bids may be rejected. Reasonable grounds for belief that any one Bidder is concerned directly or indirectly with more than one Bid will cause rejection of all Bids wherein such Bidder

is concerned. If required, a Bidder shall furnish satisfactory evidence of its competence and ability to perform the Work stipulated in its Proposal. Incompetence will constitute cause for rejection. If the Parish determines that the bidder is not responsive or responsible for any reason whatsoever, the bid may be rejected in accordance with State law.

21. The Contractor shall indemnify and hold harmless the Owner from any and all suits, costs, penalties or claims for infringement by reason of use or installation of any patented design, device, material or process, or any trademark and copyright in connection with the Work agreed to be performed under this Contract, and shall indemnify and hold harmless the Owner for any costs, expenses and damages which it may be obliged to pay by reason of any such infringement at any time during the prosecution or after completion of the Work.

22. Bidders shall familiarize themselves with and shall comply with all applicable Federal and State Laws, municipal ordinances and the rules and regulations of all authorities having jurisdiction over construction of the Project, which may directly or indirectly affect the Work or its prosecution. These laws and/or ordinances will be deemed to be included in the Contract, as though herein written in full.

23. Each Bidder shall visit the site of the proposed Work and fully acquaint itself with all surface and subsurface conditions as they may exist so that it may fully understand this Contract. Bidder shall also thoroughly examine and be familiar with drawings, Specifications and Contract Documents. The failure or omission of any Bidder to receive or examine any form, instrument, Drawing or document or to visit the site and acquaint itself with existing conditions shall in no way relieve any Bidder from any obligation with respect to its Bid and the responsibility in the premises.

24. The standard contract form enclosed with the Proposal documents is a prototype. It is enclosed with the Contract Documents for the guidance of the Owner and the Contractor. It has important legal consequences in all respects and consultation with an attorney is encouraged. Contractor shall be presumed to have consulted with its own independent legal counsel.

25. When one set of Contract plans show the Work to be performed by two or more prime Contractors, it is the responsibility of each Bidder to become knowledgeable of the Work to be performed by the other where the Work upon which this bid is submitted is shown to come into close proximity or in conflict with the Work of the other. In avoiding conflicts, pressure pipe lines must be installed to avoid conflict with gravity pipe lines and the Bidder of the smaller gravity pipe line in conflict with the larger gravity pipe line must include in his Bid the cost of a conflict box at these locations. The location of and a solution to the conflicts do not have to be specifically noted as such on the plans.

26. Bidder shall execute affidavit(s) attesting compliance with LSA-R.S. 38:2212.10, 38:2224, 38:2227, each as amended, and other affidavits as required by law, prior to execution of the contract.

27. Sealed Bids shall be delivered to St. Tammany Parish Government at the office of **St. Tammany Parish Government, Department of Procurement, 21454 Koop Drive, Suite 2-F, Mandeville, LA 70471**, and a receipt given, until the time and date denoted in Notice to Bidders, at which time and place the Bids shall be publicly opened and read aloud to those present. In accordance with LSA-R.S. 38:2212(H), the designer's final estimated cost of construction shall be read aloud upon opening bids. Sealed Bids may also be mailed by certified mail to **St. Tammany Parish Government, Department of Procurement, 21454 Koop Drive, Suite 2-F, Mandeville, LA 70471**, and must be received before the bid opening. Bids may also be submitted electronically. Information concerning links for electronic bidding is contained in the Notice to Bidders. It is the responsibility of the Bidders to insure that bids are delivered in a timely fashion. **Late bids, regardless of reason, will not be considered, and will be returned to bidder.**

28. Paper bids shall be placed in a sealed envelope, marked plainly and prominently as indicated in the Notice to Bidders, and these Instructions, and addressed:

St. Tammany Parish Government
Department of Procurement
21454 Koop Drive, Suite 2-F
Mandeville, LA 70471

29. Complete sets of Drawings, Specifications and Contract Documents may be secured at the Office of the Owner or on the Parish website http://www.stpgov.org. See Notice to Bidders for deposit schedule and availability via electronic methods.

30. The successful Bidder shall be required to post in each direction a public information sign, 4' x 4' in size, at the location of the project containing information required by the Owner. The Owner shall supply this information.

31. The award of the Contract, if it is awarded, will be to the lowest responsible Bidder, in accordance with State Law. No award will be made until the Owner has concluded such investigations as it deems necessary to establish the responsibility, qualifications, and financial ability and stability of the Bidder to do the Work in accordance with the Contract Documents to the satisfaction of the Owner within the time prescribed as established by the Department based upon the amount of work to be performed and the conditions of same. The written contract and bond shall be issued in conformance with LSA-R.S. 38:2216. If the Contract is awarded, the Owner shall give the successful Bidder written notice of the award within forty-five (45) calendar days after the opening of the Bids in conformance with LSA-R.S. 38:2215(A), or any extension as authorized thereunder.

32. At least three days prior to the execution of the Contract, the Contractor shall deliver to the Owner the required Bonds.

33. Failure of the successful Bidder to execute the Contract and deliver the required Bonds within twenty (20) days of the Notice of the Award shall be just cause for the Owner to annul the award and declare the Bid and any guarantee thereof forfeited. Award may then be made to the next lowest responsible bidder.

34. In order to ensure the faithful performance of each and every condition, stipulation and requirement of the Contract and to indemnify and hold harmless the Owner from any and all damages, either directly or indirectly arising out of any failure to perform same, the successful Bidder to whom the Contract is awarded shall furnish a Performance and Payment Bond in an amount of at least equal to one hundred percent (100%) of the Contract Price. The Contract shall not be in force or binding upon the Owner until such satisfactory Bond has been provided to and approved by the Parish. The cost of the Bond shall be paid for by the Contractor unless otherwise stipulated in the Special Provisions.

35. No surety Company will be accepted as a bondsman which has no permanent agent or representative in the State upon whom notices referred to in the General Conditions of these Specifications may be served. Service of said notice on said agent or representative in the State shall be equal to service of notice on the President of the Surety Company, or such other officer as may be concerned.

36. In conformance with LSA-R.S. 38:2219(A)(1)(a), (b), and (c):

> Any surety bond written for a public works project shall be written by a surety or insurance company currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register, or by a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best's Key Rating Guide, to write individual bonds up to ten percent of policyholders' surplus as shown in the A.M. Best's Key Rating Guide or by an insurance company that is either domiciled in Louisiana or owned by Louisiana residents and is licensed to write surety bonds.
>
> For any public works project, no surety or insurance company shall write a bond which is in excess of the amount indicated as approved by the U.S. Department of the Treasury Financial Management Service list or by a Louisiana domiciled insurance company with an A- rating by A.M. Best up to a limit of ten percent of policyholders' surplus as shown by A.M. Best; companies authorized by this Paragraph who are not on the treasury list shall not write a bond when the penalty exceeds fifteen percent of its capital and surplus, such capital and surplus being the amount by which the company's assets exceed its liabilities as reflected by the most recent financial statements filed by the company with the Department of Insurance.
>
> In addition, any surety bond written for a public works project shall be written by a surety or insurance company that is currently licensed to do business in the state

of Louisiana. All contractors must comply with any other applicable provisions of LSA-R.S. 38:2219.

37. Should the Contractor's Surety, even though approved and accepted by the Owner, subsequently remove its agency or representative from the State or become insolvent, bankrupt, or otherwise fail, the Contractor shall immediately furnish a new Bond in another company approved by the Owner, at no cost to the Owner. The new Bond shall be executed under the same terms and conditions as the original Bond. The new bond shall be submitted within thirty (30) days of such time as the Owner notifies Contractor or from the time Contractor learns or has reason to know that the original surety is no longer financially viable or acceptable to the Parish, whichever occurs first. In the event that Contractor fails or refuses to timely secure additional surety, then the Owner may secure such surety and thereafter deduct such cost or expense from any sum due, or to become due to Contractor.

38. The Contractor's bondsman shall obligate itself to all the terms and covenants of these Specifications and of contracts covering the Work executed hereunder. The Owner reserves the right to do Extra Work or make changes by altering, adding to deducting from the Work under the conditions and in the manner herein before described without notice to the Contractor's surety and without in any manner affecting the liability of bondsman or releasing it from any of its obligations hereunder.

39. The Bond shall also secure for the Owner the faithful performance of the Contract in strict accordance with plans, specifications, and other Contract Documents. It shall protect the Owner against all lien laws of the State and shall provide for payment of reasonable attorney's fees for enforcement of Contract and institution or concursus proceedings, if such proceedings become necessary. Likewise, it shall provide for all additional expenses of the Owner occurring through failure of the Contractor to perform.

40. The surety of the Contractor shall be and does hereby declare and acknowledge itself by acceptance to be bound to the Owner as a guarantor, jointly and in solido, with the Contractor, for fulfillment of terms of the Contract.

41. The performance Bond and Labor and Material Bond forming part of this Contract shall be continued by Contractor and its Surety for a period of one (1) year from date of acceptance of the Work/Project by Owner to assure prompt removal and replacement of all defective material, equipment, components thereof, workmanship, etc., and to assure payment of any damage to property of Owner or others as a result of such defective materials, equipment, workmanship, etc.

42. Contractor shall pay for cost of recording the Contract, Bond, and any change orders required to be recorded, as well as the cost of canceling any of the foregoing. Contractor shall also secure and pay for all Clear Lien and Privilege Certificates (together with any updates) which will be required before any final payment is made, and that may be required before any payment, at the request of the Owner, its representative, agent, architect, engineer and the like. All recordation and Clear Lien and Privilege Certificate requirements shall be in accordance with those requirements noted herein before in contract Specifications.

43. Contractor shall secure and maintain at its expense such insurance that will protect it and the Parish from claims for injuries to persons or damages to property which may arise from or in connection with the performance of Services or Work hereunder by the Contractor, his agents, representatives, employees, and/or subcontractors. The cost of such insurance shall be included in Contractor’s bid.

44. The Contractor shall not commence work until it has obtained all insurance as required for the Parish Project. If the Contractor fails to furnish the Parish with the insurance protection required and begins work without first furnishing Parish with a currently dated certificate of insurance, the Parish has the right to obtain the insurance protection required and deduct the cost of insurance from the first payment due the Contractor. Further deductions are permitted from future payments as are needed to protect the interests of the Parish including, but not limited to, renewals of all policies.

45. Payment of Premiums: The insurance companies issuing the policy or policies shall have no recourse against the Parish of St. Tammany for payment of any premiums or for assessments under any form of policy.

46. Deductibles: Any and all deductibles in the described insurance policies shall be assumed by and be at the sole risk of the Contractor.

47. Authorization of Insurance Company(ies) and Rating: All insurance companies must be authorized to do business in the State of Louisiana and shall have an A.M. Best rating of no less than A-, Category VII.

48. Policy coverages and limits must be evidenced by Certificates of Insurance issued by Contractor's carrier to the Parish and shall reflect:

    Date of Issue: Certificate must have current date.

    Named Insured: The legal name of Contractor under contract with the Parish and its principal place of business shall be shown as the named insured on all Certificates of Liability Insurance.

    Name of Certificate Holder: St. Tammany Parish Government, Office of Risk Management, P. O. Box 628, Covington, LA 70434

    Project Description: A brief project description, including Project Name, Project Number and/or Contract Number, and Location.

    Endorsements and Certificate Reference: All policies must be endorsed to provide, and certificates of insurance must evidence the following:

        Waiver of Subrogation: The Contractor's insurers will have no right of recovery or subrogation against the Parish of St. Tammany, it being the intention of the parties that all insurance policy(ies) so affected shall protect both parties and be the primary coverage for any and all losses covered by the below described insurance. *Policy endorsements required for all coverages*.

        Additional Insured: The Parish of St. Tammany shall be named as additional named insured with respect to general liability, marine liability, pollution/environmental liability, automobile liability and excess liability coverages. *Policy endorsements required.*

        Hold Harmless: Contractor's liability insurers shall evidence their cognizance of the Hold Harmless and Indemnification in favor of St. Tammany Parish Government by referencing same on the face of the Certificate(s) of Insurance.

        Cancellation Notice: Producer shall provide thirty (30) days prior written notice to the Parish of policy cancellation or substantive policy change.

49. The types of insurance coverage the Contractor is required to obtain and maintain throughout the duration of the Contract shall be designated by a separate document issued by the Office of Risk Management.

50. It is the intent of these instructions that they are in conformance with State Bid Laws. Should there be any discrepancy or ambiguity in these provisions, the applicable State Bid Law shall apply.

51. The letting of any public contract in connection with funds that are granted or advanced by the United States of America shall be subject to the effect, if any, of related laws of said United States and valid rules and regulations of federal agencies in charge, or governing use and payment of such federal funds.

52. Protests based on alleged solicitation improprieties that are apparent before bid opening, or the time set for receipt of initial proposals must be filed with and received by the Procurement Department BEFORE these times. Any other protest shall be filed no later than ten (10) calendar days after: the opening of the bid; the basis of the protest is known; or the basis of the protest should have been known (whichever is earlier).

53. It is the Parish's policy to provide a method to protest exclusion from a competition or from the award of a contract, or to challenge an alleged solicitation irregularity. It is always

better to seek a resolution within the Parish system before resorting to outside agencies and/or litigation to resolve differences. All protests must be made in writing, and shall be concise and logically presented to facilitate review by the Parish. The written protest shall include:

The protester's name, address, and fax and telephone numbers and the solicitation, bid, or contract number;

A detailed statement of its legal and factual grounds, including a description of the resulting prejudice to the protester;

Copies of relevant documents;

All information establishing that the protester is an interested party and that the protest is timely; and

A request for a ruling by the agency; and a statement of the form of relief requested.

The protest shall be addressed to St. Tammany Parish Government Department of Procurement, P.O. Box 628, Covington, LA 70434

The protest review shall be conducted by the Parish Legal Department.

Only protests from interested parties will be allowed. Protests based on alleged solicitation improprieties that are apparent before bid opening, or the time set for receipt of initial proposals, must be filed with and received by the Department of Procurement BEFORE those deadlines.

Any other protest shall be filed no later than ten (10) calendar days after the basis of the protest is known, or should have been known (whichever is earlier).

The Parish will use its best efforts to resolve the protest within thirty (30) days of the date that it is received by the Parish. The written response will be sent to the protestor via mail and fax, if a fax number has been provided by the protestor. The protester can request additional methods of notification.

54. The last day to submit questions and/or verification on comparable products will be no later than 2:00 pm CST, seven (7) working days prior to the opening date of the bid/proposal due date. Further, any questions or inquires must be submitted via fax to 985-898-5227, or via email to Purchasing@stpgov.org. Any questions or inquiries received after the required deadline to submit questions or inquiries will not be answered.

55. St. Tammany Parish Government contracts to be awarded are dependent on the available funding and/or approval by members designated and/or acknowledged by St. Tammany Parish Government. At any time St. Tammany Parish Government reserves the right to cancel the award of a contract if either or both of these factors is deficient.

56. Any action by the Parish to disqualify any Bidder on the grounds that they are not a responsible Bidder shall be conducted in accordance with LSA-R.S. 38:2212(X).

57. If any part of the provisions contained herein and/or in the Specifications and Contract for the Work shall for any reason be held invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provisions of this Agreement or attachment, but it shall be construed as if such invalid, illegal, or unenforceable provision or part of a provision had never been contained herein.

Section 03

Summary of Work

I. Work to Include:

The work to be preformed shall comprises the construction of a new wastewater treatment structures, including, but not limited to:

- Construction of a new package wastewater treatment plant with associated blowers, pumps, and other equipment;
- Construction of a new flow equalization tank with associated blowers, pumps and other equipment;
- Construction of a new influent screens;
- Construction of a new effluent pump station and force main;
- Improvements to the existing chlorine contact tanks; and
- Associated civil, electrical and control work as required.

II. Location of Work:

Existing West St. Tammany Wastewater Treatment Plant Site located at 108 LA HWY 1085 west of the intersection of LA 1085 and Winward Drive, Madisonville, LA

III. Documents: Bid Documents dated July 30, 2021, and entitled:

West St. Tammany WWTP Expansion

Bid No. 21-21-2

IV. OTHER REQUIREMENTS (as applicable)

When not otherwise specified herein, all work and materials shall conform to the requirements of the Louisiana Department of Transportation and Development hereafter called LDOTD (2006 Edition of Louisiana Standard Specifications for Roads and Bridges).

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: St. Tammany Parish Government
21454 Koop Dr., Suite 2F
Mandeville, La 70471
(Owner to provide name and address of owner)

BID FOR: West St. Tammany WWTP Expansion
Bid No. 21-21-2
(*Owner to provide name of project and other identifying information.)*

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: Kyle Associates, LLC and dated: July 30, 2021.
(Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____ .

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____ Dollars ($ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

NOT APPLICABLE Dollars ($ N/A)

Alternate No. 2 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

NOT APPLICABLE Dollars ($ N/A)

Alternate No. 3 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

NOT APPLICABLE Dollars ($ N/A)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

**** A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

AFFIDAVIT PURSUANT TO LSA-R.S. 38:2224 and 38:2227 FOR BIDDERS FOR PUBLIC WORKS CONTRACTS

STATE OF _____

PARISH/COUNTY OF _____

BEFORE ME, the undersigned authority, in and for the above stated State and Parish (or County), personally came and appeared:

_____

Print Name

who, after first being duly sworn, did depose and state:

1. That affiant is appearing on behalf of _____, who is seeking a public contract with St. Tammany Parish Government.

2. That affiant employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project or in securing the public contract were in the regular course of their duties for affiant; and

3. That no part of the contract price received by affiant was paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the contract, other than the payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project were in the regular course of their duties for affiant.

4. If affiant is a sole proprietor, that after July 2, 2010, he/she has not been convicted of, or has not entered a plea of guilty or nolo contendere to any of the crimes or equivalent federal crimes listed in LSA-R.S. 38:2227(B).

5. If affiant is executing this affidavit on behalf of a juridical entity such as a partnership, corporation, or LLC, etc., that no individual partner, incorporator, director, manager, officer, organizer, or member, who has a minimum of a ten percent ownership in the bidding entity, has been convicted of, or has entered a plea of guilty or *nolo contendere* to any

of the crimes or equivalent federal crimes listed in LSA-R.S. 38:2227(B).

6. If affiant is a sole proprietor, that neither affiant, nor his/her immediate family is a public servant of St. Tammany Parish Government or the Contract is not under the supervision or jurisdiction of the public servant's agency.

7. If affiant is executing this affidavit on behalf of a juridical entity such as a partnership, corporation, or LLC, etc., that no public servant of St. Tammany Parish Government, or his/her immediate family, either individually or collectively, has more than a 25% ownership interest in the entity seeking the Contract with St. Tammany Parish Government if the Contract will be under the supervision or jurisdiction of the public servant's agency.

_____

Printed Name: _____

Title: _____

Entity name: _____

THUS SWORN TO AND SUBSCRIBED BEFORE ME,

THIS_____, DAY OF _____, 202__.

_____

Notary Public

Print Name: _____

Notary I.D./Bar No.: _____

My commission expires: _____

AFFIDAVIT PURSUANT TO LSA-R.S. 38:2212.10 CONFIRMING REGISTRATION AND PARTICIPATION IN A STATUS VERIFICATION SYSTEM

STATE OF _____

PARISH/COUNTY OF _____

BEFORE ME, the undersigned authority, in and for the above stated State and Parish (or County), personally came and appeared:

_____

Print Name

who, after first being duly sworn, did depose and state:

1. That affiant is appearing on behalf of _____, a private employer seeking a bid or a contract with St. Tammany Parish Government for the physical performance of services within the State of Louisiana.

2. That affiant is registered and participates in a status verification system to verify that all employees in the state of Louisiana are legal citizens of the United States or are legal aliens; and

3. That affiant shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.

4. That affiant shall require all subcontractors to submit to the affiant a sworn affidavit verifying compliance with this law.

_____

Printed Name: _____

Title: _____

Name of Entity: _____

THUS SWORN TO AND SUBSCRIBED BEFORE ME,
THIS_____, DAY OF _____, 202__.

_____

Notary Public

Print Name: _____

Notary I.D./Bar No.: _____

My commission expires: _____

INSURANCE REQUIREMENTS*

Construction Project: WEST ST TAMMANY WWTP EXP

Bid#: 21-21-2

IMPORTANT – PLEASE READ

Prior to submitting your quote or bid, it is recommended that you review these insurance requirements with your insurance broker/agent.

These requirements modify portions of the insurance language found in the General Conditions and/or* Supplementary *General Conditions; however, there is no intention to remove all sections pertaining to insurance requirements and limits set forth in the General Conditions and/or Supplementary General Conditions, only to amend and specify those items particular for this Project.

A. The Provider shall secure and maintain at its expense such insurance that will protect it and St. Tammany Parish Government (the "Parish") from claims for bodily injury, death or property damage as well as from claims under the Workers' Compensation Acts that may arise from the performance of services under this agreement. All certificates of insurance shall be furnished to the Parish and provide thirty (30) days prior notice of cancellation to the Parish, in writing, on all of the required coverage.

B. All policies shall provide for and certificates of insurance shall indicate the following:

1. Waiver of Subrogation: The Provider's insurers will have no right of recovery or subrogation against the Parish of St. Tammany, it being the intention of the parties that all insurance policy(ies) so affected shall protect both parties and be the primary coverage for any and all losses covered by the below described insurance.

2. Additional Insured: St. Tammany Parish Government shall be named as Additional Insured with respect to general liability, automobile liability and excess liability coverages, as well as marine liability and pollution/environmental liability, when those coverages are required or necessary.

3. Payment of Premiums: The insurance companies issuing the policy or policies will have no recourse against St. Tammany Parish Government for payment of any premiums or for assessments under any form of policy.

4. Deductibles/Self-Insured Retentions: Any deductibles and/or self-insured retentions in the described insurance policies **must be declared on the Certificate of Insurance,** and are both assumed by and the sole risk of the Provider. The Parish will have the sole discretion to accept or reject deductibles and/or self-insured retentions exceeding $100,000 as it deems appropriate. The Parish may require Provider to produce evidence of verifiable financial ability to satisfy its deductibles and/or self-insured retentions; however, the Parish assumes no liability or obligation resulting from its examination, acceptance, or rejection of information presented.

5. Project Reference: The project(s) and location(s) shall be referenced in the Comment or Description of Operations section of the Certificate of Insurance (Project ##-###, or Bid # if applicable, Type of Work, Location).

C. Coverage must be issued by insurance companies authorized to do business in the State of Louisiana. Companies must have an A.M. Best rating of no less than A-, Category VII. St. Tammany Parish Risk Management Department may waive this requirement only for Workers Compensation coverage at their discretion.

Provider shall secure and present proof of insurance on forms acceptable to St. Tammany Parish Government, Office of Risk Management no later than the time of submission of the Contract to the Parish. However, should any work performed under this Contract by or on behalf of Provider include exposures that are not covered by those insurance coverages, Provider is not relieved of its obligation to maintain appropriate levels and types of insurance necessary to protect itself, its agents and employees, its subcontractors, St. Tammany Parish Government (Owner), and all other interested third parties, from any and all claims for damage or injury in connection with the services performed or provided throughout the duration of this Project, as well as for any subsequent periods required under this Contract.

The insurance coverages checked (✓) below are those required for this Contract.

☑ 1. **Commercial General Liability*** insurance – **Occurrence Form** - with a Combined Single Limit for bodily injury and property damage of at least $1,000,000 per Occurrence / $2,000,000 General Aggregate and $2,000,000 Products-Completed Operations. Contracts over $1,000,000 may require higher limits. The insurance shall provide for and the certificate(s) of insurance shall indicate the following coverages:

a) Premises - operations;
b) Broad form contractual liability;
c) Products and completed operations;
d) Personal/Advertising Injury;
e) Broad form property damage (for Projects involving work on Parish property);
f) Explosion, Collapse and Damage to underground property.
g) Additional Insured forms CG 2010 and CG 2037 in most current edition are required.

☑ 2. **Business Automobile Liability*** insurance with a Combined Single Limit of $1,000,000 per Occurrence for bodily injury and property damage, and shall include coverage for the following:

a) Any auto;
or
b) Owned autos; **and**
c) Hired autos; **and**
d) Non-owned autos.

☑ 3. **Workers' Compensation/Employers Liability insurance*** - Workers' Compensation coverage as required by State law. Employers' liability limits shall be a minimum of $1,000,000 each accident, $1,000,000 each disease, $1,000,000 disease policy aggregate. When water activities are expected to be performed in connection with this project, coverage under the USL&H Act, Jones Act and/or Maritime Employers Liability (MEL) must be included. **Coverage for owners, officers and/or partners in any way engaged in the Project shall be included in the policy.** The names of any excluded individual must be shown in the Description of Operations/Comments section of the Certificate**.**

☑ 4. **Pollution Liability and Environmental Liability*** insurance in the minimum amount of $1,000,000 per occurrence / $2,000,000 aggregate including full contractual liability and third party claims for bodily injury and/or property damage, for all such hazardous waste, pollutants and/or environmental exposures that may be affected by this project stemming from pollution/environmental incidents as a result of Contractor's operations.

If coverage is provided on a claims-made basis, the following conditions apply:

1) the retroactive date must be prior to or coinciding with the effective date of the Contract, or prior to the commencement of any services provided by the Contractor on behalf of the Parish, whichever is earlier; AND
2) continuous coverage must be provided to the Parish with the same retro date for 24 months following acceptance or termination of the Project by the Parish either by
    a) continued renewal certificates **OR**
    b) a 24 month Extended Reporting Period

*The Certificate must indicate whether the policy is written on an occurrence or claims-made basis and, if claims-made, the applicable retro date must be stated.

☑ 5. **Contractor's Professional Liability/Errors and Omissions*** insurance in the sum of at least $1,000,000 per claim / $2,000,000 aggregate is required when work performed by Contractor or on behalf of Contractor includes professional or technical services including, but not limited to, construction administration and/or management, engineering services such as design, surveying, and/or inspection, technical services such as testing and laboratory analysis, and/or environmental assessments. An occurrence basis policy is preferred.

If coverage is provided on a claims-made basis, the following conditions apply:

1) the retroactive date must be prior to or coinciding with the effective date of the Contract, or prior to the commencement of any services provided by the Contractor on behalf of the Parish, whichever is earlier; AND
2) continuous coverage must be provided to the Parish with the same retro date for 24 months following acceptance or termination of the Project by the Parish either by
    a) continued renewal certificates **OR**
    b) a 24 month Extended Reporting Period

*The Certificate must indicate whether the policy is written on an occurrence or claims-made basis and, if claims-made, the applicable retro date must be stated.

☐ 6. **Marine Liability/Protection and Indemnity*** insurance is required for any and all vessel and/or marine operations in the minimum limits of $1,000,000 per occurrence / $2,000,000 per project general aggregate. The coverage shall include, but is not limited to, the basic coverages found in the Commercial General Liability insurance and coverage for third party liability

*__Excess/Umbrella Liability__ insurance may be provided to meet the limit requirements for any Liability coverage. For example: if the General Liability requirement is $3,000,000 per occurrence, but the policy is only $1,000,000 per occurrence, then the excess policy should be at least $2,000,000 per occurrence thereby providing a combined per occurrence limit of $3,000,000.)

☑ 7. **Owners Protective Liability (OPL)** shall be furnished by the Contractor and shall provide coverage in the minimum amount of $3,000,000 CSL each occurrence / $3,000,000 aggregate. **St. Tammany Parish Government, ATTN: Risk Management Department, P. O. Box 628, Covington, LA 70434 shall be the first named insured on the policy**.

☑ 8. **Builder's Risk Insurance** written on an "all-risk" policy form shall be furnished by Contractor for 100% of the contract cost. Any contract modifications increasing the contract cost will require an increase in the limit of the Builder's Risk policy. Deductibles should not exceed $5,000 and Contractor shall be responsible for all policy deductibles. This insurance shall cover materials at the site, stored off the site, and in transit. The Builder's Risk Insurance shall include the interests of the Owner, Contractor and Subcontractors and shall terminate only when the Project is accepted in writing. **St. Tammany Parish Government, ATTN: Risk Management Department, P. O. Box 628, Covington, LA 70434 shall be the first named insured on the policy**.

☐ 9. **Installation Floater Insurance**, on an "all-risk" form, shall be furnished by Contractor and carried for the full value of the materials, machinery, equipment and labor for each location. The Contractor shall be responsible for all policy deductibles. The Installation Floater Insurance shall provide coverage for property owned by others and include the interests of the Owner, Contractor and Subcontractors and shall terminate only when the Project is accepted in writing. **St. Tammany Parish Government, ATTN: Risk Management Department, P. O. Box 628, Covington, LA 70434 shall be the first named insured on the policy**.

D. All policies of insurance shall meet the requirements of the Parish prior to the commencing of any work. The Parish has the right, but not the duty, to approve all insurance coverages prior to commencement of work. If any of the required policies are or become unsatisfactory to the Parish as to form or substance; or if a company issuing any policy is or becomes unsatisfactory to the Parish, the Provider shall promptly obtain a new policy, timely submit same to the Parish for approval, and submit a certificate thereof as provided above. The Parish agrees not to unreasonably withhold approval of any insurance carrier selected by Provider. In the event that Parish cannot agree or otherwise authorize a carrier, Provider shall have the option of selecting and submitting a new insurance carrier within 30 days of said notice by the Parish. In the event that the second submission is insufficient or is not approved, then the Parish shall have the unilateral opportunity to thereafter select a responsive and responsible insurance carrier all at the cost of Provider and thereafter deduct from Provider's fee the cost of such insurance.

E Upon failure of Provider to furnish, deliver and/or maintain such insurance as above provided, this contract, at the election of the Parish, may be declared suspended, discontinued or terminated. Failure of the Provider to maintain insurance shall not relieve the Provider from any liability under the contract, nor shall the insurance requirements be construed to conflict with the obligation of the Provider concerning indemnification.

F. Provider shall maintain a current copy of all annual insurance policies and agrees to provide a certificate of insurance to the Parish on an annual basis or as may be reasonably requested for the term of the contract or any required Extended Reporting Period. Provider further shall ensure that all insurance policies are maintained in full force and effect throughout the duration of the Project and shall provide the Parish with annual renewal certificates of insurance evidencing continued coverage, without any prompting by the Parish.

G. It shall be the responsibility of Provider to require that these insurance requirements are met by all contractors and sub-contractors performing work for and on behalf of Provider. Provider shall further ensure the Parish is named as an additional insured on all insurance policies provided by said contractor and/or sub-contractor throughout the duration of the project.

H. Certificates of Insurance shall be issued as follows:

St. Tammany Parish Government
Attn: Risk Management
P O Box 628
Covington, LA 70434

To avoid contract processing delays, be certain the project name/number is included on all correspondence including Certificates of Insurance.

***NOTICE*: St. Tammany Parish Government reserves the rights to remove, replace, make additions to and/or modify any and all of the insurance requirements at any time.**

Any inquiry regarding these insurance requirements should be addressed to:

St. Tammany Parish Government
Office of Risk Management
P O Box 628
Covington, LA 70434
Telephone: 985-898-2797
Fax: 985-898-3070
Email: riskman@stpgov.org

SECTION 06

HOLD HARMLESS AGREEMENT

_____ (Contractor) agrees to protect, defend, indemnify, save, and hold harmless St. Tammany Parish Government, its elected and appointed officials, departments, agencies, boards and commissions, its officers, agents servants, employees, including volunteers, from and against any and all claims, demands, expense and liability arising out of injury or death to any person or the damage, loss or destruction of any property to the extent caused by any act or omission of Contractor, its agents, servants, employees, and subcontractors, or any and all costs, expense and/or attorney fees incurred as a result of any claim, demands, and/or causes of action that results under the performance or non-performance of this contract.

_____ (Contractor) agrees to investigate, handle, respond to, provide defense for and defend any such claims, demand, or suit, as described in the paragraph above, at its sole expense and agrees to bear all other costs and expenses related thereto, even if it (claims, etc.) is groundless, false or fraudulent.

SIGNED, this ____ day of _____, 20___

WITNESSES:

_____

Print Name: _____

_____

Print Name: _____

_____
(Name of Contractor)

BY:_____
(Signature of Authorized Officer)

Print Name: :_____

Title: _____

STATE OF _____

PARISH/COUNTY OF_____

SWORN TO and subscribed before me, Notary, on this ____ day of _____, 20___.

_____
NOTARY PUBLIC

My Commission Expires: _____

Please complete the following:

Claims contact for this project will be:

_____
(Print name and title of Contact Person)

_____
Address

_____
Email address

_____ _____ _____
Telephone# Cell # Fax #

Section 07

Project Signs

1. General

a. Work to include providing and installing project sign(s) at the beginning of the project. Some projects may require multiple signs. Should more than one sign be required, it will be reflected in the bidding documents.

2. Materials

a. The printed project sign(s) shall be 3/8" primed Medium Density Overlay (MDO) **OR** 3 millimeter corrugated plastic secured to exterior plywood (4' x 4').

b. Contractor shall not use previously provided templates and/or fonts.

3. Execution

a. The sign(s) shall be printed on a project-by-project basis in black and white, using the template and font provided to the Contractor by the St. Tammany Parish Government Project Manager.

b. All signage proofed and approved by State Tammany Parish Government before project sign(s) are to be produced by the Contractor.

c. Exact placement of the project sign(s) must be coordinated with, and approved by, the St. Tammany Parish Government Project Manager prior to sign installation.

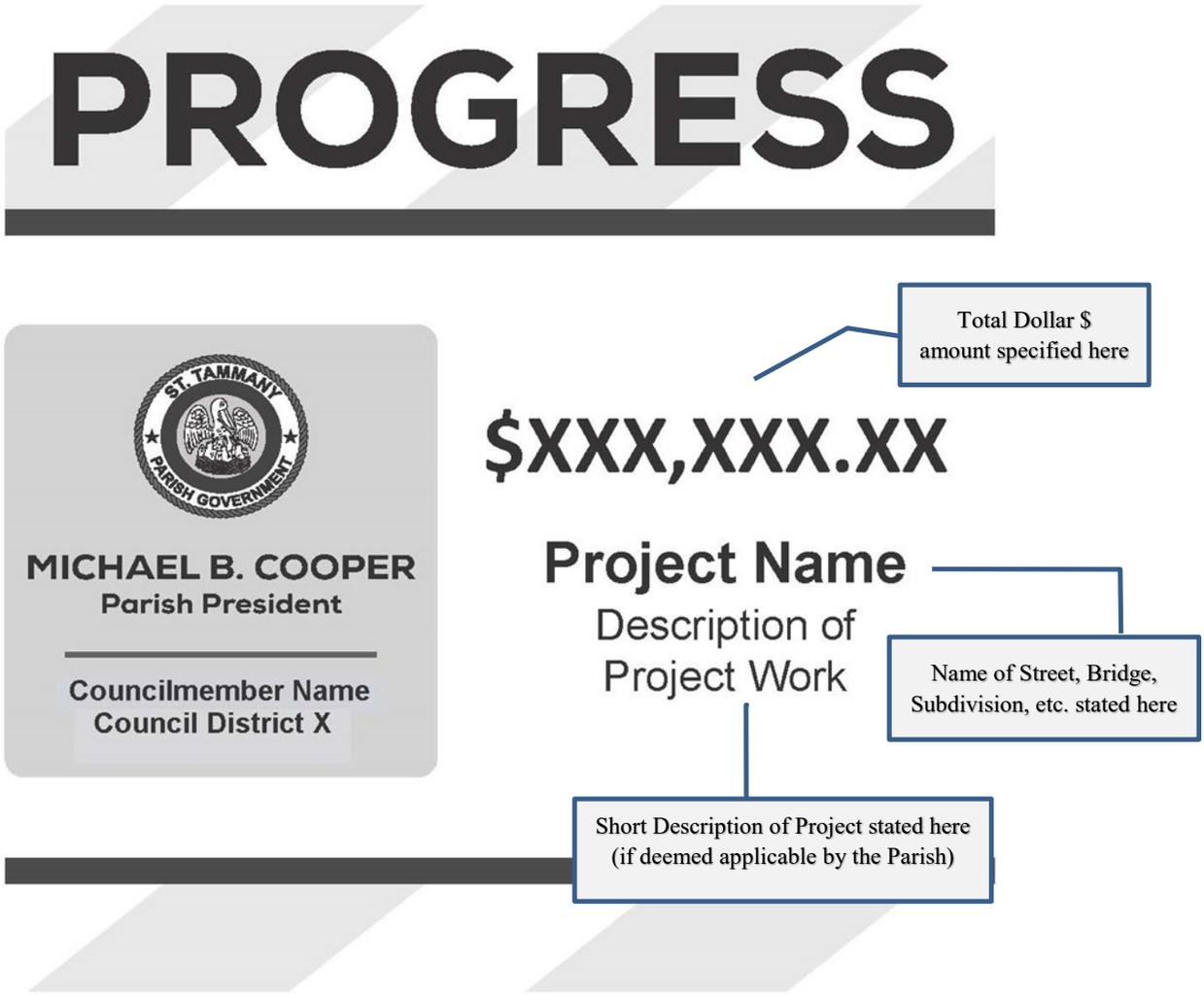
d. The sign(s) is to be installed such that the bottom of the sign is a minimum of 5' above the existing ground elevation.

e. Sign(s) is to be maintained throughout the period of construction. If sign(s) is damaged or destroyed, repair and/or replacement of sign(s) will be at Contractor's expense.

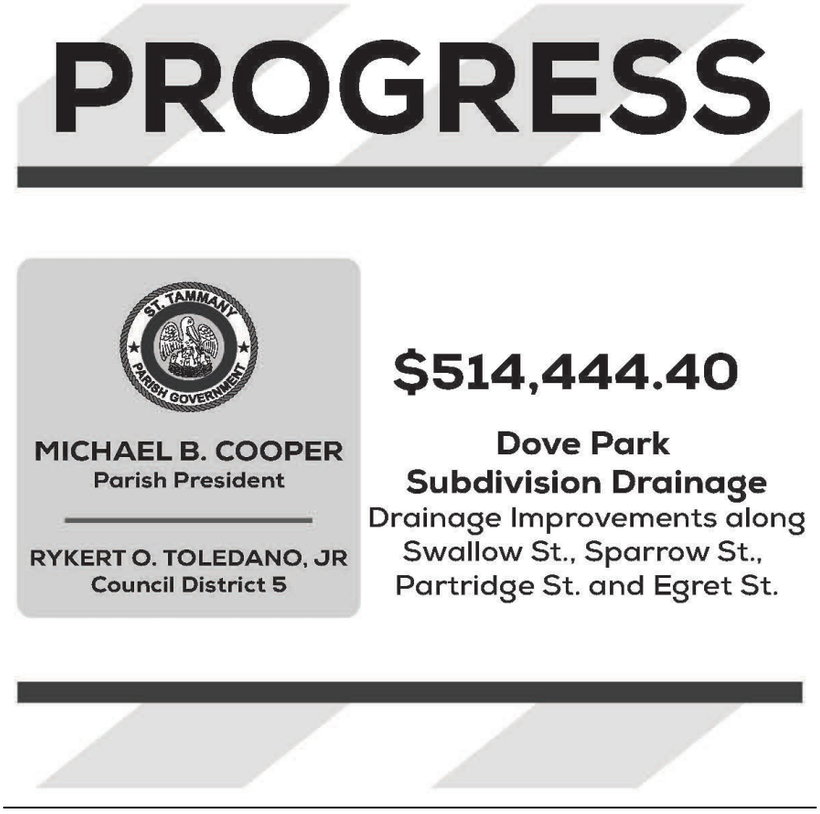
f. Contractor is responsible for the removal of all project signs upon issuance of final acceptance by the St. Tammany Parish Government Project Manager at no direct pay.

g. Cost to be included in "Temporary Signs and Barricades

Blank Template of Parish Project Sign:



Example of a Completed Parish Project Sign:



Section 08

General Conditions for St. Tammany Parish Government

This index is for illustrative purposes only and is not intended to be complete nor exhaustive.

All bidders/contractors are presumed to have read and understood the entire document. Some information contained in these conditions may not be applicable to all projects.

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01.00 DEFINITIONS OF TERMS

Whenever used in these General Conditions or in other Contract Documents, the following terms shall have the meanings indicated, and these shall be applicable to both the singular and plural thereof.

01.01 A.A.S.H.T.O American Association of State Highway and Transportation Officials. When A.A.S.H.T.O. is referred to in these Specifications it takes the meaning of the specification for materials and methods of testing specified by this association and the specification stated is considered to be a part of the Specifications as if written herein in full.

01.02 A.C.I American Concrete Institute. When A.C.I. is referred to in these Specifications it takes the meaning of the specification for materials and methods of testing specified by this institute and the specification stated is considered to be a part of the Specifications as if written herein in full.

01.03 Addenda Written or graphic instruments issued prior to the opening of bids which clarify, correct, modify or change the bidding or Contract Documents.

01.04 Advertisement The written instrument issued by the Owner at the request of the Owner used to notify the prospective bidder of the nature of the Work. It becomes part of the Contract Documents.

01.05 Agreement The written agreement or contract between the Owner and the Contractor covering the Work to be performed and the price that the Owner will pay. Other documents, including the Proposal, Addenda, Specifications, plans, surety, insurance, etc., are made a part thereof.

01.06 Application for Payment The form furnished by the Owner which is to be used by the Contractor in requesting incremental (progress) payments and which is to include information required by Section 28.01 and an affidavit of the Contractor. The affidavit shall stipulate that progress payments theretofore received from the Owner on account of the Work have been applied by Contractor to discharge in full of all Contractor's obligations reflected in prior applications for payment.

01.07 A.S.T.M. American Society of Testing Materials. When A.S.T.M. is referred to in these Specifications it takes the meaning of the specification for materials and methods of testing specified by this society and the specification stated is considered to be a part of the Specifications as if written herein in full.

01.08 Bid The offer or Proposal of the Bidder submitted on the prescribed form setting forth all the prices for the Work to be performed.

01.09 Bidder Any person, partnership, firm or corporation submitting a Bid for the Work.

01.10 Bonds Bid, performance and payment bonds and other instruments of security, furnished by the Contractor and its surety in accordance with the Contract Documents and Louisiana law.

01.11 Change Order A written order to the Contractor signed by the Owner authorizing an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time after execution of the Agreement.

01.12 Contract Documents The Agreement, Addenda, Contractor's Bid and any documentation accompanying or post-bid documentation when attached as an exhibit, the Bonds, these General Conditions, the Advertisement for Bid, Notice to Contractor, all supplementary conditions, the Specifications, the Drawings, together with all Modifications issued after the execution of the Agreement.

01.13 Contract Price The total monies payable to the Contractor under the Contract Documents.

01.14 Contract Time The number of consecutive calendar days stated in the Agreement for the completion of the Work.

01.15 Contractor The person, firm, corporation or provider with whom the Owner has executed the Agreement.

01.16 Defective Work Work which is unsatisfactory, faulty or deficient for any reason whatsoever, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, test or approval referred to in the Contract Documents, or has been damaged prior to the Owner's recommendation or acceptance.

01.17 Drawings The Drawings and plans which show the character and scope of the Work to be performed and which have been prepared or approved by the Owner and are referred to in the Contract Documents.

01.18 Field Order A written order issued by the Owner or his agent which clarifies or interprets the Contract Documents.

01.19 Modification (a) A written amendment of the Contract Documents signed by both parties, (b) A Change Order, (c) A written clarification or interpretation issued by the Owner or his agent. Modification may only be issued after execution of the Agreement.

01.20 Notice of Award The written notice by Owner to the lowest responsible Bidder stating that upon compliance of the conditions enumerated in the Notice of Award, or enumerated in the Bid documents, the Owner will deliver the Contract Documents for signature. The time for the delivery of the Contract Documents can be extended in conformance with Louisiana Law.

01.21 Notice to Contractor Instructions, written or oral given by Owner to Contractor and deemed served if given to the Contractor's superintendent, foreman or mailed to Contractor at his last known place of business.

01.22 Notice to Proceed A written notice given by the Owner fixing the date on which the Contract Time will commence, and on which date the Contractor shall start to perform his obligation under the Contract Documents. Upon mutual consent by both parties, the Notice to Proceed may be extended.

01.23 Owner St. Tammany Parish Government, acting herein through its duly constituted and authorized representative, including but not limited to the Office of the Parish President or its designee, its Chief Administrative Officer, and/or Legal Counsel. St. Tammany Parish Government (hereinafter, the “Parish”) and Owner may be used interchangeably.

01.24 Project The entire construction to be performed as provided in the Contract Documents.

01.25 Project Representative The authorized representative of the Owner who is assigned to the Project or any parts thereof.

01.26 Proposal The Bid submitted by the Bidder to the Owner on the Proposal form setting forth the Work to be done and the price for which the Bidder agrees to perform the Work.

01.27 Shop Drawings All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, Subcontractor, Manufacturer, Supplier or Distributor and which illustrate the equipment, material or some portion of the Work.

01.28 Specifications The Instructions to Bidders, these General Conditions, the Special Conditions and the Technical Provisions. All of the documents listed in the "Table of Contents."

01.29 Subcontractor An individual, firm or corporation having a direct Contract with the Contractor or with any other Subcontractor for the performance of a part of the Project Work.

01.30 Substantial Completion The date as certified by the Owner or its agent when the construction of the Project or a specified part thereof is sufficiently complete in accordance with the Contract Documents so that the Project or specified part can be utilized for the

purposes for which it was intended; or if there is no such certification, the date when final payment is due in accordance with Section 28.

01.31 Superintendent Contractor's site representative. The person on the site who is in full and complete charge of the Work.

01.32 Time Unless specifically stated otherwise, all time delays shall be calculated in calendar days.

01.33 Work Any and all obligations, duties and responsibilities necessary to the successful completion of the Project assigned to or undertaken by the Contractor under the Contract Documents, usually including the furnishing of all labor, materials, equipment and other incidentals.

01.34 The terms “he/himself” may be used interchangeably with “it/itself.”

02.00 PROPOSAL

02.01 All papers bound with or attached to the Proposal Form are a necessary part thereof and must not be detached.

02.02 For submitting Bids, the only forms allowed shall be the “Louisiana Uniform Public Work Bid Form”, “Louisiana Uniform Public Works Bid Form Unit Price Form” (if necessary), the Bid Bond, and written evidence of authority of person signing the bid. Necessary copies of the Louisiana Uniform Public Work Forms will be furnished for Bidding. Bound sets of the Contract Documents are for Bidder's information and should not be used in submitting Bids.

02.03 Proposal forms must be printed in ink or typed, unless submitted electronically. Illegibility or ambiguity therein may constitute justification for rejection of the Bid.

02.04 Each Bid must be submitted in a sealed envelope, unless submitted electronically. The outside of the envelope shall show the name and address of the Bidder, the State Contractor’s License Number of the Bidder (if work requires contractor’s license), and the Project name and number for which the Bid is submitted, along with the Bid number.

02.05 The price quoted for the Work shall be stated in words and figures on the Bid Form, and in numbers only on the Unit Price Form. The price in the Proposal shall include all costs necessary for the complete performance of the Work in full conformity with the conditions of the Contract Documents, and shall include all applicable Federal, State, Parish, Municipal or other taxes. The price bid for the items listed on the Unit Price Form will include the cost of all related items not listed, but which are normally required to do the type of Work bid.

02.06 The Bid shall be signed by the Bidder. The information required on the Louisiana Uniform Public Work Bid Form must be provided. Evidence of agency, corporate, or partnership authority is required and shall be provided in conformance with LSA-R.S. 38:2212(B).

02.07 Only the Contractors licensed by the State to do the type of Work involved can submit a Proposal for the Work. The envelope containing the Proposal shall have the Contractor's license number on it. Failure to be properly licensed constitutes authority by the Owner for rejection of Bid.

02.08 Bidders shall not attach any conditions or provisions to the Proposal. Any conditions or provisions so attached may, at the sole option of the Owner, cause rejection of the Bid or Proposal.

02.09 A Bid Guarantee of five percent (5%) of the amount of the total Bid, including Alternates, must accompany the Proposal and, at the option of the Bidder, may be a cashier's check, certified check or a satisfactory Bid Bond. The Bid Guarantee must be attached to the Louisiana Uniform Public Work Bid Form. No Bid will be considered unless it is so guaranteed. Cashier's check or certified check must be made payable to the order of the Owner. Cash deposits will not be accepted. The Owner reserves the right to cash or deposit the cashier's check or certified check. Such guarantees shall be made payable to the Parish

of St. Tammany. In accordance with LSA-R.S. 38:2218(C), if a bid bond is used, it shall be written by a surety or insurance company currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register, or by a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best's Key Rating Guide to write individual bonds up to ten percent of policyholders' surplus as shown in the A.M. Best's Key Rating Guide, or by an insurance company in good standing licensed to write bid bonds which is either domiciled in Louisiana or owned by Louisiana residents. It is **not** required to be on any AIA form.

02.10 Bid securities of the three (3) lowest Bidders will be retained by the Owner until the Contract is executed or until final disposition is made of the Bids submitted. Bid securities of all other Bidders will be returned promptly after the canvas of Bids. Bids shall remain binding for forty-five (45) days after the date set for Bid Opening. The Parish shall act within the forty-five (45) days to award the contract to the lowest responsible bidder or reject all bids as permitted by Public Bid Law. However, the Parish and the lowest responsible bidder, by mutual written consent, may agree to extend the deadline for award by one or more extensions of thirty (30) calendar days. In the event the Owner issued the Letter of Award during this period, or any extension thereof, the Bid accepted shall continue to remain binding until the Execution of the Contract.

02.11 A Proposal may be withdrawn at any time prior to the scheduled closing time for receipt of Bids, provided the request is in writing, executed by the Bidder or its duly authorized representative and is filed with the Owner prior to that time. When such a request is received, the Proposal will be returned to the Bidder unopened.

02.12 Written communications, over the signature of the Bidder, to modify Proposals will be accepted and the Proposal corrected in accordance therewith if received by the Owner prior to the scheduled closing time for receipt of Bids. Oral, telephonic or telegraphic Modifications will not be considered.

02.13 No oral interpretation obligating the Owner will be made to any Bidder as to the meaning of the Drawings, Specifications and Contract Documents. Every request for such an interpretation shall be made in writing and addressed and forwarded to the Owner. No inquiry received within seven (7) days prior to the day fixed for opening of the Bids shall be given consideration. Every interpretation made to the Bidder shall be in the form of an addendum to the Specifications. All such Addenda shall become part of the Contract Documents. Failure of Bidder to receive any such interpretation shall not relieve any Bidder from any obligation under this Bid. All Addenda shall be issued in accordance with the Public Bid Law, LSA-R.S. 38:2212(O)(2)(a) and (b).

02.14 The Owner reserves the right to reject any or all Bids for just cause in accordance with the Public Bid Law, LSA-R.S. 38:2214(B). Incomplete, informal or unbalanced Bids may be rejected. Reasonable grounds for belief that any one Bidder is concerned directly or indirectly with more than one Bid will cause rejection of all Bids wherein such Bidder is concerned. If required, a Bidder shall furnish satisfactory evidence of its competence and ability to perform the Work stipulated in its Proposal. Incompetence will constitute cause for rejection. If the Parish determines that the bidder is not responsive or responsible for any reason whatsoever, the bid may be rejected in accordance with State law.

02.15 The Contractor shall indemnify and hold harmless the Owner from any and all suits, costs, penalties or claims for infringement by reason of use or installation of any patented design, device, material or process, or any trademark and copyright in connection with the Work agreed to be performed under this Contract, and shall indemnify and hold harmless the Owner for any costs, expenses and damages which it may be obliged to pay by reason of any such infringement at any time during the prosecution or after completion of the Work.

02.16 Bidders shall familiarize themselves with and shall comply with all applicable Federal and State Laws, municipal ordinances and the rules and regulations of all authorities having jurisdiction over construction of the Project, which may directly or indirectly affect the Work or its prosecution. These laws and/or ordinances will be deemed to be included in the Contract, as though herein written in full.

02.17 Each Bidder shall visit the site of the proposed Work and fully acquaint itself with all surface and subsurface conditions as they may exist so that it may fully understand this

Contract. Bidder shall also thoroughly examine and be familiar with drawings, Specifications and Contract Documents. The failure or omission of any Bidder to receive or examine any form instrument, Drawing or document or to visit the site and acquaint itself with existing conditions, shall in no way relieve any Bidder from any obligation with respect to its Bid and the responsibility in the premises.

02.18 The standard contract form enclosed with the Proposal documents is a prototype. It is enclosed with the Contract Documents for the guidance of the Owner and the Contractor. It has important legal consequences in all respects and consultation with an attorney is encouraged. Contractor shall be presumed to have consulted with its own independent legal counsel.

02.19 When one set of Contract plans show the Work to be performed by two or more prime Contractors, it is the responsibility of each Bidder to become knowledgeable of the Work to be performed by the other where the Work upon which this bid is submitted is shown to come into close proximity or into conflict with the Work of the other. In avoiding conflicts, pressure pipe lines must be installed to avoid conflict with gravity pipe lines and the Bidder of the smaller gravity pipe line in conflict with the larger gravity pipe line must include in his Bid the cost of a conflict box at these locations. The location of and a solution to the conflicts do not have to be specifically noted as such on the plans.

02.20 Bidder shall execute affidavit(s) attesting compliance with LSA-R.S. 38:2212.10, 38:2224, 38:2227, each as amended, and other affidavits as required by law, prior to execution of the contract.

02.21 Sealed Proposals (Bid) shall be received by St. Tammany Parish Government at the office of St. Tammany Parish Government, Department of Procurement, 21454 Koop Drive, Suite 2-F, Mandeville, LA 70471, until the time and date denoted in Notice to Bidders, at which time and place the Proposals (Bids), shall be publicly opened and read aloud to those present. In accordance with LSA-R.S. 38-2212(A)(3)(c)(i), the designer's final estimated cost of construction shall be read aloud upon opening bids. Sealed Proposals (Bids) may also be mailed by certified mail to St. Tammany Parish Government, Department of Procurement, 21454 Koop Drive, Suite 2-F, Mandeville, LA 70471, and must be received before the bid opening. Bids may also be submitted electronically. Information concerning links for electronic bidding is contained in the Notice to Bidders.

02.22 Proposals (Bids) shall be executed on Forms furnished and placed in a sealed envelope, marked plainly and prominently as indicated in the Notice to Bidders, and these General Conditions, and addressed:

St. Tammany Parish Government
Department of Procurement
21454 Koop Drive, Suite 2-F
Mandeville, LA 70471

02.23 Complete sets of Drawings, Specifications, and Contract Documents may be secured at the Office of the Owner. See Notice to Bidders for deposit schedule.

02.24 The successful bidder shall be required to post in each direction a public information sign, 4' x 8' in size, at the location of the project containing information required by the Owner. The Owner shall supply this information.

03.00 AWARD, EXECUTION OF DOCUMENTS, BONDS, ETC.

03.01 The award of the Contract, if it is awarded, will be to the lowest responsible Bidder, in accordance with State Law. No award will be made until the Owner has concluded such investigations as it deems necessary to establish the responsibility, qualifications and financial ability and stability of the Bidder to do the Work in accordance with the Contract Documents to the satisfaction of the Owner within the time prescribed as established by the Department based upon the amount of work to be performed and the conditions of same. The written contract and bond shall be issued in conformance with LSA-R.S. 38:2216. The Owner reserves the right to reject the Bid of any Bidder in accordance with the Public Bid Law, LSA-R.S. 38:2214. If the Contract is awarded, the Owner shall give the successful Bidder written notice of the award within forty-five (45) calendar days after

the opening of the Bids in conformance with LSA-R.S. 38:2215(A), or any extension as authorized thereunder.

03.02 At least three counterparts of the Agreement and of such other Contract Documents as practicable shall be signed by the Owner and the Contractor. The Owner shall identify those portions of the Contract Documents not so signed and such identification shall be binding on both parties. The Owner and the Contractor shall each receive an executed counterpart of the Contract Documents.

03.03 Prior to the execution of the Agreement, the Contractor shall deliver to the Owner the required Bonds.

03.04 Failure of the successful Bidder to execute the Agreement and deliver the required Bonds within twenty (20) days of the Notice of the Award shall be just cause for the Owner to annul the award and declare the Bid and any guarantee thereof forfeited.

03.05 In order to ensure the faithful performance of each and every condition, stipulation and requirement of the Contract and to indemnify and save harmless the Owner from any and all damages, either directly or indirectly arising out of any failure to perform same, the successful Bidder to whom the Contract is awarded shall furnish a surety Bond in an amount of at least equal to one hundred percent (100%) of the Contract Price. The Contract shall not be in force or binding upon the Owner until such satisfactory Bond has been provided to and approved by the Parish. The cost of the Bond shall be paid for by the Contractor unless otherwise stipulated in the Special Provisions.

03.06 No surety Company will be accepted as a bondsman who has no permanent agent or representative in the State upon whom notices referred to in the General Conditions of these Specifications may be served. Services of said notice on said agent or representative in the State shall be equal to service of notice on the President of the Surety Company, or such other officer as may be concerned.

03.07 In conformance with LSA-R.S. 38:2219(A)(1)(a), (b), and (c):

> Any surety bond written for a public works project shall be written by a surety or insurance company currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register, or by a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best's Key Rating Guide, to write individual bonds up to ten percent of policyholders' surplus as shown in the A.M. Best's Key Rating Guide or by an insurance company that is either domiciled in Louisiana or owned by Louisiana residents and is licensed to write surety bonds.
>
> For any public works project, no surety or insurance company shall write a bond which is in excess of the amount indicated as approved by the U.S. Department of the Treasury Financial Management Service list or by a Louisiana domiciled insurance company with an A- rating by A.M. Best up to a limit of ten percent of policyholders' surplus as shown by A.M. Best; companies authorized by this Paragraph who are not on the treasury list shall not write a bond when the penalty exceeds fifteen percent of its capital and surplus, such capital and surplus being the amount by which the company's assets exceed its liabilities as reflected by the most recent financial statements filed by the company with the Department of Insurance.
>
> In addition, any surety bond written for a public works project shall be written by a surety or insurance company that is currently licensed to do business in the state of Louisiana. All contractors must comply with any other applicable provisions of LSA-R.S. 38:2219.

03.08 Should the Contractor's Surety, even though approved and accepted by the Owner, subsequently remove its agency or representative from the State or become insolvent, bankrupt, or otherwise fail, the Contractor shall immediately furnish a new Bond in another company approved by the Owner, at no cost to the Owner. The new Bond shall be executed under the same terms and conditions as the original Bond. The new bond shall be submitted within thirty (30) days of such time as the Owner notifies Contractor or from the time Contractor learns or has reason to know that the original surety is no longer financially viable or acceptable to the Parish, whichever occurs first. In the event that Contractor fails

or refuses to timely secure additional surety, then the Owner may secure such surety and thereafter deduct such cost or expense from any sum due or to become due Contractor.

03.09 The Contractor's bondsman shall obligate itself to all the terms and covenants of these Specifications and of contracts covering the Work executed hereunder. The Owner reserves the right to do Extra Work or make changes by altering, adding to deducting from the Work under the conditions and in the manner herein before described without notice to the Contractor's surety and without in any manner affecting the liability of bondsman or releasing it from any of its obligations hereunder.

03.10 The Bond shall also secure for the Owner the faithful performance of the Contract in strict accordance with plans and Specifications. It shall protect the Owner against all lien laws of the State and shall provide for payment of reasonable attorney fees for enforcement of Contract and institution or concursus proceedings, if such proceedings become necessary. Likewise, it shall provide for all additional expenses of the Owner occurring through failure of the Contractor to perform.

03.11 The surety of the Contractor shall be and does hereby declare and acknowledge itself by acceptance to be bound to the Owner as a guarantor, jointly and in solido, with the Contractor, for fulfillment of terms of Section 03.00.

03.12 The performance Bond and Labor and Material Bond forming part of this Contract shall be continued by Contractor and its Surety for a period of one (1) year from date of acceptance of this Contract by Owner to assure prompt removal and replacement of all defective material, equipment, components thereof, workmanship, etc., and to assure payment of any damage to property of Owner or others as a result of such defective materials, equipment, workmanship, etc.

03.13 Contractor shall pay for the cost of recording the Contract and Bond and the cost of canceling same. Contractor shall also secure and pay for all Clear Lien and Privilege Certificates (together with any updates) which will be required before any final payment is made, and that may be required before any payment, at the request of the Owner, its representative, agent, architect, engineer and the like. All recordation and Clear Lien and Privilege Certificate requirements shall be in accordance with those requirements noted herein before in contract Specifications.

04.00 SUBCONTRACTS

04.01 Contractor shall be fully responsible for all acts and omissions of its Subcontractors and of persons and organizations for whose acts any of them may be liable to the same extent that it is responsible for the acts and omissions of persons directly employed by it. Nothing in the Contract Documents shall create any contractual relationship between Owner and any Subcontractor or other person or organization having a direct Contract with Contractor, nor shall it create any obligation on the part of the Owner to pay or to see to the payment of any monies due any Subcontractor.

04.02 Nothing in the Contract Documents shall be construed to control the Contractor in dividing the Work among approved Subcontractors or delineating the Work to be performed by any trade.

04.03 The Contractor agrees to specifically bind every Subcontractor to all of the applicable terms and conditions of the Contract Documents prior to commencing Work. Every Subcontractor, by undertaking to perform any of the Work, shall thereby automatically be deemed bound by such terms and conditions.

04.04 The Contractor shall indemnify and hold harmless the Owner and their agents and employees from and against all claims, damages, losses and expenses including Attorney's fees arising out of or resulting from the Contractor's failure to bind every Subcontractor and Contractor's surety to all of the applicable terms and conditions of the Contract Documents.

05.00 ASSIGNMENT

05.01 Neither party to this Contract shall assign or sublet its interest in this Contract without prior written consent of the other, nor shall the Contractor assign any monies due or to become due to it under this Contract without previous written consent of the Owner, nor without the consent of the surety unless the surety has waived its right to notice of assignment.

06.00 CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS.

06.01 It is the intent of the Specifications and Drawings to describe a complete Project to be constructed in accordance with the Contract Documents. The Contract Documents comprise the entire Agreement between Owner and Contractor. Alterations, modifications and amendments shall only be in writing between these parties.

06.02 The Contract Documents are intended to be complimentary and to be read *in pari materii*, and what is called for by one is as binding as if called for by all. If Contractor finds a conflict, error or discrepancy in the Contract Documents, it shall call it to the Owner's attention, in writing, at once and before proceeding with the Work affected thereby; however, it shall be liable to Owner for its failure to discover any conflict, error or discrepancy in the Specifications or Drawings. In resolving such conflicts, errors and discrepancies, the documents shall be given precedence in the following order: Agreement, Modifications, Addenda, Special Conditions, General Conditions, Construction Specifications and Drawings. The general notes on the plans shall be considered special provisions. Figure dimensions on Drawings shall govern over scale dimensions and detail Drawings shall govern over general Drawings. Where sewer connections are shown to fall on a lot line between two lots, the Contractor shall determine this location by measurement not by scale. Any Work that may reasonably be inferred from the Specifications or Drawings as being required to produce the intended result shall be supplied whether or not it is specifically called for. Work, materials or equipment described herein which so applied to this Project are covered by a well-known technical meaning or specification shall be deemed to be governed by such recognized standards unless specifically excluded.

06.03 Unless otherwise provided in the Contract Documents, the Owner will furnish to the Contractor (free of charge not to exceed ten (10) copies) Drawings and Specifications for the execution of Work. The Drawings and Specifications are the property of the Owner and are to be returned to it when the purpose for which they are intended have been served. The Contractor shall keep one copy of all Drawings and Specifications, including revisions, Addenda, details, Shop Drawings, etc. on the Work in good order and available to the Owner or the regulatory agency of the governmental body having jurisdiction in the area of the Work.

07.00 SHOP DRAWINGS, BROCHURES AND SAMPLES

07.01 After checking and verifying all field measurements, Contractor shall submit to Owner for approval, five copies (or at Owner's option, one reproducible copy) of all Shop Drawings, which shall have been checked by and stamped with the approval of Contractor and identified as Owner may require. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction and the like to enable Owner to review the information as required.

07.02 Contractor shall also submit to Owner, for review with such promptness as to cause no delay in Work, all samples as required by the Contract Documents. All samples will have been checked by and stamped with the approval of Contractor identified clearly as to material, manufacturer, any pertinent catalog numbers and the use for which intended. At the time of each submission, Contractor shall in writing call Owner's attention to any deviations that the Shop Drawings or samples may have from the requirements of the Contract Documents.

07.03 Owner will review with reasonable promptness Shop Drawings and samples, but its review shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents. The review of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make any corrections required by Owner and shall return the required number of

corrected copies of Shop Drawings and resubmit new samples for review. Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections called for by Owner on previous submissions. Contractor's stamp of approval on any Shop Drawing or sample shall constitute a representation to Owner that Contractor has determined and verified all quantities, dimensions, field construction criteria, materials catalog numbers and similar data and thereafter assumes full responsibility for doing so, and that it has reviewed or coordinated each Shop Drawing or sample with the requirements of the Work and the Contract Documents.

07.04 Where a Shop Drawing or sample submission is required by the Specifications, no related Work shall be commenced until the submission has been reviewed by Owner. A copy of each reviewed shop Drawing and each inspected sample shall be kept in good order by Contractor at the site and shall be available to Owner.

07.05 Owner's review of Shop Drawings or samples shall not relieve Contractor from its responsibility for any deviations from the requirements of the Contract Documents unless Contractor has in writing called Owner's attention to such deviation at the time of submission and Owner has given written approval to the specific deviation, nor shall any review by Owner relieve Contractor from responsibility for errors or omissions in the Shop Drawings. The mere submittal of shop drawings which contain deviations from the requirements of plans, specifications and/or previous submittals in itself does not satisfy this requirement.

08.00 RECORD DRAWINGS

08.01 The Contractor shall keep an accurate record in a manner approved by the Owner of all changes in the Contract Documents during construction. In Work concerning underground utilities, the Contractor shall keep an accurate record in a manner approved by the Owner of all valves, fittings, etc. Before the Work is accepted by the Owner, and said acceptance is recorded, the Contractor shall furnish the Owner a copy of this record.

08.02 Contractor shall keep an accurate drawing measured in the field to the nearest 0.1' of the location of all sewer house connections. The location shown shall be the end of the connection at the property line measured along the main line of pipe from a manhole.

08.03 Contractor shall keep an accurate drawing of the storm water drainage collection system. Inverts to the nearest 0.01' and top of castings shall be shown as well as location of all structures to the nearest 0.1'. Upon completion of the Work, the plan will be given to the Owner.

09.00 PROGRESS OF WORK

09.01 Contractor shall conduct the Work in such a professional manner and with sufficient materials, equipment and labor as is considered necessary to ensure its completion within the time limit specified.

09.02 The Owner shall issue a Notice to Proceed to the Contractor within twenty (20) calendar days from the date of execution of the Contract. Upon mutual consent by both parties, the Notice to Proceed may be extended. The Contractor is to commence Work under the Contract within ten (10) calendar days from the date the Notice to Proceed is issued by the Owner.

09.03 The Contractor, immediately after being awarded the Contract, shall prepare and submit for the Owner's approval an estimated progress schedule for the work to be performed, as well as a construction signing layout for all roads within the project area. The Contractor shall not start work or request partial payment until the work schedule has been submitted to the Owner for approval.

09.04 Revisions to the original schedule will be made based on extension of days granted for inclement weather or change orders issued under the contract. No other revision shall be made which affects the original completion or updated completion date, whichever is applicable.

09.05 Failure of the Contractor to submit an estimated progress schedule or to complete timely and on schedule the Work shown on the progress schedule negates any and all causes or claims by the Contractor for accelerated completion damages. These accelerated damage claims shall be deemed forfeited.

09.06 Meetings will be held as often as necessary to expedite the progress of the job. Meetings will be held during normal working hours at the jobsite and shall be mandatory for the Contractor and all Sub-Contractors working on the project. Meetings may be requested by the Owner at any time and at the discretion of the Owner.

10.00 OWNER'S RIGHT TO PROCEED WITH PORTIONS OF THE WORK

10.01 Upon failure of the Contractor to comply with any notice given in accordance with the provisions hereof, the Owner shall have the alternative right, instead of assuming charge of the entire Work, to place additional forces, tools, equipment and materials on parts of the Work. The cost incurred by the Owner in carrying on such parts of the Work shall be payable by the Contractor. Such Work shall be deemed to be carried on by the Owner on account of the Contractor. The Owner may retain all amounts of the cost of such Work from any sum due Contractor or those funds that may become due to Contractor under this Agreement.

10.02 Owner may perform additional Work related to the Project by itself or it may let any other direct contract which may contain similar General Conditions. Contractor shall afford the other contractors who are parties to such different contracts (or Owner, if it is performing the additional Work itself) reasonable opportunity for the introduction and storage of materials and equipment and the execution of Work, and shall properly connect and coordinate its Work with the subsequent work.

10.03 If any part of Contractor's Work depends upon proper execution or results upon the Work of any such other contractor (or Owner), Contractor shall inspect and promptly report to Owner in writing any defects or deficiencies in such Work that render it unsuitable for such proper execution and results. Failure to so report shall constitute an acceptance of the other Work as fit and proper for the relationship of its Work except as to defects and deficiencies which may appear in the other Work after the execution of its Work.

10.04 Whatever Work is being done by the Owner, other Contractors or by this Contractor, the parties shall respect the various interests of the other parties at all times. The Owner may, at its sole discretion, establish additional rules and regulations concerning such orderly respect of the rights of various interests.

10.05 Contractor shall do all cutting, fitting and patching of its Work that may be required to integrate its several parts properly and fit to receive or be received by such other Work. Contractor shall not endanger any Work of others by cutting, excavating or otherwise altering Work and will only alter Work with the written consent of Owner and of the other contractors whose Work will be affected.

10.06 If the performance of additional Work by other contractors or Owner is not noted in the Contract Documents, written notice thereof shall be given to Contractor prior to starting any such additional Work. If Contractor believes that the performance of such additional Work by Owner or others may cause additional expense or entitles an extension of the Contract Time, the Contractor may make a claim therefor. The claim must be in writing to the Owner within thirty (30) calendar days of receipt of notice from the Owner of the planned additional Work by others.

11.00 TIME OF COMPLETION

11.01 The Notice to Proceed will stipulate the date on which the Contractor shall begin work. That date shall be the beginning of the Contract Time charges.

11.02 Contractor shall notify the Owner through its duly authorized representative, in advance, of where Contractor’s work shall commence each day. A daily log shall be maintained by Contractor to establish dates, times, persons contacted, and location of work. Specific notice shall be made to the Owner if the Contractor plans to work on Saturday, Sunday, or

a Parish approved holiday. If notice is not received, no consideration will be given for inclement weather and same shall be considered a valid work day.

11.03 The Work covered by the Plans, Specifications and Contract Documents must be completed sufficiently for acceptance within the number of calendar days specified in the Proposal and/or the Contract, commencing from the date specified in the Notice to Proceed. It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the time of completion is an essential condition of this Contract, and it is further mutually understood and agreed that if the Contractor shall neglect, fail or refuse to complete the Work within the time specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as partial consideration for the awarding of this Contract, to pay the Owner $500.00 per day as specified in the Contract, not as a penalty, but as liquidated damages for such breach of contract for each and every calendar day that the Contractor shall be in default after the time stipulated in the Contract for completing the Work. It is specifically understood that the Owner shall also be entitled to receive a reasonable attorney fee and all costs in the event that Contractor fails to adhere to this agreement and this contract is referred to counsel for any reason whatsoever. Reasonable attorney fees shall be the prevailing hourly rate of the private sector, and in no event shall the hourly rate be less than $175.00 per hour. All attorney fees shall be paid to the operating budget of the Office of the Parish President.

11.04 Prior to final payment, the Contractor may, in writing to the Owner, certify that the entire Project is substantially complete and request that the Owner or its agent issue a certificate of Substantial Completion. See Section 29.00.

11.05 The Owner may grant an extension(s) of time to the Contractor for unusual circumstances which are beyond the control of the Contractor and could not reasonably be foreseen by the Contractor prior to Bidding. Any such request must be made in writing to the Owner within seven (7) calendar days following the event occasioning the delay. The Owner shall have the exclusive and unilateral authority to determine, grant, and/or deny the validity of any such claim.

11.06 Extensions of time for inclement weather shall be processed as follows:

Commencing on the start date of each job, the Parish Inspector assigned to same shall keep a weekly log, indicating on each day whether inclement weather has prohibited the Contractor from working on any project within the specific job, based upon the following:

1. Should the Contractor prepare to begin work on any day in which inclement weather, or the conditions resulting from the weather, prevent work from beginning at the usual starting time, and the crew is dismissed as a result, the Contractor will not be charged for a working day whether or not conditions change during the day and the rest of the day becomes suitable for work.

2. If weather conditions on the previous day prevent Contractor from performing work scheduled, provided that no other work can be performed on any project within the package. The Parish Inspector shall determine if it is financially reasonable to require the Contractor to deviate from the schedule and relocate to another location.

3. If the Contractor is unable to work at least 60% of the normal work day due to inclement weather, provided that a normal working force is engaged on the job.

Any dispute of weather conditions as related to a specific job shall be settled by records of the National Weather Service.

11.07 Extensions of time for change orders

When a change order is issued, the Owner and Contractor will agree on a reasonable time extension, if any, to implement such change. Consideration shall be given for, but not limited to, the following:

1. If material has to be ordered;
2. Remobilization and or relocation of equipment to perform task; and
3. Reasonable time frame to complete additional work.

Time extensions for change orders shall be reflected on the official document signed by the Owner and Contractor.

11.08 At the end of each month, the Owner or its agent will furnish to the Contractor a monthly statement which reflects the number of approved days added to the contract. The Contractor will be allowed fourteen (14) calendar days in which to file a written protest setting forth in what respect the monthly statement is incorrect; otherwise, the statement shall be considered accepted by the Contractor as correct.

11.09 Apart from extension of time for unavoidable delays, no payment or allowance of any kind shall be made to the Contractor as compensation for damages because of hindrance or delay for any cause in the progress of the Work, whether such delay be avoidable or unavoidable.

12.00 LIQUIDATED DAMAGES

12.01 In case the Work is not completed in every respect within the time that may be extended, it is understood and agreed that per diem deductions of the sum of $500.00 for liquidated damages, as stipulated in the Proposal and/or Contract, shall be made from the total Contract Price for each and every calendar day after and exclusive of the day on which completion was required, and up to the completion of the Work and acceptance thereof by the Owner. It is understood and agreed that time is of the essence to this Contract, and the above sum being specifically herein agreed upon in advance as the measure of damages to the Owner on account of such delay in the completion of the Work. It is further agreed that the expiration of the term herein assigned or as may be extended for performing the Work shall, *ipso facto*, constitute a putting in default, the Contractor hereby waiving any and all notice of default. The Contractor agrees and consents that the Contract Price, reduced by the aggregate of the entire damages so deducted, shall be accepted in full satisfaction of all Work executed under this Contract. It is further understood and agreed that Contractor shall be liable for a reasonable attorney fee and all costs associated with any breach of this agreement, including but not limited to this subsection. In the event that any dispute or breach herein causes referrals to counsel, then Contractor agrees to pay a reasonable attorney fee at the prevailing hourly rate of the private sector. In no event shall the hourly rate be less than $175.00 per hour.

13.00 LABOR, MATERIALS, EQUIPMENT, SUPERVISION, PERMITS AND TAXES

13.01 The Contractor shall provide and pay for all labor, materials, equipment, supervision, subcontracting, transportation, tools, fuel, power, water, sanitary facilities and all incidentals necessary for the completion of the Work in substantial conformance with the Contract Documents.

13.02 The Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. It shall at all times maintain good discipline and order at the site.

13.03 Unless otherwise specifically provided for in the Specifications, all workmanship, equipment, materials, and articles incorporated in the Work covered by this Contract are to be new and of the best grade of their respective kinds for the purpose intended. Samples of materials furnished under this Contract shall be submitted for approval to the Owner when and as directed.

13.04 Whenever a material or article required is specified or shown on the plans by using the name of a proprietary product or of a particular manufacturer or vendor, any material or article which shall perform adequately the duties imposed by the general design will be considered equal, and satisfactory, providing the material or article so proposed is of equal substance and function and that all technical data concerning the proposed substitution be approved by the Owner prior to the Bidding. The Owner shall have the exclusive and unilateral discretion to determine quality and suitability in accordance with LSA-R.S. 38:2212(T)(2).

13.05 Materials shall be properly and securely stored so as to ensure the preservation of quality and fitness for the Work, and in a manner that leaves the material accessible to inspection. Materials or equipment may not be stored on the site in a manner such that it will interfere with the continued operation of streets and driveways or other contractors working on the site.

13.06 The Contractor, by entering into the Contract for this Work, sets itself forth as an expert in the field of construction and it shall supervise and direct the Work efficiently and with its best skill and attention. It shall be solely responsible for the means, methods, techniques, sequences and procedures of construction.

13.07 Contractor shall keep on the Work, at all times during its progress, a competent resident Superintendent, who shall not be replaced without written Notice to Owner except under extraordinary circumstances. The Superintendent will be Contractor's representative at the site and shall have authority to act on behalf of Contractor. All communications given to the Superintendent shall be as binding as if given to the Contractor. Owner specifically reserves the right to approve and/or disapprove the retention of a new superintendent, all to not be unreasonably withheld.

13.08 Any foreman or workman employed on this Project who disregards orders or instructions, does not perform his Work in a proper and skillful manner, or is otherwise objectionable, shall, at the written request of the Owner, be removed from the Work and shall be replaced by a suitable foreman or workman.

13.09 The Contractor and/or its assigned representative shall personally ensure that all subcontracts and divisions of the Work are executed in a proper and workmanlike manner, on scheduled time, and with due and proper cooperation.

13.10 Failure of the Contractor to keep the necessary qualified personnel on the Work shall be considered cause for termination of the Contract by the Owner.

13.11 Only equipment in good working order and suitable for the type of Work involved shall be brought onto the job and used by the Contractor. The Contractor is solely responsible for the proper maintenance and use of its equipment and shall hold the Owner harmless from any damages or suits for damages arising out of the improper selection or use of equipment. No piece of equipment necessary for the completion of the Work shall be removed from the job site without approval of the Owner.

13.12 All Federal, State and local taxes due or payable during the time of Contract on materials, equipment, labor or transportation, in connection with this Work, must be included in the amount bid by the Contractor and shall be paid to proper authorities before acceptance. The Contractor shall furnish all necessary permits and certificates and comply with all laws and ordinances applicable to the locality of the Work. The cost of all inspection fees levied by any governmental entity whatsoever shall be paid for by the Contractor.

13.13 In accordance with St. Tammany Police Jury Resolution 86-2672, as amended, the Contractor must provide in a form suitable to the Owner an affidavit stating that all applicable sales taxes for materials used on this project have been paid.

13.14 During the period that this Contract is in force, neither party to the Contract shall solicit for employment or employ an employee of the other.

13.15 All materials or equipment shown on the Drawings or included in these specifications shall be furnished unless written approval of a substitute is obtained from the Designer, or Owner if no separate designer.

13.16 If a potential supplier wishes to submit for prior approval a particular product other than a product specified in the contract documents, he shall do so no later than seven working days prior to the opening of bids. Within three days, exclusive of holidays and weekends, after such submission, the prime design professional shall furnish to both the public entity and the potential supplier written approval or denial of the product submitted. The burden of proof of the equality of the proposed substitute is upon the proposer and only that information formally submitted shall be used by the Designer in making its decision.

13.17 The decision of the Designer/Owner shall be given in good faith and shall be final.

14.00 QUANTITIES OF ESTIMATE, CHANGES IN QUANTITIES, EXTRA WORK

14.01 Whenever the estimated quantities of Work to be done and materials to be furnished under this Contract are shown in any of the documents, including the Proposal, such are given for use in comparing Bids and the right is especially reserved, except as herein otherwise specifically limited, to increase or diminish same not to exceed twenty-five percent (25%) by the Owner to complete the Work contemplated by this Contract. Such increase or diminution shall in no way vitiate this Contract, nor shall such increase or diminution give cause for claims or liability for damages.

14.02 The Owner shall have the right to make alterations in the line, grade, plans, form or dimensions of the Work herein contemplated, provided such alterations do not change the total cost of the Project, based on the originally estimated quantities, and the unit prices bid by more than twenty-five percent (25%) and provided further that such alterations do not change the total cost of any major item, based on the originally estimated quantities and the unit price bid by more than twenty-five (25%). (A major item shall be construed to be any item, the total cost of which is equal to or greater than ten percent (10%) of the total Contract Price, computed on the basis of the Proposal quantity and the Contract unity price). Should it become necessary, for the best interest of the Owner, to make changes in excess of that herein specified, the same shall be covered by supplemental agreement either before or after the commencement of the Work and without notice to the sureties. If such alterations diminish the quantity of Work to be done, such shall not constitute a claim for damages for anticipated profits for the Work dispensed with, but when the reduction in amount is a material part of the Work contemplated, the Contractor shall be entitled to only reasonable compensation as determined by the Owner for overhead and equipment charges which it may have incurred in expectation of the quantity of Work originally estimated, unless specifically otherwise provided herein; if the alterations increase the amount of Work, the increase shall be paid according to the quantity of Work actually done and at the price established for such Work under this Contract except where, in the opinion of the Owner, the Contractor is clearly entitled to extra compensation.

14.03 Without invalidating the Contract, the Owner may order Extra Work or make changes by altering, adding to, or deducting from the Work, the Contract sum being adjusted accordingly. The consent of the surety must first be obtained when necessary or desirable, all at the exclusive discretion of the Owner. All the Work of the kind bid upon shall be paid for at the price stipulated in the Proposal, and no claims for any Extra Work or material shall be allowed unless the Work is ordered in writing by the Owner.

14.04 Extra Work for which there is no price or quantity included in the Contract shall be paid for at a unit price or lump sum to be agreed upon in advance in writing by the Owner and Contractor. Where such price and sum cannot be agreed upon by both parties, or where this method of payment is impracticable, the Owner may, at its exclusive and unilateral discretion, order the Contractor to do such Work on a Force Account Basis.

14.05 In computing the price of Extra Work on a Force Account Basis, the Contractor shall be paid for all foremen and labor actually engaged on the specific Work at the current local rate of wage for each and every hour that said foremen and labor are engaged in such Work, plus ten percent (10%) of the total for superintendence, use of tools, overhead, direct & indirect costs/expenses, pro-rata applicable payroll taxes, pro-rata applicable workman compensation benefits, pro-rata insurance premiums and pro-rata reasonable profit. The Contractor shall furnish satisfactory evidence of the rate or rates of such insurance and tax. The Contractor will not be able to collect any contribution to any retirement plans or programs.

14.06 For all material used, the Contractor shall receive the actual cost of such material delivered at the site of the Work, as shown by original receipted bill, to which shall be added five percent (5%). There will be absolutely no additional surcharges or additional fees attached hereto with respect to this subsection.

14.07 For any equipment used that is owned by the Contractor, the Contractor shall be allowed a rental based upon the latest prevailing rental price, but not to exceed a rental price as determined by the Associated Equipment Distributors (A.E.D. Green Book).

14.08 The Contractor shall also be paid the actual costs of transportation for any equipment which it owns and which it has to transport to the Project for the Extra Work. There will be absolutely no additional surcharges or additional fees attached hereto with respect to this subsection.

14.09 If the Contractor is required to rent equipment for Extra Work, but not required for Contract items, it will be paid the actual cost of rental and transportation of such equipment to which no percent shall be added. The basis upon which rental cost are to be charged shall be agreed upon in writing before the Work is started. Actual rental and transportation costs shall be obtained from receipted invoices and freight bills.

14.10 No compensation for expenses, fees or costs incurred in executing Extra Work, other than herein specifically mentioned herein above, will be allowed.

14.11 A record of Extra Work on Force Account basis shall be submitted to the Owner on the day following the execution of the Work, and no less than three copies of such record shall be made on suitable forms and signed by both the Owner or his representative on the Project and the Contractor. All bids for materials used on extra Work shall be submitted to the Owner by the Contractor upon certified statements to which will be attached original bills covering the costs of such materials.

14.12 Payment for Extra Work of any kind will not be allowed unless the same has been ordered in writing by the Owner.

15.00 STATUS OF THE ENGINEER (NOT APPLICABLE)

16.00 INJURIES TO PERSONS AND PROPERTY

16.01 The Contractor shall be held solely and exclusively responsible for all injuries to persons and for all damages to the property of the Owner or others caused by or resulting from the negligence of itself, its employees or its agents, during the progress of or in connection with the Work, whether within the limits of the Work or elsewhere under the Contract proper or as Extra Work. This requirement will apply continuously and not be limited to normal working hours or days. The Owner's construction review is for the purpose of checking the Work product produced and does not include review of the methods employed by the Contractor or to the Contractor's compliance with safety measures of any nature whatsoever. The Contractor agrees to pay a reasonable attorney fee and other reasonable attendant costs of the Owner in the event it becomes necessary for the Owner to employ an attorney to enforce this section or to protect itself against suit over the Contractor's responsibilities. Attorney fees shall be at the prevailing hourly rate of the private sector. The attorney fee hourly rate shall not be less than $175.00 per hour. All attorney fees collected shall be paid to the operating budget of the Office of the Parish President.

16.02 The Contractor must protect and support all utility infrastructures or other properties which are liable to be damaged during the execution of its Work. It shall take all reasonable and proper precautions to protect persons, animals and vehicles or the public from the injury, and wherever necessary, shall erect and maintain a fence or railing around any excavation, and place a sufficient number of lights about the Work and keep same burning from twilight until sunrise, and shall employ one or more watchmen as an additional security whenever needed. The Contractor understands and agrees that the Owner may request that security be placed on the premises to ensure and secure same. The Owner shall exclusive authority to request placement of such security. Contractor agrees to retain and place security as requested, all at the sole expense of Contractor. Additional security shall not be considered a change order or reason for additional payment by the Owner. The Contractor must, as far as practicable and consistent with good construction, permit access to private and public property and leave fire hydrants, catch basins, streets, etc., free from encumbrances. The Contractor must restore at its own expense all injured or damaged property caused by any negligent act of omission or commission on its part or on the part of its employees or subcontractors, including, but not limited to, sidewalks, curbing, sodding, pipes conduits, sewers, buildings, fences, bridges, retaining walls, tanks, power lines, levees or any other building or property whatsoever to a like condition as existed prior to such damage or injury.

16.03 In case of failure on the part of the Contractor to restore such property or make good such damage, the Owner may upon forty-eight (48) hours' notice proceed to repair or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any monies due or which may become due under its Contract.

16.04 Contractor agrees to protect, defend, indemnify, save, and hold harmless St. Tammany Parish Government, its elected and appointed officials, departments, agencies, boards and commissions, their officers, agents servants, employees, including volunteers, from and against any and all claims, demands, expense and liability arising out of injury or death to any person or the damage, loss or destruction of any property to the extent caused by any negligent act or omission or willful misconduct of Contractor, its agents, servants, employees, and subcontractors, or any and all costs, expense and/or attorney fees incurred by St. Tammany Parish Government as a result of any claim, demands, and/or causes of action that results from the negligent performance or non-performance by Contractor, its agents, servants, employees, and subcontractors of this contract. Contractor agrees to investigate, handle, respond to, provide defense for and defend any such claims, demand, or suit at its sole expense and agrees to bear all other costs and expenses related thereto caused by any negligent act or omission or willful misconduct of Contractor, its agents, servants, employees, and subcontractors.

16.05 As to any and all claims against Owner, its agents, assigns, representatives or employees by any employee of Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts as may be liable, the indemnification obligation under Paragraph 16.04 shall not be limited in any way or by any limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or any Subcontractor under workmen's compensation acts, disability benefit acts or other employee benefit acts.

16.06 No road shall be closed by the Contractor to the public except by written permission of the Owner. If so closed, the Contractor shall maintain traffic over, through and around the Work included in his Contract, with the maximum practical convenience, for the full twenty-four hours of each day of the Contract, whether or not Work has ceased temporarily. The Contractor shall notify the Owner at the earliest possible date after the Contract has been executed and, in any case, before commencement of any construction that might in any way inconvenience or endanger traffic, in order that necessary and suitable arrangements may be determined. Any and all security, maintenance, labor or costs associated with traffic control herein shall be at the sole expense of Contractor. This expense shall be paid directly by the Contractor. This expense shall not be considered as a change order nor shall it allow the Contractor any additional cost reimbursement whatsoever. All traffic deviations herein shall be coordinated with the appropriate law enforcement officials of this Parish.

16.07 The convenience of the general public and residents along the Works shall be provided for in a reasonable, adequate and satisfactory manner. Where existing roads are not available as detours, and unless otherwise provided, all traffic shall be permitted to pass through the Work. In all such cases, the public shall have precedence over Contractor's vehicles insofar as the traveling public's vehicles shall not be unduly delayed for the convenience of the Contractor. In order that all unnecessary delay to the traveling public may be avoided, the Contractor shall provide and station competent flagmen whose sole duties shall consist of directing and controlling the movement of public traffic either through or around the Work. Any and all security, maintenance, labor or costs associated with traffic control herein shall be at the sole expense of Contractor. This expense shall be paid directly by the Contractor. This expense shall not be considered as a change order nor shall it allow the Contractor any additional cost reimbursement whatsoever. All traffic deviations herein shall be coordinated with the appropriate law enforcement officials of this Parish.

16.08 The Contractor shall arrange its Work so that no undue or prolonged blocking of business establishments will occur.

16.09 Material and equipment stored on the right of way or work site shall be so placed and the Work at times shall be so conducted as to ensure minimum danger and obstruction to the traveling public.

16.10 During grading operations when traffic is being permitted to pass through construction, the Contractor shall provide a smooth, even surface that will provide a satisfactory passageway

for use of traffic. The road bed shall be sprinkled with water if necessary to prevent a dust nuisance, provided the dust nuisance is a result of the Work.

16.11 Fire hydrants shall be accessible at all times to the Fire Department. No material or other obstructions shall be placed closer to a fire hydrant than permitted by ordinances, rules or regulations or within fifteen (15) feet of a fire hydrant, in the absence of such ordinance, rules or regulations.

16.12 The Contractor shall not, without the written permission of the Owner, do Work for a resident or property owner abutting the Work at the time that this Work is in progress.

16.13 No Work of any character shall be commenced on railroad right-of-way until the Railroad Company has issued a permit to the Owner and has been duly notified by the Contractor in writing (with a copy forwarded to the Owner) of the date it proposes to begin Work, and until an authorized representative of the Railroad Company is present, unless the Railroad Company waives such requirements. All Work performed by the Contractor within the right-of-way limits of the railroad shall be subject to the inspection and approval of the chief engineer of the Railroad Company or its authorized representative. Any precautions considered necessary by said chief engineer to safeguard the property, equipment, employees and passengers of the Railroad Company shall be taken by the Contractor without extra compensation. The Contractor shall, without extra compensation, take such precautions and erect and maintain such tell-tale or warning devices as the Railroad Company considers necessary to safeguard the operation of its trains. The temporary vertical and horizontal clearance specified by the chief engineer of the Railroad Company in approving these shall be maintained at all times. No steel, brick, pipe or any loose material shall be left on the ground in the immediate vicinity of the railway track. Before any Work is done within Railroad right of way, the Contractor shall provide and pay all costs of any special insurance requirements of the Railroad.

16.14 The Contractor, shall, without extra compensation, provide, erect, paint and maintain all necessary barricades. Also, without extra compensation, the Contractor shall provide suitable and sufficient lights, torches, reflectors or other warning or danger signals and signs, provide a sufficient number of watchmen and flagmen and take all the necessary precautions for the protection of the Work and safety of the Public.

16.15 The Contractor shall erect warning signs beyond the limits of the Project, in advance of any place on the Project where operations interfere with the use of the road by traffic, including all intermediate points where the new Work crosses or coincides with the existing road. All barricades and obstructions shall be kept well painted and suitable warning signs shall be placed thereon. All barricades and obstructions shall be illuminated at night and all lights or devices for this purpose shall be kept burning from sunset to sunrise.

16.16 Whenever traffic is maintained through or over any part of the Project, the Contractor shall clearly mark all traffic hazards. No direct payment will be made for barricades, signs and illumination therefore or for watchmen or flagmen.

16.17 The Contractor will be solely and completely responsible for conditions on the job site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours. The duty of the Owner to conduct construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures, in, or near the construction site.

17.00 SANITARY PROVISIONS

17.01 The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of its employees as may be necessary to comply with the rules and regulations of the State Health Agency or of the other authorities having jurisdiction and shall permit no public nuisance.

18.00 RIGHTS OF WAY

18.01 The Owner will furnish the Contractor with all necessary rights-of-way for the prosecution of the Work. The rights of way herein referred to shall be taken to mean only permission to use or pass through the locations or space in any street, highway, public or private property in which the Contractor is to prosecute the Work.

18.02 It is possible that all lands and rights of way may not be obtained as herein contemplated before construction begins, in which event the Contractor shall begin its Work upon such land and rights of way as the Owner may have previously acquired. Any delay in furnishing these lands by the Owner can be deemed proper cause for adjustment in the Contract amount and/or in the time of completion.

19.00 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE

19.01 The Contractor shall not enter upon private property for any purpose without first obtaining permission from the Owner, as well as the private property owner and/or and private property Lessees. The Contractor shall use every precaution necessary for the preservation of all public and private property, monuments, highway signs, telephone lines, other utilities, etc., along and adjacent to the Work; the Contractor shall use every precaution necessary to prevent damage to pipes, conduits, and other underground structures; and shall protect carefully from disturbance or damage all land monuments and property marks until an authorized agent has witnessed or otherwise referenced their location and shall not remove them until directed. The street and highway signs and markers that are to be affected by the Work shall be carefully removed when the Work begins and stored in a manner to keep them clean and dry. The Contractor must obtain all necessary information in regard to existing utilities and shall give notice in writing to the owners or the proper authorities in charge of streets, gas, water, pipes, electric, sewers and other underground structures, including conduits, railways, poles and pole lines, manholes, catch basins, fixtures, appurtenances, and all other property that may be affected by the Contractor's operations, at least forty-eight (48) hours before its operations will affect such property. The Contractor shall not hinder or interfere with any person in the protection of such Work or with the operation of utilities at any time. When property, the operation of railways, or other public utilities are endangered, the Contractor shall at its own expense, maintain flagmen or watchmen and any other necessary precautions to avoid interruption of service or damage to life or property, and it shall promptly repair, restore, or make good any injury or damage caused by its negligent operations in an acceptable manner. The Contractor must also obtain all necessary information in regard to the installation of new cables, conduits, and transformers, and make proper provisions and give proper notifications, in order that same can be installed at the proper time without delay to the Contractor or unnecessary inconvenience to the Owner.

19.02 The Contractor shall not remove, cut or destroy trees, shrubs, plants, or grass that are to remain in the streets or those which are privately owned, without the proper authority. Unless otherwise provided in the Special Provisions or the Proposal, the Contractor shall replace and replant all plants, shrubs, grass and restore the grounds back to its original good condition to the satisfaction of the Owner and/or the property owner. The Contractor shall assume the responsibility of replanting and guarantees that plants, shrubs, grass will be watered, fertilized and cultivated until they are in a growing condition. No direct payment will be made for removing and replanting of trees, shrubs, plants or grass unless such items are set forth in the Proposal.

19.03 When or where direct damage or injury is done to public or private property by or on account of any negligent act, omission, neglect or otherwise of the Contractor, it shall make good such damage or injury in an acceptable manner.

20.00 CONTRACTORS RESPONSIBILITY FOR WORK

20.01 Until final acceptance of the Work by the Owner as evidence by approval of the final estimate, the Work shall be in the custody and under the charge and care of the Contractor and it shall take every necessary precaution against injury or damage to any part thereof by the action of the elements or from the non-execution of the Work; unless otherwise provided for elsewhere in the Specifications or Contract. The Contractor shall rebuild, repair, restore and make good, without extra compensation, all injuries or damages to any portion of the Work occasioned by any of the above causes before its completion and

acceptance, and shall bear the expenses thereof. In case of suspension of the Work from any cause whatever, the Contractor shall be responsible for all materials and shall properly and securely store same, and if necessary, shall provide suitable shelter from damage and shall erect temporary structures where necessary. If in the exclusive discretion of the Owner, any Work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of its Subcontractors to so protect the Work, such materials shall be removed and replaced at the sole expense of the Contractor. Such amount shall be deducted from any sum due or to be due Contractor.

20.02 The Contractor shall give all notice and comply with all Federal, State, and local laws, ordinances, and regulations in any manner affecting the conduct of the Work, and all such orders and decrees as exist, or may be enacted by bodies or tribunals having any jurisdiction or authority over the Work, and shall indemnify and hold harmless the Owner against any claim or liability arising from, or based on, the violation of any such law, ordinance, regulation, order or decree, whether by itself, its employees or Subcontractors.

21.00 TESTS AND INSPECTIONS CORRECTION & REMOVAL OF DEFECTIVE WORK

21.01 Contractor warrants and guarantees to Owner that all materials and equipment will be new unless otherwise specified and that all Work will be of good quality and free from faults or defects and in accordance with the requirements of the Contract Documents. All unsatisfactory Work, all faulty or Defective Work and all Work not conforming to the requirements of the Contract Documents at the time of acceptance shall be considered Defective. Prompt and reasonable notice of all defects shall be given to the Contractor.

21.02 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to specifically be inspected, tested or approved by some public body, Contractor shall assume full responsibility therefor, pay all costs in connection therewith and furnish Owner the required certificates of inspection, testing or approval. All other inspections, tests and approval required by the Contract Documents shall be performed by organizations acceptable to Owner and Contractor and the costs thereof shall be borne by the Contractor unless otherwise specified.

21.03 Contractor shall give Owner timely notice of readiness of the Work for all inspections, tests or approvals. If any such Work required to be inspected, tested or approved is covered without written approval of Owner, it must, if requested by Owner, be uncovered for observation, and such uncovering shall be at Contractor's expense unless Contractor has given Owner timely notice of its intention to cover such Work and Owner has not acted with reasonable promptness in response to such notice.

21.04 Neither observations by Owner nor inspections, tests or approvals shall relieve Contractor from its obligations to perform the Work in accordance with the requirements of the Contract Document.

21.05 Owner and its representatives will at reasonable times have access to the Work. Contractor shall provide proper and safe facilities for such access and observation of the Work and also for any inspection or testing thereof by others.

21.06 If any Work is covered contrary to the written request of Owner, it must, be uncovered for Owner’s observation and replaced at Contractor's expense. If any Work has been covered which Owner has not specifically requested to observe prior to its being covered, or if Owner considers it necessary or advisable that covered Work be inspected or tested by others, the Contractor, at Owner's request, shall uncover, expose or otherwise make available for observations, inspections or testing as Owner may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is Defective, Contractor shall bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services, and an appropriate deductive Change Order shall be issued. If, however, such Work is not found to be Defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction.

21.07 If the Work is Defective, or Contractor fails to supply sufficient skilled workmen or suitable materials or equipment, or if the Contractor fails to make prompt payments to Subcontractors or for labor, materials or equipment, Owner may order Contractor to stop the Work, or any portion thereof, until the cause of such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor or any other party.

21.08 Prior to approval of final payment, Contractor shall promptly, without cost to Owner and as specified by Owner, either correct any Defective Work, whether or not fabricated, installed or completed, or if the Work has been rejected by Owner, remove it from the site and replace it with non-defective Work. If Contractor does not correct such Defective Work or remove and replace such rejected Work within a reasonable time, all as specified in a written notice from Owner, Owner may have the deficiency corrected or the rejected Work removed and replaced. All direct or indirect costs of such correction or removal and replacement including compensation for additional professional services shall be paid by Contractor, and an appropriate deductive Change Order shall be issued. Contractor shall also bear the expense of making good all Work of others destroyed or damaged by its correction, removal or replacement of its Defective Work.

21.09 If, after the approval of final payment and prior to the expiration of one year after the date of Substantial Completion or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any Work is found to be Defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such Defective Work or if it has been rejected by Owner, remove it from the site and replace it with non-defective Work. If Contractor does not promptly comply with the terms of such instructions, Owner may have the Defective Work corrected or the rejected Work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, shall be paid by Contractor. The Contractor agrees to pay a reasonable attorney fee and other reasonable attendant costs of the Owner in the event it becomes necessary for the Owner to employ an attorney to enforce this section or to protect itself against suit over the Contractor's responsibilities. Attorney fees shall be at the prevailing hourly rate of the private sector. The attorney fee hourly rate shall not be less than $175.00 per hour. All attorney fees collected shall be paid to the operating budget of the Office of the Parish President.

21.10 If, instead of requiring correction or removal and replacement of Defective Work, Owner (and prior to approval of final payment) prefers to accept it, the Owner may do so. In such case, if acceptance occurs prior to approval of final payment, a Change Order shall be issued incorporating the necessary revisions in the Contract Documents, including appropriate reduction in the Contract Price, or, if the acceptance occurs after approval of final payment, an appropriate amount shall be paid by Contractor to Owner.

21.11 If Contractor should fail to progress the Work in accordance with the Contract Documents, including any requirements of the Progress Schedule, Owner, after seven (7) days written Notice to Contractor, may, without prejudice to any other remedy Owner may have, make good such deficiencies and the cost thereof including compensation for additional professional services shall be charged against Contractor. In such cases, a Change Order shall be issued incorporating the necessary revisions in the Contract Documents including an appropriate reduction in the Contract Price. If the payments then or thereafter due Contractor are not sufficient to cover such amount, Contractor shall pay the difference to Owner.

21.12 The Owner may appoint representatives to make periodic visits to the site and observe the progress and quality of the executed Work. These representatives shall be governed by the same restrictions placed on the Owner by these Specifications. The governing body of the Federal, State or local government exercising authority in the area of the Work may appoint representatives to observe the progress and quality of the Work. Contractor shall cooperate with and assist these representatives in the performance of their duties.

21.13 The Contractor shall be responsible for the faithful execution of its Contract and the presence or absence of the Owner's or Government's Representative is in no way or manner to be presumed or assumed to relieve in any degree the responsibility or obligation of the Contractor.

21.14 The Contractor shall notify the Owner and the Governmental Agency having jurisdiction as to the exact time at which it is proposed to begin Work so the Owner may provide for inspection of all materials, foundations, excavations, equipment, etc., and all or any part of the Work and to the preparation or manufacture of materials to be used whether within the limits of the Work or at any other place.

21.15 The Owner or its representatives shall have free access to all parts of the Work and to all places where any part of the materials to be used are procured, manufactured or prepared. The Contractor shall furnish the Owner all information relating to the Work and the material therefor, which may be deemed necessary or pertinent, and with such samples of materials as may be required. The Contractor, at its own expense, shall supply such labor and assistance as may be necessary in the handling of materials for proper inspection or for inspection of any Work done by it.

21.16 No verbal instructions given to the Contractor by the Owner, Project Representative or any of their agents shall change or modify the written Contract. Contractors shall make no claims for additional payments or time based upon verbal instructions.

22.00 SUBSURFACE CONDITIONS

22.01 It is understood and agreed that the Contractor is familiar with the subsurface conditions that will be encountered and its price bid for the Work includes all of the costs involved for Work in these conditions and it is furthermore agreed that it has taken into consideration, prior to its Bid and acceptance by Owner, all of the subsurface conditions normal or unusual that might be encountered in the location of the Work.

22.02 Should the Contractor encounter during the progress of the Work subsurface conditions at the site materially differing from those shown on the Drawings or indicated in the Specifications, the attention of the Owner shall be directed to such conditions before the conditions are disturbed. If the Owner finds that the conditions materially differ from those shown on the Drawings or indicated in the Specifications, it shall at once make such changes in the Drawings or Specifications as it may find necessary, and any increase or decrease in cost or extension of time resulting from such changes shall be adjusted in the same manner as provided for changes for Extra Work. The Contractor shall submit breakdowns of all costs in a manner as instructed and approved by the Owner.

23.00 REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS

23.01 Bidder shall thoroughly examine the site of the Work and shall include in its Bid the cost of removing all structures and obstructions in the way of the Work.

23.02 The Contractor shall remove any existing structures or part of structures, fence, building or other encumbrances or obstructions that interfere in any way with the Work. Compensations for the removal of any structure shall be made only if the item(s) to be removed was/were listed as pay item(s) on the Proposal.

23.03 If called for in the Special Conditions, all privately and publicly owned materials and structures removed shall be salvaged without damage and shall be piled neatly and in an acceptable manner upon the premises if it belongs to an abutting property owner, otherwise at accessible points along the improvements. Materials in structures which is the property of the Owner or property of any public body, private body or individual which is fit for use elsewhere, shall remain property of the original Owner. It shall be carefully removed without damage, in sections which may be readily transported; same shall be stored on or beyond the right of way. The Contractor will be held responsible for the care and preservation for a period of ten (10) days following the day the last or final portion of the materials stored at a particular location are placed thereon. When privately owned materials are stored beyond the right of way, the Contractor will be held responsible for such care and preservation for a period of ten (10) days responsibility period for care and preservation of the materials begins. The Contractor must furnish the Owner with evidence satisfactory that the proper owner of the materials has been duly notified by the Contractor that the said owner must assume responsibility for its materials on the date following the Contractor's ten (10) day responsibility.

24.00 INSURANCE

24.01 Contractor shall secure and maintain at its expense such insurance that will protect it and the Parish from claims for injuries to persons or damages to property which may arise from or in connection with the performance of Services or Work hereunder by the Contractor, his agents, representatives, employees, and/or subcontractors. The cost of such insurance shall be included in Contractor's bid.

24.02 The Contractor shall not commence work until it has obtained all insurance as required for the Parish Project. If the Contractor fails to furnish the Parish with the insurance protection required and begins work without first furnishing Parish with a currently dated certificate of insurance, the Parish has the right to obtain the insurance protection required and deduct the cost of insurance from the first payment due the Contractor. Further deductions are permitted from future payments as are needed to protect the interests of the Parish including, but not limited to, renewals of all policies.

24.03 Payment of Premiums: The insurance companies issuing the policy or policies shall have no recourse against the Parish of St. Tammany for payment of any premiums or for assessments under any form of policy.

24.04 Deductibles: Any and all deductibles in the described insurance policies shall be assumed by and be at the sole risk of the Contractor.

24.05 Authorization of Insurance Company(ies) and Rating: All insurance companies must be authorized to do business in the State of Louisiana and shall have an A.M. Best rating of no less than A-, Category VII.

24.06 Policy coverages and limits must be evidenced by Certificates of Insurance issued by Contractor's carrier to the Parish and shall reflect:

Date of Issue: Certificate must have current date.

Named Insured: The legal name of Contractor under contract with the Parish and its principal place of business shall be shown as the named insured on all Certificates of Liability Insurance.

Name of Certificate Holder: St. Tammany Parish Government, Office of Risk Management, P. O. Box 628, Covington, LA 70434

Project Description: A brief project description, including Project Name, Project Number and/or Contract Number, and Location.

Endorsements and Certificate Reference: All policies must be endorsed to provide, and certificates of insurance must evidence the following:

Waiver of Subrogation: The Contractor's insurers will have no right of recovery or subrogation against the Parish of St. Tammany, it being the intention of the parties that all insurance policy(ies) so affected shall protect both parties and be the primary coverage for any and all losses covered by the below described insurance. *Policy endorsements required for all coverages*.

Additional Insured: The Parish of St. Tammany shall be named as additional named insured with respect to general liability, marine liability, pollution/environmental liability, automobile liability and excess liability coverages. *Policy endorsements required.*

Hold Harmless: Contractor's liability insurers shall evidence their cognizance of the Hold Harmless and Indemnification in favor of St. Tammany Parish Government by referencing same on the face of the Certificate(s) of Insurance.

Cancellation Notice: Producer shall provide thirty (30) days prior written notice to the Parish of policy cancellation or substantive policy change.

24.07 The types of insurance coverage the Contractor is required to obtain and maintain throughout the duration of the Contract, include, but is not limited to:

1. Commercial General Liability insurance with a Combined Single Limit for bodily injury and property damage of at least $1,000,000 per Occurrence/$3,000,000 General Aggregate/Products-Completed Operations Per Project. The insurance shall provide for and the certificate(s) of insurance shall indicate the following coverages:

    a) Premises - operations;
    b) Broad form contractual liability;
    c) Products and completed operations;
    d) Personal Injury;
    e) Broad form property damage;
    f) Explosion and collapse.

2. Marine Liability/Protection and Indemnity insurance is required for any and all vessel and/or marine operations in the minimum limits of $1,000,000 per occurrence/$2,000,000 per project general aggregate. The coverage shall include, but is not limited to, the basic coverages found in the Commercial General Liability insurance and coverage for third party liability.

3. Contractors' Pollution Liability and Environmental Liability insurance in the minimum amount of $1,000,000 per occurrence, $2,000,000 general aggregate and include coverage for full contractual liability and for all such environmental and/or hazardous waste exposures affected by this project.

4. Business Automobile Liability insurance with a Combined Single Limit of $1,000,000 per Occurrence for bodily injury and property damage, and shall include coverage for the following:

    a) Any automobiles;
    b) Owned automobiles;
    c) Hired automobiles;
    d) Non-owned automobiles;
    e) Uninsured motorist.

5. Workers' Compensation/Employers Liability insurance: worker's compensation insurance coverage and limits as statutorily required; Employers' Liability Coverage shall be not less than $1,000,000 each accident, $1,000,000 each disease, $1,000,000 disease policy aggregate, except when projects include exposures covered under the United States Longshoremen and Harbor Workers Act, Maritime and/or Jones Act and/or Maritime Employers Liability (MEL) limits shall be not less than $1,000,000/$1,000,000/$1,000,000. *Coverage for owners, officers and/or partners shall be included in the policy and a statement of such shall be made by the insuring producer on the face of the certificate.*

6. Owners Protective Liability (OPL) (formerly Owners and Contractors Protective Liability (OCP) Insurance) shall be furnished by the Contractor naming St. Tammany Parish Government as the Named Insured and shall provide coverage in the minimum amount of $1,000,000 combined single limit (CSL) each occurrence, $2,000,000 aggregate. Any project valued in excess of $3,000,000 shall be set by the Office of Risk Management. The policy and all endorsements shall be addressed to St. Tammany Parish Government, Office of Risk Management, P. O. Box 628, Covington, LA 70434.

7. Builder's Risk Insurance shall be required on buildings, sewage treatment plants and drainage pumping stations, and shall be written on an "all-risk" or equivalent policy form in the amount of the full value of the initial Contract sum, plus value of subsequent Contract modifications and cost of materials supplied or installed by others, comprising 100% total value for the entire project including foundations. Deductibles should not exceed $5,000 and Contractor shall be responsible for any and all policy deductibles. This insurance shall cover portions of the work stored off the site, and also portions of the work in transit. In addition, Installation Floater

Insurance, on an "all-risk" form, will be carried on all pumps, motors, machinery and equipment on the site or installed. Both the Builder's Risk Insurance and the Installation Floater Insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors and shall terminate only when the Project has been accepted. St. Tammany Parish Government, P. O. Box 628, Covington, LA 70434 shall be the first named insured on the Builder's Risk and Installation Floater Insurance.

8. Professional Liability (errors and omissions) insurance in the sum of at least One Million Dollars ($1,000,000) per claim with Two Million Dollars ($2,000,000) annual aggregate.

9. An umbrella policy or excess policy may be required and/or allowed to meet minimum coverage limits, subject to the review and approval by St. Tammany Parish Government, Office of Risk Management.

24.08 All policies of insurance shall meet the requirements of the Parish of St. Tammany prior to the commencing of any work. The Parish of St. Tammany has the right, but not the duty, to approve all insurance policies prior to commencing of any work. If at any time, it becomes known that any of the said policies shall be or becomes unsatisfactory to the Parish of St. Tammany as to form or substance; or if a company issuing any such policy shall be or become unsatisfactory to the Parish of St. Tammany, the Contractor shall promptly obtain a new policy, timely submit same to the Parish of St. Tammany for approval and submit a certificate thereof as provided above. The Parish agrees to not unreasonably withhold approval of any insurance carrier selected by Contractor. In the event that Parish cannot agree or otherwise authorize said carrier, Contractor shall have the option of selecting and submitting new insurance carrier within 30 days of said notice by the Parish. In the event that the second submission is insufficient or is not approved, then the Parish shall have the unilateral opportunity to thereafter select a responsive and responsible insurance carrier all at the cost of Contractor and thereafter deduct from Contractor's fee the cost of such insurance.

24.09 Upon failure of Contractor to furnish, deliver and/or maintain such insurance as above provided, the contract, at the election of the Parish of St. Tammany, may be forthwith declared suspended, discontinued or terminated. Failure of the Contractor to maintain insurance shall not relieve the Contractor from any liability under the contract, nor shall the insurance requirements be construed to conflict with the obligation of the Contractor concerning indemnification.

24.10 Contractor shall maintain a current copy of all annual insurance policies and provide same to the Parish of St. Tammany as may be reasonably requested.

24.11 It shall be the responsibility of Contractor to require that these insurance requirements are met by all contractors and sub-contractors performing work for and on behalf of Contractor. Contractor shall further ensure the Parish is named as additional insured on all insurance policies provided by said contractor and/or sub-contractor throughout the duration of the project, and that renewal certificates for any policies expiring prior to the Parish's final acceptance of the project shall be furnished to St. Tammany Parish Government, Office of Risk Management, without prompting.

NOTICE:

These are only an indication of the coverages that are generally required. Additional coverages and/or limits may be required for projects identified as having additional risks or exposures. Please note that some requirements listed may not necessarily apply to your specific services. St. Tammany Parish Government reserves the right to remove, replace, make additions to and/or modify any and all of the insurance requirement language upon review of the final scope of services presented to the Office of Risk Management prior to execution of a contract for services.

For inquiries regarding insurance requirements, please contact:
St. Tammany Parish Government
Office of Risk Management
P. O. Box 628
Covington, LA 70434
Telephone: 985-898-5226
Email: riskman@stpgov.org

24.12 Nothing contained in these insurance requirements is to be construed as limiting the extent of the Contractor's Responsibility for payment of damages resulting from its operations under this Contract.

25.00 OWNER'S RIGHT TO OCCUPANCY

25.01 The Owner shall have the right to use, at any time, any and all portions of the Work that have reached such a stage of completion as to permit such occupancy, provided such occupancy does not hamper the Contractor or prevent its efficient completion of the Contract or be construed as constituting an acceptance of any part of the Work.

25.02 The Owner shall have the right to start the construction of houses, structures or any other building concurrent with the Contractor's Work.

26.00 SURVEY HORIZONTAL AND VERTICAL CONTROL

26.01 The Owner shall provide surveys for construction to establish reference points which in its judgment are necessary to enable Contractor to layout and proceed with its Work. Contractor shall be responsible for surveying and laying out the Work and shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of the Owner. Contractor shall report to Owner whenever any reference point is lost or destroyed and the Owner shall decide if the reference point shall be replaced by its or the Contractor's forces.

26.02 The Contractor shall establish lines and grades with its own forces in sufficient number and location for the proper execution of the Work.

26.03 If the Contractor, during the construction, damages the established property corners and/or other markers and thereafter requests the Owner to re-stake same in order to complete the project, this expense will be borne solely by the Contractor.

27.00 TERMINATION OF THE CONTRACT, OWNER'S AND CONTRACTORS RIGHT TO STOP WORK.

27.01 If the Contractor should be adjudged bankrupt (voluntarily or involuntarily) or if it should make a general assignment for the benefit of its creditors, or if a receiver should be appointed on account of its insolvency, or if it should persistently or repeatedly refuse or should fail (except in cases for which extension of time is provided) to supply enough properly skilled workmen or proper materials, or if it should fail to make prompt payment to Subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Owner, or otherwise be guilty of a substantial violation of any provision of the Contract, then the Owner, upon the certificate of the Owner that, in its unilateral

discretion and judgment, believes sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor ten (10) calendar days written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools and appliances thereon and finish the Work by whatever method the Owner may deem expedient.

27.02 Failure of the Contractor to start the Work within the time limit specified herein or substantial evidence that the progress being made by the Contractor is sufficient to complete the Work within the specified time shall be grounds for termination of the Contract by the Owner.

27.03 Before the Contract is terminated, the Contractor and its surety will first be notified in writing by the Owner of the conditions which make termination of the Contract imminent. When after ten (10) calendar days' notice is given and if satisfactory effort has not been made by the Contractor or its surety to correct the conditions, the Owner may declare, in its exclusive discretion, that the Contract is terminated and so notify the Contractor and its surety accordingly.

27.04 Upon receipt of notice from the Owner that the Contract has been terminated, the Contractor shall immediately discontinue all operations. The Owner may then proceed with the Work in any lawful manner that it may elect until Work is finally completed.

27.05 The exclusive right is reserved to the Owner to take possession of any machinery, implements, tools or materials of any description that shall be found upon the Work, to account for said equipment and materials, and to use same to complete the Project. When the Work is finally completed, the total cost of same will be computed. If the total cost is less than the Contract Price, the difference will not be paid to the Contractor or its surety.

27.06 In case of termination, all expenses incident to ascertaining and collecting losses under the Bond, including legal services, shall be assessed against the Bond.

27.07 If the Work should be stopped under any order of any court or public authority for period of sixty (60) calendar days, through no act or fault of the Contractor or anyone employed by it, or if the Owner shall fail to pay the Contractor within a reasonable time any sum certified by the Owner, then the Contractor may, upon ten (10) calendar days written notice to the Owner, stop Work or terminate this Contract and recover from the Owner payment for all Work properly and professionally executed in a workmanlike manner. This loss specifically includes actual cost of materials and equipment, together with all wages inclusive of all federal, state, and local tax obligations. This loss specifically includes reimbursement of all insurances on a pro-rata basis from the date of termination to date of policy period. This loss excludes and specifically does not include recovery by the Contractor for lost profit, indirect & direct expenses, overhead, and the like.

28.00 PAYMENTS TO THE CONTRACTOR

28.01 Monthly certificates for partial payment, in a form approved by the Owner, shall be transmitted to the Owner upon receipt from the Contractor and acceptance by the Owner. In accordance with LSA-R.S. 38:2248(A), when the Contract Price is less than five hundred thousand dollars, these certificates shall be equal to ninety percent (90%) of both the Work performed and materials stored at the site; and when the Contract Price is five hundred thousand dollars or more, these certificates shall be equal to ninety-five percent (95%) of both the Work performed and materials stored at the site. Partial payment certificates shall include only Work, materials and equipment that are included in official Work Order and which meet the requirements of plans, Specifications and Contract Documents. These monthly estimates shall show the amount of the original estimate for each item, the amount due on each item, the gross total, the retained percentage, the amount previously paid and the net amount of payment due.

28.02 After final completion and acceptance by the Owner of the entire Work, and when the Contract Price is less than five hundred thousand dollars, the Owner shall issue to the Contractor Certificate of Payment in sum sufficient to increase total payments to ninety percent (90%) of the Contract Price. After final completion and acceptance by the Owner of the entire Work, and when the Contract Price is five hundred thousand dollars or more,

the Owner shall issue to the Contractor Certificate of Payment in sum sufficient to increase total payments to ninety-five percent (95%) of the Contract Price.

28.03 When the Contract Price is less than five hundred thousand dollars, the final payment certificate of the remaining ten percent (10%) of the Contract Price, minus any deduction for deficient or Defective Work or other applicable deductions, will be issued by the Owner forty-five (45) days after filing acceptance in the Mortgage Office of the Parish and a Clear Liens and Privilege Certificate has been secured. When the Contract Price is five hundred thousand dollars or more, the final payment certificate of the remaining five percent (5%) of the Contract Price, minus any deduction for deficient or Defective Work or other applicable deductions, will be issued by the Owner forty-five (45) days after filing acceptance in the Mortgage Office of the Parish and a Clear Liens and Privilege Certificate has been secured. Before issuance of the final payment certificate, the Contractor shall deposit with the Owner a certificate from the Clerk of Court and Ex-Officio Recorder of Mortgages from the Parish in which the Work is performed to the effect that no liens have been registered against Contract Work.

28.04 When, in the opinion of the Contractor, the Work provided for and contemplated by the Contract Documents has been substantially completed, the Contractor shall notify the Owner in writing that the Work is substantially complete and request a final inspection. The Owner shall proceed to perform such final inspection accompanied by the Contractor. Any and all Work found by this inspection to be Defective or otherwise not in accordance with the plans and Specifications shall be corrected to the entire satisfaction of the Owner and at the sole expense of the Contractor. If the Contract is found to be incomplete in any of its details, the Contractor shall at once remedy such defects, and payments shall be withheld and formal acceptance delayed until such Work has been satisfactorily completed.

28.05 If payment is requested on the basis of materials and equipment not incorporated in the Work, but delivered and suitably stored and protected from damage and theft at the site, the Request for Payment shall also be accompanied by such data, satisfactory to the Owner, as will establish Owner's title to the material and equipment and protect its interest therein, including applicable insurance.

28.06 Each subsequent Request for Payment shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied to discharge in full all of Contractor's obligations reflected in prior Request for Payment.

28.07 Each subsequent request for payment shall include an affidavit by Contractor that Contractor, all subcontractors, agents, material suppliers and all other persons supplying material to the project upon which State of Louisiana and/or St. Tammany sales taxes are lawfully due have paid these taxes and that all supplies and materials purchased for this project and for which Contractor has been paid have had all lawfully due State and/or St. Tammany sales taxes paid.

28.08 The Bid Proposal, unless otherwise modified in writing, and the Contract constitute the complete Project. The Contract Prices constitute the total compensation payable to Contractor and the cost of all of the Work and materials, taxes, permits and incidentals must be included into the Bid submitted by the Contractor and included into those items listed on the Proposal.

28.09 Any additional supporting data required by the Owner in order to substantiate Contractor's request for payment shall be furnished by Contractor at no cost to the Owner.

28.10 Owner may withhold from payment to Contractor as may be necessary to protect itself from loss on account of:

(1) Defective and/or inferior work;
(2) Damage to the property of Owner or others caused by Contractor;
(3) Failure by Contractor to make payments properly to sub-contractors or to pay for labor, materials or equipment used on this project;
(4) Failure by Contractor to pay taxes due on materials used on this project;
(5) Damage by Contractor to another Contractor;
(6) Insolvency;
(7) Bankruptcy, voluntary or involuntary;
(8) Revocation of corporate status;

(9) Failure to follow corporate formalities;
(10) Unprofessional activities;
(11) Unworkmanlike performance;
(12) Fraud and/or misrepresentation of any kind.

29.00 ACCEPTANCE AND FINAL PAYMENT(S)

29.01 Upon receipt of written notice from Contractor that the work is substantially complete and usable by Owner or the Pubic in suitable manner, the Owner and the Contractor shall jointly inspect the work.

29.02 If the Owner by inspection determines that the work is not substantially complete in a suitable manner for use by the Owner or the Public, then the Owner shall so notify the Contractor in writing stating such reason. All reasons need not be disclosed unless actually known. The Owner is afforded an opportunity to amend said notices as are reasonably possible.

29.03 If the Owner by its inspection determines that the work is substantially complete, it shall prepare a list of all items not satisfactorily completed and shall notify the Contractor and Owner in writing that the work is substantially complete and subject to satisfactory resolution of those items on the list (punch list). Punch lists may be amended from time to time by Owner in the event that additional deficiencies are discovered. In accordance with LSA-R.S. 38:2248(B), any punch list generated during a construction project shall include the cost estimates for the particular items of work the design professional has developed based on the mobilization, labor, material, and equipment costs of correcting each punch list item. The design professional shall retain his working papers used to determine the punch list items cost estimates should the matter be disputed later. The contract agency shall not withhold from payment more than the value of the punch list. Punch list items completed shall be paid upon the expiration of the forty-five (45) day lien period. The provisions of this Section shall not be subject to waiver.

29.04 Upon determination of substantial completeness with the punch list, the Contract Time is interrupted and the Contractor is given a reasonable time not to exceed thirty (30) consecutive calendar days to effect final completion by correcting or completing all of those items listed on the punch list. If the items on the punch list are not completed in a satisfactory manner within the thirty day period, then the Contract Time will begin to run again and will include for purposes of determining liquidated damages the thirty day period the grace period being withdrawn.

29.05 Upon receipt by Owner of written determination that all work embraced by the contract has been completed in a satisfactory manner, the Owner shall provide a written acceptance to Contractor who shall record Owner's written acceptance with the recorder of Mortgages, St. Tammany Parish. The Contractor shall properly prepare, submit and pay for all costs associated with said Acceptance. The Contractor is also responsible for preparation, re-submission and payment of any and all updated certificates.

29.06 Retainage monies, minus those funds deducted in accordance to the requirements of this agreement including but not limited to Paragraph 28.10, shall be due Contractor not earlier than forty-six (46) calendar days after recordation of certificate of Owner's acceptance provided the following:

(1) Contractor shall prepare, secure, pay for and submit clear lien and privilege certificate, signed and sealed by Clerk of Court or Recorder of Mortgages, Parish of St. Tammany and dated at least forty-six (46) days after recordation of certificate of acceptance;

(2) Ensure that the official representative of the Owner has accepted as per LSA-R.S. 38:2241.1, *et seq*. and that all following sub-sections have been properly satisfied as per law;

(3) Ensure that all signatures are affixed and that there exists the requisite authority for all signatures;

(4) Ensure accurate and proper legal descriptions;

(5) Properly identify all parties and/or signatories;

(6) Properly identify all mailing addresses;

(7) Correctly set for the amount of the contract, together with all change orders;

(8) Set out a brief description of the work performed;

(9) Reference to any previously recorded contract, lien or judgment inscription that may affect the property;

(10) Certification that substantial completion has occurred, together with any applicable date(s);

(11) Certification that no party is in default and/or that the project has been abandoned.

29.07 After securing the clear lien and privilege certificate the Contractor shall prepare its final application for payment and submit to Owner. The Owner shall approve application for payment, or state its objections in writing and forward to Contractor for resolution.

30.00 NOTICE AND SERVICE THEREOF

30.01 Any Notice to Contractor from the Owner relative to any part of this Contract shall be in writing and shall be considered delivered and the service thereof completed when said notice is posted; by certified mail, return receipt requested to the said Contractor at its last given address, or delivered in person to said Contractor or its authorized representative on the Work.

31.00 INTENTION OF THESE GENERAL CONDITIONS

31.01 These General Conditions shall be applicable to all contracts entered into by and between the Owner and Contractors, except as may be altered or amended with the consent of the Owner, and/or provided for in the Special Conditions of each contract. Contractor shall be presumed to have full knowledge of these General Conditions which shall be applicable to all contracts containing these General Conditions, whether Contractor has obtained a copy thereof or not.

32.00 SEVERABILITY

32.01 If any one or more or part of any of the provisions contained herein and/or in the Specifications and Contract for the Work shall for any reason be held invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provisions of this Agreement or attachment, but it shall be construed as if such invalid, illegal, or unenforceable provision or part of a provision had never been contained herein.

32.02 CHANGING THESE CONDITIONS: Owner reserves the right to change or modify these General Conditions as it deems best, or as required by law. The General Conditions may also be modified for a particular project by the use of Special Conditions prior to the issuance of the Advertisement for Bid. However, once an advertisement for bid is made for any specific project, any changes to the General Conditions as they affect that specific project must be made in writing and issued via an addendum in accordance with State Law.

33.00 LAW OF THE STATE OF LOUISIANA

33.01 The Contract Documents shall be governed by the Law of the State of Louisiana.

33.02 The Contractor agrees to pay reasonable attorney's fees and other reasonable attendant costs, in the event that it becomes necessary for the Owner to employ an attorney in order to enforce compliance with or any remedy relating to any covenants, obligations, or

conditions imposed upon the Contractor by this Agreement. Attorney fees shall be based upon the prevailing hourly rate of attorney rates in the private sector. In no case shall the hourly rate be less than $175.00 per hour. All attorney fees collected shall be paid the operating budget of the Office of the Parish President.

33.03 The jurisdiction and venue provisions shall apply to all contractors, sureties, and subcontractors. The 22nd Judicial District for the Parish of St. Tammany shall be the court of exclusive jurisdiction and venue for any dispute arising from these General Conditions and/or any contract executed in conjunction with these General Conditions. All parties specifically waive any rights they have or may have for removal of any disputes to Federal Court, or transfers to different State District Court.

33.04 Contractor warrants that it has and/or had received a copy of these General Conditions at all times material hereto; Contractor further agrees that it has read and fully and completely understands each and every condition herein.

33.05 The property description will be more fully set out by an attached exhibit.

33.06 The Contractor warrants that it has the requisite authority to sign and enter this agreement.

33.07 It is specifically understood and agreed that in the event Contractor seeks contribution from the Parish or pursues its legal remedies for any alleged breach of this agreement by the Parish, then the following list of damages SHALL NOT BE RECOVERABLE BY CONTRACTOR. This list includes, but is not limited to:

1. indirect costs and/or expenses;
2. direct costs and/or expenses;
3. time-related costs and/or expenses;
4. award of extra days;
5. costs of salaries or other compensation of Contractor's personnel at Contractor's principal office and branch offices;
6. expenses of Contractor's principal, branch and/or field offices;
7. any part of Contractor's capital expenses, including any interest on Contractor's capital employed for the work;
8. any other charges related to change orders;
9. overhead and general expenses of any kind or the cost of any item not specifically and expressly included in Cost of Work.

33.08 DEFAULT AND WAIVERS

It is understood that time is of the essence. It is specifically understood between the parties that Contractor waives any and all notice to be placed in default by the Owner. This subsection shall supersede and prime any other subsection herein above that is in conflict. The Owner specifically reserves its right and specifically does not waive the requirement to be placed in default by the Contractor as per law.

33.09 St. Tammany Parish Government contracts to be awarded are dependent on the available funding and/or approval by members designated and/or acknowledged by St. Tammany Parish Government. At any time St. Tammany Parish Government reserves the right to cancel the award of a contract if either or both of these factors is deficient.

33.10 It is the Parish's policy to provide a method to protest exclusion from a competition or from the award of a contract, or to challenge an alleged solicitation irregularity. It is always better to seek a resolution within the Parish system before resorting to outside agencies and/or litigation to resolve differences. All protests must be made in writing, and shall be concise and logically presented to facilitate review by the Parish. The written protest shall include:

1. The protester's name, address, and fax and telephone numbers and the solicitation, bid, or contract number;

2. A detailed statement of its legal and factual grounds, including a description of the resulting prejudice to the protester;

3. Copies of relevant documents;

4. All information establishing that the protester is an interested party and that the protest is timely; and

5. A request for a ruling by the agency; and a statement of the form of relief requested.

The protest shall be addressed to Director of Procurement, St. Tammany Parish Government, P.O. Box 628, Covington, LA 70434.

The protest review shall be conducted by the Parish Procurement Department.

Only protests from interested parties will be allowed. Protests based on alleged solicitation improprieties that are apparent before bid opening, or the time set for receipt of initial proposals must be filed with and received by the Procurement Department BEFORE those deadlines.

Any other protest shall be filed no later than ten (10) calendar days after the basis of the protest is known, or should have been known (whichever is earlier).

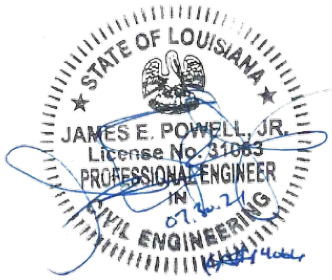
The Parish will use its best efforts to resolve the protest within thirty (30) days of the date that it is received by the Parish. The written response will be sent to the protestor via mail and, fax, if a fax number has been provided by the protestor. The protester can request additional methods of notification.

Last day to submit questions and/or verification on comparable products will be no later than 2:00 pm CST, seven (7) working days prior to the opening date of the bid/proposal due date. Further any questions or inquires must be submitted via fax to 985-898-5227, or via email to Purchasing@stpgov.org. Any questions or inquires received after the required deadline to submit questions or inquires will not be answered.

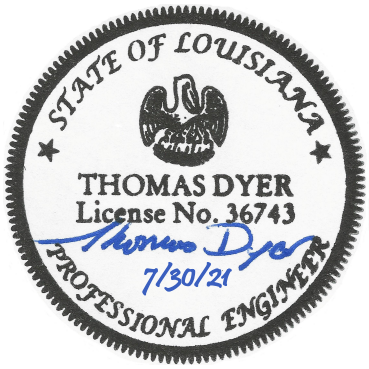
Section 09

ENGINEER CERTIFICATIONS

THE BIDDING REQUIREMENTS, CONTRACT FORMS, CONDITIONS OF THE CONTRACT, SPECIFICATION SECTIONS 01010 THROUGH 01700 (INCLUSIVE), SECTIONS 02100 THROUGH 02930 (INCLUSIVE) SECTION 09800, SECTIONS 11000 THROUGH 11501 (INCLUSIVE), AND SECTIONS 15000 THROUGH 15254 (INCLUSIVE) WERE PREPARED UNDER THE RESPONSIBLE CHARGE OF JAMES E. POWELL, JR. P.E., LOUISIANA LICENSE NO. 31063.



SPECIFICATION SECTIONS 03100 THROUGH 03400 (INCLUSIVE), SECTIONS 05120 THROUGH 05521 (INCLUSIVE), AND SECTION 07920 WERE PREPARED UNDER THE RESPONSIBLE CHARGE OF THOMAS P. DYER, P.E., LOUISIANA LICENSE NO. 36743.



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Geotechnical Engineering Report by Stratum Engineering, LLC, Dated January 19, 2016
Geotechnical Engineering Report Addendum by Stratum Engineering, LLC, Dated April 26, 2016.

SECTION 01010 - SUMMARY OF WORK

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The WORK to be performed under this Contract shall consist of furnishing plant, tools, equipment, materials, supplies and manufactured articles, furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all work or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The WORK shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the WORK in good faith shall be provided by the CONTRACTOR as though originally so indicated, at no increase in cost to the OWNER.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The WORK of this Contract comprises the construction of new treatment structures as a part of an upgrade of treatment facilities. Major elements of the WORK include, but are not limited to:

1. Construction of a new package wastewater treatment plant with associated blowers, pumps, and equipment;

2. Construction of a new flow equalization tank with associated blowers, pumps, and equipment.

3. Construction of a new influent screen;

4. Construction of a new effluent pump station;

5. Improvements to the existing chlorine contact tank;

6. Associated civil, electrical and control work as required.

B. The WORK is located at the OWNER's wastewater treatment plant on LA 1085 in St. Tammany Parish, Louisiana.

1.3 CONTRACT METHOD

A. The WORK hereunder will be constructed under a single lump sum contract. Contract payments will be based upon an approved Schedule of Values as detailed within Section 01301 – Schedule of Values.

1.4 CONTRACTOR USE OF SITE

A. The CONTRACTOR's use of the Site shall be limited to its construction operations, including on-Site storage of materials, on-Site fabrication facilities, and field offices.

1.5 OUTAGE PLAN AND REQUESTS

A. Unless the Contract Documents indicate otherwise, the CONTRACTOR shall not remove from service, de-energize, or modify settings for any existing operating tank pipeline, valve, channel, equipment, structure, road, or any other facility without permission from the OWNER and the ENGINEER.

1. The maximum duration of any outage shall be six (6) hours.

2. The minimum time between outages shall be 24 hours.

B. Where the WORK requires modifications to existing facilities or construction of new facilities and connection of new facilities to existing facilities, the CONTRACTOR shall submit a detailed outage plan and schedule for the ENGINEER'S approval a minimum of 2 weeks in advance of the time that such outage is planned.

C. A completed System Outage Request Form shall accompany each outage plan. The outage plans shall be coordinated with the construction schedule and shall meet the restrictions and conditions of the Contract Documents. The outage plan shall describe the CONTRACTOR's method for preventing bypassing of other treatment units; the length of time required to complete said operation; any necessary temporary power, controls, instrumentation or alarms required to maintain control, monitoring, and alarms for the treatment plant processes; and the manpower, plant, and equipment which the CONTRACTOR will furnish for proper operation of associated treatment units. All costs for preparing and implementing the outage plans shall be at no increase in cost to the OWNER.

D. The ENGINEER shall be notified in writing at least one week in advance of the required outage if the schedule for performing the work has changed or if revisions to the outage plan are required.

E. The CONTRACTOR shall provide written confirmation of the shutdown date and time 2 working days prior to the actual shutdown.

1.6 OWNER USE OF THE SITE

A. The OWNER may utilize all or part of the existing facilities at the Site during the entire period of construction for the conduct of the OWNER's normal operations. The CONTRACTOR shall cooperate and coordinate with the OWNER to facilitate the OWNER's operations and to minimize interference with the CONTRACTOR's operations at the same time. In any event, the OWNER shall be allowed access to the Site during the period of construction.

1.7 PROJECT MEETINGS

A. Preconstruction Conference

1. Prior to the commencement of WORK at the Site, a preconstruction conference will be held at a mutually agreed time and place. The conference shall be attended by the CONTRACTOR'S Project Manager, its superintendent, and its subcontractors as the CONTRACTOR deems appropriate. Other attendees will be:

a. ENGINEER and the Resident Project Representative.

b. Representatives of OWNER.

c. Governmental representatives as appropriate.

d. Others as requested by CONTRACTOR, OWNER, or ENGINEER.

2. The CONTRACTOR shall bring the preconstruction conference submittals in accordance with Section 01300 - Contractor Submittals.

3. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the CONTRACTOR prior to the meeting date. However, the CONTRACTOR shall be prepared to discuss all of the items listed below.

a. Status of CONTRACTOR's insurance and bonds.

b. CONTRACTOR's tentative schedules.

c. Transmittal, review, and distribution of CONTRACTOR's submittals.

d. Processing applications for payment.

e. Maintaining record documents.

f. Critical work sequencing.

g. Field decisions and Change Orders.

h. Use of Site, office and storage areas, security, housekeeping, and OWNER's needs.

i. Major equipment deliveries and priorities.

j. CONTRACTOR's assignments for safety and first aid.

k. Daily Report Form which the ENGINEER will furnish.

l. Submittal Transmittal Form which the ENGINEER will furnish.

4. The ENGINEER will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance.

B. Progress Meetings

1. The ENGINEER will schedule and hold regular on-Site progress meetings at least monthly and at other times as requested by CONTRACTOR or as required by progress of the WORK. The CONTRACTOR, ENGINEER, and all subcontractors active on the Site shall attend each meeting. CONTRACTOR may at its discretion request attendance by representatives of its suppliers, manufacturers, and other subcontractors.

2. The ENGINEER will preside at the progress meetings and will arrange for keeping and distributing the minutes. The purpose of the meetings is to review the progress of the WORK, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the CONTRACTOR shall present any issues that may impact its progress with a view to resolve these issues expeditiously.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

END OF SECTION 01010

SECTION 01070 - ABBREVIATIONS OF INSTITUTIONS

PART 1 -- GENERAL

1.1 GENERAL

A. Wherever in these Specifications references are made to the standards, specifications, or organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of the Specifications, the following acronyms or abbreviations which may appear shall have the meanings indicated herein.

1.2 ABBREVIATIONS

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABMA	American Bearing Manufacturer's Association – ABMA
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
AF&PA	American Forest and Paper Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AI	The Asphalt Institute
AIA	American Institute of Architects
AIHA	American Industrial Hygiene Association
AIIM	Association for Information and Image Management
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association International, Inc
ANS	American Nuclear Society
ANSI	American National Standards Institute, Inc.
APA	The Engineered Wood Association
API	American Petroleum Institute
APWA	American Public Works Association
ARI	Air-Conditioning and Refrigeration Institute
ASA	Acoustical Society of America
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
ASQ	American Society for Quality
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWCI	American Wire Cloth Institute
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturer's Association
CABO	Council of American Building Officials

CDA	Copper Development Association
CEMA	Conveyors Equipment Manufacturer's Association
CGA	Compressed Gas Association
CLFMI	Chain Link Fence Manufacturer's Institute
CLPCA	California Lathing and Plastering Contractors Association
CMAA	A division/section of the Material Handling Industry of America
CRSI	Concrete Reinforcing Steel Institute
DCDMA	Diamond Core Drilling Manufacturer's Association
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
DOS	Jefferson Parish Department of Sewer
EI	Energy Institute
EIA	Electronic Industries Alliance
EPA	Environmental Protection Agency
ETL	Electrical Test Laboratories
FCC	Federal Communications Commission
FCI	Fluid Controls Institute
FEMA	Federal Emergency Management Association
FHWA	Federal Highway Administration
FM	Factory Mutual System
FPL	Forest Products Laboratory
HI	Hydronics Institute, Hydraulic Institute
HSWA	Federal Hazardous and Solid Waste Amendments
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
IBC	International Building Code
ICC	International Code Council
ICEA	Insulated Cable Engineers Association
ICCEC	Electrical Code
ICC-ES	International Code Council Evaluation Service
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
IFC	International Fire Code
IFGC	International Fuel Gas Code
IMC	International Mechanical Code
IME	Institute of Makers of Explosives
IPC	International Plumbing Code, Association Connecting Electronic Industries
IRC	International Residential Code
ISA	Instrument Society of America
ISDI	Insulated Steel Door Institute
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
ITU-T	Telecommunications Standardization Sector of the International Telecommunications Union
LADHH	Louisiana Department of Health and Hospitals
LDOTD	Louisiana Department of Transportation and Development
LPI	Lightning Protection Institute
LRQA	Lloyd’s Register Quality Assurance
LSSRB	Louisiana Standard Specifications for Roads and Bridges
MBMA	Metal Building Manufacturer's Association
MIL	Military Standards (DoD)
MPTA	Mechanical Power Transmission Association
MSS	Manufacturers Standardization Society
NAAMM	National Association of Architectural Metal Manufacturer's
NACE	National Association of Corrosion Engineers
DASMA	Door and Access Systems Manufacturers Association International

NAPF	National Association of Pipe Fabricators
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors
NCCLS	National Committee for Clinical Laboratory Standards
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association or National Fluid Power Association
NISO	National Information Standards Organization
NIST	National Institute of Standards and Technology
NLGI	National Lubricating Grease Institute
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NWWDA	National Wood Window and Door Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PPI	Plastic Pipe Institute
RCRA	Resource Conservation and Recovery Act
RIS	Redwood Inspection Service, a division of the California Redwood Association, CRA
RMA	Rubber Manufacturers Association
RVIA	Recreational Vehicle Industry Association
RWMA	Resistance Welder Manufacturer's Association
SAE	Society of Automotive Engineers
SCIP	Sewerage Capital Improvements Program (SCIP)
SDI	Steel Door Institute, Steel Deck Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPFA	Steel Plate Fabricator’s Association
SPIB	Southern Pine Inspection Bureau
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Society for Protective Coating
SSPWC	Standard Specifications for Public Works Construction
STLE	Society of Tribologists and Lubricating Engineers
TAPPI	Technical Association of the Worldwide Pulp, Paper, and Converting Industry
TFI	The Fertilizer Institute
TIA	Telecommunications Industries Association
TPI	Truss Plate Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WDMA	National Window and Door Manufacturers Association
WEF	Water Environment Federation
WI	Woodwork Institute
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01070

SECTION 01090 - REFERENCE STANDARDS

PART 1 -- GENERAL

1.1 GENERAL

A. Titles of Sections and Paragraphs: Titles and subtitles accompanying specification sections and paragraphs are for convenience and reference only, and do not form a part of the Specifications.

B. Applicable Publications: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Contract is advertised for bids shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth in the Specifications or shown on the Drawings will be waived because of any provision of, or omission from, said standards or requirements.

C. Specialists, Assignments: In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the CONTRACTOR has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the WORK; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the CONTRACTOR.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. The CONTRACTOR shall construct the WORK in accordance with the Contract Documents and the referenced portions of those referenced codes, standards, and specifications.

B. References herein to "Building Code" or "International Building Code" shall mean International Building Code of the International Conference of Building Officials (ICBO). "Electric Code" or "National Electric Code (NEC)" shall mean the National Electric Code of the National Fire Protection Association (NFPA). The latest edition of the codes as approved by the Municipal Code and used by the local agency as of the date that the WORK is advertised for bids, as adopted by the agency having jurisdiction, shall apply to the WORK herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes, reference standards, drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the ENGINEER for clarification and directions prior to ordering or providing any materials or furnishing labor. The CONTRACTOR shall bid for the most stringent requirements.

D. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

E. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

F. References to the LSSRB shall refer to the Louisiana Standard Specifications for Roads and Bridges, 2016 edition as published by the Louisiana Department of Transportation and Development (LDOTD). Such references shall be for technical or material quality only, and no measurement and payment terms indicated therein shall apply.

1.3 REGULATIONS RELATED TO HAZARDOUS MATERIALS

A. The CONTRACTOR shall be responsible that all work included in the Contract Documents, regardless if shown or not, shall comply with all EPA, OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing the storage and conveyance of hazardous materials, including petroleum products.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01090

PART 1 -- GENERAL

1.1 GENERAL

A. Wherever submittals are required in the Contract Documents, submit them to the ENGINEER.

1.2 PRECONSTRUCTION CONFERENCE SUBMITTALS

A. At the preconstruction conference of Section 01010 - Summary of Work, the CONTRACTOR shall submit the following items to the ENGINEER for review:

1. A preliminary schedule and list of Shop Drawings, Samples, and proposed Substitute ("Or- Equal") submittals.

2. A list of permits and licenses the CONTRACTOR shall obtain, indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.

3. A preliminary schedule of values in accordance with Section 01301 - Schedule of Values.

4. A 60 Day plan of operation in accordance with Section 01311 - CPM Construction Schedule.

5. A project overview bar chart in accordance with Section 01311 - CPM Construction Schedule.

1.3 SHOP DRAWINGS

A. Wherever called for in the Contract Documents or where required by the ENGINEER, the CONTRACTOR shall furnish to the ENGINEER for review, a number and type of each Shop Drawing submittal as established at the pre – construction conference. Shop Drawings may include detail design calculations, shop-prepared drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. Whenever the CONTRACTOR is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an engineer registered in the appropriate branch and in the state wherein the project is located, unless otherwise indicated.

B. Shop Drawing submittals shall be accompanied by the CONTRACTOR's standard submittal transmittal form. Submittals shall be signed by the CONTRACTOR as an indication that they have been reviewed for completeness and organization.

C. Organization

1. A single submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable, unless the primary specification references other sections for components. Example: if a pump section references other sections for the motor, shop-applied protective coating, anchor bolts, local control panel, and variable frequency drive, a single submittal would be acceptable. A single submittal covering vertical turbine pumps and horizontal split case pumps would not be acceptable.

2. On the transmittal form, index the components of the submittal and insert tabs or other physical divider in the submittal to match the components. Relate the submittal components to specification paragraph and subparagraph, Drawing number, detail number, schedule title, room number, or building name, as applicable.

3. Unless indicated otherwise, terminology and equipment names and numbers used in submittals shall match those used in the Contract Documents.

D. Format

1. Minimum sheet size shall be 8.5-inches by 11-inches. Maximum sheet size shall be 24-inches by 36-inches. Every page in a submittal shall be numbered in sequence. Each copy of a submittal shall be collated a stapled or bound, as appropriate. The ENGINEER will not collate sheets or copies.

2. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with complete pertinent data capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.

3. Each submittal shall be assigned a unique number. Submittals shall be numbered sequentially, and the submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number followed by a letter of the alphabet to distinguish between the original submittal and each resubmittal. For example, if submittal 25-A requires a resubmittal, the first resubmittal will bear the designation "25-B" and the second resubmittal will bear the designation "25-C" and so on.

E. Disorganized submittals that do not meet the requirements of the Contract Documents will be returned without review.

F. Except as may otherwise be indicated, the ENGINEER will return a copy of each submittal to the CONTRACTOR with comments noted thereon, within 30 Days following receipt by the ENGINEER. It is considered reasonable that the CONTRACTOR will make a complete and acceptable submittal to the ENGINEER by the first resubmittal on an item. The OWNER reserves the right to withhold monies due to the CONTRACTOR to cover additional costs of the ENGINEER's review beyond the first resubmittal. The ENGINEER'S maximum review period for each submittal or resubmittal will be 30 Days. Thus, for a submittal that requires 2 resubmittals before it is complete, the maximum review period could be 90 Days.

G. If a submittal is returned to the CONTRACTOR marked "REVIEWED," formal revision and resubmission will not be required.

H. If a submittal is returned marked "REVIEWED AS NOTED," CONTRACTOR shall make the corrections on the submittal, but formal revision and resubmission will not be required.

I. If a submittal is returned marked "REVISE & RESUBMIT," the CONTRACTOR shall revise it and shall resubmit the required number of copies to the ENGINEER for review. Resubmittal of portions of multi-page or multi-drawing submittals will not be allowed. For noted as "REVISE & RESUBMIT," the submittal as a whole is deemed "REVISE & RESUBMIT," and 10 drawings are required to be resubmitted.

J. If a submittal is returned marked "REJECTED," it shall mean either that the proposed material or product does not satisfy the specification, the submittal is so incomplete that it cannot be reviewed, or is a substitution request not submitted in accordance with Section 01600 - Products, Materials, Equipment, and Substitutions. In the first 2 cases, the CONTRACTOR shall prepare a new submittal and shall submit the required number of copies to the ENGINEER for review.

K. Resubmittal of rejected portions of a previous submittal will not be allowed. Every change from a submittal to a resubmittal or from a resubmittal to a subsequent resubmittal shall be identified and flagged on the resubmittal.

L. Fabrication of an item may commence only after the ENGINEER has reviewed the pertinent submittals and returned copies to the CONTRACTOR marked either "REVIEWED" or "REVIEWED AS NOTED." Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as changes to the contract requirements.

M. Submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR prior to submission to the ENGINEER. Each submittal shall be dated and signed by the CONTRACTOR as being correct and in strict conformance with the Contract Documents. In the case of Shop Drawings, each sheet shall be so dated and signed. Any deviations from the Contract Documents shall be noted on the transmittal sheet. The ENGINEER will only review submittals that have been so verified by the CONTRACTOR. Non-verified submittals will be returned to the CONTRACTOR without action taken by the ENGINEER, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

N. Corrections or comments made on the CONTRACTOR's Shop Drawings during review do not relieve the CONTRACTOR from compliance with Contract Drawings and Specifications. Review is for conformance to the design concept and general compliance with the Contract Documents only. The CONTRACTOR is responsible for confirming and correlating quantities and dimensions, fabrication processes and techniques, coordinating WORK with the trades, and satisfactory and safe performance of the WORK.

1.4 RECORD DRAWINGS

A. The CONTRACTOR shall maintain one set of Drawings at the Site for the preparation of record drawings. On these, it shall mark every project condition, location, configuration, and any other change or deviation which may differ from the Contract Drawings at the time of award, including buried or concealed construction and utility features that are revealed the horizontal and vertical location of buried utilities that differ from the locations indicated, or that were not indicated on the Contract Drawings. Said record drawings shall be supplemented by any detailed sketches as necessary or as CONTRACTOR is directed, to fully indicate the WORK as actually constructed. These record drawings are the CONTRACTOR's representation of as-built conditions, shall include revisions made by addenda and change orders, and shall be maintained up-to-date during the progress of the WORK. Red ink shall be used for alterations and notes. Notes shall identify relevant Change Orders by number and date.

B. Paper copies of the record drawings shall be submitted on the 20th Day of every third month after the month in which the Notice to Proceed is given as well as at completion of WORK. This submittal will be required with the pay request for that month.

C. In the case of those drawings that depict the detail requirement for equipment to be assembled and wired in the factory, such as motor control centers and the like, the record drawings shall be updated by indicating those portions which are superseded by change order drawings or final Shop Drawings, and by including appropriate reference information describing the change orders by number and the Shop Drawings by manufacturer, drawing, and revision numbers.

D. Disorganized or incomplete record drawings will not be accepted. The CONTRACTOR shall revise them and resubmit within 10 Days.

E. Record drawings shall be accessible to the ENGINEER during the construction period.

F. Final payment will not be acted upon until the record drawings have been completed and delivered to the ENGINEER. Said up-to-date record drawings shall be in the form of a set of prints with carefully plotted information overlaid and an electronic form under Adobe Acrobat, or other software required by the Specifications.

G. Information submitted by the CONTRACTOR will be assumed to be correct, and the CONTRACTOR shall be responsible for the accuracy of such information

1.5 QUALITY CONTROL (QC) SUBMITTALS

A. Quality control submittals are defined as those required by the Specifications to present documentary evidence to the ENGINEER that the CONTRACTOR has satisfied certain requirements of the Contract Documents.

B. Unless otherwise indicated, QC submittals shall be submitted:

Before delivery and unloading, for the following types of submittals:

1. Manufacturers' installation instructions
2. Manufacturers' and Installers' experience qualifications
3. Ready mix concrete delivery tickets
4. Design calculations
5. Affidavits and manufacturers' certification of compliance with indicated product requirements
6. Laboratory analysis results
7. Factory test reports

Within 30 Days of the event documented for the following types of submittals:

1. Manufacturers' field representative certification of proper installation
2. Field measurement
3. Field test reports
4. Receipt of permit
5. Receipt of regulatory approval

C. The ENGINEER will record the date that a QC submittal was received and review it for compliance with submittal requirements, but the review procedures above for Shop Drawings and samples will not apply.

1.6 MONTHLY PAY REQUESTS

A. The CONTRACTOR shall furnish the documentation listed below with each monthly pay request. The CONTRACTOR shall use EJCDC Form C-620, Application For Payment.

1. OWNER required Certificate of Payment form.

2. Construction photographs showing the progress of the WORK.

3. Revised CPM schedule update per Section 01311, Paragraph 1.2.D.

4. Progress report per Section 01311, Paragraph 1.7.

5. Updated schedule of submittals.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01300

SECTION 01301 - SCHEDULE OF VALUES

PART 1 -- GENERAL

1.1 PRELIMINARY SCHEDULE OF VALUES

A. The CONTRACTOR shall submit a preliminary Schedule of Values for the major components of the WORK at the Preconstruction Conference in accordance with Section 01010 - Summary of Work. The listing shall include, at a minimum, the proposed value for the following major WORK components:

1. Mobilization.

2. The total value of electrical WORK.

3. The total value of Instrumentation and Control WORK.

4. The total value of Protective Coatings WORK.

5. The total value of yard mechanical WORK inclusive of excavation, pipe installation, testing and backfill of pipe, and all incidental WORK associated with underground pipe installations.

6. The total value of all mechanical WORK, exclusive of yard mechanical WORK included in Item 5 above. This includes all piping, valves, equipment, tanks, and appurtenances at new and existing structures. Additionally, this total value shall be broken down into separate values for each new and existing structure constructed or modified as a part of the WORK.

7. The total value of structural reinforced concrete WORK inclusive of all excavation, dewatering, subgrade preparation, backfill and incidental WORK for all new structures. Additionally, this total value shall be broken down into separate values for each new structure constructed as a part of the WORK. Miscellaneous and minor concrete WORK may be listed as one item in this breakdown.

8. The total value of site civil WORK inclusive of clearing and grubbing, paving, grading and drainage WORK.

9. The total value of all other WORK not specifically included in the above items.

B. The CONTRACTOR and ENGINEER shall meet and jointly review the preliminary Schedule of Values and make any adjustments in value allocations if, in the opinion of the ENGINEER, these are necessary to establish fair and reasonable allocation of values for the major WORK components. Front end loading will not be permitted. The ENGINEER may require reallocation of major WORK components from items in the above listing if in the opinion of the ENGINEER such reallocation is necessary. This review and any necessary revisions shall be completed within five (5) days from the date of Notice to Proceed, or the date of the Preconstruction Conference, whichever is sooner.

1.2 DETAILED SCHEDULE OF VALUES

A. The CONTRACTOR shall prepare and submit a detailed Schedule of Values to the ENGINEER within ten (10) days from the date of Notice to Proceed. The detailed Schedule of Values shall be based on the accepted preliminary Schedule of Values for major WORK components. Because the ultimate requirement is to develop a detailed Schedule of Values sufficient to determine appropriate monthly progress payment amounts through cost loading of the CPM Schedule activities, sufficient detailed breakdown shall be provided to meet this requirement. The ENGINEER shall be the sole judge of acceptable numbers, details and description of values established. If, in the opinion of the ENGINEER, a greater number of Schedule of Values items than proposed by the CONTRACTOR is necessary, the CONTRACTOR shall add the additional items so identified by the ENGINEER.

1. The minimum detail of breakdown of the major WORK components is indicated below. Greater detail shall be provided as directed by the ENGINEER.

    a. Mobilization - no breakdown required.

    b. Section 01311, "Scheduling and Report," broken down by submittal.

    c. The electrical WORK shall be broken down by structure and yard facilities. Structures electrical WORK shall be broken down into conduit and raceway installation, cable and wire installation, electrical equipment installation, terminations and lighting. Yard facilities shall be broken down by duct bank designation and substations.

    d. Instrumentation and Control WORK shall be broken down by structure.

    e. Protective Coating WORK shall be broken down by structure and yard area. Where specific coating WORK at structures or yard areas may be critical to performing the WORK to meet milestone and Contract dates, such WORK shall be included as individual pay and Schedule activity items.

    f. Yard piping WORK shall be broken down into individual pipelines running from and to Contract termination points. Each pipeline shall be an individual pay item unless otherwise allowed by the ENGINEER.

    g. Mechanical WORK shall be broken down within each structure to identify individual piping systems, equipment installation by equipment name and number, and equipment testing and checkout.

    h. Concrete structures shall be broken down into excavation, subgrade preparation, and appurtenant pre foundation WORK, concrete foundation construction, slabs on grade, walls/columns, suspended slabs, stairs, etc. (sufficient breakdown shall be provided to accommodate necessary Schedule detail), hydrostatic structure testing where required and backfill.

    i. Civil site WORK shall be broken down into individual drainage piping, drainage structures, site concrete, paving, excavation cut and fill, removal of existing pipe, clearing and grubbing and any other items determined to be necessary for the establishment of Pay and Schedule Activity items.

    j. Equipment testing and plant startup shall be broken down for completion milestones for each.

    k. All other WORK not specifically included in the above items shall be broken down as necessary for establishment of pay and Schedule activity items.

2. The CONTRACTOR and ENGINEER shall meet and jointly review the detailed Schedule of Values within 20 days from the date of Notice to Proceed. The value allocations and extent of detail shall be reviewed to determine any necessary adjustments to the values and to determine if sufficient detail has been proposed to allow acceptable cost loading of the CPM Schedule activities. Any adjustments deemed necessary to the value allocation or level of detail shall be made by the CONTRACTOR and a revised detailed Schedule of Values shall be submitted within 30 days from the date of Notice to Proceed.

1.3 CHANGES TO SCHEDULE OF VALUES

A. Changes to the CPM Schedule which add activities not included in the original schedule but included in the original WORK (schedule omissions) shall have values assigned as approved by the ENGINEER. Other activity values shall be reduced to provide equal value adjustment increases for added activities as approved by the ENGINEER.

B. In the event that the CONTRACTOR and ENGINEER agree to make adjustments to the original Schedule of Values because of inequities discovered in the original accepted detailed Schedule of Values, increases and equal decreases to values for activities may be made.

1.4 MEASUREMENT AND PAYMENT

A. The CONTRACTOR will be paid under the approved detailed schedule of values for the estimated percentage of the WORK completed in monthly intervals.

B. Mobilization will be paid in accordance with Section 01505 – Mobilization.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01301

PART 1 -- GENERAL

1.1 GENERAL

A. Scheduling of the WORK shall be performed by the CONTRACTOR in accordance with the requirements of this Section.

B. Development of the schedule and project status reporting requirements of the Contract shall employ computerized Critical Path Method (CPM) The CPM schedule and all reports should be prepared with the current version of Primavera Project Planner (P3) software or equivalent scheduling software platform. Where submittals are required hereunder, the CONTRACTOR shall submit a number and type of copies as established at the pre – construction conference.

1.2 INITIAL SCHEDULE SUBMITTALS

A. The CONTRACTOR shall submit two short term schedule documents at the Preconstruction Conference which shall serve as the CONTRACTOR'S Plan of Operation for the initial 60 day period of the Contract Time and to identify the manner in which the CONTRACTOR intends to complete all WORK within the Contract Time.

1. 60 Day Plan of Operation: During the initial 60 days of the Contract Time, the CONTRACTOR shall conduct operations in accordance with a 60 day bar chart type of plan of operation. The bar chart so prepared shall show the accomplishment of the CONTRACTOR'S early activities (mobilization, permits, submittals necessary for early material and equipment procurement, submittals necessary for long lead equipment procurement, CPM submittals, initial Site work and other submittals and activities required in the first 60 days).

2. Project Overview Bar Chart: The overview bar chart shall indicate the major components of the WORK and the sequence relations between major components and subdivisions of major components. The overview bar chart shall indicate the relationships and time frames in which the various components of the WORK will be made substantially complete and placed into service in order to meet the project milestones. Sufficient detail shall be included for the identification of subdivisions of major components into such activities as excavation, pile driving, completion of all structural concrete, major mechanical work, major electrical work, instrumentation and control work, and other important work for each major item of the WORK within the overall project scope. Planned durations and start dates shall be indicated for each work item subdivision. Each major component and subdivision component shall be accurately plotted on time scale sheets not to exceed 36-inch by 60-inch in size. Not more than four sheets shall be employed to represent this overview information.

B. The ENGINEER and the CONTRACTOR shall meet to review and discuss the 60-day plan of operation and project overview bar chart within 5 days after submittal to the ENGINEER. The ENGINEER'S review and comment on the schedules will be limited to conformance with the sequencing and milestone requirements in the Contract Documents. The CONTRACTOR shall make corrections to the schedules necessary to comply with the requirements and shall adjust the schedules to incorporate any missing information requested by the ENGINEER.

1.3 CPM SCHEDULE SUBMITTALS

A. Original CPM Schedule Submittal: With 30 days after the commencement date stated in the Notice to Proceed, the CONTRACTOR shall submit for review by the ENGINEER a hard copy and electronic copy of the CPM Schedule. This submittal shall have already been reviewed and approved by the CONTRACTOR'S Project Manager prior to submission. The CPM Schedule shall be a time-scaled network diagram of the "i-j" activity-on-arrow or precedence type. The Network Diagram shall describe the activities to be accomplished and their logical relationships and show the critical path.

B. All float in the schedule shall belong to the project

C. Acceptance

1. Acceptance of the CONTRACTOR'S schedule by the ENGINEER and OWNER will be based solely upon compliance with the requirements. By way of the CONTRACTOR assigning activity durations and proposing the sequence of the WORK, the CONTRACTOR agrees to utilize sufficient and necessary management and other resources to perform the work in accordance with the schedule. Upon submittal of a schedule update, the updated schedule shall be considered the "current" project schedule.

2. Submission of the CONTRACTOR'S progress schedule to the OWNER or ENGINEER shall not relieve the CONTRACTOR of total responsibility for scheduling, sequencing, and pursuing the WORK to comply with the requirements of the Contract Documents, including adverse effects such as delays resulting from ill-timed WORK.

D. Monthly Updates and Periodic CPM Schedule Submittals

1. Following the acceptance of the CONTRACTOR'S original CPM Schedule, the CONTRACTOR shall monitor the progress of the WORK and adjust the schedule each month to reflect actual progress and any changes in planned future activities. Each schedule update submitted shall be complete including all information requested in the original schedule submittal and be in the schedule report format indicated below. Each update shall continue to show all work activities including those already completed. Completed activities shall accurately reflect "as built" information by indicating when the work was actually started and completed.

2. Neither the submission nor the updating of the CONTRACTOR'S original schedule submittal nor the submission, updating, change, or revision of any other report, curve, schedule, or narrative submitted to the ENGINEER by the CONTRACTOR under this Contract, nor the ENGINEER'S review or acceptance of any such report, curve, schedule, or narrative shall have the effect of amending or modifying, in any way, the Contract Times or milestone dates or of modifying or limiting, in any way, the CONTRACTOR'S obligations under this Contract. Only a signed, fully executed Change Order can modify contractual obligations.

3. The monthly schedule update submittal will be reviewed with the CONTRACTOR during regular construction progress meetings. The goal of these meetings is to enable the CONTRACTOR and the ENGINEER to initiate appropriate remedial action to minimize any known or foreseen delay in completion of the WORK and to determine the amount of WORK completed since the previous schedule update.

E. Schedule Revisions: The CONTRACTOR shall highlight or otherwise identify all changes to the schedule logic or activity durations made from the previous schedule. The CONTRACTOR shall modify any portions of the CPM schedule which become infeasible because of activities behind schedule or for any other valid reason.

1.4 CHANGE ORDERS

A. Upon approval of a Change Order, or upon receipt by the CONTRACTOR of authorization to proceed with additional work, the change shall be reflected in the next submittal of the CPM Schedule. The CONTRACTOR shall utilize a sub-network in the schedule depicting the changed work and its effect on other activities. This sub-network shall be tied to the main network with appropriate logic so that a true analysis of the critical path can be made.

1.5 CPM STANDARDS

A. Definitions: CPM, as required by this Section, shall be interpreted to be generally as outlined in the Association of General Contractors (AGC) publication, "The Use of CPM in Construction." except that either

"i-j" arrow diagrams or precedence diagramming format may be utilized. In the case of conflicts between this specification and the AGC document, this specification shall govern.

B. Construction Schedules: Construction schedules shall include a graphic network diagram and computerized construction schedule reports as required below for status reporting.

C. Networks: The CPM network shall be in a form of a time scaled "i-j" activity-on-arrow or precedence type diagram and may be divided into a number of separate sheets with suitable match lines relating the interface points among the sheets. Individual sheets shall not exceed 36 inches by 60 inches.

D. Construction and procurement activities shall be presented in a time-scaled format with a calendar time line along the entire sheet length. Each activity arrow or node shall be plotted so that the beginning and completion dates of each activity are accurately represented along the calendar time line. All activities shall use symbols that clearly distinguish between critical path activities, non-critical activities, and free float for each non-critical activity. All activity items shall be identified by their respective activity number, responsibility code, work duration, and their dollar value. All non-critical path activities shall show total float time in scale form by utilizing a dotted line or some other graphical means.

E. Duration Estimates: The duration estimate for each activity shall be computed in working days and shall represent the single best estimate considering the scope of the work and resources planned for the activity. Except for certain non-labor activities, such as curing of concrete or delivery of materials, activity duration shall not exceed 10working days nor be less than one working day unless otherwise accepted by the ENGINEER.

F. Float Time

1. Definition: Unless otherwise provided herein, float is synonymous with total float. Total float is the period of time measured by the number of working days each noncritical path activity may be delayed before it and its succeeding activities become part of the critical path. If a non-critical path activity is delayed beyond its float period, then that activity becomes part of the critical path and controls the end date cause delay to the project itself.

2. Float Ownership: Neither the OWNER nor the CONTRACTOR owns the float time. The project owns the float time. As such, liability for delay of the project completion date rests with the party actually causing delay to the project completion date. For example, if Party A uses some, but not all of the float time and Party B later uses the remainder of the float time as well as additional time beyond the float time, Party B shall be liable for the costs associated with the time that represents a delay to the project's completion date. Party A would not be responsible for any costs since it did not consume all of the float time and additional float time remained, therefore, the project's completion date was unaffected.

1.6 SCHEDULE REPORT FORMAT

A. Schedule Reports: Schedule Reports shall be prepared based on the CPM Schedule, and shall include the following minimum data for each activity:

1. Estimated activity duration.
2. Activity description.
3. Activity's percent completion.
4. Early start date (calendar dated).
5. Early finish date (calendar dated).
6. Late start date (calendar dated).
7. Late finish date (calendar dated).
8. Status (whether critical).
9. Total float for each activity.
10. Free float for each activity.

B. Project Information: Each Schedule Report shall be prefaced with the following summary data:

1. Project name.
2. Contractor.
3. Type of tabulation.
4. Project duration.
5. Contract Times (revised to reflect time extensions by Change Order).
6. The commencement date stated in the Notice to Proceed.
7. The data date and plot date of the CPM Schedule.
8. If an update, cite the new schedule completion date.

1.7 PROJECT STATUS REPORTING

A. The CONTRACTOR shall furnish monthly project status reports (Overview Bar Chart and a written narrative report) in conjunction with the revised CPM Schedules as indicated above. Status reporting shall be in the form below.

B. The CONTRACTOR shall prepare and submit monthly an Overview Bar Chart schedule of the major project components. The overview bar chart schedule shall be a summary of the current CPM Schedule (original and as updated and adjusted throughout the entire construction period). It shall be limited to not more than four sheets which shall not exceed 36 inches by 60 inches. The major project components shall be represented as time bars which shall be subdivided into various types of work including demolition, excavation and earthwork, yard piping, concrete construction, mechanical, electrical and instrumentation installations. Major components shall include each new structure by area designation, site work, modifications to existing structures, tie-ins to existing facilities, and plant startups.

C. Each major component and subdivision shall be accurately plotted consistent with the project overview bar chart above. It shall represent the same status indicated by early start and finish activity information contained in the latest update of the CPM Schedule. In addition, a percent completion shall be indicated for each major component and subdivision. The initial submittal of the overview bar chart schedule shall be made at the time that the revised original CPM Schedule is submitted to the ENGINEER (65 days from the commencement date stated in the Notice to Proceed). The CONTRACTOR shall amend the overview schedule to include any additional detail required by the ENGINEER. The CONTRACTOR shall include any additional information requested by the ENGINEER at any time during the construction of the WORK.

D. The CONTRACTOR shall prepare monthly written narrative reports of the status of the project for submission to the ENGINEER. Written status reports shall include:

1. The status of major project components (percent complete, amount of time ahead or behind schedule) and an explanation of how the project will be brought back on schedule if delays have occurred.

2. The progress made on critical activities indicated on the CPM Schedule.

3. Explanations for any lack of work on critical path activities planned to be performed during the last month.

4. Explanations for any schedule changes, including changes to the logic or to activity durations.

5. A list of the critical activities scheduled to be performed in the next two month period.

6. The status of major material and equipment procurement.

7. The value of materials and equipment properly stored at the Site but not yet incorporated into the WORK.

8. Any delays encountered during the reporting period.

9. An assessment of inclement weather delays and impacts to the progress of the WORK.

E. The CONTRACTOR may include any other information pertinent to the status of the project. The CONTRACTOR shall include additional status information requested by the ENGINEER.

1.8 INCLEMENT WEATHER PROVISIONS OF THE SCHEDULE

A. The CONTRACTOR'S construction schedule shall include at least the number of days of delay due to unusually severe weather as listed in the Contract Documents.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01311

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. WORK shall be scheduled, sequenced, and performed in a manner which minimizes disruption to the operation and maintenance of existing facilities.

B. The CONTRACTOR shall incorporate the construction and schedule constraints of this Section in preparing the construction schedules required under Section 01311 – CPM Construction Schedule.

1.2 EXISTING PLANT

A. The WORK shall be executed while the existing wastewater treatment plant is in operation. Operation of the existing plant shall not be jeopardized nor shall the efficiency of wastewater treatment be reduced as a result of the execution of the WORK.

B. Unless indicated otherwise, temporary pumping, piping, power, lighting, controls, instrumentation, alarms, security devices, and safety devices shall be provided by the CONTRACTOR whenever its work or interruption due to its work affects the existing facility.

C. The construction constraints in this Section do not include all items affecting the completion of the WORK, but are intended to describe the sequence of critical events necessary to minimize disruption to the ongoing treatment plant processes and to ensure compliance with Louisiana Department of Health and Hospitals regulations. It shall be understood and agreed by the CONTRACTOR that the critical events described are not all inclusive and that additional items of work not included may be required to minimize disruption and ensure compliance. Deviation from or modification of these suggested sequences is permitted if techniques and methods known to the CONTRACTOR will result in reducing disruption to the facility operation and maintaining treatment efficiency, and if deviation is approved in advance by the ENGINEER.

1.3 OPERATION OF PLANT EQUIPMENT

A. Operational functions or shutdown of the existing plant required to facilitate CONTRACTOR's operation will be done by the OWNER's personnel only.

B. The plant operation and maintenance personnel will cooperate in every way that is practical in order to facilitate CONTRACTOR's operation. However, certain shutdown and connections may only be permissible at times other than normal working hours such as nights or weekends. No additional payment will be made to the CONTRACTOR for any night, weekend, or holiday premium or overtime payments.

C. If it becomes necessary for the proper operation or maintenance of portions of the plant, the OWNER may require the CONTRACTOR to reschedule an approved shutdown. The CONTRACTOR shall then reschedule its operations so there shall be no conflict with necessary operations or maintenance of the plant. The CONTRACTOR shall, within 2 working days, furnish the ENGINEER a revised outage request and a plan for rescheduling the shutdown in accordance with the requirements of the construction schedule.

1.4 TEMPORARY CONNECTIONS

A. The making of connections to existing facilities or other operations that interfere with the operation of the existing equipment shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall be completed as quickly as possible and with as little delay as possible, and shall proceed continuously (24 hours a day and seven days a week) if necessary to complete modifications and/or connections in the minimum time.

B. The cost of any temporary facilities and night, weekend, or holiday work and overtime payments required during process interruptions shall be included in the price of the WORK.

C. Temporary facilities and piping shall be located to minimize interference with CONTRACTOR's construction facilities and OWNER's operation and maintenance of the wastewater treatment plant. Unless otherwise indicated, each temporary pipeline shall be of the same size as its connection to the existing or permanent facility at the downstream end of the pipeline. Piping materials shall be suitable for the material being conveyed and be as required in the Contract Specifications.

D. When temporary electrical power, controls, instrumentation, or alarms are required for routine continuous operations of existing or new equipment, the CONTRACTOR shall provide the necessary equipment and appurtenances. Prior to installing said equipment and appurtenances, CONTRACTOR shall furnish a submittal on the proposed components and installation for ENGINEER's review and approval.

E. A plan showing the size and location of the temporary facilities and piping shall be submitted to the ENGINEER at the same time as the outage plan required under this Section. All costs for design, provision, operation, and removal of temporary facilities and piping shall be the responsibility of the CONTRACTOR.

1.5 CONSTRUCTION SEQUENCING

A. All construction activities shall be scheduled and sequenced to ensure continuous operation of the existing treatment facilities. The CONTRACTOR's scheduling shall develop all construction sequencing so that the work will not adversely impact treatment. The CONTRACTOR shall be responsible for development of the construction sequencing. In implementing the construction sequencing, the CONTRACTOR shall maintain the existing facilities in service until new facilities are constructed and are operational to supplement the existing capacity. When new facilities are operational, the existing facilities may be taken out of service. The following general guidelines shall be used by the CONTRACTOR in planning the sequence of construction.

1. During all rehabilitation, modification, and demolition work, safe working conditions for personnel shall be maintained at all times. The foregoing includes at least proper trench excavation, the provision of temporary equipment guards, supports, warning signs, walkways, covers over openings, handrailing, and protection of electrical equipment and power supply.

2. All temporary facilities shall be constructed in accordance with applicable codes and regulations to operate safely and properly.

3. Valves to be temporarily shut off during the work shall be tagged as such and shall be wired shut with a crimped lead seal and padlocked.

4. Electrical and mechanical equipment shall be similarly shut down.

1.6 SCHEDULE CONSTRAINTS

A General: It is the CONTRACTOR'S responsibility to coordinate and plan the construction activities to integrate each schedule constraint into performance of the overall work.

B. A list of schedule constraints contained herein does not mean that all constraints or special conditions have been identified. A list does not substitute for the CONTRACTOR's coordination and planning for completion of the WORK within the Contract Times.

C. Constraints affecting the construction schedule are described in Section 01010 – Summary of Work.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01313

SECTION 01400 - QUALITY CONTROL

PART 1 -- GENERAL

1.1 DEFINITION

A. Specific quality control requirements for the WORK are indicated throughout the Contract Documents. The requirements of this Section are primarily related to performance of the WORK beyond furnishing of manufactured products. The term "Quality Control" includes inspection, sampling and testing, and associated requirements.

1.2 INSPECTION AT PLACE OF MANUFACTURE

A. Unless otherwise indicated, all products, materials, and equipment shall be subject to inspection by the ENGINEER at the place of manufacture.

B. The presence of the ENGINEER at the place of manufacturer, however, shall not relieve the CONTRACTOR of the responsibility for providing products, materials, and equipment which comply with all requirements of the Contract Documents. Compliance is a duty of the CONTRACTOR, and said duty shall not be avoided by any act or omission on the part of the ENGINEER.

1.3 SAMPLING AND TESTING

A. Unless otherwise indicated, all sampling and testing will be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered; however, the OWNER reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the ENGINEER will assure the OWNER that the quality of the workmanship is in full accord with the Contract Documents.

B. Any waiver by the OWNER of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the testing or other quality assurance requirements originally indicated, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial WORK, shall not be construed as a waiver of any requirements of the Contract Documents.

C. Notwithstanding the existence of such waiver, the ENGINEER reserves the right to make independent investigations and tests, and failure of any portion of the WORK to meet any of the requirements of the Contract Documents, shall be reasonable cause for the ENGINEER to require the removal or correction and reconstruction of any such WORK in accordance with the General Conditions.

1.4 INSPECTION AND TESTING SERVICE

A. Inspection and testing laboratory service shall consist of with the following:

1. Unless indicated otherwise by the Technical Specifications, the OWNER will appoint, employ, and pay for services of an independent firm to perform inspection and testing or will perform inspection and testing itself. Materials testing for proposed materials to be incorporated into the work shall be the responsibility of the CONTRACTOR per the General Conditions.

2. The OWNER or independent firm will perform inspections, testings, and other services as required by the ENGINEER under Paragraph 1.3C above.

3. Reports of testing, regardless of whether the testing was the OWNER'S or the CONTRACTOR'S responsibility, will be submitted to the ENGINEER in duplicate, indicating observations and results of tests and indicating compliance or noncompliance with Contract Documents.

4. The CONTRACTOR shall cooperate with the OWNER or independent firm and furnish samples of materials, design mix, equipment, tools, storage, and assistance as requested.

5. The CONTRACTOR shall notify ENGINEER forty-eight (48) hours prior to the expected time for operations requiring inspection and laboratory testing services.

6. Retesting required because of non-conformance to requirements shall be performed by the same independent firm on instructions by the ENGINEER. The CONTRACTOR shall bear all costs from such retesting.

7. For samples and tests required for CONTRACTOR'S use, the CONTRACTOR shall make arrangements with an independent firm for payment and scheduling of testing. The cost of sampling and testing for the CONTRACTOR'S use shall be the CONTRACTOR'S responsibility per the General Conditions.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Inspection: The CONTRACTOR shall inspect materials or equipment upon the arrival on the job site and immediately prior to installation, and reject damaged and defective items.

B. Measurements: The CONTRACTOR shall verify measurements and dimensions of the WORK, as an integral step of starting each installation.

C. Manufacturer's Instructions: Where installations include manufactured products, the CONTRACTOR shall comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in Contract Documents.

END OF SECTION 01400

SECTION 01505 - MOBILIZATION

PART 1 -- GENERAL

1.1 GENERAL

A. CONTRACTOR shall mobilize as required for the proper performance and completion of the WORK and in accordance with the Contract Documents.

B. Mobilization shall include at least the following items:

1. Moving onto the Site of CONTRACTOR's field office, ENGINEER's field office, and equipment necessary for the first month of operations. Field offices shall be complete and in accordance with Section 1590 – Field Offices.

2. Having the CONTRACTOR's superintendent present at the Site full time.

3. Installing temporary construction power, wiring, and lighting facilities.

4. Establishing fire protection system.

5. Developing construction water supply.

6. Providing on-Site sanitary facilities and potable water facilities.

7. Arranging for and erection of CONTRACTOR's WORK and storage yards.

8. Constructing and implementing security features and requirements complying with Section 01520 - Security.

9. Obtaining required permits.

10. Having OSHA required notices and establishing safety programs.

11. Submitting Original CPM schedule in accordance with Section 01311 – CPM Construction Schedule.

12. Submitting initial detailed schedule of values in accordance with Section 01301 - Schedule of Values.

13. Submitting preconstruction site condition survey in accordance with Section 01532 - Site Condition Surveys

1.2 PAYMENT FOR MOBILIZATION

A. The CONTRACTOR's attention is directed to the condition that no payment for mobilization, or any part thereof, will be recommended for payment under the Contract until mobilization items listed above have been completed.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01505

SECTION 01510 - TEMPORARY UTILITIES

PART 1 -- GENERAL

1.1 GENERAL REQUIREMENTS

A. Types: The types of utility services required for general temporary use at the Site include the following:

1. Water service (potable for certain uses)

2. Electric power service

3. Lighting (for night operations)

PART 2 -- PRODUCTS

2.1 MATERIALS

A. The CONTRACTOR shall provide either new or used materials and equipment, which are in substantially undamaged condition and without significant deterioration and which are recognized in the construction industry, by compliance with appropriate standards, as being suitable for intended use in each case. Where a portion of temporary utility is provided by utility company, the CONTRACTOR shall provide the remaining portion with matching and compatible materials and equipment and shall comply with recommendations of utility company.

PART 3 -- EXECUTION

3.1 INSTALLATION OF TEMPORARY UTILITY SERVICES

A. General: Wherever feasible, the CONTRACTOR shall engage the utility company to install temporary service to project, or as a minimum, to make connection to existing utility service; locate services where they will not interfere with total project construction WORK, including installation of permanent utility services; and maintain temporary services as installed for required period of use; and relocate, modify or extend as necessary from time to time during that period as required to accommodate total project construction WORK.

B. Approval of Electrical Connections: Temporary connections for electricity shall be subject to approval of the ENGINEER and the power company representative, and shall be removed in like manner at the CONTRACTOR's expense prior to final acceptance of the WORK.

C. Separation of Circuits: Unless otherwise permitted by the ENGINEER, circuits used for power purposes shall be separate from lighting circuits.

D. Construction Wiring: Wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. Electrical facilities shall conform to the requirements of Subpart K of the OSHA Safety and Health Standards for Construction.

3.2 INSTALLATION OF POWER DISTRIBUTION SYSTEM

A. Power: The CONTRACTOR shall provide power required for its operations under the Contract, and shall provide and maintain all temporary power lines required to perform the WORK in a safe and satisfactory manner.

B. Temporary Power Distribution: The CONTRACTOR shall provide a weatherproof, grounded, temporary power distribution system sufficient for performance of entire WORK of project, including temporary electrical heating where indicated, operation of test equipment and test operation of building equipment and systems which cannot be delayed until permanent power connections are operable, temporary

operation of other temporary facilities, including permanent equipment and systems which must be placed in operation prior to use of permanent power connections (pumps, HVAC equipment, elevators, and similar equipment), and power for temporary operation of existing facilities (if any) at the Site during change-over to new permanent power system. Provide circuits of adequate size and proper power characteristics for each use; run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations and will result in minimal interference with performance of the WORK; provide rigid steel conduit or equivalent raceways for wiring which must be exposed on grade, floors, decks, or other exposures to damage or abuse.

3.3 INSTALLATION OF LIGHTING

A. Construction Lighting: WORK conducted at night or under conditions of deficient daylight shall be suitably lighted to insure proper WORK and to afford adequate facilities for inspection and safe working conditions.

B. Temporary Lighting: The CONTRACTOR shall provide a general, weatherproof, grounded temporary lighting system in every area of construction work, as soon as overhead floor/roof deck structure has been installed to provide sufficient illumination for safe work and traffic conditions. Run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations on grade, floors, decks, or other areas of possible damage or abuse.

3.4 WATER SUPPLY

A. General: The CONTRACTOR shall provide an adequate supply of water of a quality suitable for construction purposes.

B. Water Connections: The CONTRACTOR shall not make connection to or draw water from any fire hydrant or pipeline without first obtaining permission of the Plaquemines Parish Department of Public Service. For each such connection made, the CONTRACTOR shall first attach to the fire hydrant or pipeline a valve and a meter per requirements of the Plaquemines Parish Department of Public Service. Water used by the CONTRACTOR shall be metered, but the CONTRACTOR will not be charged by the Plaquemines Parish Department of Public Service.

3.5 INSTALLATION OF SANITARY FACILITIES

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of CONTRACTOR's employees. Toilets at construction job sites shall conform to the requirements of Subpart D, Section 1926.51 of the OSHA Standards for Construction. The CONTRACTOR shall provide separate field office facilities in conformance with Section 01590.

3.6 OPERATIONS AND TERMINATIONS

A. Inspections: Prior to placing temporary utility services into use, the CONTRACTOR shall inspect and test each service and arrange for governing authorities' required inspection and tests, and obtain required certifications and permits for use thereof.

B. Protection: The CONTRACTOR shall maintain distinct markers for underground lines, and protect from damage during excavating operations.

C. Termination and Removal: When need for a temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use of permanent services, or not later than time of substantial completion, the CONTRACTOR shall promptly remove installation unless requested by ENGINEER to retain it for a longer period. The CONTRACTOR shall complete and restore WORK which may have been delayed or affected by installation and use of temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces.

D. Removal of Water Connections: Before final acceptance of the WORK on the project, all temporary connections and piping installed by the CONTRACTOR shall be entirely removed, and all affected improvements shall be restored to original condition or better, to the satisfaction of the ENGINEER and to the agency owning the affected utility.

END OF SECTION 01510

SECTION 01520 - SECURITY

PART 1 -- GENERAL

1.1 SECURITY PROGRAM

A. The CONTRACTOR shall:

1. Protect WORK, stored materials, existing premises and OWNER'S operations from theft, vandalism, and unauthorized entry.

2. Initiate program in coordination with OWNER'S existing security system at mobilization.

3. Maintain program throughout construction period until end of construction operations.

1.2 ENTRY CONTROL

A. The CONTRACTOR shall:

1. Restrict entry of persons and vehicles into Site.

2. Allow entry only to authorized persons with proper identification.

3. Maintain log of workmen and visitors and make log available to OWNER on request.

4. Coordinate access of OWNER’S personnel to Site in coordination with OWNER’S security forces.

B. OWNER will control entrance of persons and vehicles related to OWNER'S operations.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01520

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SECTION 01530 - PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.1 GENERAL

A. The CONTRACTOR shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than prior to such damage or temporary relocation, all in accordance with the Contract Documents.

1.2 RESTORATION OF PAVEMENT

A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. The pavement restoration requirement to match existing sections shall apply to all components of existing sections, including sub-base, base, and pavement. Temporary and permanent pavement shall conform to the requirements of the affected pavement owner. Pavements which are subject to partial removal shall be neatly saw cut in straight lines.

B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the CONTRACTOR shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.

C. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the CONTRACTOR shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

D. Restoration of Sidewalks or Private Driveways: Wherever sidewalks or private roads have been removed for purposes of construction, the CONTRACTOR shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions. If no such period of time is so fixed, the CONTRACTOR shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

1.3 EXISTING UTILITIES AND IMPROVEMENTS

A. General: The CONTRACTOR shall protect underground Utilities and other improvements which may be impaired during construction operations, regardless of whether or not the Utilities are indicated on the Drawings. The CONTRACTOR shall take all possible precautions for the protection of unforeseen Utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Except where the Drawings indicate Utilities have been field located during design or certain Utility locations shall be exposed as part of the WORK, the CONTRACTOR shall locations and depths of Utilities which may interfere with its work. All such exploratory excavations shall be performed as soon as practicable after Notice to Proceed and, in any event, a sufficient time in advance of construction to avoid possible delays to the CONTRACTOR's progress. When such exploratory excavations show the Utility location as shown on the Drawings to be in error, the CONTRACTOR shall so notify the ENGINEER.

C. The number of exploratory excavations required shall be that number which is sufficient determine the alignment and grade of the Utility.

D. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the CONTRACTOR, be notified by the OWNER to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the ENGINEER a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

E. Utilities to be Removed: Where the proper completion of the WORK requires the temporary or permanent removal and/or relocation of an existing Utility or other improvement which is indicated, the CONTRACTOR shall remove and, without unnecessary delay, temporarily replace or relocate such Utility or improvement in a manner satisfactory to the ENGINEER and the owner of the facility. In all cases of such temporary removal or relocation, restoration to the former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the Utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

F. OWNER's Right of Access: The right is reserved to the OWNER and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the WORK of this Contract.

G. Underground Utilities Indicated: Existing Utility lines that are indicated or the locations of which are made known to the CONTRACTOR prior to excavation and that are to be retained, and all Utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the CONTRACTOR, unless otherwise repaired by the owner of the damaged Utility. If the owner of the damaged facility performs its own repairs, the CONTRACTOR shall reimburse said owner for the costs of repair.

H. Underground Utilities Not Indicated: In the event that the CONTRACTOR damages existing Utility lines that are not indicated or the locations of which are not made known to the CONTRACTOR prior to excavation, a verbal report of such damage shall be made immediately to the ENGINEER and a written report thereof shall be made promptly thereafter. The ENGINEER will immediately notify the owner of the damaged Utility. If the ENGINEER is not immediately available, the CONTRACTOR shall notify the Utility owner of the damage. If directed by the ENGINEER, repairs shall be made by the CONTRACTOR under the provisions for changes and extra work contained in the General Conditions.

I. Costs of locating and repairing damage not due to failure of the CONTRACTOR to exercise reasonable care, and removing or relocating such Utility facilities not indicated in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the WORK which was interrupted or idled by removal or relocation of such Utility facilities, and which was necessarily idled during such work will be paid for as extra work in accordance with the provisions of the General Conditions.

J. Approval of Repairs: All repairs to a damaged Utility or improvement are subject to inspection and approval by an authorized representative of the Utility or improvement owner before being concealed by backfill or other work.

K. Maintaining in Service: Unless indicated otherwise, oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the WORK shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the ENGINEER are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.4 TREES OR SHRUBS WITHIN STREET RIGHTS-OF-WAY AND PROJECT LIMITS

A. General: Except where trees or shrubs are indicated to be removed, the CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or OWNER. Existing trees and shrubs which are damaged during construction shall be trimmed or replaced by the CONTRACTOR or a certified tree company under permit from the jurisdictional agency and/or the OWNER. Tree trimming and replacement shall be accomplished in accordance with the following paragraphs.

1.5 LAWN AREAS

A. Lawn or landscaped areas damaged during construction shall be repaired to match the pre-construction condition to the satisfaction of the OWNER.

1.6 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the CONTRACTOR shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire. The CONTRACTOR shall also notify the Louisiana One Call System prior to such excavation in accordance with requirements of the Louisiana One Call System.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01530

SECTION 01532 - SITE CONDITIONS SURVEYS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall conduct thorough pre-construction and post-construction Site conditions surveys of the entire Project. Site conditions surveys shall consist of photographs and videotape recordings.

1.2 CONTRACTOR SUBMITTALS

A. Video surveys, photographs, and other data of the preconstruction conditions shall be submitted to the ENGINEER for record purposes prior to, but not more than three weeks before, commencement of any construction activities.

B. A complete set of all photographs of the post-construction conditions shall be completed and submitted prior to final inspection by the OWNER and ENGINEER. Photographs shall be in digital format.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 PHOTOGRAPHS AND VIDEO RECORDINGS

A. In accordance with the requirements of the Special Provisions, CONTRACTOR, as a minimum, shall document pre- and post-construction conditions by preparing videotape surveys of the following:

1. Roadways used to access the Site or haul materials and equipment to the Site.

2. Work areas, including actual work sites, materials processing and stockpiling areas, access corridors, disposal areas, and staging areas.

3. Any work completed by other contractors at the Site that will be connected to or otherwise affected by the WORK.

4. Driveways, sidewalks, and buildings which might be affected by the WORK.

B. Supplement videotape surveys with photographs as required to thoroughly document the original condition and location of existing features and facilities.

C. Videotape records shall be in DVD format.

END OF SECTION 01532

SECTION 01550 - SITE ACCESS AND STORAGE

PART 1 -- GENERAL

1.1 HIGHWAY LIMITATIONS

A. The CONTRACTOR shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the WORK. It shall be the CONTRACTOR's responsibility to construct and maintain any haul roads required for its construction operations.

1.2 CONTRACTOR'S WORK AND STORAGE AREA

A. The OWNER will designate and arrange for the CONTRACTOR's use, a portion of the property for its exclusive use during the term of the Contract as a storage and shop area for its construction operations on the WORK. At completion of WORK, the CONTRACTOR shall return this area to its original condition, including grading and landscaping.

B. The CONTRACTOR shall make its own arrangements for any necessary off-Site storage or shop areas necessary for the proper execution of the WORK.

C. Lands to be furnished by the OWNER for camp sites, construction operation, concrete aggregate pits, roads and other purposes are indicated. Should the CONTRACTOR find it necessary to use any additional land for its camp or for other purposes during the construction of the WORK, it shall arrange for the use of such lands at its own expense.

D. The CONTRACTOR shall construct and use a separate storage area for hazardous materials used in constructing the WORK.

1. For the purpose of this paragraph, hazardous materials to be stored in the separate Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition, whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, two-part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.

2. Hazardous materials shall be stored in groupings according to the Material Safety Data Sheets.

3. The CONTRACTOR shall develop and submit to the ENGINEER a plan for storing and disposing of the materials above.

4. The CONTRACTOR shall obtain and submit to the ENGINEER a single EPA number for wastes generated at the Site.

5. The separate storage area shall meet all the requirements of all authorities having jurisdiction over the storage of hazardous materials.

6. All hazardous materials which are delivered in containers shall be stored in the original containers until use. Hazardous materials which are delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

7. All hazardous materials which are delivered in containers shall be stored in the original containers until use. Hazardous materials which are delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

1.3 PARKING

A. The CONTRACTOR shall:

1. Direct its employees to park in areas as directed by the OWNER or ENGINEER.

2. Traffic and parking areas shall be maintained in a sound condition, free of excavated material, construction equipment, mud, and construction materials. The CONTRACTOR shall repair breaks, potholes, low areas which collect standing water, and other deficiencies.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01550

SECTION 01560 - TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 -- GENERAL

1.1 DUST ABATEMENT

A. The CONTRACTOR shall prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity of the Site. The CONTRACTOR shall be responsible for any damage resulting from dust originating from its operations. Dust abatement measures shall be continued until the CONTRACTOR is relieved of further responsibility by the ENGINEER.

B. Storage Piles: Enclose, cover, water (as needed), or apply non-toxic soil binders according to manufacturer's specifications on material piles (i.e. gravel, sand, dirt) with a silt content of 5 percent or greater.

C. Active Areas of Site: Water active construction areas and unpaved roads as needed and as directed by ENGINEER.

D. Inactive Areas of Site: Apply non-toxic soil stabilizers according to manufacturer's specifications to inactive construction areas, or water as needed to maintain adequate dust control.

E. Vehicle Loads: Cover or maintain at least 2-feet of freeboard vertical distance between the top of the load and the top of the trailer sides on trucks hauling dirt, sand, soil, or other loose materials off of the Site.

F. Roads: When there is visible track-out onto a paved public road, install wheel washers where the vehicles exit and enter onto the paved roads and wash the undercarriage of trucks and any equipment leaving the Site on each trip. Sweep the paved street with a Mobil Athey or similar water spray pick-up broom-type street sweeper as necessary or as directed by the OWNER or ENGINEER.

G. Vehicle Speeds: If watering of unpaved roads is not sufficient to control dust, reduce vehicle speeds to 15 mph or less on such roads.

1.2 STORMWATER POLLUTION PREVENTION

A. CONTRACTOR shall minimize stormwater pollution from the Site in accordance with Section 01565 – Erosion Control.

1.3 RUBBISH CONTROL

A. During the progress of the WORK, the CONTRACTOR shall keep the Site and other areas for which it is responsible in a neat and clean condition and free from any accumulation of rubbish. The CONTRACTOR shall dispose of rubbish and waste materials of any nature and shall establish regular intervals of collection and disposal of such materials and waste as directed by the OWNER or ENGINEER. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of rubbish and surplus materials shall be off the Site in accordance with local codes and ordinances governing locations and methods of disposal and in conformance with applicable safety laws and the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.4 SANITATION

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.

B. Sanitary and Other Organic Wastes: The CONTRACTOR shall establish a regular daily collection of sanitary and organic wastes. Wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the Site in a manner satisfactory to the ENGINEER and in accordance with Laws and Regulations pertaining thereto.

1.5 CHEMICALS

A. Chemicals used on the WORK or furnished for facility operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer. In addition, see the requirements set forth in paragraph 6.11 of the General Conditions.

1.6 CULTURAL RESOURCES

A. The CONTRACTOR's attention is directed to the National Historic Preservation Act of 1966 (16 U.S.C. 470) and 36 CFR 800 which provides for the preservation of potential historical architectural, archaeological, or cultural resources (hereinafter called "cultural resources").

B. In the event potential cultural resources are discovered during subsurface excavations at the Site, the following procedures shall be instituted:

1. The OWNER will issue a temporary Notice to Suspend Work directing to cease construction operations at the location of such potential cultural resources find.

2. The suspension Notice will contain the following:

a. A clear description of the WORK to be suspended

b. Instructions regarding issuance of further orders by the CONTRACTOR for material services

c. Guidance as to the action to be taken on subcontracts

d. Suggestions to the CONTRACTOR to minimize incurred costs

e. Estimated duration of the temporary suspension

3. Such suspension shall be effective until such time as a qualified archeologist can assess the value of the potential cultural resources and make recommendations to the State Historic Preservation Office.

4. The OWNER will implement appropriate actions as directed by the State Historic Preservation Office. The CONTRACTOR shall cease WORK in the area of a discovery until appropriate actions have been determined in accordance with this paragraph.

5. If human remains are discovered, all WORK in the immediate vicinity of the find shall stop. The Parish Coroner shall be notified.

C. If the archeologist determines that the potential find is a bonafide cultural resource, at the direction of the State Historic Preservation Office, the OWNER will extend the duration of the suspension.

D. Changes to the Contract Time and/or Contract Price for suspension due to discovery of a potential cultural resource will be made per the General Conditions.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01560

SECTION 01565 - EROSION CONTROL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide erosion control measures and a storm water pollution prevention plan (SWPP) in accordance with these specifications and requirements of the LDEQ General Permit LAR200000.

1.2 SUBMITTALS

A. The CONTRACTOR shall prepare a storm water pollution prevention plan (SWPP) in accordance with the conditions and requirements of LDEQ General Permit LAR200000.

B. The CONTRACTOR shall submit a detailed plan to the ENGINEER showing the layout of all erosion control measures and proposed practices for construction.

C. The CONTRACTOR shall prepare and submit a Small Construction Activity Completion Report under the conditions of LAR200000 by January 28 in the year following completion of the WORK.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Fabric: Fabric for silt fencing shall be Class G Filter Fabric in compliance with Section 02274 – Geotextiles.

B. Posts: Posts shall be wood, at least 2 inches by 2 inches, at least 6 feet long.

C. Fencing: Woven wire fabric fencing shall be galvanized, mesh spacing of 6 inches, maximum 14 gauge, at least 30 inches tall.

D. Baled Straw or Hay: Baled straw shall be placed as indicated on the drawings to form checks or dams to control erosion and siltation. Bales shall be properly staked or otherwise secured as indicated on the drawings. The bales shall be buried as necessary to prevent scour under the bales. A minimum of two stakes shall be driven through each bale.

E. Fasteners: Fasteners to wood posts shall be galvanized clips.

PART 3 -- EXECUTION

3.1 GENERAL

A. Construction Site Notice: CONTRACTOR shall provide all construction site notices as required by LDEQ General Permit LAR200000. Posting shall be legible and posted within plain sight.

3.2 PREPARATION

A. Provide erosion control barriers as required to prevent erosion and silt loss from the Site. Contractor shall not commence clearing, grubbing, earthwork, or other activities which may cause erosion until barriers are in place.

3.3 INSTALLATION

A. Barrier systems shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.

B. Attach the woven wire fencing to the posts that are spaced a maximum of 6 feet apart and embedded a minimum of 12 inches. Install posts at a slight angle toward the source of the anticipated runoff.

C. Trench in the toe of the filter fabric barrier with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow. Lay fabric along the edges of the trench. Backfill and compact.

D. Securely fasten the fabric materials to the woven wire fencing with tie wires.

E. Reinforced fabric barrier shall have a height of 18 inches.

F. Provide the filter fabric in continuous rolls and cut to the length of the fence to minimize the use of joints. When joints are necessary, splice the fabric together only at a support post with a minimum 6-inch overlap and seal securely.

3.4 MAINTENANCE

A. CONTRACTOR shall regularly inspect and repair or replace damaged components of the barrier. Unless otherwise directed, maintain the erosion control system until final acceptance; then remove erosion and sediment control systems promptly.

B. CONTRACTOR shall remove sediment deposits when silt reaches a depth of 6 inches or 1/2 the height of the barrier, whichever is less. Dispose of sediments on the Site, or at a site arranged by the CONTRACTOR which is not in or adjacent to a stream or floodplain.

END OF SECTION 01565

SECTION 01600 - PRODUCTS, MATERIALS, EQUIPMENT AND SUBSTITUTIONS

PART 1 -- GENERAL

1.1 DEFINITIONS

A. The word "Products," as used in the Contract Documents, is defined to include purchased items for incorporation into the WORK, regardless of whether specifically purchased for the project or taken from CONTRACTOR's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form WORK. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

B. Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying, and erection of the WORK.

1.2 QUALITY ASSURANCE

A. Source Limitations: To the greatest extent possible for each unit of WORK, the CONTRACTOR shall provide products, materials, and equipment of a singular generic kind from a single source.

B. Compatibility of Options: Where more than one choice is available as options for CONTRACTOR's selection of a product, material, or equipment, the CONTRACTOR shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

1.3 PRODUCT DELIVERY AND STORAGE

A. The CONTRACTOR shall deliver and store the WORK in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at the Site and overcrowding of construction spaces. In particular, the CONTRACTOR shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.

1.4 TRANSPORTATION AND HANDLING

A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.

B. The CONTRACTOR shall provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage.

C. The CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.5 STORAGE AND PROTECTION

A. Products shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.

B. For exterior storage of fabricated products, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.

C. Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.

D. Storage shall be arranged to provide access for inspection. The CONTRACTOR shall periodically inspect to assure products are undamaged and are maintained under required conditions.

E. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

1.6 MAINTENANCE OF PRODUCTS IN STORAGE

A. Stored products shall be periodically inspected on a scheduled basis. The CONTRACTOR shall maintain a log of inspections and shall make the log available on request.

B. The CONTRACTOR shall comply with manufacturer's product storage requirements and recommendations.

C. The CONTRACTOR shall maintain manufacturer-required environmental conditions continuously.

D. The CONTRACTOR shall ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.

E. For mechanical and electrical equipment, the CONTRACTOR shall provide a copy of the manufacturer's service instructions with each item and the exterior of the package shall contain notice that instructions are included.

F. Products shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to final acceptance by the OWNER in accordance with the Contract Documents.

1.7 PROPOSED SUBSTITUTIONS OR "OR-EQUAL" ITEM

A. Proposed substitutions shall be as indicated in the General Conditions and Special Provisions.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01600

SECTION 01656 - PRESSURE PIPE TESTING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall test pressure pipes and appurtenant piping, in accordance with the Contract Documents.

B. CONTRACTOR shall coordinate pressure and leakage testing with adjacent work as necessary to preclude work interferences or duplication of effort and to expedite the overall progress of the work.

C. CONTRACTOR shall provide all necessary piping, piping connections, temporary valves, backflow preventers, and all other items of equipment or facilities necessary to complete the pressure and leakage testing.

D. In all cases where it is necessary to interrupt service, permission of the OWNER shall be obtained at least two (2) days before the service will be interrupted. IN all cases where it is necessary to interrupt service to water customers, permission of the OWNER shall be obtained and each customer affected notified of the proposed service interruption at least two (2) days prior to the service interruption.

E. ENGINEER or ENGINEER's representative shall be present during testing and shall be notified of the time and place of testing at least 3 days prior to commencement of testing. All testing shall be performed to the satisfaction of the ENGINEER, and in accordance with all governing standards and regulations.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 – Contractor Submittals.

B. Furnish: A testing plan and schedule, including method for water conveyance, control, disposal, and disinfection shall be submitted in writing for approval.

1.3 SPECIAL TESTING REQUIREMENTS

A. Unless otherwise acceptable, a temporary pressure gauge shall be installed at each end of the limits of the pipeline to be tested.

B. Unless otherwise acceptable, tests shall be made before connections are made to existing pipelines, or to any portion of pipelines installed under this Contract which have already been placed into service.

C. Unless otherwise acceptable, upon completion of testing connections made to existing water lines or to any portion of water lines installed under this contract that have already been put into service, and any other portion of the pipeline not subject to the pressure test, shall be usually inspected for leakage after placing the water line into service and before backfilling the connection.

D. If testing is permitted against a valve, the maximum differential test pressure across the valve seat (gate) in the closed position shall not exceed the drip – tight rated pressure of the valve.

PART 2 -- PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. All test equipment, chemicals for chlorination, temporary valves, bulkheads, and other water control equipment, and choice of disinfectant shall be as determined by the CONTRACTOR. No materials shall be used which would be injurious to the WORK

B. Chlorine for disinfection may be in the form of liquid chlorine, sodium hypochlorite solution, or calcium hypochlorite granules or tablets.

1. Liquid chlorine shall be in accordance with the requirements of ANSI/AWWA B301 - Liquid Chlorine, and shall be used only when each of the following conditions are satisfied:

a. Appropriate gas flow chlorinators and ejectors are used.

b. An experienced technician directly supervises.

c. Appropriate safety practices are observed.

2. Sodium and calcium hypochlorite shall be in accordance with ANSI/AWWA B300 - Hypochlorites.

C. Dechlorination agents may be sodium bisulfate, sodium sulfite, or sodium thiosulfate.

2.2 TEST EQUIPMENT

A. All necessary connections between the piping to be tested and the water source, including pumping equipment, meters, pressure gauges, backflow prevention, and all other equipment, materials, and facilities required to perform the specified tests shall be provided by the CONTRACTOR.

B. All required blind flanges, valves, bulkheads, and other sectionalizing devices shall also be provided. All temporary sectionalizing devices shall be removed upon completion of testing. Vents shall be provided in test bulkheads where necessary to expel air from the piping to be used.

C. Test pressure shall be applied by means of a force pump sized to produce and maintain the required pressure without interruption during the test.

D. Water meters and pressure gauges shall be accurately calibrated and shall be subject to review and acceptance by the ENGINEER.

E. Permanent or temporary gauge connections shall be installed at each location where test gauges are connected to the piping during the required test. Drilling and tapping of pipe walls will not be permitted. Upon successful completion of testing, each permanent gauge connection shall be fitted with an isolation valve and a permanent gauges, and or cap acceptable to the ENGINEER.

PART 3 -- EXECUTION

3.1 GENERAL

A. Water for testing and disinfecting water pipelines will be furnished by the OWNER; however, the CONTRACTOR shall convey the water from the OWNER-designated source to the points of use.

B. All pressure pipelines shall be tested; those for potable water shall be disinfected. All chlorinating and testing operations shall be performed in the presence of the ENGINEER.

C. Disposal of flushing water and water containing chlorine shall be by methods acceptable to the ENGINEER.

3.2 PIGGING

A. The CONTRACTOR shall clean the system thoroughly by pigging to remove sand, grit, gravel, stones, fluids, construction waste, and all material which would not be found in a properly cleaned pipeline. Pigging shall obtain a smooth interior pipe surface free from any material or fluid not used in cleaning.

B. Pigging shall be defined as passage of a sufficient number of pigs through the pipeline to achieve the clean conditions required. Flushing will not be acceptable as a substitute for pigging.

C. Provision for pig access and egress points and disposal of water and materials shall be the CONTRACTOR's responsibility.

D. Pigs shall be individually marked and their location shall be controlled and monitored so that no pigs remain in the system after cleaning.

E. Pigging may be done in conjunction with initial filling for the hydrostatic test.

3.3 HYDROSTATIC TESTING OF PIPELINES

A. Pipeline 30-inches diameter and larger shall be visually inspected that all debris has been removed prior to flushing.

B. Prior to hydrostatic testing, pipelines shall be flushed or blown out as appropriate. The CONTRACTOR shall test pipelines in sections. Sections to be tested shall be defined by isolation valves in the pipeline. Where such valves are not present, the CONTRACTOR shall install temporary bulkheads or plugs for the purpose of testing. Sections that do not have isolation valves shall be tested in approximate one-mile segments. Sections that have a zero leakage allowance may be tested as a unit. No section of the pipeline shall be tested until field-placed concrete or mortar has attained an age of 14 Days. The test shall be made by closing valves when available or by placing bulkheads and filling the line slowly with water. The CONTRACTOR shall be responsible for ascertaining that test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to or movement of the adjacent pipe. Unharnessed sleeve-type couplings, expansion joints, or other sliding joints shall be restrained or suitably anchored prior to the test to avoid movement and damage to piping and equipment. Remove or protect any pipeline-mounted devices that may be damaged by the test pressure. The CONTRACTOR shall provide sufficient temporary tappings in the pipelines to allow for trapped air to exit. After completion of the tests, such taps shall be permanently plugged. Care shall be taken that air relief valves are open during filling.

C. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the release valves at a reasonable velocity. The air within the pipeline shall be allowed to escape completely. The differential pressure across the orifices in the air release valves shall not be allowed to exceed 5 psi at any time during filling. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, as applicable, to absorb water and to allow the escape of air from air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the ENGINEER shall be taken.

D. The hydrostatic test shall consist of holding the indicated test pressure on the pipeline segment for a period of 4 hours. The test pressure for yard piping shall be as indicated on the Piping Schedule measured at the lowest point of the pipeline section being tested. No pressure test will be required for a reservoir overflow line. Visible leaks that appear during testing shall be repaired in a manner acceptable to the ENGINEER. Add water to restore the test pressure if the pressure decreases 5 psi below test pressure during the test period.

E. The maximum leakage for yard piping shall be as indicated on the Piping Schedule. Pipe with welded joints shall have no leakage. Exposed piping shall show no visible leaks and no pressure loss during the test. In the case of pipelines that fail to pass the leakage test, the CONTRACTOR shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall again test the pipeline, repeating as necessary until the pipeline passes.

END OF SECTION 01656

SECTION 01660 - TESTING AND PLANT STARTUP

PART 1 -- GENERAL

1.1 GENERAL

A. Equipment testing and plant startup are prerequisites to satisfactory completion of the contract requirements and shall be completed within the Contract Times.

B. Startup of a treatment plant is a highly complex operation requiring the combined expertise of the CONTRACTOR, manufacturers' representatives, subcontractors, the ENGINEER, and the OWNER. The CONTRACTOR shall be responsible for coordinating all parties for a successful startup: the ENGINEER and OWNER may be available for technical and operational advice prior to and during startup.

C. Testing and startup activities shall be scheduled according to Section 01311 – CPM Construction Schedule. Testing periods shall start prior to midday on a Tuesday, or a Wednesday. Testing periods shall not include Mondays, Fridays, Saturdays, or Sundays. Testing periods shall not include holidays, based on the OWNER's calendar.

D. During testing periods, the CONTRACTOR shall filter-to-waste or otherwise waste all process water.

1.2 SUBMITTALS

A. Schedule: The schedule for testing and startup shall be submitted under Section 01311.

B. Testing and Startup Plan: Not less than 30 Days prior to startup, submit for review a detailed Testing and Startup Plan. The Plan shall include schedules for manufacturers' equipment certification, schedules for submitting final Owner's Manuals, schedule for training the OWNER's personnel, list of OWNER and CONTRACTOR-furnished supplies, electrical testing, and detailed schedule of operations to achieve successful system testing, startup, and performance and acceptance testing. The Plan shall include test checklists and data forms for each item of equipment and shall address coordination with the OWNER's staff. The CONTRACTOR shall revise the Plan as necessary based on review comments.

C. System Outage Requests: Request for shutdown of existing systems as necessary to test or start up new facilities.

D. Records and Documentation

1. Equipment Installation Certification: Where required by the specifications, submit documentation from manufacturer's representative that the equipment has been properly installed and lubricated, is in accurate alignment, is free from undue stresses from connecting piping and anchoring, and has operated satisfactorily under full load conditions.

2. Records of testing and startup as indicated below.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 EXECUTION

A. Prerequisites: The following shall be completed before testing and startup begins.

1. Furnish all Technical Manual information required by the Contract Documents.

2. Provide all safety equipment, emergency shower and eyewash units, fire extinguishers, gas detectors, protective guards and shields, emergency repair kits, safety chains, handrails, gratings, safety signs,

and valve and piping identification required by the Contract Documents. Devices and equipment shall be fully functional, adjusted, and tested.

3. Manufacturer's certifications of proper installation have been accepted.

4. Leakage tests, electrical tests, and adjustments have been completed.

5. The ENGINEER has approved the CONTRACTOR's Testing and Startup Plan.

6. Functional verification of the individual instrumentation loops (analog, status, alarm, and control).

7. Adjustment of the pressure switches, flow switches, timing relays, level switches, vibration switches, temperature switches, RTD monitors, pressure regulating valves, and other control devices to the settings determined by the ENGINEER or the equipment manufacturer.

8. Functional verification of the individual interlocks between the field-mounted control devices and the motor control circuits, control circuits of variable-speed controllers, and packaged system controls.

B. Supplies:

1. The CONTRACTOR shall furnish:

a. Oil and grease

b. Other necessary materials not listed for the OWNER to furnish

2. The OWNER will furnish:

a. Water

b. Power

C. Records of Testing and Startup: The CONTRACTOR shall maintain the following during testing and startup and submit originals to ENGINEER prior to acceptance:

1. Lubrication and service records for each mechanical and electrical equipment item

2. Hours of daily operation for each mechanical and electrical equipment item

3. Equipment alignment and vibration measurement records

4. Logs of electrical measurements and tests

5. Instrumentation calibration and testing logs

6. Testing and validation of SCADA inputs, outputs, logic functions, status indications, and alarms

7. Factory and field equipment settings

8. Log of problems encountered and adjustments made

9. Other records, logs, and checklists as required by the Contract Documents

3.2 SYSTEM TESTING

A. After individual equipment items have been tested and certified as required by the Technical Specifications, tests of systems comprised of single or multiple equipment items with appurtenant

equipment and instruments and controls shall be conducted. Items of equipment shall be tested as part of a system to the maximum extent possible.

B. The CONTRACTOR shall demonstrate the manual and automatic modes of operation to verify proper control sequences, software interlocks, proper operation of software logic and controllers, etc. System testing shall include the use of water or other process media, as applicable, to simulate the actual conditions of operation.

C. Systems testing activities shall follow the detailed test procedures and checklists in the Testing and Startup Plan. Completion of systems testing shall be documented by a report.

D. The CONTRACTOR shall system test the utility, chemical feed, safety equipment, and other support systems before testing the process system.

E. Furnish the ENGINEER at least 10 Days written notice confirming the start of system testing. The OWNER's staff will observe systems testing.

F. The CONTRACTOR shall arrange for manufacturer's representative to revisit the Site as often as necessary to correct malfunctions to the ENGINEER's satisfaction.

G. Unless otherwise indicated by the ENGINEER, each system shall be tested for a continuous 12 hour period. If any system malfunctions during the test, the item or equipment shall be repaired and the test restarted at time zero with no credit given for the elapsed time before the malfunction.

3.3 STARTUP AND ACCEPTANCE TESTING

A. The CONTRACTOR shall start up the plant and operate it at rates directed by the ENGINEER without malfunction for a continuous two Day, 24 hour per day, acceptance test period. If any equipment item, subsystem, or system malfunctions during the test period, the item shall be repaired and the test restarted at time zero with no credit given for the elapsed time before the malfunction.

B. Defects in material or workmanship that appear shall be promptly corrected. Time lost for wiring corrections, control point settings, or other reasons that interrupt the test may, at the judgment of the ENGINEER, be cause for extending the test period an equal amount of time.

C. Acceptance testing shall not begin until leakage tests, instrumentation tests and adjustments, electrical tests and adjustments, equipment field tests, and system tests have been completed to the satisfaction of the ENGINEER.

D. The CONTRACTOR shall furnish the services of manufacturer's representatives, if necessary, to correct equipment malfunctions.

E. The OWNER will furnish certified treatment plant operators during the test period. Certified operators will be under the direct supervision of and be responsible to the CONTRACTOR. The CONTRACTOR shall furnish continuous, 24 hour staffing at the facility during testing periods.

F. During acceptance testing, the CONTRACTOR shall:

1. Lubricate and maintain equipment in accordance with the manufacturers' recommendations.

2. Clean or replace strainers, screens, and filter elements.

3.4 DISINFECTION

A. After startup is complete, all process piping, utility water piping, clarifier tank, filter tanks and clearwell shall be thoroughly disinfected by the use of chlorine or chlorine compounds before being placed in use. The rate of application of chlorine shall be in such proportion to the rate of water entering the

pipe or other appurtenances that the chlorine dose applied to the water shall be at least 50 mg/l. Chlorinated water shall be retained for a period of at least three hours. After the chlorine treated water has been retained for the required time, the chlorine residual at pipe extremities and at other representative points shall be at least 5 mg/l. If the residual is less than 5 mg/l, the disinfection procedure shall be repeated until a 5 mg/l residual is obtained.

B. The clearwell may be disinfected by washing down the interior of the tank with a chlorine solution having at least 200 mg/l available chlorine, then washing the interior of the tank with potable water, and then wasting the wash water.

C. Following disinfection as required above, the CONTRACTOR shall conduct tests performed by a laboratory which is certified by LADHH to demonstrate the new process treatment units and piping are free from contamination by coliform bacteria.

3.5 START OF PRODUCTION

D. After startup and disinfection is complete, the CONTRACTOR shall contact LADHH Region 1 and District 1 and notify of same. This notification shall take place before the OWNER places the new process treatment units into production.

END OF SECTION 01660

PART 1 -- GENERAL

1.1 FINAL CLEANUP

A. The CONTRACTOR shall promptly remove from the vicinity of the completed WORK, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the WORK by the OWNER will be withheld until the CONTRACTOR has satisfactorily performed the final cleanup of the Site.

1.2 CLOSEOUT TIMETABLE

A. The CONTRACTOR shall establish dates for equipment testing, acceptance periods, and on-site instructional periods (as required under the Contract). Such dates shall be established not less than one week prior to beginning any of the foregoing items, to allow the OWNER, the ENGINEER, and their authorized representatives sufficient time to schedule attendance at such activities.

1.3 FINAL SUBMITTALS

A. The CONTRACTOR, prior to requesting final payment, shall obtain and submit the following items to the ENGINEER for transmittal to the OWNER:

1. Written guarantees, where required.

2. Technical Manuals and instructions.

3. Maintenance stock items; spare parts; special tools.

4. Completed record drawings in accordance with Section 01300 - Submittals.

5. Certificates of inspection and acceptance by local governing agencies having jurisdiction.

6. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION 01700

SECTION 02100 - SITE PREPARATION

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. The WORK of this Section includes measures required during the CONTRACTOR's initial move onto the Site to protect existing fences, houses and associated improvements, streets, and utilities near construction areas from damage due to construction operations; and clearing, grubbing, and stripping.

1.2 SITE INSPECTION

A. Prior to moving onto the Site, the CONTRACTOR shall inspect the Site conditions and review maps of the existing plant site and facilities delineating the OWNER's property and right-of-way lines.

PART 2 -- PRODUCTS - (NOT USED)

PART 3 – EXECUTION

3.1 PRIMARY PLANT SITE ACCESS

A. The CONTRACTOR shall develop any necessary access to the Site, including access barriers to prohibit entry of unauthorized persons.

B. Utility Interference: Where existing utilities interfere with the WORK, notify the utility owner and the ENGINEER before proceeding in accordance with the General Conditions.

3.2 CLEARING, GRUBBING, AND STRIPPING

A. Construction areas shall be cleared of grass and weeds to at least a depth of 6-inches and cleared of structures, pavement, sidewalks, concrete or masonry debris, trees, logs, upturned stumps, and any other objectionable material of any kind which would interfere with the performance or completion of the WORK, create a hazard to safety, or impair the subsequent usefulness of the WORK, or obstruct its operation. Trees and other natural vegetation outside the actual lines of construction shall be protected from damage during construction, as directed by the ENGINEER.

B. Within the limits of clearing, the areas below the natural ground surface shall be grubbed to a depth necessary to remove all stumps, roots, buried logs, and all other objectionable material. Septic tanks, drain fields, and connection lines and any other underground structures, debris or waste shall be removed if found on the Site. All objectionable material from the clearing and grubbing process shall be removed from the Site and wasted in approved safe locations.

C. Unless otherwise indicated, native trees larger than 3-inches in diameter at the base shall not be removed without the ENGINEER's approval. The removal of any trees, shrubs, fences, or other improvements outside of rights-of-way, if necessary for the CONTRACTOR's choice of means and methods, shall be arranged with the owner of the property, and shall be removed and replaced, at no additional cost to the OWNER.

END OF SECTION 02100

SECTION 02140 – DEWATERING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall dewater trench and structure excavations, in accordance with the Contract Documents. The CONTRACTOR shall secure all necessary permits to complete the requirements of this Section of the Specifications.

B. When the CONTRACTOR encounters wastewater in trench or structure excavations, the wastewater shall be disposed of in a wastewater treatment structure as approved by the ENGINEER.

1.2 CONTRACTOR SUBMITTALS

A. Prior to commencement of excavation, the CONTRACTOR shall submit a detailed plan and operation schedule for dewatering of excavations. The CONTRACTOR may be required to demonstrate the system proposed and to verify that adequate equipment, personnel, and materials are provided to dewater the excavations at all locations and times. The CONTRACTOR's dewatering plan is subject to review by the ENGINEER.

1.3 QUALITY CONTROL

A. It shall be the sole responsibility of the CONTRACTOR to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.

B. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the CONTRACTOR.

C. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the CONTRACTOR. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

PART 2 -- PRODUCTS

2.1 EQUIPMENT

A. Dewatering, where required, may include the use of well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, and other means. Standby pumping equipment shall be maintained on the Site.

PART 3 -- EXECUTION

3.1 GENERAL REQUIREMENTS

A. The CONTRACTOR shall provide all equipment necessary for dewatering. It shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.

B. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.

C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with drain rock.

F. The CONTRACTOR shall maintain the water level below the bottom of excavation in all work areas where groundwater occurs during excavation construction, backfilling, and up to acceptance.

G. Flotation shall be prevented by the CONTRACTOR by maintaining a positive and continuous removal of water. The CONTRACTOR shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.

H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the CONTRACTOR shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

I. The CONTRACTOR shall dispose of water from the WORK in a suitable manner without damage to adjacent property. CONTRACTOR shall be responsible for obtaining any permits that may be necessary to dispose of water. No water shall be drained into work built or under construction without prior consent of the ENGINEER. Water shall be filtered using an approved method to remove sand and fine-sized soil particles before disposal into any drainage system.

J. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

K. Dewatering of trenches and other excavations shall be considered as incidental to the construction of the WORK.

END OF SECTION 02140

SECTION 02160 – SHEETING, SHORING, AND BRACING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. This section shall include supplying materials, services, and labor necessary to provide sheeting, shoring, and bracing or supports as required to provide a safe working condition for CONTRACTOR's personnel and to provide for protection of utilities, buildings, and structures. It shall be the sole responsibility of the CONTRACTOR to comply with these requirements.

1.2 CONTRACTOR SUBMITTALS

A. Prior to beginning excavation operations, the CONTRACTOR shall submit his proposed excavation plan, in writing to the ENGINEER, his proposed plan to comply with the requirements of this Section. The plan is to be prepared and stamped by a qualified Louisiana licensed ENGINEER. The CONTRACTOR is solely responsible to design, provide, install and maintain support systems required to complete the work in a continuous safe manner. No excavation work shall be allowed to commence until the CONTRACTOR has fulfilled this requirement.

1.3 SAFETY REQUIREMENTS

A. All sheeting, shoring, and bracing of excavations shall conform to requirements necessary to comply with local codes and authorities having jurisdiction. Impact pile driving and sheet pile installations will cause vibrations that may affect existing residences or underground utilities in the vicinity of the proposed force main. Peak particle velocities due to pile driving should be monitored at critical locations with a seismograph during the installation of test piles, job piles and sheet piles. The record of peak particle velocities will provide information in assessing the need for changes in driving operations and the types of changes best suited for the project requirements. Monitoring will be performed by an independent testing lab retained by the OWNER.

PART 2 -- PRODUCTS

2.1 WOOD SHEETING

A. Wood for shoring and sheeting shall be green, rough cut hardwood (i.e. oak or hickory). Planking for sheeting and foundation lumber shall have a minimum thickness of 2 inches.

2.2 STEEL SHEETING

A. Steel sheet piling shall be a continuous interlock design. The sheet piling must be in good condition and shall provide a tight interlocking connection, which will retard the infiltration of ground water. Cofferdams shall be provided when constructing wet wells at pump station sites. The CONTRACTOR shall be responsible for the design and installation of all cofferdams.

2.3 TRENCH BOXES AND SHIELDS

A. Trench boxes and shields shall be in good, sound condition and shall comply with all applicable OSHA requirements. Installation, use, and removal of trench shields or boxes shall be in accordance with the manufacturer’s recommendations. CONTRACTOR shall be responsible for the design and installation of all trench boxes or shields and the use thereof shall be depicted within the CONTRACTOR’s sheeting, shoring and bracing plan.

PART 3 -- EXECUTION

3.1 PERFORMANCE

A. The planning, installation and removal of all sheeting, shoring, bracing, and sheet piling shall be accomplished in such a manner as to maintain the required trench or excavated cross section and to maintain the undisturbed state of the soils adjacent to the excavation and below the excavated bottom. All trenches and structural excavations shall be properly sheeted, shored and braced.

B. The use of horizontal strutting below the barrel of a pipe or structure or the use of a pipe as support for trench bracing will not be permitted.

C. Wood sheeting shall be left in place in permanent servitudes and the upper part of the sheeting shall be cut off 3 feet below the finished ground surface after backfilling. All bracing above this level shall also be removed. Lower bracing shall be left in place.

D. The right of the ENGINEER to order sheeting and bracing left in place in locations other than where indicated in the Contract Documents shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the CONTRACTOR from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the CONTRACTOR to leave in place in the trench sufficient sheeting and bracing to prevent any caving or moving of the ground adjacent to the sides of the trench. If the ENGINEER orders the sheeting to be left in place in locations other than where indicated, the CONTRACTOR shall be paid the invoice cost of materials only.

E. Steel sheeting or piling which are withdrawn shall be extracted in a manner so as to prevent subsequent settlement of the pipe or produce additional loadings to the structure and to maintain the undisturbed state of the soil adjacent to the trench or in the immediate area.

END OF SECTION 02160

SECTION 02200 – EARTHWORK FOR STRUCTURES

PART 1 -- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division I – General Requirements, apply to work specified in this section.

1.2 DESCRIPTION OF WORK

A. This section includes all materials, labor, equipment and other items required to provide all of the work as shown on the drawings and described herein. Performance shall meet the requirements of the specifications.

B. The work covered by this section of Specifications includes but is not necessarily limited to the following:

1. Site clearing and all earthwork required to complete the work.

2. Stripping of ground surface.

3. Excavation and filling.

4. Grading.

PART 2 -- PRODUCTS

2.1 FILL AND BACKFILL

A. Fill and backfill material shall be obtained from off-site and shall be native sand-clay or sand-clay-gravel mixture having a maximum of 30% passing the #200 sieve and a liquid limit less than 40 and a plasticity index less than 18.

B. The material shall be free from stones larger than 3” in diameter, clay lumps, debris, or other deleterious matter.

C. Contractor shall be responsible for locating a source for the material and transporting it to the site.

2.2 LIMESTONE BASE

A. Material shall be crushed limestone meeting all material, durability, and compaction requirements of the LSSRB, Section 1003.

PART 3 -- EXECUTION

3.1 CLEARING

A. Areas of the site on which fill is to be placed shall be stripped of all live and dead vegetation, rubbish, debris, and other unsatisfactory material.

B. Grub out stumps and roots to a depth of 24 inches in areas to be occupied by building slabs or foundations. In other areas, remove stumps and roots to a depth of 6 inches. Backfill resulting holes to level of adjacent ground.

3.2 SITE FILL

A. The site shall be filled as required to achieve the required finish grades.

B. After site clearing any remaining subgrade under buildings, foundations, or paving that are not pile supported shall be undisturbed or re-compacted to at least 95% of maximum density ASTM D698 (Standard Proctor).

C. Do not place fill on surfaces that are muddy or frozen or that contain frost or ice.

D. Place fill in successive horizontal layers of not more than 8 inches loose depth and compact areas under structural elements that are not pile supported to a minimum of 95% maximum density ASTM D698 (Standard Proctor).

E. Stabilize fill at property lines in an approved manner to prevent fill from washing onto adjacent land areas.

3.3 EXCAVATION

A. Excavate for new construction to the depth, elevations, lines and levels required for executing work. Excavation shall include the removal of all materials encountered. If excavation is carried below the required grade, backfill to grade with compacted material.

B. Excavate utility trenches along straight lines or to uniform curves to provide minimum cover as specified. Pipe shall have its bottom quadrant, for the full length of the barrel, embedded in undisturbed earth or on at least 4” of thoroughly compacted fill, unless specifically noted otherwise.

3.4 BACKFILL

A. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance by ENGINEER on construction below finish grade.

2. Review, testing, and recording locations of underground utilities.

3. Removal of shoring or bracing, and backfilling of voids with satisfactory materials.

4. Removal of trash and debris.

B. Place backfill materials in layers not more than 8” thick and compact uniformly to 95% maximum density ASTM D698 (Standard Proctor).

3.5 FINISHING

A. The surface of all excavations, fills, backfills, and raw subgrade shall be finished to a reasonably smooth and compact surface in accordance with the lines, grades and cross sections or elevations shown. All graded areas shall be within 0.05 foot of the grades and elevations indicated, unless noted otherwise.

3.6 PUMPING AND WATER CONTROL

A. Control excavated materials, and fill and backfill materials, so that excavations are protected from surface water and to assure free drainage of the site. Provide temporary ditching and earthwork to divert surface water from the construction area.

B. Do not allow water to accumulate in excavations. Remove water to prevent softening and soil changes detrimental to the stability of subgrades. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations and fill areas.

3.7 SPECIAL REQUIREMENTS

A. Protect excavations, including utility trenches, against caving and settling of banks. The CONTRACTOR shall assume responsibility for the means and extent of protection and for security of excavations and surrounding areas. Employ sheathing, bracing and other means as necessary.

3.8 EXISTING UTILITIES

A. Locate existing underground utilities in the area of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

B. Should uncharted or incorrectly charted, piping or other utilities be encountered during excavation, consult the Utility Owner immediately for directions. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of Utility Owner.

C. Do not interrupt service of existing utilities except when permitted in writing by ENGINEER and then only after acceptable temporary utility services have been provided.

3.9 USE OF EXPLOSIVES

A. The use of explosives is not permitted.

3.10 CLEANUP

A. At completion of the work and prior to acceptance inspection, temporary ditches shall be filled, excess earthen materials shall be removed, and ground surfaces disturbed by construction operations shall be

restored by grading to eliminate holes, ruts and mounds, and to provide natural surface drainage, away from new construction within the site limits, and those areas between the poverty line and street curbs.

B. Unacceptable, defective and surplus materials, including debris from clearing and grubbing, excess fill and base course materials, shall become the property of the CONTRACTOR and shall be removed by him and disposed of away from the OWNER's property.

PART 4 -- TESTING LABORATORY

4.1 The Testing Laboratory shall perform the following work in conjunction with this section of the specifications:

A. Verify that all unsuitable materials have been removed prior to placement of fill.

B. Determine maximum density and optimum moisture content for fill, backfill, and surface preparation for areas under buildings, foundations, or paving that are not pile supported. Maximum density shall be determined by ASTM D698 (Standard Proctor).

C. Determine in-place density of subgrade, fill, and backfill under paving, buildings, and foundations that are not pile supported. In-place density shall be determined by ASTM D 1556 or D 2922. Number and locations of in-place density tests will be determined by the ENGINEER.

D. Report test results to the ENGINEER.

E. The CONTRACTOR shall be responsible for notifying the Testing Laboratory and ensuring that compaction tests are made on each lift of fill or backfill and on any other compacted soil.

END OF SECTION 02200

SECTION 02274 - GEOTEXTILES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide geotextiles, complete and in place, in accordance with the Contract Documents.

B. The geotextile fabric shall be composed of at least 85% by weight of polyolefins, polyesters, or polyamides. The geotextile fabric shall be resistant to chemical attack, rot, and mildew and shall have no tears or defects which adversely alter its physical properties.

C. When required, the geotextile fabric shall contain stabilizers and/or inhibitors added to the base material to make filaments resistant to deterioration due to ultraviolet and heat exposure.

D. Fibers of other composition may be woven into the geotextile fabric for reinforcing purposes. When added, durability of these fibers shall be equivalent to that of the geotextile fabric.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings

1. Manufacturer material specifications and product literature.

2. Installation drawings showing geotextile sheet layout, location of seams, direction of overlap, and sewn seams.

3. Description of proposed method of geotextile deployment, sewing equipment, sewing methods, and provisions for holding geotextile temporarily in place until permanently secured.

C. Samples

1. Geotextile: One-piece, minimum 18-inches long, taken across full width of roll of each type and weight of geotextile. Label each with brand name and furnish documentation of lot and roll number from which each sample was obtained.

2. Field Sewn Seam: 5-foot length of seam, 12-inches wide with seam along center, for each type and weight of geotextile.

3. Securing Pin and Washer: 1 each.

D. Certifications

1. Certification from geotextile manufacturer that products satisfy the indicated requirements.

2. Field seam efficiency test results.

PART 2 -- PRODUCTS

2.1 MATERIALS REQUIREMENTS

A. Geotextile classes and materials requirements shall be as defined in the table below:

Property	Test Method	Class and Requirements						
		A	B	C	D	S	F	G
AOS, Metric Sieve, µm, Max	ASTM D4751	300	300	212	600	850	850	850
Grab Tensile, N, Min.	ASTM D4632	330	400	580	800	800	400	400
% Elongation at Failure, Min.	ASTM D4632	--	--	50	50	--	--	--
% Elongation at 200N, Max.	ASTM D4632	--	--	--	--	--	--	50
Burst Strength, N, Min	ASTM D3787	44	620	930	1290	1390	--	--
Puncture, N, Min.	A D4833 STM	110	130	10	330	330	--	--
Trapezoid Tear Strength, N, Min.	ASTM D4533	110	130	180	220	220	--	--
Permittivity, Sec - 1, Min.	ASTM D4491	1.0	1.0	1.0	1.0	0.2	0.01	0.01
Grab Tensile Strength, Retained after Weathering 150H, UVA lamps, %, Min.	ASTM D4491 ASTM G154	70	70	70	70	70	--	--

2.2 UTILIZATION SCHEDULE

A. Unless noted otherwise on the drawings or elsewhere in the Contract Documents, the geotextile fabric shall be utilized as follows:

Application		Geotextile Class (as defined in Section 2.1)
Drainage	Underdrains	A, B, C, or D
	Pipe and Precast Manhole Joints	A, B, C, or D
	Weep holes	A, B, C, or D
	Bedding Fabric	B, C, or D
	Geocomposite Drainage Systems	B, C, or D
Stabilization	Bulkheads	C or D
	Flexible Revetments	C or D
	Rip Rap	D
	Railroad Crossings	D
	Base Course	D
	Subgrade Layer	D
	Soil Stabilization	C, D, or S
Paving	Paving Fabric	B or C
Silt Fencing	Self-Supported Fencing	F
	Wire Supported Fencing	G

PART 3 -- EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver each roll with sufficient information attached to identify manufacturer and product name or number.

B. Handle products in manner that maintains undamaged condition.

C. Do not store products directly on ground. Ship and store geotextile with suitable wrapping for protection against moisture and ultraviolet exposure. Store geotextile in a way that protects it from elements. If stored outdoors, elevate and protect geotextile with waterproof cover.

3.2 LAYING GEOTEXTILE

A. Notify the ENGINEER whenever geotextiles are to be placed. Do not place geotextile prior to obtaining ENGINEER's approval of underlying materials.

B. Lay and maintain geotextile smooth and free of tension, folds, wrinkles, or creases.

3.3 ORIENTATION ON SLOPES

A. Orient geotextile with long dimension of each sheet parallel to direction of slope.

B. Geotextile may be oriented with long dimension of sheet transverse to direction of slope only if sheet width, without unsewn seams, is sufficient to cover entire slope and anchor trench and extend at least 18-inches beyond toe of slope.

3.4 JOINTS

A. Unseamed Joints

1. Unseamed joints shall be overlapped to the following dimensions unless otherwise indicated:

a. Foundation/Subgrade Stabilization: Minimum 18-inches.

b. Riprap: Minimum 18-inches.

c. Drain Trenches: Minimum 18-inches, except overlap shall equal trench width if trench width is less than 18-inches.

d. Other Applications: Minimum 12-inches.

B. Sewn seams shall be used wherever stress transfer from one geotextile sheet to another is necessary. Sewn seams, as approved by ENGINEER, also may be used instead of overlap at joints for applications that do not require stress transfer.

1. Seam efficiency shall be minimum 70 percent, verified by preparing and testing minimum of one set of nondestructive samples per acre of each type and weight of geotextile provided. Test according to ASTM D 4884.

2. Type: "J" type seams are preferred, but flat or butterfly seams are acceptable.

3. Stitch Count: Minimum 3 to maximum 7 stitches per inch.

4. Stitch Type: Double-thread chain stitch, Type 401, Federal Standard No. 751a.

5. Stitch Location: 2-inches from geotextile sheet edges, or more if necessary to develop required seam strength.

6. Sewing Machines: Capable of penetrating 4 layers of geotextile.

3.5 SECURING GEOTEXTILE

A. Secure geotextile during installation as necessary with sand bags or other means approved by ENGINEER.

B. Securing Pins

1. Insert securing pins with washers through geotextile, midway between edges of overlaps and 6-inches from free edges.

2. Spacing

Slope	Maximum Pin Spacing, feet
Steeper than 3:1	2
3:1 to 4:1	3
Flatter than 4:1	5

3. Install additional pins across each geotextile sheet as necessary to prevent slippage of geotextile or to prevent wind from blowing geotextile out of position.

4. Push each securing pin through geotextile until washer bears against geotextile and secures it firmly to subgrade.

3.6 PLACING PRODUCTS OVER GEOTEXTILE

A. Notify ENGINEER before placing material over geotextile. Do not cover installed geotextile prior to receiving authorization from the ENGINEER to proceed.

B. If tears, punctures, or other geotextile damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geotextile. Repair damage as indicated below.

3.7 INSTALLING GEOTEXTILE IN TRENCHES

A. Place geotextile in a way that will completely envelope granular drain material to be placed in trench and with indicated overlap at joints. Overlap geotextile in direction of flow. Place geotextile in a way and with sufficient slack for geotextile to contact trench bottom and sides fully when trench is backfilled.

B. After granular drain material is placed to grade, fold geotextile over top of granular drain material, unless otherwise indicated. Maintain overlap until overlying fill or backfill is placed.

3.8 SILT FENCE APPLICATIONS

A. Install geotextile in one piece or continuously sewn to make one piece, for full length and height of fence, including portion of geotextile buried in toe trench.

B. Install bottom edge of sheet in toe trench and backfill in a way that securely anchors geotextile in trench.

C. Securely fasten geotextile to a wire mesh backing and each support post in a way that will not result in tearing of geotextile when fence is subjected to service loads.

D. Promptly repair or replace silt fence that becomes damaged.

3.9 REPAIRING GEOTEXTILE

A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile. Repair damaged geotextile by placing patch of undamaged geotextile over damaged area plus at least 18-inches

in all directions beyond damaged area. Remove interfering material as necessary to expose damaged geotextile for repair. Sew patches or secure them with pins and washers, as indicated above for securing geotextile, or by other means approved by ENGINEER.

3.10 REPLACING CONTAMINATED GEOTEXTILE

A. Protect geotextile from contamination that would interfere, in ENGINEER's opinion, with its intended function. Remove and replace contaminated geotextile with clean geotextile.

END OF SECTION 02274

SECTION 02565 – Ductile Iron Pipe

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide ductile iron pipe and appurtenant work, complete in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, and STANDARDS

A. Commercial Standards

AWWA C104	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105	Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110	Ductile-Iron and Gray-Iron Fittings, 3 in through 48 in for Water
AWWA C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115	Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C116	Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service.
AWWA C150	Thickness Design of Ductile-Iron Pipe
AWWA C151	Ductile-Iron Pipe, Centrifugally Cast for Water
AWWA C153	Ductile-Iron Compact Fittings for Water Service
AWWA C600	Installation of Ductile Iron Water Mains and Their Appurtenances
AWWA C606	Grooved and Shouldered Joints
ASTM C 150	Portland Cement

1.3 CONTRACTOR SUBMITTALS

A. Furnish Shop Drawings of pipe and fittings in accordance with Section 01300 – Contractor Submittals, the requirements of the referenced standards and the following supplemental requirements as applicable:

1. Certified dimensional drawings of all valves, fittings, and appurtenances.

2. For pipe 24-inches in diameter and larger, line layout and marking diagrams which indicate the specific number of each fitting and the location and the direction of each fitting in the completed line. In addition, the line layouts shall include: the pipe station and invert elevation at all changes in grade or horizontal alignment; all elements of curves and bends, both in horizontal and vertical alignment; and the limits of each reach of restrained joints, or of concrete encasement.

B. Certifications: The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section and as specified in the referenced standards and the following supplemental requirements:

1. Physical and chemical properties.

2. Hydrostatic test reports.

C. The CONTRACTOR shall be responsible for performing and paying for sampling and testing as necessary for the certifications.

1.4 QUALITY ASSURANCE

A. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of the referenced standards as applicable.

B. The CONTRACTOR shall perform said material tests at no additional cost to the OWNER. The ENGINEER shall have the right to witness all testing conducted by the CONTRACTOR; provided, that the CONTRACTOR's schedule is not delayed for the convenience of the ENGINEER.

C. In addition to those tests specifically required, the ENGINEER may request additional samples of any material including lining and coating samples for testing by the OWNER. The additional samples shall be furnished as a part of the WORK.

D. Inspection: Pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein. The CONTRACTOR shall notify the ENGINEER in writing of the manufacturing starting date not less than 14 calendar days prior to the start of any phase of the pipe manufacture.

E. During the manufacture of the pipe, the ENGINEER shall be given access to all areas where manufacturing is in process and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.

PART 2 -- PRODUCTS

2.1 PIPE GENERAL

A. Mortar-lined and polyethylene-wrapped ductile iron pipe shall conform to AWWA C151, C104, and C105, subject to the supplemental requirements in this Section. The pipe shall be of the diameter and class indicated, shall be provided complete with rubber gaskets, specials, and fittings as required under the Contract Documents.

B. Markings: The CONTACTOR shall legibly mark specials 24-inches in diameter and larger in accordance with the laying schedule and marking diagram. Each fitting shall be marked at each end with top field centerline.

C. Handling and Storage: The pipe shall be handled as a minimum at the 1/3 points by use of wide slings, paddled cradles, or other devices designed and constructed to prevent damage to the pipe coating/exterior. The use of chains, hooks, or other equipment that might injure the pipe coating/exterior will not be permitted. Stockpiled pipe shall be supported on padded skids, sand or earth berms free of rock exceeding 3 inches in diameter, sand bags, or suitable means so that the coating will not be damaged. The pipe shall not be rolled and shall be secured to prevent accidental rolling.

D. Laying Lengths: Nominal pipe laying lengths shall be 20 ft.

E. Finish: The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing, and roughness.

F. Closures and Correction Pieces: Closures and corrections pieces shall be provided as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing on the Drawings. The locations of correction pieces and closure assemblies are shown on the Drawings. Any change in location or number of said items shall only be as accepted by the ENGINEER.

2.2 SPECIALS AND FITTINGS

A. Fittings for ductile iron pipe shall conform to the requirements of AWWA C153 or AWWA C110 and shall have a minimum pressure rating of 250 psi. Ductile iron fittings larger than 48-inches shall conform to AWWA C153.

2.3 DESIGN OF PIPE

A. The pipe shall be designed, manufactured, inspected, and marked according to AWWA C150 and C151 except where modified by this Section.

B. Pipe Dimensions: The pipe shall be of the diameter and class indicated.

C. Fitting Dimensions: The fittings shall be of the diameter and class indicated.

D. Joint Design: Ductile iron pipe and fittings shall be furnished with mechanical joints, push-on joints, flanged joints, or restrained joints as required.

1. Mechanical and push-on joints shall conform to AWWA C111.

2. Flanged joints shall conform to AWWA C115. Where threaded flanges are provided, the pipe wall thickness under the cut threads shall not be less than the calculated net thickness required for the pressure class of the pipe.

3. Restrained joints shall be “Flex-Ring” restrained joint by American Ductile Iron Pipe, “TR FLEX” restrained joint by U.S. Pipe, or equal.

4. Joint restraining devices that impart point loads and/or wedging action on the pipe wall as a means of joint restraint shall not be allowed unless there are no other options for joint restraint available. Under such circumstances, the CONTRACTOR may propose such devices provided the following conditions are met and the request is made as a substitution:

a. A formal request for substitution is submitted stating the location(s) where the devices are intended to be used and a statement from the device manufacturer and the pipe manufacturer that the proposed device is appropriate for the intended installation and rated at least for the class of the pipe being supplied.

b. A statement from the pipe manufacturer is provided accepting the use of the retaining devices and indicating that the use of such devices will in no way affect the warranty of the pipe and/or the performance of the pipe.

c. The manufacturer of the device and the pipe manufacturer jointly provide instruction on the proper installation of the device to the personnel installing the units and provide certification to the OWNER that the installers are adequately trained in the installation of the units and that all warranties are in full affect for the project.

d. The devices shall be MegaLug Model 1100 as manufactured by EBAA Iron or equal.

E. For bell-and-spigot ends with rubber gaskets, the clearance between the bells and spigots shall be such that when combined with the gasket groove configuration and the gasket itself, will provide watertight joints under

all operating conditions when properly installed. The CONTRACTOR shall require the pipe manufacturer to submit details complete with significant dimensions and tolerances and also to submit performance data indicating that the proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.

2.4 CEMENT-MORTAR LINING

A. Cement-Mortar Lining for Shop Application: Except as otherwise provided herein, interior surfaces of all ductile iron pipe, fittings, and specials shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with AWWA C104. During the lining operation and thereafter, the pipe shall be maintained in a round condition by suitable bracing or strutting. The lining machines shall be of a type that has been used successfully for similar work. Every precaution shall be taken to prevent damage to the lining. If lining is damaged or found faulty at the Site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications.

1. Cement: Cement for mortar lining shall conform to the requirements of AWWA C104; provided, that cement for mortar lining shall be Type II or V. Cement shall not originate from kilns that bum metal-rich hazardous waste fuel, nor shall a fly ash or pozzolan be used as a cement replacement.

B. The minimum thickness shall be as follows:

Nominal Pipe Diameter (in)	Minimum Lining Thickness (in)
3-12	1/16
14-24	3/32
30-64	1/8

C. Protection of Pipe Lining/Interior: Shop-applied cement mortar lining shall be given a seal coat of epoxy per AWWA C-116, and NSF 61 certified for potable water use.

2.5 EXTERIOR PROTECTION OF PIPE

A. Exterior Coating of Exposed Piping: The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer conforming to the requirements of Section 09800 – Protective Coating. The surface shall be prepared in accordance with manufacturer's instructions and the shop primer shall be applied directly to the ductile iron substrate.

B. Exterior Coating of Buried Piping: The exterior coating shall be an asphaltic coating approximately 1 mil thick.

C. Polyethylene Sleeve: Sleeves shall conform to the requirements of AWWA C105, CONTRACTOR's choice between tubular 8 mil thick linear low-density film or 4 mil thick high-density cross-laminated film. Color shall be white.

PART 3 -- EXECUTION

3.1 INSTALLATION OF PIPE

A. The CONTRACTOR shall inspect each pipe and fitting prior to installation to insure that there are no damaged portions of the pipe. Pipe damaged prior to Substantial Completion shall be repaired or replaced by the CONTRACTOR.

B. Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the WORK.

C. Pipe Laying: The pipe shall be installed in accordance with AWWA C600.

D. Pipe shall be laid directly on the bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.

E. Each section of pipe 24-inches in diameter and larger shall be laid in the order and position shown on the laying schedule. Each section shall be laid to the set line and grade, within approximately one inch plus or minus.

F. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the ENGINEER may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 75 percent of the maximum deflection recommended by the pipe manufacturer. No joint shall be misfit any amount that will be detrimental to the strength and water tightness of the finished joint.

G. Except for short runs that may be permitted by the ENGINEER, pipes shall be laid uphill on grades exceeding 10 percent. Pipe that is laid on a downhill grade shall be blocked and held in place until sufficient support is furnished by the following pipe to prevent movement. Bends shall be properly installed as indicated.

H. Cold Weather Protection: No pipe shall be installed upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation before backfilling occurs.

I. Pipe and Specials Protection: The openings of all pipe and specials shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.

J. Pipe cleanup: As pipe laying progresses, the CONTRACTOR shall keep the pipe interior free of all debris. The CONTRACTOR shall completely clean the interior of the pipe of all sand, dirt, mortar splatter, and any other debris following completion of pipe laying and shall perform any necessary interior repairs prior to testing and disinfecting the completed pipeline.

3.2 RUBBER GASKETED JOINTS

A. Rubber Gasketed Joints: Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned, and a clean rubber gasket shall be placed in the bell groove. The spigot end of the pipe and the inside surface of the gasket shall be carefully cleaned and lubricated. The lubricant shall be suitable for lubricating the parts of the joint for assembly and be a compound listed as in compliance with NSF Standard 61. The lubricant shall be nontoxic, shall not support the growth of bacteria, and shall have no deleterious effects on the gasket material. The lubricant shall not impart taste or odor to water in the pipe. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and telescoped into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

3.3 INSTALLATION OF PIPE APPURTENANCES

A. Protection of Appurtenances: Where the joining pipe is dielectric-coated, buried appurtenances shall be coated in kind. Where pipe is encased in polyethylene sleeves, buried appurtenances shall also be encased in polyethylene.

B. Installation of Valves: Valves shall be handled in a manner to prevent any injury or damage to any part of the valve. Joints shall be thoroughly cleaned and prepared prior to installation. The CONTRACTOR shall adjust all stem packing and operate each valve prior to installation to insure proper operation.

C. Valves shall be installed so that the valve stems are plumb and in the location indicated.

END OF SECTION 02565

SECTION 02665 POTABLE WATERLINES

PART 1 -- GENERAL

1.1 WORK INCLUDED

A. The CONTRACTOR shall furnish all materials, equipment and labor necessary to install potable waterlines as shown on the Drawings.

B. Pressure testing of waterlines is covered in Section 01656 – Pressure Pipe Testing.

C. Valves are covered in Division 15.

1.2 REFERENCED SPECIFICATIONS

A. ASTM: American Society of Testing Materials.

B. AWWA: American Water Works Association.

1.3 SUBMITTALS

A. Complete shop drawings and product data and engineering data for all products shall be submitted to the ENGINEER in accordance with the requirements of Section 01300 of these Specifications.

B. The CONTRACTOR shall submit written certification from the manufacturer(s) that the products furnished comply with all applicable requirements of these Specifications.

1.4 TRANSPORTATION AND HANDLING

A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification. Pipe handled on skids shall not be rolled or skidded against the pipe on the ground.

B. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front end loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.

1.5 STORAGE AND PROTECTION

A. Store all pipe that cannot be distributed along the route. Use suitable storage areas.

B. Stored materials shall be kept safe from damage. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipe in adjacent tiers.

D. Stored mechanical and push-on joint gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

E. Mechanical-joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

PART 2 -- PRODUCTS

2.1 DUCTILE IRON FITTINGS

A. Fittings shall be ductile iron and shall conform to AWWA C110 or AWWA C153 with a minimum rated working pressure of 250 psi. Fittings shall be cement lined in accordance with AWWA C104 and shall be furnished with a bituminous outside coating. In lieu of cement lining and bituminous coating, fittings may be provided with a fusion bonded coating and lining meeting the requirements of AWWA C116.

B. Joints for fittings:

1. Unless shown or specified otherwise, joints shall be standard mechanical restrained joints for fittings. Mechanical joints shall conform to AWWA C111.

2. Restrained joints shall be ductile iron retainer glands, Megalug Series 2000 as manufactured by EBBA Iron, Inc., or equal.

3. Provide the appropriate gaskets for mechanical joints.

4. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A193, Grade B8. Nuts shall be heavy hex, stainless steel conforming to ASTM A194, Grade 8.

2.2 POLYVINYL CHLORIDE PIPE - AWWA TYPE

A. Polyvinyl chloride pipe (PVC) shall have belled ends for push-on type jointing and shall conform to AWWA C900 or C905, ductile iron pipe equivalent (DIPS) outside diameters. The pipe shall have a Dimension Ratio (DR) of 18 and shall be capable of withstanding a working pressure of 235 psi. Pipe shall be supplied in minimum lengths of 20 feet. Pipe shall be approved for potable water use by the National Sanitation Foundation (NSF).

B. Restrained joints for PVC pipe, as required, shall be retainer glands, Megalug Series 2800 as manufactured by EBAA Iron, Inc., or equal.

C. Detection tape and detection wire shall be provided over all PVC waterlines.

D. Each length of pipe shall be stamped "NSF Approved", “AWWA C905”, and the pipe diameter.

2.3 VALVE BOXES

A. All buried valves shall be equipped with valve boxes. Valve boxes shall be cast iron two-piece screw type with drop covers. Valve boxes shall have a 5.25-inch inside diameter. Valve box covers shall weigh a minimum of 13 pounds. Valve boxes shall be adjustable to 6-inches up or down from the nominal required cover over the pipe. Valve boxes shall be of sufficient length that the bottom flange of the lower belled portion of the box is below the valve operating nut. Ductile or cast iron

extensions shall be provided as necessary. Covers shall have “WATER" cast into them. Valve boxes shall be manufactured in the United States.

2.4 PLUGS AND CAPS

A. The CONTRACTOR shall provide, install, and remove standard plugs or caps as required for testing. Plugs and caps shall be suitable for permanent service.

B. The CONTRACTOR shall plug, cap or otherwise cover all piping work in progress.

C. Permanent plugs shall be restrained mechanical joint ductile iron.

2.5 TRANSITION COUPLINGS/ADAPTORS

A. Between different types of pipe and/or fittings special couplings or adapters may be required to provide proper connection. Some of these may be indicated on the Drawings or specified with individual types of pipe. However it is the CONTRACTOR’s responsibility to ensure proper connection between various types of pipe, and between pipe and valves, fittings and other appurtenances. The CONTRACTOR shall provide all adapters as required for a functioning pipeline, whether specifically noted or not.

B. Couplings and adapters shall be suitable for direct bury, with proper dielectric insulation (if necessary) and if metallic and not stainless steel, with two coats of high solids epoxy.

2.6 DETECTION TAPE AND WIRE

A. Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket. Tapes shall be color coded in accordance with APWA color codes with the following legends: Water Systems, Safety Precaution Blue, and “Caution Water Line Buried Below”. Colors may be solid or striped. Tape shall be permanently printed with no surface printing allowed. Tape width shall be a minimum of 2 inches. Detection tape shall be equal to Lineguard Type III Detectable, or Allen Systems Detectatape, or equal.

B. Detection wire shall be plastic bonded solid 16 gauge copper wire and continuous along the entire length or waterline. Wire shall be grounded to all valves and hydrants.

PART 3 -- EXECUTION

3.1 EXISTING UTILITIES AND OBSTRUCTIONS

A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the Owner. The CONTRACTOR shall call the Louisiana One Call Center (1-800-272-3020) as required by Louisiana Law and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site at least 72 hours (three business days) prior to construction to verify the location of the existing utilities.

B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.

1. Provide the required notice to the utility owners and allow them to locate their facilities according to Louisiana law. Field utility locations are valid for only 10 days after original notice. The CONTRACTOR shall ensure, at the time of any excavation that a valid utility location exists at the point of excavation.

2. Expose the facility, for a distance of at least 80 feet in advance of pipeline construction, to verify its true location or exposing their true location.

3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.

4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number was issued, if any. The CONTRACTOR shall provide the ENGINEER with an updated copy of the log monthly, or more frequently if required.

C. Conflict with Existing Utilities

D. Electronic Locator: The CONTRACTOR shall have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The CONTRACTOR may change the proposed alignment of the water main to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the ENGINEER. Then such relocation of the water main is denied by the ENGINEER, the CONTRACTOR shall arrange to have the utility, main, or service relocated.

2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main. The CONTRACTOR may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the ENGINEER. Where such relocation of the water main is denied by the ENGINEER, the CONTRACTOR shall arrange to have the utility, main, or service relocated.

E. Water and Sewer Separation

1. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. If neither of these two separation criteria is possible, the water main shall be installed below the sewer with a minimum vertical separation of 18-inches.

2. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete depth to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.

3.2 CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS

A. Install pipe lines and appurtenances along highways, streets and roadways in accordance with the applicable regulations of Plaquemines Parish with reference to construction operations, safety, traffic control, road maintenance and repair.

B. Construction Operations

1. Perform all work along highways, streets and roadways to minimize interference with traffic.

2. Stripping: Where the pipe line is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.

3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.

C. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off of the pavement in a timely manner.

D. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

E. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right-of-way and easement. The CONTRACTOR shall take extreme care in moving landscape features and promptly re-establishing these features.

F. Maintaining Highways, Streets, Roadways and Driveways

1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the work.

2. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the work.

3.3 PIPE DISTRIBUTION

A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

B. No street or roadway may be closed for unloading of pipe without first obtaining permission from Plaquemines Parish or LADOTD. The CONTRACTOR shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.

C. No distributed pipe shall be placed inside drainage ditches.

D. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than 15 feet from the roadway pavement, including shoulders, as measured edge-to-edge.

3.4 LAYING AND JOINTING PIPE AND ACCESSORIES

A. Lay all pipe and fittings to accurately conform to the lines and grades established by the ENGINEER.

B. Pipe Installation

1. Proper implements, tools and facilities shall be provided for the safe performance of the work. All pipe, fittings, valves and hydrants shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or equipment in such a manner as to prevent damage to materials and protective coatings and linings. Under no circumstances shall waterline materials be dropped or dumped into the trench.

2. All pipe, fittings, valves, hydrants and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the ENGINEER, who may prescribe corrective repairs or reject the materials.

3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe containing dirt shall be laid.

4. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be placed in the pipe at any time.

5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

6. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade, shall not be used.

7. Detection tape shall be buried 6 to 12-inches deep. Detection wire shall be installed on top of the pipe.

C. Alignment and Gradient

1. Lay pipe straight in alignment and gradient or follow true curves as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.

2. Maintain a transit, level and accessories on the job to layout angles and ensure that deflection allowances are not exceeded.

D. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible. Do not leave un-jointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress, If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the ENGINEER.

E. Joint Assembly: Push-on and restrained type joints shall be assembled in accordance with the manufacturer's recommendations.

F. Cutting Pipe: Cut PVC pipe using a suitable saw; remove all burrs and smooth the end before jointing. The CONTRACTOR shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location.

G. Valve and Fitting Installation

1. Prior to installation, valves shall be inspected for direction of opening, number of tums to open, freedom of operation, tightness of pressure-containing bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks, Defective valves shall be corrected or held for inspection by the ENGINEER. Valves shall be closed before being installed.

2. Valves, fittings, plugs and caps shall be set and joined to the pipe in the manner specified in this Section for cleaning, laying and joining pipe, except that 12-inch and larger valves shall be provided with special support, such as crushed stone, concrete pads or a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. Valves shall be installed in the closed position.

3. A valve box shall be provided on each underground valve. They shall be carefully set, centered exactly over the operating nut and truly plumbed. The valve box shall not transmit shock or stress to the valve. The bottom flange of the lower belled portion of the box shall be placed below the valve operating nut. This flange shall be set on compacted crushed stone, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe. Extension stems shall be installed where depth of bury places the operating nut in excess of 30-inches beneath finished grade so as to set the top of the operating nut 30-inches below finished grade. The valve box cover shall be flush with the surface of the finished area or such other level as directed by the ENGINEER.

4. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.

3.5 JOINT RESTRAINT

A. Retainer Glands: Provide retainer glands where shown on the Drawings and on all associated fittings and valves. Retainer glands shall be installed in accordance with the manufacturer's recommendations, particularly, the required torque of the set screws. The CONTRACTOR shall furnish a torque wrench to verify the torque on all set screws which do not have inherent torque indicators.

3.6 DISINFECTING PIPELINE

A. After successfully pressure testing each pipeline section, disinfect in accordance with the Louisiana Sanitary Code and these Specifications.

B. Specialty Contractor: Disinfection shall be performed by an approved Specialty Contractor. Before disinfection is performed, the CONTRACTOR shall submit a written procedure for approval before being permitted to proceed with the disinfection. This plan shall also include the steps to be taken for the neutralization of the chlorinated water.

C. Chlorination

1. Apply chlorine solution to achieve a concentration of at least 50 milligrams per liter free chlorine in new line. Retain chlorinated water for 4 hours.

2. Chlorine concentration shall be recorded at every outlet along the line at the beginning and end of the 4 hour period.

3. After 4 hours, all samples of water shall contain at least 50 milligrams per liter free chlorine. Re-chlorinate if required results are not obtained on all samples.

D. Disposal of Chlorinated Water: Reduce chlorine residual of disinfection water to less than one milligram per liter if discharged directly to a body of water or to less than two milligrams per liter if discharged onto the ground prior to disposal. Treat water with sulfur dioxide or other reducing chemicals to neutralize chlorine residual. Flush all lines until residual is equal to existing system residual in the area.

E. Bacteriological Testing: After final flushing and before the water main is placed in service, the CONTRACTOR shall collect samples from the line and have tested for bacteriological quality in accordance with the rules of the Louisiana Department of Health and Hospitals (LADHH). The bacteriological samples shall be analyzed for both coliform and non-coliform growth. Testing shall be performed by a laboratory certified by the LADHH. Two or more successive sets of samples, as required by the LADHH, taken at 24 hour intervals, shall indicate bacteriologically satisfactory water and the results shall be submitted to the LADHH. Re-chlorinate lines until required results are obtained.

3.7 PROTECTION AND RESTORATION OF WORK AREA

A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.

1. The CONTRACTOR shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.

2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.

B. Man-Made Improvements: Protect, or remove and replace with the ENGINEER's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the work.

C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the ENGINEER. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.

D. Cutting of Trees: Do not cut trees for the performance of the work, except as absolutely necessary and as approved by the ENGINEER. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the CONTRACTOR. No stumps, wood piles, or trash piles will be permitted on the work site.

E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.

END OF SECTION 02665

SECTION 02831 – CHAIN LINK FENCING AND GATES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide chain link fencing and gates and appurtenant WORK, complete and operable, in accordance with the Contract Documents.

B. Single Manufacturer: Chain link fencing, gates, accessories, fittings, and fastenings shall be products of a single manufacturer.

1.2 CONTRACTOR SUBMITTALS

A. General: Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings

1. Manufacturer's technical data, product specifications, standard details, certified product test results, installation instructions and general recommendations.

2. Scale layout of fencing, gates, and accessories. Drawings shall show fence height, post layout, including sizes and sections; post setting and bracing configuration, details of gates and corner construction, barbed wire support arms; and other accessories which may be necessary.

C. Samples: Samples of proposed fence components, at least 12-inches long, to illustrate the selected color and finish.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Dimensions indicated herein for roll-formed pipe and H-sections are outside dimensions, excluding coatings.

B. Fence fabric height shall be 6 feet unless otherwise indicated.

C. Fencing materials shall be hot-dip galvanized after fabrication.

D. Fencing shall be topped with 3 lines of barbed wire on single, 45 degree supporting arms, sloped outward.

2.2 STEEL FABRIC

A. Fence fabric shall be No. 9 gauge steel wire, 2-inch mesh, with top selvages knuckled

B. Fabric Finish: Fabric shall be galvanized in conformance with ASTM A 392 - Zinc- Coated Steel Chain Link Fence Fabric, Class II, with not less than 2.0 ounces zinc per square foot of coated surface.

2.3 FRAMING AND ACCESSORIES

A. Steel Framework, General: Unless otherwise indicated, framework components shall be fabricated of galvanized steel conforming to ASTM A 53 - Pipe, Steel, Black and Hot Coatings on Iron and Steel Products, with not less than 1.8 ounces zinc per square feet.

1. Fittings and accessories shall be galvanized in accordance with ASTM A 153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware, with zinc weights per Table I of that standard, except that no coating shall be less than 1.8-ounce zinc per square foot of coated surface.

B. End, Corner and Pull Posts: Posts shall be one-piece without circumferential welds, 3- inch schedule 40 pipe, 5.79 pounds per linear foot.

C. Line Posts: Line posts shall be spaced no more than 10-feet on center and shall be 2- 1/4 inch "H" column section, 4.1-pounds per linear foot, or schedule 40, 2-1/2 inch pipe, 3.65-pounds per linear foot.

D. Gate Posts: Gate posts shall be 4-inch schedule 40 pipe, 9.1-pounds per linear foot.

E. Top Rail: Top railing shall be provided in manufacturer's longest lengths, with expansion type couplings, approximately 6-inches long, for each joint. Fence design shall provide positive, secure attachment of top rail to each gate post, corner post, pull post and end post. Top rail and braces shall be 1-5/8 inch schedule 40 pipe, 2.27- pounds per linear foot, or 1-1/2 inch "H" column section, 2.00-pounds per linear foot.

F. Tension Wire: Tension wire shall be located at the bottom of the fabric and shall consist of No. 7 gauge coated coil spring wire of metal and finish to match fabric. Tension wire shall be interlaced with the fabric or attached to the fabric along the extreme bottom of the fence. Tension wire attachment shall be with fabric tie wires at a spacing of no more than 24-inches apart.

G. Fabric Tie Wires: Fabric tie wires shall be No. 9 gauge galvanized steel wire of the same finish as the fabric. Aluminum ties shall not be used. Ties shall be spaced 14- inches apart on posts and 24-inches apart on rails.

H. Post Brace Assembly: Post brace assembly shall be manufacturer's standard adjustable brace assembly provided at each end post, gate post and at both sides of each corner post and intermediate brace post. Material used for brace shall be same as top rail. Truss bracing between line posts shall be achieved with 0.375-inch diameter rod and adjustable tensioner.

I. Post Tops: Post tops shall be weather-tight closure caps, designed for containment of top rail and positive permanent attachment to post. One cap shall be provided for each post.

J. Stretcher Bars: Stretcher bars shall be one-piece lengths equal to the full height of the fabric, with minimum cross-section of 3/16-inch by 3-1/2 inch. One stretcher bar shall be provided for each gate and end post, and 2 for each corner and intermediate brace post.

K. Stretcher Bar Bands: Stretcher bar bands shall be one-piece fabrications designed to secure stretcher bars to end, corner, intermediate brace, and gate posts. Bands shall have a minimum cross-section of 1/8-inch by 3/4-inch. Stretcher bar bands shall be spaced no more than 15-inches on center.

L. Barbed Wire Supporting Arms: Supporting arms shall be manufacturer's standard fabrication, of metal and finish to match fence framework, with provision for anchorage to each post and attachment of three rows of barbed wire to each arm. Supporting arms may be either attached to posts or integral with post top weather cap. Supporting arm shall be single 45-degree arm type and shall be capable of withstanding 250 pounds of downward pull at outermost end.

M. Barbed Wire: Barbed wire shall be 2-strand, No. 12-1/2 gauge zinc-coated steel or iron wire with four-point, 14-gauge barbs spaced no more than 5-inches apart.

2.4 GATES

A. Fabrication: Perimeter frames of gates shall be fabricated from same metal and finish as fence framework. Gate frames shall be assembled by welding or with fittings and rivets for rigid, secure connections. Welds

shall be ground smooth. Gate frames and any ungalvanized hardware, shall be hot-dip galvanized after fabrication. Horizontal and vertical members shall be provided to ensure proper gate operation and attachment of fabric, hardware and shall be hot-dip galvanized after fabrication.

1. Fabric for gates shall match fence fabric, unless otherwise indicated. Fabric shall be installed with stretcher bars at all perimeter edges. Stretcher bars shall be attached to gate frame with stretcher bar bands spaced no more than 15 inches on center.

2. Each gate shall be diagonally cross-braced with a 3/8-inch diameter adjustable length truss rod to ensure frame rigidity without sag or twist.

3. Where barbed wire is indicated above gates, vertical members shall be extended and fabricated as required to receiver barbed wire supporting arms.

B. Swing Gates: Perimeter frames of swing gates shall be constructed of the same pipe or "H" column members as the top rails and shall be fabricated by welding. Welds shall be ground smooth prior to hot-dip galvanizing.

1. Hardware and accessories shall be provided for each gate, galvanized in conformance with ASTM A 153, and in accordance with the following:

a. Hinges: Hinges shall be of size and material to suit gate size, non-lift-off type, offset to permit 180-degree gate opening. Two hinges shall be provided foreach leaf less than 6 feet in height.

b. Latch: Latch shall be forked type or plunger-bar type, permitting operation from either side of the gate, with padlock eye as an integral part of the latch.

c. Keeper: Keeper shall be provided which automatically engages the gate leaf and holds it in the open position until it is manually released.

d. Double Gates: Gate stops shall be provided for double gates, consisting of mushroom type flush plate with anchors, set in concrete, and designed to engage center drop rod or plunger bar. Locking device and padlock eyes shall be provided as an integral part of the latch, permitting both gate leaves to be locked with a single padlock.

2.5 RELATED ITEMS

A. Concrete: Concrete shall be provided according to Section 03300 - Cast-In-Place Concrete.

B. Nuts, bolts and screws shall be steel, minimum size 3/8-inch diameter, hot-dip galvanized after fabrication.

2.6 MANUFACTURERS

A. Manufacturer's Qualifications: Chain link fencing and gates shall be products of a single manufacturer which has been successfully engaged in the production of such items for a period of at least 5 years.

B. Installer's Qualifications: Installation of the chain link fence shall be by the manufacturer or by a firm accepted and licensed by the manufacturer.

C. Manufacturers, or equal

1. American Fence Corp.

2. Anchor Fence, Inc.

3. United States Steel

PART 3 -- EXECUTION

3.1 INSPECTION

A. Prior to commencing installation, require Installer to inspect all areas and conditions within which WORK of this Section will be performed. Dimensions and clearances shall be verified. Final grading shall be completed and all earth, brush, or other obstructions which interfere with the proper alignment and construction of fencing shall be removed.

3.2 INSTALLATION

A. General: Unless otherwise indicated, all posts shall be set in concrete. Gate and related posts, corner posts, and other critical elements shall be provided with concrete foundations which are designed by an engineer to safely accommodate the loads to which they will be subjected. The soils report is appended to the Contract Documents and contains information regarding soil properties in the vicinity of the Site.

B. Excavation: Holes for posts shall be drilled or hand excavated to the diameters and spacing indicated, in firm, undisturbed or compacted soil. Post foundations which are not designed by an engineer shall comply with the following:

1. Holes shall be excavated to a diameter not less than 12-inches or not less than 5 times the largest dimension of the item being anchored, whichever is larger.

2. Depth for holes shall be not less than 40-inches; excavated approximately 4-inches lower than the post bottom, with bottom of posts set not less than 36-inches below finish grade surface.

C. Setting Posts: Line posts shall be spaced at not more than 10-foot intervals, measured from center to center of the posts, parallel to the ground slope. Posts shall be set plumb and shall be centered in holes, 4-inches above the bottom of the excavation, with posts extending not less than 36-inches below finish grade surface.

1. Corner posts shall be installed where changes in the fence lines equal or exceed 15 degrees, measured horizontally.

2. Each post shall be properly aligned vertically and its top aligned parallel to the ground slope. Posts shall be maintained in proper position during placement and finishing operations.

D. Concrete

1. Concrete for footings may be placed without forms, providing the ground is firm enough to permit excavation to neat line dimensions. Prior to placing concrete, the earth around the hole shall be thoroughly moistened.

2. Encasement concrete for footings shall be placed immediately after mixing in a manner such that there will be no concentration of the large aggregates. The concrete shall be consolidated by tamping or vibrating.

3. Concrete footings shall have a neat appearance and shall be extended 2-inches above grade and troweled to a crown to shed water.

4. A minimum of 7 days shall elapse after placing the concrete footings before the fence fabric or barbed wire is fastened to the posts.

E. Bracing: Bracing shall be provided at all ends, corners, gates, and intermediate brace posts. Corner posts and intermediate brace posts shall be braced in both directions. Horizontal brace rails shall be set midway between the top rail and the ground, running from the corner, end, intermediate brace or gate post to the first line post. Diagonal tension members shall connect tautly between posts below horizontal braces.

1. Braces shall be so installed that posts remain plumb when diagonal rod is under proper tension.

F. Intermediate Brace Posts: Where straight runs of fencing exceed 500-feet, intermediate brace posts shall be installed, spaced equally between ends or corners; with additional posts provided as required, such that the spacing between intermediate brace posts does not exceed 500-feet. Intermediate brace posts shall be equivalent in size to corner posts and shall be braced with horizontal brace rails and diagonal tension members in both directions.

G. Top Rails: Top rails shall be run continuously through post caps, bending to radius for curved runs. Expansion couplings shall be provided as recommended by the fencing manufacturer.

H. Tension Wire: Continuous bottom tension wire shall be stretched tight with turnbuckles at end, gate, intermediate, and corner posts. Tension wire shall be installed on a straight grade between posts, with approximately 2-inches of space between finish grade and bottom selvage, unless otherwise indicated. Tension wire shall be tied to each post with not less than 6 gauge galvanized wire.

I. Fabric

1. Chain-link fabric shall be fastened on the secured side of the posts.

2. Fabric shall be stretched and securely fastened to posts. Between posts, top and bottom edges of the fabric shall be fastened to the top rail and bottom tension wire, respectively.

3. Fabric shall be stretched and anchored in such a manner that it remains in tension after the pulling force is released.

J. Tie Wires: Tie wire shall be bent to conform to the diameter of the pipe to which it is attached, clasping pipe and fabric firmly with ends twisted at least two full turns. Ends of wire shall be bent back to minimize hazard to persons or clothing.

1. Fabric shall be tied to line posts with tie wires spaced at 12-inches on center.

2. Fabric shall be tied to rails and braces with tie wires spaced at 24-inches on center.

3. Fabric shall be tied to tension wires, with hog rings spaced 24-inches on center.

K. Stretcher Bars: Fabric shall be fastened to end, corner, intermediate brace, and gate posts with stretcher bars. Bars shall be threaded through or clamped to fabric at 4- inches on center and secured to posts with stretcher bar bands spaced no more than 14- inches on center.

L. Fasteners: Nuts for tension bands and hardware bolts shall be installed on the side of fence opposite the fabric side. Ends of bolts shall be peened or the threads scored to prevent removal of nuts.

M. Galvanized coating damaged during construction of the fencing shall be repaired by application of Galvo-Weld; Galvinox; or equal.

N. Damage to PVC coating shall be repaired with material equivalent in color and thickness to the original coating.

3.3 GROUNDING

A. Fences crossed by powerlines of 600 volts or more shall be grounded at or near the point of crossing and at distances not exceeding 150-feet on each side of the crossing.

B. Fences, gates and appurtenances enclosing electrical equipment areas, gas yards, or other hazardous areas shall be electrically continuous and grounded.

C. Ground conductor shall consist of No. 8 AWG solid copper wire. Grounding electrodes shall be 3/4-inch by 10-foot long copper-clad steel rod. Electrodes shall be driven into the earth so that the top of the electrode is at least 6-inches below grade.

1. Where driving is impracticable, electrodes shall be buried a minimum of 12-inches deep and radically from the fence. Top of electrode shall be not less than 2-feet or more than 8-feet from the fence.

D. Ground conductor shall be clamped to the fence and electrodes with bronze grounding clamps so as to create electrical continuity between fence posts, fence fabric, and ground rods. After installation, the total resistance of fence to ground shall not be greater than 25 ohms.

END OF SECTION 02831

SECTION 02930 - SEEDING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall apply grass seeding complete and in place, in accordance with the Contract Documents. Unless otherwise specified, seed shall be applied either mechanically in a dry condition.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300-Contractor Submittals for approval.

B. Materials List: A list of all materials to be used in the turfing and seeding operations together with the source of those materials.

C. Certificates: Certificates of compliance that materials meet the indicated requirements prior to the delivery of materials.

1.3 CLEANUP

A. Upon completion of all seeding operations, the portion of the Site used for a work or storage area by the CONTRACTOR shall be cleaned of all debris, superfluous materials, equipment, and garbage.

B. Walks and pavement shall be swept or washed clean upon completion of the WORK of this Section.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Topsoil: Topsoil, if required, shall be per Section 02200.

B. Fertilizer: Fertilizer shall be a complete fertilizer with an analysis of 8-8-8 or 13-13-13.

C. Seed: Grass seed (March through September) shall be hulled Bermuda with minimum 82% by weight live pure live seed and maximum 1% by weight weed seed. Grass seed (September through March) shall be 50% turf type tall fescue (variety “Jaguar”) and 50% non – hulled Bermuda seed. Fescue shall have a minimum 82% by weight pure live seed and Bermuda seed shall have a minimum 82% by weight live seed and maximum 1% by weight weed seed.

PART 3 -- EXECUTION

3.1 PREPARATION AND APPLICATION

A. Seed beds shall be prepared disking, harrowing or other approved methods. The soil shall be thoroughly pulverized to a minimum depth of four (4”) inches and smoothed by means of raking or other approved method. Each shall be rolled with alight roller and then finely raked. The finished surface shall be smooth, finely textured, and free from sticks and debris.

B. Fertilizer shall be distributed evenly, by mechanical spreader, over all areas to be seeded. The rate of application shall be twenty (20) pounds per 1,000 square feet, or as per manufacturer’s recommendations.

C. Grass seed shall be applied at the rate of ten (10) pounds each of the specified seed types per 1,000 square feet of seed be by means of an approved mechanical seed spreader which will provide a depth of 1/8” to ¼”, or by raking.

D. Seed shall be watered immediately after installation. Watering shall be accomplished in a manner as to prevent erosion of soil or seed.

3.2 MAINTENANCE AND PROTECTION

A. CONTRACTOR shall water seed as required to keep newly seeded grasses alive and healthy.

B. CONTRACTOR shall refill, re-seed, and re-fertilize all bare areas as necessary to achieve complete coverage with a satisfactory stand of grass with no gaps larger than 4” square.

END OF SECTION 02930

SECTION 03100 - CONCRETE FORMWORK

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall furnish concrete formwork, bracing, shoring, and supports for cast-in-place concrete and shall design and construct falsework in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Manufacturer's information demonstrating compliance with requirements for the following:

1. Form ties and related accessories, including taper tie plugs, if taper ties are used.

2. Form gaskets.

3. Form release agent, including NSF certification if not using mineral oil.

4. Manufacturer's information on formwork, form materials, and locations for use.

1.3 QUALITY ASSURANCE

A. Tolerances: The variation from required lines or grade shall not exceed 1/4-inch in 10-feet, non-cumulative, and there shall be no offsets or visible waviness in the finished surface. Other tolerances shall be within the tolerances of ACI 117 - Standard Tolerances for Concrete Construction and Materials

PART 2 -- PRODUCTS

2.1 GENERAL

A. Except as otherwise expressly accepted by the ENGINEER, lumber brought on the Site for use as forms, shoring, or bracing shall be new material. Forms shall be smooth surface forms and shall be of the following materials:

Walls	-	Steel, fiberglass, or plywood panel
Columns	-	Steel, plywood or fiberglass
Roof and floor	-	Plywood
All other WORK	-	Steel panels, fiberglass, plywood or tongue and groove lumber

2.2 FORM AND FALSEWORK MATERIALS

A. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:

1. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with U.S. Product Standard PS 20 – American Softwood Lumber Standard.

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bounded, exterior type Douglas Fir or Southern Yellow Pine plywood manufactured especially for concrete formwork, shall conform to the requirements of PS 1 – Construction and Industrial Plywood, for Concrete Forms, Class I, and shall be edge sealed.

3. Form materials shall be metal, wood, plywood, or other material that will not adversely affect the concrete and will facilitate placement or concrete to the shape, form, line, and grade indicated. Metal forms shall accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.

B. Unless otherwise indicated, exterior corners in concrete members shall be provided with 3/4-inch chamfers or be tooled to 1/2-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

C. Forms and falsework to support the roof and floor slabs shall be designed for the total dead load, plus a live load of 50 psf minimum. The minimum design load for combined dead and live loads shall be 100 psf.

2.3 FORM TIES

A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties or other removable form tie fasteners having a circular cross-section shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form ties for water-retaining structures shall have integral waterstops that tightly fit the form tie so that they cannot be moved from mid-point of the tie. Form ties shall be Wrench Head Snap Tie by MeadowBurke; Snap-Ties by Dayton/Richmond; or equal.

B. Removable taper ties may be used when approved by the ENGINEER. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie. Use Taper-Tie by MeadowBurke; Taper-Tie by Dayton/Richmond; or equal.

PART 3 -- EXECUTION

3.1 GENERAL

A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The CONTRACTOR shall assume full responsibility for the adequate design of forms, and any forms that are unsafe or inadequate in any respect shall promptly be removed from the WORK and replaced. Provide worker protection from protruding reinforcement bars in accordance with applicable safety codes. A sufficient number of forms of each kind shall be available to permit the required rate of progress to be maintained. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state, and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by CONTRACTOR's personnel and by the ENGINEER and shall be in sufficient number and properly installed. During concrete placement, the CONTRACTOR shall continually monitor plumb and string line form positions and immediately correct deficiencies.

B. Concrete forms shall conform to the shape, lines, and dimensions of members required, and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly

braced or tied together to maintain their position and shape under a load of freshly-placed concrete. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

3.2 FORM DESIGN

A. Forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8-inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement, and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1- to 1-1/2-inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the ENGINEER. Whenever concrete cannot be placed from the top of a wall form in a manner that meets the requirements of the Contract Documents, form windows shall be provided in the size and spacing needed to allow placement of concrete to the requirements of Section 03300 - Cast-in-Place Concrete. The size, number, and location of such form windows shall be as acceptable to the ENGINEER.

3.3 CONSTRUCTION

A. Vertical Surfaces: Vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is indicated. Not less than 1-inch of concrete shall be added to the indicated thickness of a concrete member where concrete is permitted to be placed against trimmed ground in lieu of forms. Permission to do this on other concrete members will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

B. Construction Joints: Concrete construction joints will not be permitted at locations other than those indicated, except as may be acceptable to the ENGINEER. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

C. Form Ties

1. Embedded Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties that cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.

2. Removable Ties: Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink or regular cement grout for above-grade walls that are dry on both sides. Exposed faces of walls shall have the outer 2-inches of the exposed face filled with a cement grout that shall match the color and texture of the surrounding wall surface.

3.4 REUSE OF FORMS

A. Forms may be reused only if in good condition and only if acceptable to the ENGINEER. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water retaining structures, unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the ENGINEER.

3.5 REMOVAL OF FORMS

A. Careful procedures for the removal of forms shall be strictly followed, and this WORK shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. In the case of roof slabs and above-ground floor slabs, forms shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 percent of the 28 Day strength in Section 03300. No forms shall be disturbed or removed under an individual panel or unit before the concrete in the adjacent panel or unit has attained 75 percent of the 28 Day strength and has been in place for a minimum of 7 Days. The time required to establish said strength shall be as determined by the ENGINEER who will make several test cylinders for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the 7 Day minimum, then that time shall be used as the minimum length of time. Forms for vertical walls of waterholding structures shall remain in place at least 36 hours after the concrete has been placed. Forms for parts of the WORK not specifically mentioned herein shall remain in place for periods of time as recommended in ACI 347 - Guide to Formwork for Concrete.

3.6 MAINTENANCE OF FORMS

A. Forms shall be maintained in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Before concrete is placed, the forms shall be thoroughly cleaned. The form surfaces shall be treated with a nonstaining mineral oil or other lubricant acceptable to the ENGINEER. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, the CONTRACTOR shall perform the oiling at least 2 weeks in advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

3.7 FALSEWORK

A. The CONTRACTOR shall be responsible for the design, engineering, construction, maintenance, and safety of falsework, including staging, walkways, forms, ladders, and similar appurtenances, which shall equal or exceed the applicable requirements of the provisions of the OSHA Safety and Health Standards for Construction, and the requirements herein.

B. Falsework shall be designed and constructed to provide the necessary rigidity and to support the loads. Falsework for the support of a superstructure shall be designed to support the loads that would be imposed if the entire superstructure were placed at one time.

C. Falsework shall be placed upon a solid footing, safe against undermining, and be protected from softening. When the falsework is supported on timber piles, the maximum calculated pile loading shall not exceed 20 tons. When falsework is supported on any portion of the structure which is already constructed, the load imposed by the falsework shall be spread, distributed, and braced in such a way as to avoid any possibility of damage to the structure.

END OF SECTION 03100

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide reinforcement steel and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings

1. Shop bending diagrams, placing lists, and drawings of reinforcement steel prior to fabrication. The shop bending diagrams shall show the actual lengths of bars to the nearest inch measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. Include bar placement diagrams that clearly indicate the dimensions of each bar splice.

2. Details of the concrete reinforcement steel and concrete inserts shall be submitted at the earliest possible date after receipt by the CONTRACTOR of the Notice to Proceed. Said details of reinforcement steel for fabrication and erection shall conform to ACI 315 - Details and Detailing of Concrete Reinforcement, and the requirements herein.

3. Where mechanical couplers are required or permitted to be used to splice reinforcement steel, the CONTRACTOR shall submit manufacturer's literature which contains instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and Shop Drawings which show the location of each coupler with details of how they are to be installed in the formwork.

4. If reinforcement steel is spliced by welding at any location, the CONTRACTOR shall submit mill test reports which shall contain the information necessary for the determination of the carbon equivalent per AWS D1.4 - Structural Steel Welding Code - Reinforcing Steel. The CONTRACTOR shall submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding; merely a statement that AWS procedures will be followed is not acceptable.

5. If reinforcement steel is spliced by welding at any location, the CONTRACTOR shall submit certifications of procedure qualifications for each welding procedure and certification of welder qualifications, for each welding procedure, and for each welder performing on the WORK.

1.3 QUALITY ASSURANCE

A. If requested by the ENGINEER, the CONTRACTOR shall furnish samples from each heat of reinforcement steel in a quantity adequate for testing. Costs of initial tests will be paid by the OWNER. Costs of additional tests if material fails initial tests shall be the CONTRACTOR’s responsibility.

B. Welder qualifications and procedure qualifications shall be as specified in AWS D1.4.

C. If requested by the ENGINEER, the CONTRACTOR shall furnish samples of each type of welded splice in a quantity and of dimensions adequate for testing. At the discretion of the ENGINEER, radiographic testing of direct butt welded splices will be performed. The CONTRACTOR shall provide assistance

necessary to facilitate testing. The CONTRACTOR shall repair any weld which fails to meet the requirements of AWS D1.4. The costs of testing will be paid by the OWNER, but the costs of tests that fail to meet requirements shall be the CONTRACTOR's responsibility.

PART 2 -- PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. Materials which may remain or leave residues on or within the concrete shall be certified as compliant with NSF Standard 61- Drinking Water System Components.

2.2 REINFORCEMENT STEEL

A. Reinforcement steel for cast-in-place reinforced concrete construction shall conform to the following requirements:

1. Bar and spiral reinforcement shall conform to the requirements of ASTM A 615 - Deformed and Plain Billet - Steel Bars, for Grade 60 reinforcement unless otherwise indicated.

2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185 - Welded Steel Wire Fabric, Plain, for Concrete Reinforcement, and the details indicated. Welded wire fabric with longitudinal wire of W4 size wire and smaller shall be in flat sheets or in rolls with a core diameter of not less than 10-inches. Welded wire fabric with longitudinal wires larger than W4 size shall be in flat sheets only.

B. Accessories

1. Accessories shall include necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. Bar supports shall meet the requirements of the CRSI Manual of Standard Practice, including special requirements for supporting epoxy coated reinforcing bars. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8-inch minimum thickness of plastic coating that extends at least 1/2-inch from the concrete surface. Plastic shall be gray in color.

2. Concrete blocks (dobies) used to support and position reinforcement steel shall have the same or higher compressive strength as required for the concrete in which they are located. Wire ties shall be embedded in concrete block bar supports.

C. Epoxy coating for reinforcing and accessories, where indicated, shall conform to ASTM A 775 - Epoxy - Coated Reinforcing Steel Bars.

2.3 MECHANICAL COUPLERS

A. Mechanical couplers shall be provided where indicated and where approved by the ENGINEER. The couplers shall develop a tensile strength that exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice.

B. Where the type of coupler used is composed of more than one component, components required for a complete splice shall be provided. This shall apply to mechanical splices, including those splices intended for future connections.

C. The reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection. Straight threaded type couplers shall require the use of the next larger size reinforcing bar or shall be used with reinforcing bars with specially forged ends which provide upset threads which do not decrease the basic cross section of the bar.

D. Couplers shall be Lenton Form Saver by Erico Products; Dowel Bar Splicer System by Dayton/Richmond; or equal.

2.4 WELDED SPLICES

A. Welded splices shall be provided where indicated and where approved by the ENGINEER. Welded splices of reinforcement steel shall develop a tensile strength that exceeds 125 percent of the yield strength of the reinforcement bars that are connected.

B. Materials required to conform the welded splices to the requirements of AWS D1.4 shall be provided.

2.5 EPOXY GROUT

A. Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled. Epoxy grout shall meet the requirements in Section 03315 - Grout.

PART 3 -- EXECUTION

3.1 GENERAL

A. Reinforcement steel, welded wire fabric, couplers, and other appurtenances shall be fabricated, and placed in accordance with the requirements of the Building Code and the supplementary requirements herein.

3.2 FABRICATION

A. General

1. Reinforcement steel shall be accurately formed to the dimensions and shapes indicated, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318 - Building Code Requirements for Reinforced Concrete, except as modified by the Drawings. Bars shall be bent cold. Bars shall be bent per ACI 318.

2. The CONTRACTOR shall fabricate reinforcement bars for structures in accordance with bending diagrams, placing lists, and placing drawings.

B. Fabricating Tolerances: Bars used for concrete reinforcement shall satisfy the following fabricating tolerances:

1. Sheared length: plus and minus 1-inch

2. Depth of truss bars: plus 0, minus 1/2-inch

3. Stirrups, ties, and spirals: plus and minus 1/2-inch

4. Other bends: plus and minus 1-inch

3.3 PLACING

A. Reinforcement steel shall be accurately positioned as indicated and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. Reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers that are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. Concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties that are embedded in the blocks. For concrete over formwork, the CONTRACTOR shall provide concrete, metal, plastic, or other acceptable bar chairs and spacers.

B. Limitations on the use of bar support materials shall be as follows.

1. Concrete Dobies: permitted at any location except where architectural finish is required.

2. Wire Bar Supports: permitted only at slabs over dry areas, interior dry wall surfaces, and exterior wall surfaces.

3. Plastic Bar Supports: permitted at every location except on grade.

C. Tie wires shall be bent away from the forms in order to provide the required concrete coverage.

D. Bars additional to those indicated which may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at its own expense.

E. Unless otherwise indicated, reinforcement placing tolerances shall be within the limits in Section 7.5 of ACI 318 except where in conflict with the requirements of the Building Code.

F. Bars may be moved as necessary to avoid interference with other reinforcement steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be as reviewed and accepted by the ENGINEER.

G. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters. Slab bolsters shall be spaced not more than 30-inches on centers, shall extend continuously across the entire width of the reinforcement mat, and shall support the reinforcement mat in the plane indicated.

H. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3-feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

I. Epoxy coated reinforcing bars shall be stored, transported, and placed in such a manner as to avoid chipping of the epoxy coating. Non-abrasive slings made of nylon and similar materials shall be used. Specially coated bar supports shall be used. Chips or cracks in the epoxy coating shall be repaired with a compatible epoxy repair material prior to placing concrete.

J. Accessories supporting reinforcing bars shall be spaced such that there is no deflection of the accessory from the weight of the supported bars. When used to space the reinforcing bars from wall forms, the forms and bars shall be located so that there is no deflection of the accessory when the forms are tightened into position.

3.4 SPACING OF BARS

A. The clear distance between parallel bars (except in columns and between multiple layers of bars in beams) shall be not less than the nominal diameter of the bars, nor less than 1-1/3 times the maximum size of the coarse aggregate, nor less than one-inch.

B. Where reinforcement in beams or girders is placed in 2 or more layers, the clear distance between layers shall be not less than one-inch.

C. In columns, the clear distance between longitudinal bars shall be not less than 1-1/2 times the bar diameter, nor less than 1-1/2 times the maximum size of the coarse aggregate, nor less than 1-1/2 inches.

D. The clear distance between bars shall also apply to the distance between a contact splice and adjacent splices or bars.

3.5 SPLICING

A. General

1. Reinforcement bar splices shall only be used at locations indicated. When it is necessary to splice reinforcement at points other than where indicated, the character of the splice shall be as reviewed and accepted by the ENGINEER.

2. Unless otherwise indicated, dowels shall match the size and spacing of the spliced bar.

B. Splices of Reinforcement

1. The length of lap for reinforcement bars, unless otherwise indicated, shall be in accordance with ACI 318, Section 12.15.1 for a Class B splice.

2. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

3. Splices in column spiral reinforcement, when necessary, shall be made by welding or by a lap of 1-1/2 turns.

C. Bending or Straightening: Reinforcement shall not be straightened or rebent in a manner which will injure the material. Bars shall be bent or straight as indicated. Do not use bends different from the bends indicated. Bars shall be bent cold, unless otherwise permitted by the ENGINEER. No bars partially embedded in concrete shall be field-bent except as indicated or specifically permitted by the ENGINEER.

D. Couplers that are located at a joint face shall be a type that can be set either flush or recessed from the face as indicated. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. Couplers intended for future connections shall be recessed a minimum of 1/2-inch from the concrete surface. After the concrete is placed, the coupler shall be plugged with plastic plugs which have an O-ring seal and the recess filled with sealant to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged.

E. Unless indicated otherwise, mechanical coupler spacing and capacity shall match the spacing and capacity of the reinforcing indicated for the adjacent section.

3.6 CLEANING AND PROTECTION

A. Reinforcement steel shall always be protected from conditions conducive to corrosion until concrete is placed around it.

B. The surfaces of reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be reinspected and, if necessary, recleaned.

3.7 EMBEDMENT OF DRILLED REINFORCING STEEL DOWELS

A. Hole Preparation

1. The hole diameter shall be as recommended by the epoxy manufacturer but shall be no larger than 1/4-inch greater than the diameter of the outer surface of the reinforcing bar deformations.

2. The depth of the hole shall be as recommended by the epoxy manufacturer to fully develop the bar but shall not be less than 12 bar diameters, unless indicated otherwise.

3. The hole shall be drilled by methods that do not interfere with the proper bonding of epoxy.

4. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling. The location of holes shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.

5. The hole shall be blown clean with clean, dry compressed air to remove dust and loose particles.

B. Embedment

1. Epoxy shall be injected into the hole through a tube placed to the bottom of the hole. The tube shall be withdrawn as epoxy is placed but kept immersed to prevent formation of air pockets. The hole shall be filled to a depth that insures that excess material will be expelled from the hole during dowel placement.

2. Dowels shall be twisted during insertion into the partially filled hole so as to guarantee full wetting of the bar surface with epoxy. The bar shall be inserted slowly enough to avoid developing air pockets.

END OF SECTION 03200

SECTION 03290 – JOINTS IN CONCRETE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide joints in concrete, complete and in place, in accordance with the Contract Documents.

B. Joints in concrete structures shall be the types defined below and will be permitted only where indicated, unless specifically accepted by the ENGINEER.

1.2 TYPES OF JOINTS

A. **Construction Joints:** When fresh concrete is placed against a hardened concrete surface, the joint between the two pours is called a construction joint. Unless otherwise indicated, joints in water bearing members shall be provided with a waterstop and/or sealant groove of the shape indicated.

B. **Contraction Joints:** Contraction joints are similar to construction joints except that the fresh concrete shall not bond to the hardened surface of the earlier pour. The slab reinforcement shall be stopped 4-1/2 inches from the joint; which is provided with a sleeve-type dowel, to allow shrinkage of the concrete of the latest pour. Waterstop and/or sealant groove shall also be provided when indicated.

C. **Expansion Joints:** To allow the concrete to expand freely, a space is provided between the two pours, and the joint shall be formed as indicated. The space is obtained by placing a filler joint material against the earlier pour, to act as a form for the latest pout. Unless otherwise indicated, expansion joints in water bearing members shall be provided with a center-bulb type waterstop as indicated.

1. Pre-molded expansion joint material shall be installed with the edge at the indicated distance below or back from finished concrete surface, and shall have a slightly tapered, dressed, and oiled wood strip secured to or placed at the edge thereof during concrete placement, which shall later be removed to form space for sealing material.

2. The space so formed shall be filled with a joint sealant material as indicated below. In order to keep the two wall or slab elements in line the joint shall also be provided with a sleeve-type dowel as indicated.

D. **Control Joints:** The function of the control joint is to provide a weaker plane in the concrete, where shrinkage cracks will probably occur. A groove, of the shape and dimensions indicated, is formed or saw-cut in the concrete. This groove is afterward filled with a joint sealant material.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings

1. Placement drawings showing the location and type of all joints for each structure.

2. Certified test reports from the sealant manufacturer on the actual batch of material being supplied indicating compliance with requirements shall be furnished before the sealant is used on the job.

3. Copies of Waterstop Welding Certification to be provided by manufacturer or authorized agent of manufacturer. Every person who is to be involved with waterstop installation is required to have

individual Certification on file with ENGINEER, which states said individuals are certified and trained to install waterstop per manufacturer's recommendations and specifications.

4. Manufacturer's information demonstrating compliance with requirements for the following:

    a. Bearing Pad

    b. Neoprene Sponge

    c. Preformed Joint Filler

    d. Backing Rod

    e. Waterstop

    f. Slip Dowels

    g. PVC Tubing

C. Samples

1. Prior to production of the material required under this Section, qualification samples of waterstops shall be submitted which represent in all respects the material proposed. Such samples shall consist of extruded or molded sections of each size or shape to be used. The balance of the material to be used shall not be produced until after the ENGINEER has reviewed the qualification samples.

2. **Certificates:** Written certification from the manufacturer as an integral part of the shipping form, to show that all of the material shipped to this project meets or exceeds the physical property requirements of the Contract Documents. Supplier certificates are not acceptable.

1.4 QUALITY ASSURANCE

A. **Waterstop Inspection:** It is required that all waterstop field joints shall be subject to rigid inspection, and no such WORK shall be scheduled or started without having made prior arrangements with the ENGINEER for the required inspections. Not less than 24 hours notice shall be given for scheduling such inspections.

B. Field joints in waterstops shall be subject to rigid inspection for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, and other defects which would reduce the potential resistance of the material to water pressure at any point. Defective joints shall be replaced with material which passes inspection; faulty material shall be removed from the Site and disposed of.

C. The following waterstop defects represent a partial list of defects which shall be grounds for rejection:

1. Offsets at joints greater that 1/16-inch or 15 percent of material thickness, at any point, whichever is less.

2. Exterior crack at joint, due to incomplete bond, which is deeper that 1/16-inch or 15 percent of material thickness, at any point, whichever is less.

3. Any combination of offset or exterior crack which will result in a net deduction in the cross section of the waterstop in excess of 1/16-inch or 15 percent of material thickness at any point, whichever is less.

4. Misalignment of joint which results in misalignment of the waterstop in excess of ½-inch in 10 feet.

5. Porosity in the welded joint as evidenced by the visual inspection.

6. Bubbles or inadequate bonding which can be detected with a penknife test. (If, while prodding the entire joint with the point of a pen knife, the knife breaks through the outer portion of the weld into a bubble, the joint shall be considered defective.)

7. Visible signs of separation when the cooled splice is bent by hand at any sharp angle.

8. Any evidence of burned material.

D. **PVC Waterstop Samples:** Prior to use of the waterstop material in the field, a sample of a prefabricated (shop made fitting) mitered cross and a tee constructed of each size or shape of material to be used shall be submitted. These samples shall be prefabricated (shop made fitting) so that the material and workmanship represent in all respects the fittings to be provided. Field samples of prefabricated (shop made fitting) fittings (crosses, tees, etc.) will also be selected at random by the ENGINEER for testing by a laboratory at the OWNER's expense. When tested, tensile strength across the joints shall be at least 1120 psi.

E. **Construction Joint Sealant:** The CONTACTOR shall prepare adhesion and cohesion test specimens as required herein, at intervals of 5 working days while sealants are being installed.

F. The sealant material shall show no signs of adhesive or cohesive failure when tested in accordance with the following procedure in laboratory and field tests:

1. Sealant specimen shall be prepared between 2 concrete blocks (1-inch by 2-inch by 3-inch). Spacing between the blocks shall be 1-inch. Coated spacers (2-inch by 1-1/2-inch by ½-inch) shall be used to insure sealant cross-sections of ½-inch by 2 inches with a width of 1-inch.

2. Sealant shall be cast and cured according to manufacturer's recommendations except that curing period shall be not less than 24 hours.

3. Following curing period, the gap between blocks shall be widened to 1-1/2-inch. Spacers shall be used to maintain this gap for 24 hours prior to inspection for failure.

1.5 SPECIAL WARRANTY REQUIREMENTS

A. The CONTRACTOR shall furnish a 5 year written warranty of the entire sealant installation against faulty and/or incompatible materials and workmanship, together with a statement that it agrees to repair or replace, to the satisfaction of the OWNER, any such defective area which become evident with said 5 year guarantee period.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Joint materials shall be listed as compliant with NSF Standard 61.

2.2 WATERSTOPS

A. **PVC Waterstops:** Waterstops shall be extruded from an elastomeric polyvinyl chloride compound containing the plasticizers, resins, stabilizers, and other materials necessary to meet the requirements of this Section. No reclaimed or scrap material shall be used. The CONTRACTOR shall obtain from the waterstop manufacturer and shall furnish to the ENGINEER for review, current test reports and a written certification of the manufacturer that the material to be shipped to the job meets the physical requirements as outlined in the U.S. Army Corps of Engineers Specification CRD-C572-PVC Waterstops, and those listed herein.

1. Flatstrip and Center-Bulb Waterstops: Flatstrip and center-bulb waterstops shall be as manufactured by **Greenstreak Plastic Products Co., Profiles 646, 679, 732, and 735; Tamms Horn/Durajoint Types 9, 10, 11, and 11A**; or equal; provided, that at no place shall the thickness of flat strip waterstops, including the center bulb type, be less than 3/8-inch. Waterstop shall be provided with factory installed hog rings at 12 inches on centers along the waterstop.

2. Multi-Rib Waterstops: Multi-rib waterstops, where required, shall be as manufactured by **Greenstreak Plastic Products Co., Profiles 789 and 790; Tamms Horn/Durajoint Types 25 and 26;** or equal. Prefabricated (shop made fitting) joint fittings shall be used at all intersections of the ribbed-type waterstops.

3. Retrofit Waterstops: Retrofit waterstops and batten bars shall be as manufactured by **Greenstreak Plastic Products Co., Style #609**, or equal. Waterstop shall be supplied as a complete system including waterstop, SS batten bar, SS anchor bolts, and epoxy gel.

4. **Waterstop Testing Requirements:** When tested in accordance with the test standards, the waterstop material shall meet or exceed the following requirements:

Physical Property, Sheet Material	Value	ASTM Std.
Tensile Strength-min (psi)	2000	D 638, Type IV
Ultimate Elongation-min (percent)	350	D 638, Type IV
Low Temp Brittleness-max (degrees F)	-35	D 746
Stiffness in Flexure-min (psi)	600	D 747
Accelerated Extraction (CRD-C572)		
Tensile Strength-min (psi)	1500	D 638, Type IV
Ultimate Elongation-min (percent)	300	D 638, Type IV
Effect of Alkalies (CRD-C572)		
Change in Weight (percent)	plus 0.25/minus 0.10	------
Change in Durometer, Shore A	plus and minus 5	D 2240
Finish Waterstop		
Tensile Strength-min (psi)	1400	D 638, Type IV
Ultimate Elongation-min (percent)	280	D 638, Type IV

B. **Pre-formed Hydrophilic Waterstop:** Hydrophilic (bentonite-free) waterstops shall be **Hydrotite CJ10202k** as manufactured by **Greenstreak Plastic Products Co., or Adeka Ultraseal MC2010** as manufactured by **Asahi Denka**.

1. Hydrophilic waterstop shall be the type which expands in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast.

2. Waterstop shall be manufactured from chloroprene rubber and modified chloroprene rubber with hydrophilic properties. Waterstop shall have a delay coating to inhibit initial expansion due to moisture present in fresh concrete. The minimum expansion ratio of modified chloroprene shall be not less than 2 to 1 volumetric change in distilled water at 70 degrees F (21 degrees C).

Physical Property, Chloroprene	Value	ASTM Std.
Tensile Strength-min (psi)	1275	D 412
Ultimate Elongation-min (percent)	350	D 412
Hardness, Shore A	55 plus and minus 5	D 2240

Physical Property, Modified Chloroprene	Value	ASTM Std.
Tensile Strength-min (psi)	300	D 412
Ultimate Elongation-min (percent)	600	D 412
Hardness, Shore A	55 plus and minus 5	D 2240

3. Bonding agent for hydrophilic waterstop shall be the manufacturers recommended adhesive for wet, rough concrete.

C. **Other Types of Waterstops:** When types of waterstops not listed above are indicated, they shall be subjected to the same requirements as those listed herein.

2.3 JOINT SEALANT FOR WATER BEARING JOINTS

A. Joint sealant shall be polyurethane designed for bonding to concrete which is continuously submerged in water. No material will be acceptable which has an unsatisfactory history as to bond or durability when used in the joints of water retaining structures.

B. Joint sealant material shall meet the following requirements (73 degrees F and 5 percent R.H.):

Work Life	45 - 180 minutes
Time to Reach 20 Shore "A" Hardness (at 77 degrees F, 200 gr quantity)	24 hours, maximum
Ultimate Hardness (ASTM D 2240)	20 - 45 Shore "A"
Tensile Strength (ASTM D 412)	175 psi, minimum
Ultimate Elongation (ASTM D 412)	400 percent, minimum
Tear Resistance (Die C, ASTM D 624)	75 pounds per inch of thickness, minimum
Color	Light Gray

C. Polyurethane sealants for waterstop joints in concrete shall conform to the following requirements:

1. Sealant shall be 2-part polyurethane with the physical properties of the cured sealant conforming to or exceeding the requirements of ANSI/ASTM C 920 – Elastomeric Joint Sealant, or Federal Specification TT-S-0227 E(3) – Sealing Compound, Elastomeric Type, Multicomponent, for Caulking, Sealing, and Glazing Buildings and Other Structures, for 2-part material, as applicable.

2. For vertical joints and overhead horizontal joints, only “non-sag” compounds shall be used; all such compounds shall conform to the requirements of ANSI/ASTM C 920 Class 25, Grade NS, or Federal Specification TT-S-0227 E(3), Type II, Class A.

3. For plane horizontal joints, the self-leveling compounds which meet the requirements of ANSI/ASTM C 920 Class 25, Grade P, or Federal Specification TT-S-0227 E(3), Type I shall be used. For joints subject to either pedestrian or vehicular traffic, a compound providing non-tracking characteristics, and having a Shore “A” hardness range of 35 to 45, shall be used.

4. Primer materials, if recommended by the sealant manufacturer, shall conform to the printed recommendations of the manufacturer.

D. Sealants, indicated, shall be **PSI-270** as manufactured by **Polymeric Systems Inc., Sikaflex 2C,** as manufactured by **Sika Corporation,** or equal.

E. Sealants for non-waterstop joints in concrete shall conform to Section 07920 – Sealants and Caulking.

2.4 JOINT MATERIALS

A. **Bearing Pad:** Bearing pad shall be neoprene conforming to ASTM D 2000 – Standard Classification System for Rubber Products in Automotive Applications, BC 420, 40 durometer hardness unless otherwise indicated.

B. **Neoprene Sponge:** Sponge shall be neoprene, closed-cell, expanded, conforming to ASTM D 1056 – Flexible Cellular Materials – Sponge or Expanded Rubber, type 2C5-E1

C. Joint Filler

1. Joint filler for expansion joints in waterholding structures shall be neoprene conforming to ASTM D1056, Type 2C5-E1.

2. Joint filler material in other locations shall be of the performed non-extruding type joint filler constructed of cellular neoprene sponge rubber or polyurethane of firm texture. Bituminous fiber type will not be permitted. All non-extruding and resilient-type performed expansion joint fillers shall conform to the requirements and tests set forth in ASTM D 1752 – Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction, for Type I, except as otherwise indicated.

2.5 BACKING ROD

A. Backing rod shall be extruded closed-cell, polyethylene foam rod. The material shall be compatible with the joint sealant material and shall have a tensile strength of not less than 40 psi and a compression deflection of approximately 25 percent and 8 psi. The rod shall be 1/8-inch larger in diameter than the joint width except that a one-inch diameter rod shall be used for a ¾-inch wide joint.

2.6 SLIP DOWELS

A. Slip dowels in joints shall be smooth epoxy-coated bars, conforming to ASTM A 775 – Epoxy Coated Reinforcing Steel Bars.

2.7 PVC TUBING

A. PVC tubing in joints shall be Sch. SDR 13.5, conforming to ASTM D 2241 – Poly (Vinyl Chloride)(PVC) Pressure-Rated Pipe (SDR Series).

PART 3 -- EXECUTION

3.1 GENERAL

A. Waterstops shall be embedded in the concrete across joints as indicated. Waterstops shall be fully continuous for the extent of the joint. Splices necessary to provide such continuity shall be accomplished in conformance to printed instructions of manufacturer of the waterstops. The CONTACTOR shall take suitable precautions and means to support and protect the waterstops during the progress of the work and shall repair or replace at its own expense any waterstops damaged during the progress of the work. Waterstops shall be stored so as to permit free circulation of air around the waterstop material.

B. When any waterstop is installed in the concrete on one side of a joint, while the other half or portion of the waterstop remains exposed to the atmosphere for more than 2 days, suitable precautions shall be taken to shade and protect the exposed waterstop from direct rays of the sun during the entire exposure and until the exposed portion of the waterstop is embedded in concrete.

3.2 SPLICES IN PVC WATERSTOPS

A. Splices in PVC waterstops shall be performed by heat sealing the adjacent waterstop sections in accordance with the manufacturer's printed recommendations. It is essential that:

1. The material not be damaged by heat sealing.

2. The splices have a tensile strength of not less than 80 percent of the unspliced material tensile strength.

3. The continuity of the waterstop ribs and of its tubular center axis shall be maintained. No edge welding is allowed.

B. Butt joints of the ends of 2 identical waterstop sections may be made while the material is in the forms.

C. All joints with waterstops involving more than 2 ends to be jointed together, and all joints which involve an angle cut, alignment change, or the joining of 2 dissimilar waterstop sections shall be prefabricated (shop made fitting) prior to placement in the forms, allowing not less than 24-inch long strips of waterstop material beyond the joint. Upon being inspected and approved, such prefabricated (shop made fitting) waterstop joint assemblies shall be installed in the forms and the ends of the 24-inch strips shall be butt welded to the straight run portions of waterstop in place in the forms.

D. Where a centerbulb waterstop intersects and is jointed with a non-centerbulb waterstop, care shall be taken to seal the end of the centerbulb, using additional PVC material if needed.

3.3 JOINT CONSTRUCTION

A. **Setting Waterstops:** In order to eliminate faulty installation that may result in joint leakage, particular care shall be taken of the correct positioning of the waterstops during installation. Adequate provisions must be made to support and anchor the waterstops during the progress of the WORK and to insure the proper embedment in the concrete. The symmetrical halves of the waterstops shall be equally divided between the concrete pours at the joints. The center axis of the waterstops shall be coincident with the joint openings. Maximum density and imperviousness of the concrete shall be insured by thoroughly working it in the vicinity of the joints.

B. In placing PVC waterstops in the forms, means shall be provided to prevent them from being folded over by the concrete as it is placed. Waterstops shall be held in place with light wire ties on 12-inch centers which shall be passed through hog rings at the edge of the waterstop and tied to the curtain of reinforcing steel. Horizontal waterstops, with their flat face in a vertical plane, shall be held in place with continuous supports to which the top edge of the waterstop shall be tacked. In placing concrete around horizontal waterstops,

with their flat face in a horizontal plane, concrete shall be worked under the waterstops by hand so as to avoid the formation of air and rock pockets.

C. In placing centerbulb waterstops in expansion joints, the centerbulb shall be centered on the joint filler material.

D. Waterstop in vertical wall joints shall stop 6 inches from the top of the wall where such waterstop does not connect with any other waterstop and is not to be connected to a future concrete placement.

E. **Joint Location:** Construction joints and other types of joints shall be provided where indicated. When not indicated, construction joints shall be provided at 25-foot maximum spacing for all concrete construction. Where joints are indicated spaced greater than 40 feet apart, additional joints shall be provided to maintain the 25-foot maximum spacing. The location of all joints, of any type, shall be submitted for acceptance by the ENGINEER.

F. **Joint Preparation:** Special care shall be used in preparing concrete surfaces at joints where bonding between 2 sections of concrete is required. Unless otherwise indicated, such bonding will be required at all horizontal joints in walls. Surfaces shall be prepared in accordance with the requirements of Section 03300 – Cast-in-Place Concrete.

G. **Retrofit Joint Preparation:** Existing surfaces to receive a retrofit waterstop shall be clean and free from any loose or foreign material. Surface shall be given a light sandblast or hydroblast finish to 1/8-inch amplitude prior to application of epoxy and waterstop.

H. **Construction Joint Sealant:** Construction joints in water-bearing floor slabs, and elsewhere as indicated, shall be provided with tapered grooves which shall be filled with a construction joint sealant. The material used for forming the tapered grooves shall be left in the grooves until just before the grooves are cleaned and filled with joint sealant. After removing the forms from the grooves, all laitance and fins shall be removed, and the grooves shall be sand-blasted. The grooves, shall be allowed to become thoroughly dry, after which they shall be blown out; immediately thereafter, they shall be primed and filled with the construction joint sealant. The primer shall be furnished by the sealant manufacturer. No sealant will be permitted to be used without a primer. Care shall be used to completely fill the sealant grooves. Areas designated to receive a sealant fillet shall be thoroughly cleaned, as outlined for the tapered gloves, prior to application of the sealant.

I. The primer and sealant shall be placed strictly in accordance with the printed recommendations of the manufacturer, taking special care to properly mix the sealant prior to application. The sides of the sealant groove shall not be coated with bond breaker, curing compound, or any other substance which would interfere with proper bonding of the sealant. Sealant shall achieve final cure at least 7 days before the structure is filled with water.

J. Sealant shall be installed by a competent waterproofing specialty contractor that has a successful record of performance in similar installations.

K. Thorough, uniform mixing of 2-part, catalyst-cured materials is essential; special care shall be taken to properly mix the sealer before its application. Before any sealer is placed, the CONTRACTOR shall arrange to have the crew doing the WORK carefully instructed on the proper method of mixing and application by a representative of the sealant manufacturer.

L. Any joint sealant that fails to fully and properly cure after the manufacturer's recommended curing time for the conditions of the WORK hereunder shall be completely removed; the groove shall be thoroughly sandblasted to remove all traces of the uncured or partially cured sealant and primer, and shall be re-sealed with the indicated joint sealant. Costs of such removal, joint treatment, re-sealing, and appurtenant work shall be the CONTRACTOR's responsibility.

M. Hydrophilic Waterstop

1. Where a hydrophilic waterstop is called for in the Contract Documents, it shall be installed with the manufacturer's instructions and recommendations except as modified herein.

2. When requested by the ENGINEER, the CONTRACTOR shall arrange for the manufacturer to furnish technical assistance in the field.

3. Hydrophilic waterstop shall only be used where complete confinement by concrete is provided. Hydrophilic waterstop shall not be used in expansion or contraction joints nor in the first 6-inches of any non-intersecting joint.

4. The hydrophilic waterstop shall be located as near as possible to the center of the joint and it shall be continuous around the entire joint. The minimum distance from the edge of the waterstop to the face of the member shall be 5-inches.

5. Where the thickness of the concrete member to be placed on the hydrophilic waterstop is less than 12-inches, the waterstop shall be placed in grooves formed or ground into the concrete. The groove shall be at least 3/4-inch deep and 1-1/4 inches wide. When placed in the groove, the minimum distance from the edge of the waterstop to the face of the member shall be 2-1/2 inches.

6. Where a hydrophilic waterstop is used in combination with PVC waterstop, the hydrophilic waterstop shall overlap the PVC waterstop for a minimum of 6-inches and shall be adhered to PVC waterstop with single component water-swelling sealant as recommended by manufacturer.

7. The hydrophilic waterstop shall not be installed where the air temperature falls outside the manufacturer's recommended range.

8. The concrete surface under the hydrophilic waterstop shall be smooth and uniform. The concrete shall be ground smooth if needed. Alternately, the hydrophilic waterstop shall be bonded to the surface using an epoxy grout which completely fills all voids and irregularities beneath the waterstop material. Prior to installation, the concrete surface shall be wire brushed to remove any laitance or other materials that may interfere with the bonding of epoxy.

9. The hydrophilic waterstop shall be secured in place with concrete nails and washers at 12-inch maximum spacing. This shall be in addition to the adhesive recommended by the manufacturer.

N. **Retrofit Waterstop:** Retrofit waterstops shall be set in a bed of epoxy over a sandblasted surface with stainless steel batten bars and 1/4-inch diameter stainless steel anchors at 6-inches on center, staggered, and in accordance with the manufacturer's written recommendations.

END OF SECTION 03290

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide cast-in-place concrete in accordance with the Contract Documents.

B. The following types of concrete are covered in this Section:

1. Structural Concrete: Concrete to be used in all cases except where indicated otherwise in the Contract Documents.

2. Pea Gravel Concrete: Concrete in thin sections and areas with congested reinforcing, at the option of the CONTRACTOR and with written approval of the ENGINEER for the specific location.

3. Sitework Concrete: Concrete to be used for curbs, gutters, catch basins, sidewalks, pavements, fence and guard post embedment, underground pipe encasement, underground duct bank encasement and other concrete appurtenant to electrical facilities unless otherwise indicated.

4. Lean Concrete: Concrete to be used for thrust blocks, pipe trench cut-off blocks and cradles that are indicated on the Drawings as unreinforced. Lean concrete shall be used as protective cover for dowels intended for future connection.

C. The term "hydraulic structure" used in these specifications means environmental engineering concrete structures for the containment, treatment, or transmission of water, wastewater, other fluids, or gases.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 – Contractor Submittals.

B. Mix Designs: Prior to beginning the WORK and within 14 Days of the Notice to Proceed, submit preliminary concrete mix designs which shall show the proportions and gradations of materials proposed for each class and type of concrete. Mix designs shall be checked by an independent testing laboratory acceptable to the ENGINEER. Costs related to such checking shall be CONTRACTOR'S responsibility as part of the WORK. Since laboratory trial batches require 35 calendar days to complete, the CONTRACTOR shall test a minimum of 2 mix designs for each class of concrete.

C. Delivery Tickets: Where ready-mix concrete is used, the CONTRACTOR shall furnish delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state-certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate added at the batching plant, and the amount allowed to be added at the Site for the specific design mix. In addition, each ticket shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the Site, when unloading began, and when unloading was finished.

D. Test data relating to the cement, aggregate, and admixtures shall be less than 6 months old. Furnish the following submittals in accordance with ACI 301 – Structural Concrete for Buildings:

1. Mill tests for cement.

2. Admixture certification. Chloride ion content shall be included.

3. Aggregate gradation test results and certification.

4. Materials and methods for curing.

1.3 CONCRETE CONFERENCE

A. A meeting to review the detailed requirements of the CONTRACTOR's proposed concrete design mixes and to determine the procedures for producing proper concrete construction shall be held no later than 14 Days after the Notice to Proceed.

B. Parties involved in the concrete WORK shall attend the conference, including the following at a minimum:

1. CONTRACTOR's representative

2. Testing laboratory representative

3. Concrete subcontractor

4. Reinforcing steel subcontractor and detailer

5. Concrete supplier

6. Admixture manufacturer's representative

C. The conference shall be held at a mutually agreed upon time and place. The ENGINEER shall be notified no less than 5 Days prior to the date of the conference.

1.4 QUALITY ASSURANCE

A. General

1. Tests on component materials and for compressive strength and shrinkage of concrete shall be performed as indicated. Tests for determining slump shall be in accordance with the requirements of ASTM C 143 – Test Method for Slump of Hydraulic Cement Concrete.

2. Testing for aggregate shall include sand equivalence, reactivity, organic impurities, abrasion resistance, and soundness, according to ASTM C 33 – Concrete Aggregates.

3. The cost of laboratory tests on cement, aggregates, and concrete, will be the OWNER'S responsibility. However, the CONTRACTOR shall pay the cost of any additional tests and investigation on WORK that does not meet the specifications. The laboratory will meet or exceed the requirements of ASTM C 1077 – Practice for Laboratories Testing Concrete and Concrete Aggregates for use in Construction and Criteria for Laboratory Evaluation.

4. Concrete for testing shall be furnished by the CONTRACTOR, and the CONTRACTOR shall assist the ENGINEER in obtaining samples, and disposal and cleanup of excess material.

B. Field Compression Tests

1. Compression test specimens shall be taken during construction from the first placement of each class of concrete and at intervals thereafter as selected by the ENGINEER to insure continued compliance with these specifications. Each set of test specimens shall be a minimum of 5 cylinders.

2. Compression test specimens for concrete shall be made in accordance with Section 9.2 of ASTM C 31 – Practices for Making and Curing Concrete Test Specimens in the Field. Specimens shall be 6-inch diameter by 12-inch high cylinders.

3. Compression tests shall be performed in accordance with ASTM C 39 – Test Method for Compressive Strength of Cylindrical Concrete Specimens. One test cylinder will be tested at 7 Days and 2 at 28 Days. The remaining cylinders will be held to verify test results, if needed.

C. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete will be according to the requirements of ACI 318 – Building Code Requirements for Reinforced Concrete, Chapter 5 "Concrete Quality," and as indicated.

2. A statistical analysis of compression test results will be performed according to the requirements of ACI 214 – Recommended Practice for Evaluation of Strength Test Methods. The standard deviation of the test results shall not exceed 640 psi, when ordered at equivalent water content as estimated by slump.

3. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for subsequent batches of the type of concrete affected.

4. When the standard deviation of the test results exceeds 640 psi, the average strength for which the mix is designed shall be increased by an amount necessary to satisfy the statistical requirement that the probability of any test being more than 500 psi below or the average of any 3 consecutive tests being below the required compressive strength is 1 in 100. The required average strength shall be calculated by Criterion No. 3 of ACI 214 using the actual standard of deviation.

5. Concrete that fails to meet the ACI requirements and these Specifications is subject to removal and replacement.

D. Shrinkage Tests

1. Drying shrinkage tests shall be performed for the trial batches indicated in the Article below entitled "Trial Batch and Laboratory Tests," the first placement of each class of structural concrete, and during construction to insure continued compliance with these specifications.

2. Drying shrinkage specimens shall be 4-inch by 4-inch by 11-inch prisms with an effective gauge length of 10-inches; fabricated, cured, dried, and measured in accordance with ASTM C 157 – Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete, modified as follows: specimens shall be removed from molds at an age of 23 hours plus or minus 1 hour after trial batching, shall be placed immediately in water at 70 degrees F plus or minus 3 degrees F for at least 30 minutes, and shall be measured within 30 minutes thereafter to determine original length and then submerged in saturated lime water at 73 degrees F plus or minus 3 degrees F. Measurement to determine expansion expressed as a percentage of original length shall be made at age 7 Days. This length at age 7 Days shall be the base length for drying shrinkage calculations ("0" days drying age). Specimens then shall be stored immediately in a humidity control room maintained at 73 degrees F plus or minus 3 degrees F and 50 percent plus or minus 4 percent relative humidity for the remainder of the test. Measurements to determine shrinkage expressed as percentage of base length shall be made and reported separately for 7, 14, 21, and 28 Days of drying after 7 Days of moist curing.

3. The drying shrinkage deformation of each specimen shall be computed as the difference between the base length (at "0" days drying age) and the length after drying at each test age. The average drying shrinkage deformation of the specimens shall be computed to the nearest 0.0001 inch at each test age. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004-inch, the results obtained from that specimen shall be disregarded. Results of the shrinkage test shall be reported to the nearest 0.001 percent of shrinkage. Compression test specimens shall be taken in each case from the same concrete used for preparing drying shrinkage specimens. These tests shall be considered a part of the normal compression tests for the project. Allowable shrinkage limitations shall be as indicated in Part 2 below.

E. Aggregate Testing: Aggregate testing shall be made for the trial batch in the Article below entitled "Trial Batch and Laboratory Tests," prior to construction and every 12 months during construction to insure continued compliance with these specifications.

F. Construction Tolerances: The CONTRACTOR shall set and maintain concrete forms and perform finishing operations to ensure that the completed WORK is within tolerances. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the permissible variation from lines, grades, or dimensions indicated on the Drawings. Where tolerances are not stated in the specifications, permissible deviations will be in accordance with ACI 117 – Standard Tolerance for Concrete Construction and Materials.

1. The following non-cumulative construction tolerances apply to finished walls and slab unless otherwise indicated:

Item	**Tolerance**
Variation of the constructed linear outline from the established position in plan.	In 10-feet: 1/4-inch; In 20-feet or more: 1/2-inch
Variation from the level or from the grades indicated.	In 10-feet: 1/4-inch; In 20-feet or more: 1/2-inch
Variation from plumb	In 10-feet: 1/4-inch; In 20-feet or more: 1/2-inch
Variation in the thickness of slabs and walls.	Minus 1/4-inch; Plus 1/2-inch
Variation in the locations and sizes of slabs and wall openings	Plus or minus 1/4-inch

PART 2 -- PRODUCTS

2.1 CONCRETE MATERIALS

A. General

1. Materials shall be classified as acceptable for potable water use according to NSF Standard 61.

2. Cement for concrete that will contact potable water shall not be obtained from kilns that burn metal rich hazardous waste fuel.

3. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Cement reclaimed from cleaning bags or leaking containers shall not be used. Cement shall be used in the sequence of receipt of shipments.

B. Materials shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.

C. Storage of materials shall conform to the requirements of Section 205 of ACI 301.

D. Materials for concrete shall conform to the following requirements:

1. Cement shall be standard brand Portland cement conforming to ASTM C 150 –Portland cement, for Type II or Type V. A minimum of 85 percent of cement by weight shall pass a 325 screen. A single brand of cement shall be used throughout the WORK, and prior to its use, the brand shall be accepted by the ENGINEER. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports, including fineness, for each shipment of cement to be used shall be submitted to the ENGINEER, if requested, regarding compliance with these specifications.

2. Water for mixing and curing shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts, and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (greater than 1000 mg/l TDS) shall not be used.

3. Aggregates shall be obtained from pits acceptable to the ENGINEER, shall be non-reactive, and shall conform to the requirements of ASTM C 33 – Concrete Aggregates. Maximum size of coarse aggregate shall be as indicated. Lightweight sand for fine aggregate will not be permitted.

a. Coarse aggregates shall consist of clean, hard, durable gravel, crushed gravel, crushed rock, or a combination thereof. The coarse aggregates shall be prepared and handled in 2 or more size groups for combined aggregates with a maximum size greater than 3/4-inch. When the aggregates are proportioned for each batch of concrete, the 2 size groups shall be combined. See the article below entitled "Trial Batch and Laboratory Tests" for the use of the size groups.

b. Fine aggregates shall be natural sand or a combination of natural and manufactured sand that is hard and durable. When tested in accordance with ASTM D 2419 – Test Methods for Sand Equivalent Value of Soils and Fine Aggregate, the sand equivalency shall not be less than 75 percent for an average of 3 samples, nor less than 70 percent for an individual test. Gradation of fine aggregate shall conform to ASTM C 33 when tested in accordance with ASTM C 136 for the fineness modulus of the sand used, including the optional grading in Section 6.2. The fineness modulus of sand used shall not be over 3.1.

c. Combined aggregates shall be well graded from coarse to fine sizes and shall be uniformly graded between screen sizes to produce a concrete that has optimum workability and consolidation characteristics. Where a trial batch is required for a mix design, the final combined aggregate gradations will be established during the trial batch process.

d. When tested in accordance with ASTM C 33, the ratio of silica released to reduction in alkalinity shall not exceed 1.0.

e. When tested in accordance with ASTM C 33, the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.

f. When tested in accordance with ASTM C 33, the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions or 10.5 percent after 100 revolutions.

g. When tested in accordance with ASTM C 33, the loss resulting after 5 cycles of the soundness test shall not exceed 10 percent for fine aggregate and 12 percent for coarse aggregate when using sodium sulfate.

4. Ready-mix concrete shall conform to the requirements of ASTM C 94 – Ready Mixed Concrete.

5. Gouts shall consist of Portland cement, water, and or sand. Grout shall achieve a compressive strength of 11,000 psi at 28 days.

6. Admixtures: Admixtures shall be compatible and be furnished by a single manufacturer capable of providing qualified field service representation. Admixtures shall be used in accordance with manufacturer's recommendations. If the use of an admixture is producing an inferior end result, the CONTRACTOR shall discontinue use of the admixture. Admixtures shall not contain thiocyanates nor more than 0.05 percent chloride ion, and shall be non-toxic after 30 days.

   a. Air-entraining agent meeting the requirements of ASTM C 260 – Air Entraining Admixtures for Concrete shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 5 percent. Concrete floors to receive a dry-shake floor hardener shall have an air content not to exceed 3 percent. The OWNER reserves the right, at any time, to sample and test the air-entraining agent. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement. Air content shall be tested at the point of placement. Air entraining agent shall be Micro-Air by Master Builders; Daravair by W.R. Grace; Sika AEA-15 by Sika Corporation; or equal.

   b. Waterproofing admixtures: Incorporate Xypex, or equal waterproofing admixture into the concrete to be used in the slab foundations of the Equalization tank and Package Plant System at a rate of 12 lbs. per cubic yard, and in accordance with manufacturer’s instructions.

   c. Set controlling and water reducing admixtures: Admixtures may be added at the CONTRACTOR's option, subject to the ENGINEER's approval, to control the set, effect water reduction, and increase workability. The cost of adding an admixture shall be the CONTRACTOR's responsibility. Concrete containing an admixture shall be first placed at a location determined by the ENGINEER. Admixtures shall conform to the requirements of ASTM C 494 – Chemical Admixtures for Concrete. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used.

      1) Concrete shall not contain more than one water reducing admixture.

2) Set controlling admixture may be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently greater than 80 degrees F, a set retarding admixture such as Plastocrete 161MR by Sika Corporation; Pozzolith 300R by Master Builders; Daratard by W.R. Grace; or equal shall be used. Where the air temperature at the time of placement is expected to be consistently less than 40 degrees F, a non-corrosive set accelerating admixture such as Plastocrete 161FL by Sika Corporation; Pozzutec 20 by Master Builders; Polarset by W.R. Grace; or equal shall be used.

3) Normal range water reducer shall conform to ASTM C 494, Type A. WRDA 64 or 79 by W.R. Grace; Pozzolith 322-N by Master Builders; Plastocrete 161 by Sika Corporation; or equal. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.

4) High range water reducer shall conform to ASTM C 494, Type F or G. Daracem 100 or ADVA 100 by W.R. Grace; Sikament FF or Sikament 86 by Sika Corporation; Rheobuild 1000 by Master Builders; or equal. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified. No more than 14 ounces of water reducer per sack of cement shall be used. Water reducer shall be considered as part of the mixing water when calculating the water/cement ratio.

5) If the high range water reducer is added to the concrete at the Site, it may be used in conjunction with the same water reducer added at the batch plant. Concrete shall have a slump of 3-inches plus or minus 1/2-inch prior to adding the high range water reducing admixture at the Site. The high range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the primary system.

6) Concrete shall be mixed at mixing speed for a minimum of 70 mixer revolutions or 5 minutes after the addition of the high range water reducer, unless recommended otherwise by the manufacturer.

7) Flyash: Flyash shall not be used.

2.2 CURING MATERIALS

A. Materials for curing concrete shall conform to the following requirements and ASTM C 309 – Liquid Membrane – Forming Components for Curing Concrete.

1. Curing compounds shall be white pigmented, resin based, and compliant with local VOC requirements. Sodium silicate compounds shall not be allowed. Concrete curing compound shall be Kurez VOX White Pigmented by Euclid Chemicals Company; L&M Cure R-2 by L&M Construction Chemicals; 1200-White by W.R. Meadow; or equal. When curing compound must be removed for finishes or grouting, compounds shall be Korez DR VOX by Euclid Chemical Company; Masterkure-100W by ChemRex MBT; L&M Cure R-2 by L & M Construction Chemicals;1100-Clear by W.R. Meadows; or equal.

2. Polyethylene sheet for use as concrete curing blanket shall be white and shall have a nominal thickness of 6-mils. The loss of moisture when determined in accordance with the requirements of ASTM C 156 – Test Method for Water Retention by Concrete Curing Materials, shall not exceed 0.055 grams per square centimeter of surface.

3. Polyethylene-coated waterproof paper sheeting for use as concrete curing blanket shall consist of white polyethylene sheeting free of visible defects, uniform in appearance, have a nominal thickness of 2-mils, and be permanently bonded to waterproof paper conforming to the requirements of Federal Specification UU-B-790A – Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant). The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 gram per square centimeter of surface.

4. Polyethylene-coated burlap for use as concrete curing blanket shall be 4-mil thick, white opaque polyethylene film impregnated or extruded into one side of the burlap. Burlap shall weigh not less than 9 ounces per square yard. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 grams per square centimeter of surface.

5. Curing mats for use in Curing Method 6 below, shall be heavy shag rugs or carpets or cotton mats quilted at 4-inches on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.

6. Evaporation retardant shall be a material such as Confilm by ChemRex MBT; Eucobar by Euclid Chemical Company; E-CON by L & M Construction Chemicals, Inc.; or equal.

2.3 NON-WATERSTOP JOINT MATERIALS

A. Materials for non-waterstop joints in concrete shall conform to the following requirements:

1. Preformed joint filler shall be a non-extruding, neoprene sponge or polyurethane type conforming to Section 03290 - Joints in Concrete.

2. Elastomeric joint sealer shall conform to the requirements of Section 07920 - Sealants and Caulking.

3. Mastic joint sealer shall be a material that does not contain evaporating solvents; that will tenaciously adhere to concrete surfaces; that will remain permanently resilient and pliable; that will not be affected by continuous presence of water and will not in any way contaminate potable water; and that will effectively seal the joints against moisture infiltration even when the joints are subject to movement due to expansion and contraction. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable mastic substance containing no volatile oils or lubricants and shall be capable of meeting the test requirements set forth below, if testing is required by the ENGINEER.

2.4 MISCELLANEOUS MATERIALS

A. Dampproofing agent shall be an asphalt emulsion such as Hydrocide 600 by ChemRex Sonneborn; Emulsified Asphalt by Euclid Chemical Company; Sealmastic by W. R. Meadows Inc., or equal.

B. Bonding agents shall be epoxy adhesives conforming to the following:

1. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur 32 Hi-Mod Epoxy Adhesive by Sika Corporation; Concresive Liquid (LPL), by ChemRex MBT; BurkEpoxy MV by Burke by Edoco; or equal.

2. For bonding hardened concrete or masonry to steel, Sikadur 31 Hi-Mod Gel by Sika Corporation; BurkEpoxy NS by Burke by Edoco; Concresive Paste (LPL) by ChemRex MBT; or equal.

C. Vapor Retarder: Vapor retarder shall be 30-mil thick, Class A, 3 ply, nylon or polyester cord reinforced high density polyethylene sheet laminated to a non-woven geotextile fabric, in accordance with ASTM E 1745 - Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs. Reef Industries, Inc., Griffolyn T-65 G or equal.

D. Granular Material Above Vapor Retarder: Crushed stone, gravel, or sand with the following size distribution and meeting the deleterious substance limits of ASTM C 33 for fine aggregates.

Sieve Size	**Percentage Passing**
3/8-inch	100
4.75 mm	85-100
No. 100	10 – 30

E. Seams in vapor retarder sheet shall be sealed with tape, adhesive, or other material as recommended by sheet manufacturer for the areas to be sealed and sheet material.

F. Colorant for duct bank concrete shall be an integral red oxide coloring pigment used in the proportion of 8 pounds per cubic yard of concrete.

2.5 CONCRETE DESIGN REQUIREMENTS

A. General: Concrete shall be composed of cement, admixtures, aggregates, and water of the qualities indicated. The exact proportions in which these materials are to be used for different parts of the WORK will be determined during the trial batch. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage, and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results. Changes shall be subject to review by the ENGINEER.

B. Fine Aggregate Composition: In mix designs for structural concrete, the percentage of fine aggregate in total aggregate by weight, shall be as indicated in the following table.

FINE AGGREGATE	
Fineness Modulus	**Maximum Percent**
2.7 or less	41
2.7 to 2.8	42
2.8 to 2.9	43
2.9 to 3.1	44

1. For other concrete, the maximum percentage of fine aggregate of total aggregate, by weight, shall not exceed 50.

C. Duct bank concrete shall contain an integral red-oxide coloring pigment. Concrete shall be dyed red throughout. Surface treatment to color duct banks will not be acceptable.

D. Water/Cement Ratio and Compressive Strength: The water/cement ratio indicated is for saturated-surface dry condition of aggregate. Every Day, throughout the day, the batch water added shall be adjusted for the total free water in the aggregates.

1. Total free moisture of aggregates shall be determined by:

   a. Starting with the total moisture content of all aggregate, calculated by ASTM C 566 -Test Method for Total Moisture Content of Aggregate by Drying

   b. Subtracting the moisture absorbed by the coarse aggregate, calculated by ASTM C 127 – Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate

   c. Subtracting the moisture absorbed by the fine aggregate, calculated by ASTM C 128 – Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregate

2. Concrete shall have the following minimum properties:

Type of Work	Min 28-Day Compressive Strength, psi	Maximum Size Aggregate, in	Cement Content per cubic yd, lbs	Maximum W/C Ratio (by weight)
Structural Concrete				
Roof, floor slabs, columns, walls, and all other concrete items not indicated elsewhere.	4,000	1	564 to 600	0.45
12-inch and thicker walls, slabs on grade, and footings (optional)	4,000	1-1/2	564 to 600	0.45
Pea Gravel Concrete				
Thin sections and areas with congested reinforcing, at the CONTRACTOR'S option and with the written approval of the ENGINEER for the specific location. Maximum fine aggregate 50 percent by weight of aggregate.	4,000	3/8	752 to 788	0.40
Sitework concrete	3,000	1	470 (min)	0.50
Lean concrete	2,000	1	376 (min)	0.60

NOTE: The CONTRACTOR is cautioned that the limiting parameters above are not a mix design. Admixtures may be required to achieve workability required by the CONTRACTOR'S construction methods and aggregates. The CONTRACTOR is responsible for providing concrete with the required workability.

E. Adjustments to Mix Design: The CONTRACTOR may elect to decrease the water/cement ratio to achieve the strength and shrinkage requirements and/or add water reducers, as required to achieve workability. The mixes shall be changed whenever such change is necessary or desirable to secure the required strength, density, workability, and surface finish, and the CONTRACTOR shall be entitled to no additional compensation because of such changes. Any changes to the accepted concrete mix design shall be submitted to the ENGINEER for review and shall be tested again in accordance with these Specifications.

2.6 CONSISTENCY

A. The quantity of water in a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete that can be worked properly into place without segregation and which can be compacted by vibratory methods to give the desired density, impermeability, and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143 – Test Method for Slump of Hydraulic Cement Concrete. The slumps shall be as follows:

Part of Work	**Slump (in)**
All concrete, unless indicated otherwise	3-inches plus or minus 1-inch
With high range water reducer added	7-inches plus or minus 2-inches
Pea gravel mix	7-inches plus or minus 2-inches
Ductbank and pipe encasement	5-inches plus or minus 1-inch

2.7 TRIAL BATCH AND LABORATORY TESTS

A. The CONTRACTOR shall only use a mix design for construction that has first met the trial batch testing requirements.

B. Before placing any concrete, a testing laboratory selected by the ENGINEER shall prepare a trial batch of each class of structural concrete, based on the preliminary concrete mixes submitted by the CONTRACTOR. During the trial batch the aggregate proportions may be adjusted by the testing laboratory using the two coarse aggregate size ranges to obtain the required properties. If one size range produces an acceptable mix, a second size range need not be used. Such adjustments will be considered refinements to the mix design and will not be the basis for extra compensation to the CONTRACTOR. Concrete shall conform to the requirements of this Section, whether the aggregate proportions are from the CONTRACTOR's preliminary mix design, or whether the proportions have been adjusted during the trial batch process. The trial batch shall be prepared using the aggregates, cement, and admixture proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain 3 drying shrinkage, and 6 compression test specimens from each batch.

C. The determination of compressive strength will be made by testing 6-inch diameter by 12-inch high cylinders; made, cured and tested in accordance with ASTM C 192 - Practice for Making and Curing Concrete Test Specimens in the Laboratory and ASTM C 39. Three compression test cylinders will be

tested at 7 Days and 3 at 28 Days. The average compressive strength for the 3 cylinders tested at 28 Days for any given trial batch shall not be less than 125 percent of the indicated compressive strength.

D. A sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements of ASTM C 136 – Method for Sieve Analysis of Fine and Coarse Aggregates. Values shall be given for percent passing each sieve.

2.8 SHRINKAGE LIMITATION

A. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21 Day drying age or at 28 Day drying age shall be 0.036 percent or 0.042 percent, respectively. Standard deviation will not be considered. The CONTRACTOR shall only use a mix design for construction that has first met the trial batch shrinkage requirements. Shrinkage limitations apply only to structural concrete.

B. The maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than 25 percent.

C. If the required shrinkage limitation is not met during construction, the CONTRACTOR shall take any or all of the following actions to reestablish compliance. These actions may include changing the source of aggregates, cement and/or admixtures; reducing water/cement ratio; washing of coarse and/or fine aggregate to reduce fines; increasing the number of construction joints; modifying the curing requirements; or other actions designed to minimize shrinkage or the effects of shrinkage.

2.9 MEASUREMENT OF CEMENT AND AGGREGATE

A. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment furnished by the CONTRACTOR and acceptable to the ENGINEER.

B. Weighing tolerances

Material	**Percent of Total Weight**
Cement	1
Aggregates	3
Admixtures	3

2.10 MEASUREMENT OF WATER

A. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the ENGINEER and capable of measuring the water in variable amounts within a tolerance of one percent. The water feed control mechanism shall be capable of being locked in position so as to deliver constantly any required amount of water to each batch of concrete. A positive quick-acting valve shall be used for a cut-off in the water line to the mixer. The operating mechanism shall prevent leakage when the valves are closed.

2.11 READY-MIXED CONCRETE

A. At the CONTRACTOR'S option, ready-mixed concrete may be used if it meets the requirements as to materials, batching, mixing, transporting, and placing indicated herein and is in accordance with ASTM C 94, including the following supplementary requirements.

B. Ready-mixed concrete shall be delivered to the WORK, and discharge shall be completed within one hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first.

C. Truck mixers shall be equipped with electrically actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.

D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. Materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

E. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than one-inch when the required slump is 3-inches or less, or if they differ by more than 2-inches when the required slump is more than 3-inches, the mixer shall not be used on the WORK unless the causative condition is corrected and satisfactory performance is verified by additional slump tests. Mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

F. Each batch of ready-mixed concrete delivered to the Site shall be accompanied by a delivery ticket furnished to the ENGINEER in accordance with the Paragraph above entitled "Delivery Tickets."

G. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the ENGINEER.

PART 3 -- EXECUTION

3.1 PROPORTIONING AND MIXING

A. Proportioning: Proportioning of the mix shall conform to the requirements of Chapter 3 "Proportioning" of ACI 301.

B. Mixing: Mixing shall conform to the requirements of Chapter 7 of ACI 301.

C. Slump: Slumps shall be as indicated herein.

D. Retempering: Retempering of concrete or mortar that has partially hardened shall not be permitted.

3.2 PREPARATION OF SURFACES FOR CONCRETING

A. General: Earth surfaces shall be thoroughly wetted by sprinkling prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. Vapor Retarder Sheet

1. Sheet shall be installed under on-grade building floor slabs of occupiable (non-hydraulic) structures and at other locations indicated.

2. Sand base shall be at least 2-inches thick within the foundation line after moistening and compaction by mechanical means. Sand surface shall be flat and level within a tolerance of plus 0-inches to minus 3/4-inch.

3. Place, protect, and repair defects in sheet according to ASTM E 1643 – Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs, and the manufacturer's written instructions. Seams shall be lapped and sealed in accordance with ASTM E 1643.

4. Granular material above the sheet shall be moistened and compacted to 2-inches thickness within the same flatness criteria as the sand base.

C. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the concrete has been stopped or interrupted so that, as determined by the ENGINEER, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bonding. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, foreign material, and be roughened to a minimum 1/4-inch amplitude. Such cleaning and roughening shall be accomplished by hydroblasting or sandblasting (exposing aggregate) followed by thorough washing. Pools of water shall be removed from the surface of construction joints before the new concrete is placed.

D. After the surfaces have been prepared, each approximately horizontal construction joint shall be covered with a 6-inch lift of a pea gravel mix. The mix shall be placed and spread uniformly. Wall concrete shall follow immediately and shall be placed upon the fresh pea gravel mix.

E. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent WORK; provided that construction joints shall be made only where acceptable to the ENGINEER.

F. Embedded Items: No concrete shall be placed until formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the ENGINEER at least 4 hours before placement of concrete. Surfaces of forms and embedded items that have become encrusted with dried grout from previous usage shall be cleaned before the surrounding or adjacent concrete is placed.

G. Inserts or other embedded items shall conform to the requirements herein.

H. Reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms at locations indicated on the Drawings or shown by Shop Drawings and shall be acceptable to the

ENGINEER before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.

I. Casting New Concrete Against Old: Where concrete is to be cast against old concrete (any concrete which is greater than 60 Days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydroblasting or sandblasting to expose aggregate. The joint surface shall be coated with an epoxy bonding agent unless indicated otherwise by the ENGINEER.

J. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the WORK. No concrete shall be deposited underwater nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, shall be subject to the review of the ENGINEER.

K. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2-inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

L. Openings for pipes, inserts for pipe hangers and brackets, and anchors shall, where practicable, be provided during the placing of concrete.

M. Anchor bolts shall be accurately set and shall be maintained in position by templates while being embedded in concrete.

N. Cleaning: The surfaces of metalwork to be in contact with concrete shall be thoroughly cleaned of dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.3 HANDLING, TRANSPORTING, AND PLACING

A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section. No aluminum materials shall be used in conveying any concrete.

B. Non-Conforming WORK or Materials: Concrete which during or before placing is found not to conform to the requirements indicated herein shall be rejected and immediately removed from the WORK. Concrete which is not placed in accordance with these requirements or which is of inferior quality shall be removed and replaced.

C. Unauthorized Placement: No concrete shall be placed except in the presence of a duly authorized representative of the ENGINEER. The CONTRACTOR shall notify the ENGINEER in writing at least 24 hours in advance of placement of any concrete.

D. Placement in Wall and Column Forms: Concrete shall not be dropped through reinforcement steel or into any deep form, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, means such as hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete below the ends of ducts, chutes, or buggies exceed 4-feet in walls and 8-feet in columns. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing

shall any portion be displaced in the forms more than 6-feet in horizontal direction. Concrete in wall forms shall be deposited in uniform horizontal layers not deeper than 2-feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in wall forms shall not exceed 5-feet of vertical rise per hour. Sufficient illumination shall be provided in the interior of forms so that the concrete at the places of deposit is visible from the deck or runway.

E. Casting New Concrete Against Old: Epoxy adhesive bonding agent shall be applied to the old surfaces according to the manufacturer's written recommendations. This provision shall not apply to joints where waterstop is provided. See Section 03290 - Joints in Concrete.

F. Conveyor Belts and Chutes: Ends of chutes, hopper gates, and other points of concrete discharge throughout the CONTRACTOR'S conveying, hoisting, and placing system shall be designed and arranged so that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the ENGINEER. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the indicated consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. Conveyor belts and chutes shall be covered.

G. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement. As the WORK progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

H. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 55 degrees F for sections less than 12-inches thick nor less than 50 degrees for other sections. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the minimum temperature. When the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 45 minutes. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete below 90 degrees F as it is placed. The CONTRACTOR shall be entitled to no additional compensation on account of the foregoing requirements.

I. Cold Weather Placement

1. Placement of concrete shall conform to ACI 306.1 - Cold Weather Concreting, and the following.

2. Remove snow, ice, and frost from the surfaces, including reinforcement, against which concrete is to be placed. Before beginning concrete placement, thaw the subgrade to a minimum depth of 6-inches. Reinforcement and embedded items shall be warmed to above 32 degrees F prior to concrete placement.

3. Maintain the concrete temperature above 50 degrees F for at least 72 hours after placement.

3.4 PUMPING OF CONCRETE

A. General: If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment: The pumping equipment shall have 2 cylinders and be designed to operate with one cylinder in case the other one is not functioning. In lieu of this requirement, the CONTRACTOR may have a standby pump on the Site during pumping.

C. The minimum diameter of the hose conduits shall be in accordance with ACI 304.2R – Placing Concrete by Pumping Methods.

D. Pumping equipment and hose conduits that are not functioning properly shall be replaced.

E. Aluminum conduits for conveying the concrete shall not be permitted.

F. Field Control: Concrete samples for slump, air content, and test cylinders will be taken at the placement end of the hose.

3.5 ORDER OF PLACING CONCRETE

A. The order of placing concrete in all parts of the WORK shall be acceptable to the ENGINEER. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints at the indicated locations. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least 5 Days for hydraulic structures and 2 Days for all other structures before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the 2 adjacent wall panels have cured at least 10 Days for hydraulic structures and 4 Days for all other structures.

B. The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about 1/2-inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and laitance shall be removed.

3.6 TAMPING AND VIBRATING

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete. Vibrators shall be Group 3 per ACI 309 – Consolidation of Concrete, high speed power vibrators (8000 to 12,000 rpm) of an immersion type in sufficient number and with at least one standby unit as required. Group 2 vibrators may be used only at specific locations when accepted by the ENGINEER.

B. Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.

C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against each surface. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the required results within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall

not contact the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.7 FINISHING CONCRETE SURFACES

A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions indicated are defined as tolerances and are indicated above. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.

B. Formed Surfaces: No treatment is required after form removal except for curing, repair of defective concrete, treatment of surface defects and as noted below in 3.08.A.

1. Basins and exposed walls shall be given a smooth finish as indicated below.

C. Unformed Surfaces: After proper and adequate vibration and tamping, unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant. The retardant shall be used again after each work operation as necessary to prevent drying shrinkage cracks. The classes of finish for unformed concrete surfaces are designated and defined as follows:

1. Finish U1 - Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8-inch. No further special finish is required.

2. Finish U2 - After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades. Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities shall not exceed 1/4-inch. Joints and edges shall be tooled where indicated or as determined by the ENGINEER.

3. Finish U3 - After the Finish U2 surface has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples, and trowel marks. The finish shall be smooth and free of all irregularities.

4. Finish U4 - Trowel the Finish U3 surface to remove local depressions or high points. In addition, the surface shall be given a light broom finish with brooming perpendicular to drainage unless otherwise indicated. The resulting surface shall be rough enough to provide a nonskid finish.

5. Unformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE	
Area	**Finish**
Grade slabs and foundations to be covered with concrete or fill material	U1
Floors to be covered with grouted tile or topping grout	U2
Water bearing slabs with slopes 10 percent and less	U3
Water bearing slabs with slopes greater than 10 percent	U4
Slabs not water bearing	U4
Top surface of walls U3	U3

3.8 ARCHITECTURAL FINISH

A. General: Architectural finishes shall be provided only where specifically indicated below. In other locations, the paragraph entitled Finishing Concrete Surfaces, shall apply.

Location	Finish
Formed and unformed surfaces above grade and exposed to view	Smooth Concrete Finish

B. Immediately after the forms have been stripped, the concrete surface shall be inspected and any poor joints, voids, rock pockets, or other defective areas shall be repaired and form-tie holes filled as indicated herein.

C. Architectural finishes shall not be applied until the concrete surface has been repaired as required and the concrete has cured at least 14 Days.

D. Smooth Concrete Finish

1. The concrete surface shall be wetted, and a grout shall be applied with a brush. The grout shall be made by mixing one part Portland cement and one part of fine sand that will pass a No. 16 sieve with sufficient water to give it the consistency of thick paint. The cement used in said grout shall be 1/2 gray and 1/2 white Portland cement, or other proportion as determined by the ENGINEER. White Portland cement shall be Atlas white, or equal. Calcium chloride at 5 percent by volume of the cement shall be used in the brush coat. The freshly applied grout shall be vigorously rubbed into the concrete surface with a wood float filling all small air holes. After all the surface grout has

been removed with a steel trowel, the surface shall be allowed to dry and, when dry, shall be vigorously rubbed with burlap to remove completely all surface grout so that there is no visible paint-like film of grout on the concrete. The entire cleaning operation for any area shall be completed the day it is started, and no grout shall be left on the surface overnight.

2. Cleaning operations for any given day shall be terminated at panel joints. It is required that the various operations be carefully timed to secure the desired effect which is a light-colored concrete surface of uniform color and texture without any appearance of a paint or grout film.

3. In the event that improper manipulation results in an inferior finish, the CONTRACTOR shall rub such inferior areas with carborundum bricks.

4. Before beginning any of the final treatment on exposed surfaces, the CONTRACTOR shall treat in a satisfactory manner a trial area of at least 200 square feet in some inconspicuous place selected by the ENGINEER and shall preserve said trial area undisturbed until final completion.

3.9 CURING AND DAMPPROOFING

A. General: Concrete shall be cured for not less than 7 Days after placing, in accordance with the methods indicated below for the different parts of the WORK.

Surface to be Cured or Dampproofed	**Method**
Unstripped forms	1
Wall sections with forms removed	6
Construction joints between footings and walls, and between floor slab and columns	2
Encasement and ductbank concrete and thrust blocks	3
All concrete surfaces not specifically indicated in this Paragraph	4
Floor slabs on grade in hydraulic structures	5
Slabs not on grade	6

B. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removal. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 7 Days of placing the concrete, curing shall be continued in accordance with Method 6 below.

C. Method 2: The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.

D. Method 3: The surface shall be covered with moist earth not less than 4 hours nor more than 24 hours after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 Days after placement of concrete.

E. Method 4: The surface shall be sprayed with a liquid curing compound.

1. It shall be applied in accordance with the manufacturer's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film that will seal thoroughly.

2. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the 7 Day curing period. If the seal is damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.

3. Wherever curing compound has been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, compound shall be entirely removed by wet sandblasting just prior to the placing of new concrete.

4. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces and within 2 hours after removal of forms. Repairs to formed surfaces shall be made within the 2 hour period; provided, however, that any such repairs which cannot be made within the said 2 hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound.

5. At locations where concrete is placed adjacent to a panel which has been coated with curing compound, the panel shall have curing compound reapplied to an area within 6-feet of the joint and to any other location where the curing membrane has been disturbed.

6. Prior to final acceptance of the WORK, visible traces of curing compound shall be removed from surfaces in such a manner that does not damage the surface finish.

F. Method 5

1. Until the concrete surface is covered with curing compound, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed. The concrete shall be given a coat of curing compound in accordance with Method 4 above. Not less than one hour nor more than 4 hours after the curing compound has been applied, the surface shall be wetted with water delivered through a fog nozzle, and concrete-curing blankets shall be placed on the slabs. The curing blankets shall be polyethylene sheet, polyethylene-coated waterproof paper sheeting, or polyethylene-coated burlap. The blankets shall be laid with the edges butted together and with the joints between strips sealed with 2-inch wide strips of sealing tape or with edges lapped not less than 3-inches and fastened together with a waterproof cement to form a continuous watertight joint.

2. The curing blankets shall be left in place during the 7 Day curing period and shall not be removed until after concrete for adjacent work has been placed. If the curing blankets become torn or otherwise ineffective, the CONTRACTOR shall replace damaged sections. During the first 3 Days of the curing period, no traffic of any nature and no depositing, temporary or otherwise, of any materials shall be permitted on the curing blankets. During the remainder of the curing period, foot traffic and temporary depositing of materials that impose light pressure will be permitted only on top of plywood sheets 5/8-inch minimum thickness, laid over the curing blanket. The

CONTRACTOR shall add water under the curing blanket as often as necessary to maintain damp concrete surfaces at all times.

G. Method 6: This method applies to both walls and slabs.

1. The concrete shall be kept continuously wet by the application of water for a minimum period of at least 7 Days beginning immediately after the concrete has reached final set or forms have been removed.

2. Until the concrete surface is covered with the curing medium, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed.

3. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period. The curing medium shall be weighted or otherwise held substantially in contact with the concrete surface to prevent being dislodged by wind or any other causes. Edges shall be continuously held in place.

4. The curing blankets and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours.

5. Immediately after the application of water has terminated at the end of the curing period, the curing medium shall be removed, the entire concrete surface shall be wetted, and curing compound shall be immediately applied to the entire surface in accordance with Method 4 above.

6. The CONTRACTOR shall dispose of excess water from the curing operation to avoid damage to the WORK.

H. Damp proofing

1. The exterior surfaces of roof slabs to be buried and walls to be backfilled shall be dampproofed as follows.

2. Immediately after completion of curing the surface shall be sprayed with a dampproofing agent consisting of an asphalt emulsion. Application shall be in 2 coats. The first coat shall be diluted to one-half strength by the addition of water and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon of dilute solution. The second coat shall consist of an application of the undiluted material, and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon. Dampproofing material shall be as indicated above.

3. As soon as the material has taken an initial set, the entire area thus coated shall be coated with whitewash. Any formula for mixing the whitewash may be used if it produces a uniformly coated white surface and remains until placing of the backfill. If the whitewash fails to remain on the surface until the backfill is placed, the CONTRACTOR shall apply additional whitewash.

3.10 PROTECTION

A. The CONTRACTOR shall protect concrete against injury until final acceptance.

B. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever precipitation is imminent or occurring.

3.11 CURING IN COLD WEATHER

A. Water curing of concrete may be reduced to 6 Days during periods when the mean daily temperature in the vicinity of the Site is less than 40 degrees F; provided that, during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing shall be temporarily discontinued.

B. Concrete cured by an application of curing compound will require no additional protection from freezing if the protection at 50 degrees F for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces; otherwise the concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours protection at 50 degrees F. Concrete cured by water shall be protected against freezing temperatures for 72 hours immediately following the 72 hours of protection at 50 degrees F.

C. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40 degrees F in 24 hours. In the spring, when the mean daily temperature rises above 40 degrees F for more than 3 successive Days, the required 72-hour protection at a temperature not lower than 50 degrees F may be discontinued for as long as the mean daily temperature remains above 40 degrees F; provided, that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

D. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound; provided, that the use of curing compound for such surfaces is otherwise permitted.

3.12 TREATMENT OF SURFACE DEFECTS

A. As soon as forms are removed, exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the ENGINEER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall be repaired as indicated below. Concrete containing extensive voids, holes, honeycombing, or similar depression defects shall be completely removed and replaced. Repairs and replacements shall be performed promptly.

B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, plus not less than 1/32-inch depth of the surface film from all hard portions by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces underneath will remain moist but not so wet as to overcome the suction upon which a good bond depends. The material used for repair shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white Portland cement as is required to make the color of the patch match the color of the surrounding concrete.

C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. Holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section and other

imperfections having a depth greater than their least surface dimension shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.

D. Repairs shall be built up and shaped in such a manner that the completed WORK will conform to the requirements of this Section, as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

E. Prior to filling any structure with water, cracks shall be "vee'd" as indicated and filled with sealant conforming to the requirements of Section 03290 - Joints in Concrete. This repair method shall be done on the water bearing face of members. Prior to backfilling, faces of members in contact with fill which are not covered with a waterproofing membrane shall also have cracks repaired as indicated herein.

3.13 PATCHING HOLES IN CONCRETE

A. Patching Small Holes

1. Holes that are less than 12-inches in the least dimension and extend completely through concrete members shall be filled.

2. Small holes in members that are water-bearing or in contact with soil or other fill material shall be filled with non-shrink grout. Where a face of the member is exposed to view, the non-shrink grout shall be held back 2-inches from the finished surface. The remaining 2-inches shall then be patched according to the Article above entitled "Treatment of Surface Defects."

3. Small holes through all other concrete members shall be filled with non-shrink grout, with exposed faces treated as above.

B. Patching Large Holes

1. Holes which are larger than 12-inches in the least dimension shall have a keyway chipped into the edge of the opening all around, unless a formed keyway exists. The holes shall then be filled with concrete as indicated herein.

2. Holes which are larger than 24-inches in the least dimension and which do not have reinforcing steel extending from the existing concrete, shall have reinforcing steel set in grout in drilled holes. The reinforcing added shall match the reinforcing in the existing wall unless indicated otherwise.

3. Large holes in members that are water bearing or in contact with soil or other fill shall have a hydrophilic type waterstop material placed around the perimeter of the hole in accordance with Section 03290 - Joints in Concrete, unless there is an existing waterstop in place.

3.14 CARE AND REPAIR OF CONCRETE

A. The CONTRACTOR shall protect concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed WORK, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete.

END OF SECTION 03300

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide grout, complete and in place, in accordance with the Contract Documents.

B. The following types of grout are specified in this Section:

1. Cement Grout

2. Non-Shrink Grout - Class I (cement based)

3. Non-Shrink Grout - Class II (cement based)

4. Non-Shrink Epoxy Grout

5. Topping Grout and Concrete/Grout Fill

1.2 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M171	Standard Specification for Sheet Materials for Curing Concrete
AASHTO M182	Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

B. ASTM International (ASTM)

ASTM C307	Standard Test Method for Tensile Strength of Chemical – Resistant Mortar, Grouts, and Monolithic Surfaces
ASTM C496	Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
ASTM C579	Standard Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfaces, and Polymer Concretes
ASTM C580	Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical – Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes
ASTM C827	Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
ASTM C882	Standard Test Method for Bond Strength of Epoxy Resin Systems Used with Concrete by Slant Shear

ASTM C939	Standard Test Method for Flow of Grout for Pre-placed Aggregate Concrete (Flow Cone Method)
ASTM C1090	Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic – Cement Grout
ASTM C1107	Standard Specification for Packaged Dry Hydraulic Cement Grout (Nonshrink)

C. International Concrete Repair Institute

1. Technical Guide for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

D. Louisiana Department of Transportation and Development Testing Procedures (LDOTD)

TR 226	Making, Field Curing, and Transporting Concrete Specimens
TR 230	Curing, Capping, and Determining the Compressive Strength of Molded Concrete Cylinders

1.3 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

A. The CONTRACTOR shall furnish submittals in accordance with Section 01010 – Summary of Work.

B. Grout (All Types):

1. Submittal/Source Approval: The CONTRACTOR shall submit Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each type of grout used in the WORK, and location of use. The submittal shall contain a certification that grouts used on the project contain no chlorides or other chemicals that cause corrosion. A certification that non-shrink grout does not contain aluminum, zinc, or magnesium powders as a method of expansion shall be included for non – shrink grouts.

2. Acceptance: The CONTRACTOR shall submit a certificate of compliance for all shipments of grout to the WORK.

3. Verification: If required by the ENGINEER, compression test specimens will be taken. If required, specimens will be taken at intervals thereafter selected by the ENGINEER. The specimens will be made by the ENGINEER or its representative. Compression tests and fabrication of specimens for cement grout and cement based non-shrink grout will be performed in accordance with ASTM C 1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink), at intervals during construction selected by the ENGINEER. A set of 3 specimens will be made for testing at 7 Days, 28 Days, and each additional time period as appropriate. Compression tests and fabrication of specimens for epoxy grouts will be performed in accordance with ASTM C 579 - Test Methods for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacings and Polymer Concretes, Method B, at intervals during construction selected by the ENGINEER. A set of 3 specimens will be made for testing at 7 Days and each earlier time period as appropriate. Compression tests for fabrication of specimens for topping grout and concrete/grout fill will be performed in accordance with LDOTD TR 226. The cost of laboratory tests on grout will be paid by the OWNER except where test results show the grout to be defective. In such case, the CONTRACTOR shall pay for the tests, removal and replacement of Defective Work, and re-testing, all as part of the WORK. The CONTRACTOR shall assist the ENGINEER

in obtaining specimens for testing and shall furnish materials necessary for fabricating the test specimens.

PART 2 -- PRODUCTS

2.1 APPLICATION

A. Unless indicated otherwise, grouts shall be provided as listed below whether indicated on the Drawings or not.

Application	Type of Grout
Anchor bolts and reinforcing steel required to be set in grout that is not in high temperature or high fire risk areas.	Epoxy Anchor Grout
Beam and column (1 or 2 story) base plates less than 16- inches in the least dimension.	Non-Shrink - Class I
Storage tanks and other non-motorized equipment and machinery under 30 horsepower	Non-Shrink - Class I
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-Shrink - Class I (Class II where placement time exceeds 20 min.)
Under precast concrete elements	Non-Shrink - Class II
Toppings and concrete/grout fill less than 3-inches thick	Topping Grout
Toppings and concrete/grout fill greater than 3-inches thick	Minor Concrete, Class R or Class M per Section 03901 – Portland Cement Concrete
Surface repairs	Cement Grout
Repair of holes and defects in concrete members which are not water bearing and not in contact with soil or other fill material	Non-Shrink - Class I
Repair of holes and defects in concrete members which are water bearing or in contact with soil or other fill materials	Non-Shrink - Class II
Any application not listed above, where grout is called for on the Drawings	Non-Shrink Class I, unless noted otherwise

2.2 CEMENT GROUT

A. Cement grout shall be composed of one-part cement, 3 parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white portland cement shall be blended with regular cement as needed. The minimum compressive strength at 28 Days shall be 4000 psi.

2.3 NON-SHRINK GROUTS (cement based)

A. General:

1. Cement-based non-shrink grout shall be a prepackaged, inorganic, fluid, non-gas- liberating, non-metallic, cement type grout requiring only the addition of water. Cement from kilns burning metal-rich hazardous waste fuel shall not be used.

2. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout indicated herein shall be that recommended by the manufacturer for the particular application.

3. Grout shall not contain chlorides or additives that may contribute to corrosion.

4. Grout shall be formulated to be used at any consistency from fluid to plastic.

5. Cement-based non-shrink grout shall have the following minimum properties when tested at a fluid consistency, at 28 Days:

a. Minimum tensile splitting strength of 500 psi per ASTM C 496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.

b. Minimum flexural strength of 1000 psi per ASTM C 580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

c. Minimum bond strength (concrete to grout) of 1900 psi per modified ASTM C 882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.

d. Grout to be used in a marine environment shall be certified for use in a marine environment.

e. Grout shall be certified for use in freeze/thaw environments.

B. Class I Non-Shrink Grout:

1. Class I non-shrink grout shall have a minimum 28 Day compressive strength of 5000 psi when mixed at a fluid consistency.

2. Class I non-shrink grout shall meet the requirements of ASTM C 1107, Grade B or C, when mixed to fluid, flowable, and plastic consistencies.

3. Grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C 827 – Test Method for Early Volume Change of Cementitious Mixtures. The grout when tested shall not bleed or segregate at maximum allowed water.

4. Grout shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C 1090 - Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout.

5. Furnish certification that the non-shrink property of grout is not based on gas production or gypsum expansion.

6. Class I Non-Shrink Grout shall be Masterflow 713 Plus by MBT-Chemrex; Five Star Grout by Five Star Products; Sikagrout 212 by Sika Corporation; Premier by L&M Construction Chemicals; High-Flow Grout by Euclid Chemical Company; CG 200 PC by Hilti, or equal.

C. Class II Non-Shrink Grout:

1. Class II non-shrink grout shall be a high precision, fluid, extended working time, grout. The minimum 28-Day compressive strength shall be 7500 psi, when mixed at a fluid consistency.

2. Grout shall have a maximum early age height change of 4.0 percent expansion and shall have no shrinkage (0.0 percent) in accordance with ASTM C 827.

3. Grout shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C 1090.

4. Class II non-shrink grout shall have an extended working time of 30 minutes minimum when mixed to a fluid consistency as defined in ASTM C 827 at temperature extremes of 45 to 90 degrees F in accordance with ASTM C 1107.

5. Class II non-shrink grout shall meet the requirements of ASTM C 1107, Grade B or C when tested using the amount of water needed to achieve fluid consistency per ASTM C 939.

6. The grout when tested shall not bleed or segregate at maximum allowed water content.

7. Provide certification that its non-shrink property is not based on gas production or gypsum expansion.

8. Class II non-shrink grout shall be Masterflow 928 by MBT-Chemrex; Five Star Fluid Grout 100 by Five Star Products; Crystex by L&M Construction Chemicals; or equal.

2.4 NON-SHRINK EPOXY GROUT

A. Non-shrink epoxy grout shall be a flowable, non-shrink, 100 percent solids system. The epoxy grout system shall have 3 components: resin, hardener, and specially blended aggregate, each premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.

B. Epoxy grout shall have a maximum early age height change of 4.0 percent expansion and shall have no shrinkage (0.0 percent) in accordance with ASTM C 827, (modified for epoxy grouts by using an indicator ball with a specific gravity between 0.9 and 1.1).

C. Epoxy grout shall have a negligible (less than 0.0006 in/in) length change after hardening, and a coefficient of thermal expansion less than 0.00003 in/in F when tested according to ASTM C 531 - Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing.

D. The epoxy grout shall develop a minimum compressive strength of 9000 psi in 24 hours and 13,000 psi in seven days when tested in accordance with ASTM C 579, method B.

E. The mixed epoxy grout shall have a minimum working life of 90 to 120 minutes at 70 degrees F.

F. The effective bearing area shall be a minimum of 95 percent EBA in accordance with ASTM C 1339 – Standard Test Method for Flowability and Bearing Area of Chemical- Resistant Polymer Machinery Grouts, for bearing area and flow.

G. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application. Do not reduce aggregate loading or add solvents to increase flowability.

H. Non-shrink epoxy grout shall have the following minimum properties when tested at 7 Days:

1. Minimum bond strength to concrete of 3000 psi per ASTM C 882 modified.

2. Minimum bond strength to steel of 1700 psi per ASTM C 882 modified.

3. Minimum flexural strength of 2500 psi per ASTM C 580.

4. Minimum tensile strength of 2000 psi per ASTM C 307 -- Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

I. Non-shrink epoxy grout shall be Five Star DP Epoxy Grout by Five Star Products, Inc.; Masterflow 648 CP Plus by MBT-Chemrex; Sikadur 42 Grout-Pak by Sika Corporation; or equal.

2.5 TOPPING GROUT AND CONCRETE/GROUT FILL

A. Where fill is thicker than 3-inches, Minor Concrete, Class M or R, as indicated in Section 03901 – Portland Cement Concrete shall be used.

B. Grout for topping of slabs and concrete/grout fill for built-up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and be mixed as indicated.

C. Topping grout and concrete/grout fill shall contain a minimum of 564 pounds of cement per cubic yard with a maximum water cement ratio of 0.45.

D. Coarse aggregate shall be graded as follows:

U.S. STANDARD SIEVE SIZE	PERCENT BY WEIGHT PASSING
1/2 in	100
3/8 in	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

2.6 CURING MATERIALS

A. Curing materials shall be burlap cloth complying with AASHTO M182, Class 3, or combined burlap and white polyethylene sheeting shall complying with AASHTO M 171. For prepackaged grouts, curing materials shall be as recommended by the manufacturer of prepackaged grouts.

2.7 CONSISTENCY

A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.

B. The slump for topping grout and concrete/grout fill shall be adjusted to match placement and finishing conditions but shall not exceed 4-inches.

2.8 MEASUREMENT OF INGREDIENTS

A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurements shall not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 -- EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Grout shall be stored in accordance with manufacturer's recommendations.

3.2 GENERAL

A. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the ENGINEER.

B. When cementitious grouts are used on concrete surfaces, the concrete surface shall be saturated with water for 24 hours prior to placement. Upon completion of the saturation period, excess water shall be removed with clean, oil free compressed air prior to grouting. Concrete substrate shall not be wet prior to placement of epoxy grouts.

C. Surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete, and other deleterious materials.

D. Shade the WORK from sunlight for at least 24 hours before and 48 hours after grouting.

E. Contact the grout manufacturer's representative for assistance on hot and cold weather grouting techniques and precautions if applicable.

3.3 GROUTING PROCEDURES

A. General: Mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

B. Structural, equipment, tank, and piping support bases shall be grouted, unless indicated otherwise.

1. The original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum one-inch thickness of grout, or a thickness as indicated.

2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout through a headbox of appropriate size. The mixture shall be of a fluid consistency and poured continuously into the space between the plate and the base concrete. Forms for grout shall be tight against retaining surfaces, and joints shall be sealed as recommended by the grout manufacturer to be liquid-tight. Forms shall be coated as recommended by the grout manufacturer for easy form release. Where this method of placement is not practical or where required by the ENGINEER, alternate grouting methods shall be submitted for acceptance by the ENGINEER.

C. Topping Grout and Concrete/Grout Fill

1. Mechanical, electrical, and finish WORK shall be completed prior to placement of topping or concrete/grout fill. To ensure bonding to the base slab, the base slab shall be given an exposed aggregate finish. Alternatively, where accepted by the ENGINEER, the base slab shall be given a roughened textured surface by a close-spaced rake while the surface is green. After curing, high pressure washing shall expose the aggregates and produce not less than a 3/16-inch amplitude roughness. Jackhammers or chipping hammers shall not be used.

2. The minimum thickness of grout topping and concrete/grout fill shall be one-inch. Where the finished surface of concrete/grout fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2 inches wide by 1-1/2 inches deep.

3. The base slab shall be thoroughly cleaned and wetted to saturated surface dry (SSD) condition per the International Concrete Repair Institute (ICRI) -- Technical Guide for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, prior to placing topping and fill. No topping concrete shall be placed until the slab is completely free from standing pools or ponds of water. A thin coat of neat cement grout shall be broomed into the surface of the slab just before topping or fill placement. The neat cement grout shall not be allowed to dry before topping placement. If it does dry, it must be immediately removed using wet stiff brooms and reapplied. The topping and fill shall be compacted by rolling or thorough tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment manufacturer after the grout is brought to the established grade. Coat surface with evaporation retardant as needed to prevent plastic shrinkage cracks.

4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.

5. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping or fill has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement, or mixture of dry cement and sand shall be applied to the surface.

6. As soon as topping or fill finishing is completed, coat surface with curing compound. After the topping is set and sufficiently hard in clarifiers and where required by the ENGINEER, the tank shall be filled with sufficient water to cover the entire floor for 14 days.

3.4 CONSOLIDATION

A. Grout shall be placed in such a manner, for the consistency necessary for each application, to assure that the space to be grouted is completely filled.

3.5 CURING

A. Cement based grouts shall be cured with wet burlap or combined wet burlap and white polyethylene sheeting and per the manufacturer's recommendations.

END OF SECTION 03315

SECTION 03400 – PRECAST CONCRETE STRUCTURES

PART 1 -- GENERAL

1.1 WORK INCLUDED

A. This section covers the construction of precast structures.

B. Included in this section are precast concrete wet wells and the precast box. Sheeting, shoring, and bracing of excavations is covered in Section 02160 – Sheeting, Shoring, and Bracing.

C. The CONTRACTOR shall furnish all materials, equipment, transportation, tools and labor necessary and complete the system in substantial conformance with the lines, grades, and locations shown on the Drawings.

1.2 REFERENCED SPECIFICATIONS

A. ASTM: American Society of Testing Materials.

1.3 CONTRACTOR SUBMITTALS

A. Shop drawings: The CONTRACTOR shall submit shop drawings for all precast units. The shop drawings shall be fully dimensional and show reinforcing details, joint details, design loads and pertinent design calculations. Shop drawings shall also include the precast unit manufacturer's handling, assembly, and installation directions and recommendations. All drawings shall bear the seal of a Professional ENGINEER registered in the State of Louisiana.

PART 2 -- PRODUCTS

2.1 STRUCTURES

A. Wet well shall be precast concrete and shall be as shown on the drawings. Precast wet well shall conform to the requirements of ASTM C478. Pipe penetrations shall use Kor-N-Seal Flexible Pipe Connectors meeting ASTM C923. All joints shall be sealed with Ram-nek flexible plastic gasket per ASTM C990. All joints shall be wrapped on the exterior with rubber seal wrap per ASTM C877, Type II or Type III.

B. Box walls, top and bottom shall be constructed with precast concrete sections conforming to ASTM C478 and shall be as shown on the drawings. All joints shall be sealed with Ram-nek flexible plastic gasket per ASTM C990.

C. Concrete used for precast wet well, and box sections shall be Class 1 air-entrained precast concrete with minimum design compressive strength of 5000 PSI at 28 days to ensure proper density of concrete. Type I/II Portland cement suitable for type II cement per ASTM C150 shall be used. All precast concrete sections shall be dosed with Xypex Water-proofing admixture at a minimum of 3 percent by weight of Portland cement. CONTRACTOR shall provide certification that precast concrete manufacturer has verified concrete compressive strength of all precast concrete section through in-house compressive strength testing per ASTM C39.

D. Precast structures shall be as manufactured by Gainey's Concrete Products or equal.

2.2 ACCESS HATCHES

A. Aluminum hatch covers and frames for wet wells and valves boxes shall be designed to support a 300 psf live load with a maximum deflection of 1/150th of the span. All hardware shall be Type 316 Stainless Steel.

B. Channel frame shall be ¼ inch thick extruded aluminum with bend down anchor tabs around the perimeter.

C. Covers shall be ¼ inch thick aluminum plate with diamond pattern. Covers shall be hinged and shall have a recessed padlock hasp. CONTRACTOR shall provide two brass padlocks, keyed alike. Covers shall be equipped with a hold open arm that automatically locks the covers in the open position.

D. Hinges shall be heavy forged Type 316 stainless steel and shall be specifically designed for horizontal installation. Hinges shall be through bolted to the cover with tamperproof Type 316 stainless steel lock bolts and shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts. Hinges, each having a minimum ¼ inch diameter Type 316 stainless steel pin, shall pivot so the cover does not protrude into the channel frame.

E. Lifting mechanism shall have the required number and size of compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed ¼ inch gusset support plate. Springs and spring tubes shall be Type 316 stainless steel.

F. Factory finish for frame and covers shall be mill finish aluminum with bituminous coating applied to the exterior of the frame.

G. Stainless steel cable holders including the cable hooks shall be fabricated from Type 316 stainless steel plate. Sharp corner and edges shall be ground smooth to prevent abrasion and cutting of electrical cable insulation. The cable holder shall be of sufficient length and strength to provide support for each separate cable.

H. Covers shall be Halliday Products, Model W1S (single door), Model W2S (double door), or approved equal.

PART 3 -- EXECUTION

3.1 FOUNDATION

A. The foundation shown on the drawings is a minimum design section; the use of additional material will be at the CONTRACTOR's expense.

3.2 STRUCTURES

A. Precast wet well, and box shall be installed as specified herein and indicated on the Drawings.

B. All precast section interior joints shall be grouted and coated with an epoxy coating system as specified in paragraph 2.01.D. CONTRACTOR shall grout all internal joints prior to coating in the field. Non-shrink grout shall be used on interior and exterior manhole surfaces. Grout shall be free of cracks and deflects for no less than 1 yeah from date of installation. CONTRACTOR shall be trained and qualified to apply coating in the field, including but not limited to proper material storage, mixing, and application. Any damage to the protective coating during shipping or installation shall be repaired by the CONTRACTOR in accordance with the coating manufacturer's recommendations at no additional cost to the OWNER.

END OF SECTION 03400

SECTION 05120 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes structural steel and grout.

1.2 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and fabricator testing agency.

B. Welding certificates. All welding shall be performed by certified welders and shall be in accordance with the American Welding Society "Structural Welding Code - Steel", AWS D1.1, latest edition.

C. Mill test reports for structural steel, including chemical and physical properties.

D. Source quality-control reports.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.

2. AISC 360.

3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. Pre-installation Conference: Conduct conference at location as determined by the engineer.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 572, Grade 50.

B. Channels, M, S-Shapes: ASTM A 572, Grade 50.

C. Angles, Plate, and Bar: ASTM A 36.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53, Type S, Grade B.

F. Welding Electrodes: Comply with AWS requirements (E70XX).

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

B. Shear Connectors: Shear connectors shall be "Nelson" or equal headed type conforming to ASTM A108 grades 1015-1020.

C. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, straight.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

D. Threaded Rods: ASTM A 193/A 193M, Grade B7.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

E. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

2.3 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Paragraph 4.2.1 of the above code shall be deleted in its entirety and replaced with the following:

a. “Corrections or comments made on the shop drawings during the Structural Engineer's review do not relieve the Contractor from compliance with the requirements of the drawings and specifications. The review is only an examination of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all sizes, quantities, and dimensions; selecting fabrication and erection processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.”

2. Paragraphs 7.9.2 and 7.9.3 of the above code shall be deleted in their entirety.

B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

C. Structural elements shall be fabricated and assembled in the shop to the greatest extent possible. All field connections shall be bolted unless shown otherwise on the structural drawings.

D. All holes in steel shall be mechanically drilled or punched.

E. No flame cutting or enlarging will be allowed without specific approval of the Engineer.

F. All electrodes shall be 70xx unless otherwise specified.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.

2. Surfaces to be field welded.

3. Surfaces to be high-strength bolted with slip-critical connections.

4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SURFACE COATINGS

A. Interior unexposed structural steel that is not to receive sprayed-on fireproofing shall receive one shop coat of paint in accordance with Steel Structures Painting Council's Painting System Guide No. 7.00 utilizing SSPC Paint 13 or Paint 15, Type I.

B. All exposed or visible structural steel not designated to be galvanized shall receive one or more coats of paint after fabrication in accordance with all requirements of the Steel Structures Painting Council's requirements for Zone 1A for interior steel or Zone 1B for exterior steel. All such paints shall be compatible with the finish coat as specified in Division 9.

C. Members shown on the drawings to be galvanized and any other exterior lintels or members not designated to be painted that are exposed or in contact with exterior masonry shall be galvanized after fabrication in accordance with ASTM A123 "Standard Specification for Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled Steel Shapes, Plates, Bars, and Strip", latest edition.

D. Any surface coating that is damaged shall be touched up to provide full coverage and protection. Brush welds with a steel brush and recoat with primer in field as required.

E. No field cutting or altering of structural members will be allowed without approval of the Engineer.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.

2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

3. Ultrasonic Inspection: ASTM E 164.

4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.

2. Weld plate washers to top of baseplate.

3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Unless specifically approved otherwise, structural members shall be spliced only where indicated and as detailed on the structural drawings.

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

c. Ultrasonic Inspection: ASTM E 164.

d. Radiographic Inspection: ASTM E 94.

D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 05120

SECTION 05500 - MISCELLANEOUS METALWORK

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide miscellaneous metalwork and appurtenances, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Federal Specifications

MIL-G-18015 A (3)	(Ships) Aluminum Planks (6063-T6)
MIL-A-907E	Anti seize Thread Compound, High Temperature.

B. Commercial Standards

AA-M32C22A41	Aluminum Assn
AASHTO HS-20	Truck Loading
AISC	Manual of Steel Construction
AISI	Design of Light Gauge, Cold-Formed Steel Structural Members.
ASTM A 36	Carbon Structural Steel
ASTM A 48	Gray Iron Castings
ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 193	Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
ASTM A 194	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
ASTM A 307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 992	Steel for Structural Shapes for Use in Building Framing
ANSI/AWS D1.1	Structural Welding Code - Steel
ANSI/AWS D1.2	Structural Welding Code - Aluminum

ANSI/AWS QC1 Qualification and Certification of Welding Inspectors

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: Shop Drawings shall conform to AISC recommendations and specifications and shall show holes, etc. required for other parts of the WORK. Drawings shall include complete details of members and connections, anchor bolt layouts, schedules for fabrication procedures, and diagrams for the sequence of erection.

1. Layout drawings for grating, showing the direction of span, type and depth of grating, size and shape of grating panels, seat angle details, and details of grating hold down fasteners. Load and deflection tables shall be submitted for each style and depth of grating used.

2. An ICC-ES report listing the ultimate load capacity in tension and shear for each size and type of concrete anchor. CONTRACTOR shall submit manufacturer's recommended installation instructions and procedures for adhesive anchors. Upon review by ENGINEER, these instructions shall be followed specifically.

3. No substitution for the indicated adhesive anchors will be considered unless accompanied with ICC-ES report verifying strength and material equivalency, including temperature at which load capacity is reduced to 90 percent of that determined at 75 degrees F.

1.4 QUALITY ASSURANCE

A. Weld procedures and welder qualifications shall be available in the CONTRACTOR's field office for review.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Steel

Wide Flange Shapes	ASTM A 992
Shapes, Plates, Bars	ASTM A 36
Pipe, Pipe Columns, Bollards	ASTM A 53, Type E or S, Grade B standard weight unless indicated otherwise
HSS	ASTM A 500 Grade B

B. Corrosion Protection: Unless otherwise indicated, fabricated steel metalwork which will be used in a corrosive environment and/or will be submerged in water/wastewater shall be coated in accordance with Section 09800 - Protective Coating and shall not be galvanized prior to coating. Other miscellaneous steel metalwork shall be hot-dip galvanized after fabrication.

C. Stainless Steel: Unless otherwise indicated, stainless steel metalwork and bolts shall be of Type 316 stainless steel.

D. Aluminum: Unless otherwise indicated, aluminum metalwork shall be of Alloy 6061-T6. Aluminum in contact with concrete, masonry, wood, porous materials, or dissimilar metals shall have contact surfaces coated in accordance with Section 09800.

E. Cast Iron: Unless otherwise indicated, iron castings shall conform to the requirements of ASTM A 48, Class 50B or better.

2.2 METAL STAIRS

A. Metal Stairs: Metal stairs shall be composed of steel or aluminum stringers and supports, be designed and fabricated by the contractor, in accordance with standard practice of the National Association of Ornamental Metal Manufacturers, and be as indicated. Steel stair members shall be hot-dip galvanized after fabrication. Design stairs to support a live load of 100 psf.

2.3 GRATING STAIR TREADS

A. Grating stair treads shall be designed to support a live load of 100 psf or a concentrated load at mid-span of 1000 pounds, whichever creates the higher stress. The maximum deflection due to the uniform live load shall be as required for metal grating below. Grating stair treads shall have an integral non-slip nosing.

2.4 SAFETY STAIR NOSINGS

A. Safety stair nosing shall be provided on concrete stairs and other locations as indicated. The nosing shall be 3-inches wide extruded aluminum with cast-in abrasive strips and integral extruded anchors. The color of the cast abrasive shall be as selected by the ENGINEER from the manufacturer's standard colors. The nosing shall be Amstep Products, Style "231-A", American Mason Safety Tread Company, Figure "31A," or equal.

2.5 LADDERS

A. Ladders which may be partially or wholly submerged or which are located inside a hydraulic structure, shall be entirely of Type 316 stainless steel. Other ladders shall be of aluminum or as indicated.

B. Every ladder that does not have an exterior handhold shall be equipped with a pop-up extension. Pop-up extension device shall be manufactured of the same material and finish as the ladder and have telescoping tubular section that locks automatically when fully extended. Upward and downward improvement shall be controlled by stainless steel spring balancing mechanisms. Units shall be completely assembled with fasteners for securing to the ladder rungs in accordance with the manufacturer’s instructions.

2.6 METAL GRATING

A. General: Metal grating shall be of the design, sizes, and types indicated. Grating shall be completely banded at edges and cutouts using material and cross section equivalent to the bearing bars. Such banding shall be welded to each cut bearing bar. Grating shall be supported around an opening by support members. Where grating is supported on concrete, embedded support angles matching grating material shall be used, unless indicated otherwise. Such angles shall be mitered and welded at corners.

1. Pieces of grating shall be fastened in 2 locations to each support.

2. Where grating forms the landing at the top of a stairway, the edge of the grating that forms the top riser shall have an integral non-slip nosing, width equal to that of the stairway.

3. Where grating depth is not given, grating shall be provided that will be within allowable stress levels and which shall not exceed a deflection of 1/4-inch or the span divided by 180, whichever is less. For standard duty plank and safety grating, the loading to be used for determining stresses and deflections

shall be the uniform live load of the adjacent floor or 100 psf, whichever is greater or a concentrated load of 1000 pounds. For heavy duty grating, the loading used for determining stresses and deflections shall be AASHTO HS-20.

B. Material

1. Except where indicated otherwise, bar grating shall be fabricated entirely of aluminum as follows: Bearing and banding bars, alloy 6061-T6; cross bars, alloy 6063-T5.

2. Plank grating shall be fabricated of aluminum alloy 6063-T6.

3. Grating that may be partially or wholly submerged shall be fabricated entirely of stainless steel, Type 316.

C. Standard-Duty Grating

1. No single piece of grating shall weigh more than 80 pounds, unless indicated otherwise. Standard duty grating shall be serrated bar grating.

2. Cross bars shall be welded or mechanically locked tightly into position so that there is no movement allowed between bearing and cross bars.

D. Plank Grating

1. Plank grating shall be extruded in 6-inch widths with a minimum of 6 integral 1-bar type bearing bars per plank. The top surface shall be solid with raised ribs, unless indicated otherwise. The planks shall have continuous tongue and groove type interlock at each side, except that interlocking planks shall be arranged so that any 4-foot wide section may be removed independently from the other grating sections.

E. Plank grating shall be provided with a clear anodized finish.

2.7 BOLTS AND ANCHORS

A. Standard Service (Non-Corrosive Application): Unless otherwise indicated, bolts, anchor bolts, washers, and nuts shall be Type 316 stainless steel, in accordance with Paragraph 2.7 C herein. Except as otherwise indicated, steel for bolt material, anchor bolts, and cap screws shall be in accordance with the following:

1. Structural connections: Type 316 stainless steel.

2. Anchor Bolts: Type 316 stainless steel.

3. High strength bolts where indicated: ASTM A 325.

4. Pipe and equipment flange bolts: Type 316 stainless steel.

B. Corrosive Service: Bolts, nuts, and washers in the locations listed below shall be stainless steel as indicated.

1. Buried locations.

2. Submerged locations.

3. Locations subject to seasonal or occasional flooding.

4. Inside hydraulic structures below the top of the structure.

5. Inside buried vaults, manholes, and structures that do not drain through a gravity sewer or to a sump with a pump.

6. Chemical handling areas.

7. Inside trenches, containment walls, and curbed areas.

8. Locations indicated by the Contract Documents or designated by the ENGINEER to be provided with stainless steel bolts.

C. Unless otherwise indicated, stainless steel bolts, anchor bolts, nuts, and washers shall be Type 316 stainless steel, Class 2, conforming to ASTM A 193 for bolts and to ASTM A 194 for nuts. Threads on stainless steel bolts shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts, to meet government specification MIL-A-907E. Buried bolts in poorly drained soil shall be coated the same as the buried pipe.

1. Antiseize lubricant shall be classified as acceptable for potable water use by the NSF.

2. Antiseize lubricant shall be "PURE WHITE" by Anti-Seize Technology, Franklin Park, IL, 60131, AS-470 by Dixon Ticonderoga Company, Lakehurst, NJ, 08733, or equal.

D. Bolt Requirements

1. The bolt and nut material shall be free-cutting steel.

2. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. Bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.

3. Bolts and nuts shall be installed with washers fabricated of material matching the base material of bolts, except that hardened washers for high strength bolts shall conform to the requirements of the AISC Specification. Lock washers fabricated of material matching the bolts shall be installed where indicated.

4. The length of each bolt shall be such that the bolt extends at least 1/8-inch beyond the outside face of the nut before tightening, except for anchor bolts, which shall be flush with the face of the nut before tightening.

E. Adhesive Anchors and Rods: Unless otherwise indicated, drilled concrete or masonry anchors shall be adhesive anchor and rod systems as specified below.

1. Adhesive anchors and rods shall employ an injectable adhesive. Adhesive shall be furnished in side-by-side refill packets that keep components separate prior to installation. Side-by-side refill packets shall accept static mixing nozzles which thoroughly combines components and allows injection directly into drilled hole. Only injection tools and static mixing nozzles as recommended by manufacturer shall be used. Manufacturer’s recommended instructions shall be followed. Injection adhesive shall be HILTI HIT-HY 150 MAX-SD or equal.

2. Anchor rods shall be furnished with chamfered ends so that either end will accept a nut and washer. Alternatively, anchor rods shall be furnished with at 45 degree chisel end on one end to allow for easy insertion into an adhesive – filled hole. Anchor rods shall be manufactured to meet ISO 898 Class 5.8, ASTM A193 Grade B7 (high strength carbon steel anchor). Anchor rods shall be HILTI HAS Rods or equal.

F. Non-Shrink Grouted Anchors: Anchors, if indicated or permitted, shall be grouted with a non-shrink cementitious grout in accordance with the manufacturer's recommendation. Embedment depth shall be as

the manufacturer recommends for the load to be supported. Non-shrink grout material shall be Class B or C in accordance with Section 03315 - Grout.

2.8 ACCESS HATCHES

A. Aluminum hatch covers and frames for wet wells and valve boxes shall be designed to support a 300 psf live load with a maximum deflection of 1/150th of the span. All hardware shall be Type 316 Stainless Steel.

B. Channel frame shall be ¼ inch thick extruded aluminum with bend down anchor tabs around the perimeter.

C. Covers shall be ¼ inch thick aluminum plate with diamond pattern. Covers shall be hinged and shall have a recessed padlock hasp. Contractor shall provide two brass padlocks, keyed alike. Covers shall be equipped with a hold open arm that automatically locks the covers in the open position.

D. Hinges shall be heavy forged Type 316 stainless steel and shall be specifically designed for horizontal installation. Hinges shall be through bolted to the cover with tamperproof Type 316 stainless steel lock bolts and shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts. Hinges, each having a minimum ¼ inch diameter Type 316 stainless steel pin, shall pivot so the cover does not protrude into the channel frame.

E. Lifting mechanism shall have the required number and size of compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed ¼ inch gusset support plate. Springs and spring tubes shall be Type 316 stainless steel.

F. Factory finish for frame and covers shall be mill finish aluminum with bituminous coating applied to the exterior of the frame.

G. Stainless Steel cable holders including the cable hooks shall be fabricated from type 316 stainless steel plate. Sharp corner and edges shall be ground smooth to prevent abrasion and cutting of electrical cable insulation. The cable holder shall be of sufficient length and strength to provide support for each separate cable.

H. Covers shall be Halliday Products, Model W1S (single door), Model W2S (double door), or approved equal.

PART 3 -- EXECUTION

3.1 FABRICATION AND INSTALLATION REQUIREMENTS

A. Fabrication and Erection: Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction." Structural elements shall be fabricated and assembled in the shop to the greatest extent possible. All field connections shall be bolted unless shown otherwise on the structural drawings. All holes in steel shall be mechanically drilled or punched. No flame cutting or enlarging will be allowed without specific approval of the ENGINEER.

3.2 WELDING

A. Method: Welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.

B. Quality: In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as indicated by the AWS Code. Upon completion of welding, weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. Sharp corners of material that is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

3.3 GALVANIZING

A. Structural steel plate shapes, bars, and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A 123. Any galvanized part that becomes warped during the galvanizing operation shall be straightened. Bolts, anchor bolts, nuts, and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153.

B. Field repairs to damaged galvanizing shall be made by preparing the surface and applying a coating.

1. Surface preparation shall consist of removing oil, grease, soil, and soluble material by cleaning with water and detergent (SSPC SP1) followed by brush off blast cleaning (SSPC SP7), over an area extending at least 4-inches into the undamaged area.

2. Coating shall be applied to at least 3-mils dry film thickness. Use Zinc-Clad XI by Sherwin-Williams, Galvax by Alvin Products, or Galvite by ZRC Worldwide.

3.4 DRILLED ANCHORS

A. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions. Holes shall be roughened with a brush on a power drill, cleaned and dry. Drilled anchors shall not be installed until the concrete has reached the required 28-day compressive strength. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions. The set anchor may not be disturbed or loaded before the specified curing time.

B. Holes in connection plates shall be no more than 1/16” larger than the bolt diameter. If larger holes are needed for erection purposes the contractor shall provide plate washers welded to the connection plate to transfer the bolt load.

C. All abandoned holes shall be filled with epoxy grout.

D. Create a template at each adhesive anchor connection location prior to fabricating holes in connection plates. Template shall be made by locating existing rebar with an approved reinforcement detection system. Anchors may be repositioned a maximum of ½” as required to avoid conflicts with existing reinforcing.

END OF SECTION 05500

SECTION 05521 - ALUMINUM RAILINGS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide aluminum railing work, complete and in place, in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: Include railing layouts, post locations and spacing, gate locations, removable railing sections, construction details, manufacturer's engineering data, installation instructions, and product data.

C. Calculations: Engineering structural calculations for railings, handrail brackets, brackets, support flanges, and fasteners or anchors.

PART 2 -- PRODUCTS

2.1 SYSTEM DESIGN AND STRUCTURAL PERFORMANCE OF RAILING COMPONENTS

A. General: All railings and installation shall be in accordance with the manufacturer's published recommendations and specifications.

B. Code Requirements: Railings, guardrails, and handrails shall conform to the code requirements for IBC and OSHA. Railings, guardrails, and handrails, when part of a means of egress as defined by the governing codes, shall conform to the requirements of the most stringent of the codes or reference standards.

C. Loading Conditions: Railings and handrail brackets shall be capable of withstanding either of the following loading conditions without exceeding the allowable working stress of the material and without permanent deformation.

1. A 200-pound concentrated load applied to any point in any direction.

2. A 50-pound per linear foot loading applied perpendicular to the top rail.

D. The allowable working stress shall be 60 percent of the material yield stress for materials that are more than 3-inches from a weld and 40 percent of the yield stress for all materials within 3-inches of any weld.

2.2 MATERIALS

A. Rail Section: Railings and handrails shall be round pipe design railing system unless otherwise indicated.

B. Rail Material: Aluminum shall be U.S. Alloy 6061 or 6063, T-5 or T-6. Aluminum pipe rail shall be not less than 1-1/2 inch diameter, Schedule 40 pipe.

C. Welding Rods: Aluminum welding rods shall be of type recommended by the aluminum manufacturer for anodized finished products.

D. Isolation from Concrete: Electrolysis protective material shall be in accordance with Section 09800 - Protective Coating.

E. Sleeves: Sleeves shall be formed with PVC or Styrofoam blocks.

F. Fasteners: Fasteners, screws, and bolts shall be concealed and shall be of stainless steel or aluminum. Handrail bracket fasteners and fasteners over water basins shall be of stainless steel.

G. Brackets: Handrail brackets shall be aluminum with a finish that matches the handrail or railing of which they are a part.

H. Kickplates: Kickplates shall be extruded (match railing system) aluminum of not less than 6 inches in height. Kickplates for pipe railing shall be a channel section for strength.

I. Grout: Non-shrink grout for handrail posts shall consist of an inorganic, non-metallic, premixed grout with a minimum 28-day compressive strength of 4,000 psi.

2.3 FINISHES

A. Pipe Railing System: Pipe railing system including handrails, railings, tube caps, and other miscellaneous parts of rails shall be provided with an Architectural Class I, 0.7-mil clear anodized finish, AA-M12.

2.4 SUB-ASSEMBLIES

A. Height Requirements: Top of upper railing shall be 42-inches above the working surface. Kickplates shall be installed not more than 1/4-inch off the working surface and shall be provided where indicated and/or required by codes or Reference Standards.

B. Round Sections: Round tube railings shall be sleeve or side mounted unless otherwise indicated. Posts shall be not less than 1-1/2 inch diameter, Schedule 40 pipe or 1-1/2 inch by 2-inches oval section. The posts shall be evenly spaced at not less than 4-feet nor more than 5-feet on centers. Field conditions may require some adjustment of spacing. Top rails and railings shall be not less than 1-1/2 inch OD pipe or 2-inch oval section. Rails may be type with bottom enclosures. Bottom rails shall be not less than 1-1/2 inch OD pipe or 1-7/8 inch diameter extrusion with bottom enclosures. The top railings shall be as long as possible and the post shall not project through the top rails.

C. Guardrails: Guardrails shall be a 3 rail system with equal open spaces between rails (and kickplate when required) with no open space larger than 12 inches as required by IBC.

2.5 MANUFACTURERS, OR EQUAL

A. Round Pipe Railings

1. "C-V Pipe Rail" by CraneVeyor Corp.

2. "Wesrail" by Moultrie Manufacturing Co.

PART 3 -- EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken packages, containers, or bundles bearing the label of the manufacturer.

B. Storage: All materials shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.

3.2 COMPONENT SYSTEMS

A. Unless otherwise indicated, aluminum handrails and railings shall be component systems, installed complete and ready for use with all anchors, attachments, balusters, brackets, caps, fasteners, gates, posts, sleeves, trim, and all other related items required or necessary for the complete installation.

3.3 CRAFTSMANSHIP

A. All work shall be performed by craftsmen experienced in the fabrication of architectural metal work. Exposed surfaces shall be free from defects or other surface blemishes. Dimensions and conditions shall be verified in the field in advance. Joints, junctions, miters, and butting sections shall be precision-fitted, with no gaps occurring between sections, and all surfaces shall be flush and aligned and without sharp edges.

3.4 ALIGNMENT

A. Extruded, case, molded, or bent work shall be straight with true edges. Railings and handrails shall be provided with continuous top rails, without post projections or other obstructions.

3.5 WELD FINISH

A. All exposed welds shall be ground smooth and flush and shall be polished and anodized. Discoloration of exposed aluminum surfaces, whether or not due to welding, shall constitute a basis for rejection of the entire assembly.

3.6 EXPANSION/CONTRACTION

A. Railings shall provide expansion joints in the railing at all expansion joints in the structure. In addition exterior railing systems shall provide for 1/4-inch expansion and contraction per 20-linear feet of railing, and interior railing systems shall provide for 1/8-inch expansion or contraction per 20-linear feet of railing. Expansion joints shall be carefully aligned and without sharp edges.

3.7 FASTENER FINISH

A. Stainless steel fasteners shall be painted to match adjacent aluminum finishes.

3.8 RAILING CONTINUITY AND END TREATMENT

A. Handrails and railings shall be designed to form a continuous run system with elbow turns and bends that do not have interferences with hand movement. Handrails shall be continuous for the full length of the stairs and landings. The handrails shall extend not less than 12-inches beyond the top and bottom risers. Whenever possible, the extension shall be at least 18-inches for the possible use by handicapped people. The ends of handrails shall be returned to wall or shall be terminated in newel posts or safety terminals. Newel posts and safety terminals may be used only when approved by the ENGINEER.

3.9 GATES AND REMOVABLE SECTIONS

A. Gates shall be provided with self-closing hinges and self-closing latch bolts. Removable handrail sections shall be provided where indicated. The gate and removable railing hardware's color shall match that of the railing system of which it is a part.

B. Handrail posts installed into sleeves shall be provided with weep holes between 1/2-inch and 1/4-inch above the finish deck for condensation drainage.

3.10 CONTACT FACE COATING

A. Aluminum items in contact with concrete or steel or embedded in concrete shall be provided with an electrolysis protective material in accordance with Section 09800 - Protective Coating. The protective material shall be applied to the aluminum surface that will be in contact with the dissimilar material.

END OF SECTION 05521

SECTION 07920 - SEALANTS AND CAULKING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide caulking, sealing, and appurtenant work, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE STANDARDS

A. General: Portions of the following standards are incorporated into this Section by references below. The standards are listed here for convenience.

B. Federal Specifications

TT-S-001543A	Sealing Compound, Silicone Rubber Base, (For Caulking, Sealing and Glazing in Buildings and Other Structures)
SS-S-200D	Sealants, Joint, Two Compound, Jet Blast Resistant, Cold Applied for Portland Cement Concrete Pavement.
TT-S-00227E	Sealing Compound, Elastomeric Type, Multi-Component, (For Caulking, Sealing and Glazing in Buildings and Other Structures)
TT-S-00230C	Sealing Compound, Elastomeric Type, Single Component, (For Caulking, Sealing, and Glazing in Buildings and Other Structures)

C. Commercial Standards

ASTM C 557	Adhesives for Fastening Gypsum Wallboard to Wood Framing
ASTM C 834	Latex Sealants
ASTM C 919	Standard Practice for Use of Sealants in Acoustical Applications
ASTM C 920	Elastomeric Joint Sealants
ASTM D 1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM E 84	Standard Test Methods for Surface Burning Characteristics of Building Materials
ASTM E 814	Standard Test Methods for Fire Tests of Through Penetrations: Firestops
UL 1479	Underwriter's Laboratory Standard for Safety Fire Tests of Through Penetration Firestops.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Technical Data: A complete materials list along with the manufacturer's technical data and literature, specifications, joint width and depth tables, and installation instructions.

C. Samples: Samples (including color samples) of all the caulking and sealant materials and other materials proposed for use on the WORK. The samples shall be clearly marked with the manufacturer's name and product identification.

D. Certificates: If requested by the ENGINEER, certificates from an independent testing laboratory approved by the ENGINEER, certifying that the submitted materials meet all the requirements of the ASTM and Federal Specifications cited.

E. Warranty: A copy of the manufacturer's warranty covering all sealants, caulking materials, and other materials against defects in materials.

PART 2 -- PRODUCTS

2.1 SEALANTS AND CAULKING MATERIALS

A. General

1. Manufacturer's Standards: In addition to the standards listed below, the sealants and caulking products and application shall be in accordance with the manufacturer's published recommendations and specifications.

2. Wherever manufacturer's names and products are listed in this Section, "or equal" products will be considered in accordance with Section 01300 - Contractor Submittals.

B. Materials shall conform to the following requirements:

1. Significant Movement Sealants (plus or minus 25 percent movement capability)

a. For expansion wall joints; masonry and metal curtainwall joints; precast concrete joints and concrete panels; perimeter sealing (windows, doors, and panels); control joints; interior and non-traffic horizontal joints.

1) Two component, non-sag, polyurethane or polysulfide sealant conforming to Federal Specification TT-S-227E, Class A, Type II, and ASTM C 920, Type M, Class 25, Grade NS.

Products Research & Chemical Corp. "RC-2"
Progress Unlimited "Iso-Flex 2000"

2) One component, non-sag, low modulus, polyurethane or polysulfide sealant conforming to Federal Specification TT-S230C, Class A, Type II, and ASTM C 920, Type S, Class 25, Grade NS.

Products Research & Chemical Corp. "RC-1"
Tremco "Dymonic"

3) One component, non-sag, medium modulus, neutral cure, silicone sealant conforming to Federal Specification TT-S-1543A, Class A, and ASTM C 920, Type S, Class 25, Grade NS.

Products Research & Chemical Corp. "PRC-4000"
Dow Corning "795"

b. For horizontal joints not exposed to fuel spillage.

1) Two component, self-leveling, polyurethane or polysulfide sealant conforming to Federal Specification TT-S-227E, Class A, Type I, and ASTM C 920, Type M, Class 25, Grade P.

Products Research & Chemical Corp. "RC-2SL"
Bostic "Chem-Calk 550"

2) One component, self-leveling, polyurethane or polysulfide sealant conforming to Federal Specification TT-S-230C, Class A, Type I, and ASTM C 920, Type S, Class 25, Grade P.

Products Research & Chemical Corp. "6006"
Mameco "Vulkem 45"

2. Interior Sealant and Caulking

a. For general applications

1) One component, acrylic latex caulking conforming to ASTM C 834

Pecora Corp. "AC-20"
Bostic "Chem-Calk 600"

b. For non-exposed acoustical applications

1) One component, non-drying, non-hardening, non-shrinking, acoustical caulking conforming to ASTM C 557 and ASTM C 919.

Inmont Company "Prestite 579.64"
Tremco, "Acoustical Sealant"
United States Gypsum, "Acoustical Sealant"
W.W. Henry, "Type 313, Acoustical Sealant"

3. Preformed Sealants: Preformed sealant shall be polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealant capable of sealing out moisture, air, and dust when installed as recommended by the manufacturer. At temperatures from minus 30 to plus 160 degrees F, the sealant shall be non-bleeding and shall have no loss of adhesion.

4. Tape Sealant: Dimensions shall be as required for application conditions. Tape sealants shall be type recommended by tape manufacturer for connecting and bonding to surfaces.

5. Joint backing (backer rod) material shall be resilient, closed-cell polyethylene foam conforming to ASTM D 1752, Type II or III, and/or bond breakers of proper size for joint widths. Joint backing shall be compatible with sealant manufacturer's product and shall not stain the sealant nor the materials to which applied.

6. Primer: Primers shall be as recommended in the manufacturer's printed instructions for caulking and sealants, and shall not stain the sealant nor the materials to which applied. Manufacturer shall be consulted for all surfaces not specifically covered in submittal application instructions. Primer shall be used in accordance with manufacturer's instructions with all primers being applied prior to the installation of any backer rod or bond breaker tape.

7. Cleaning and cleanup solvents, agents, and accessory materials shall be as recommended in the manufacturer's printed instructions for cleaning up.

2.2 COLOR OF SEALANTS

A. Color of sealants that are visible after installation shall match adjacent building finish. If in doubt of color match, obtain color approval from ENGINEER.

PART 3 -- EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken packages or containers bearing the manufacturer's label. Packages or containers shall be delivered to the Site with seals unbroken.

B. Shelf Life: Materials whose shelf life dates have expired shall not be used in the WORK. Such materials shall be promptly removed from the Site.

C. Storage: All materials shall be carefully stored in accordance with the manufacturer's instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the product. Materials shall be stored at temperatures between 40 and 90 degrees unless otherwise specified by the manufacturer.

3.2 INSTALLATION

A. Manufacturer's Recommendations: All work under this Section and all testing, where applicable, shall be performed in accordance with manufacturer's printed recommendations, specifications, and installation instructions except where more stringent requirements are indicated herein; and, except where project conditions require extra precautions or provisions to assure performance of the waterproofing system.

B. Authorized Installers: Caulking and sealants shall be complete systems and be installed only by installers authorized and approved by the respective manufacturers.

C. Surface Preparation

1. General: The surfaces of joints to be sealed shall be dry. Oil, grease, dirt, chalk, particles of mortar, dust, loose rust, loose mill scale, and other foreign substances shall be removed from surfaces of joints which will be in contact with the sealant. Ferrous metal surfaces shall be cleaned of all rust, mill scale, and other coatings by wire brush, grinding, or sandblasting. Oil and grease shall be removed by cleaning in accordance with sealant manufacturer's printed recommendations. Protective coatings shall be removed from all aluminum surfaces against which caulking or sealing compound is to be placed. Bituminous or resinous materials shall be removed from surfaces to receive caulking or sealants.

2. Concrete and Masonry Surfaces: Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence, and loose mortar shall be removed from the joint cavity.

3. Steel Surfaces: Steel surfaces to be in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish WORK, the metal shall be scraped and wire brushed to remove loose mill scale. Protective coatings on steel surfaces shall be removed by sandblasting or by a solvent that leaves no residue.

4. Aluminum Surfaces: Aluminum surfaces to be in contact with sealants shall be cleaned of temporary protective coatings. When masking tape is used for a protective cover, the tape and any residual adhesive shall be removed just prior to applying the sealant. Solvents used to remove protective coating shall be as recommended by the manufacturer of the aluminum work and shall be non-staining.

5. Wood Surfaces: Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

D. Joint Types and Sizes: Joint shapes and sizes shall be as indicated or as necessary for job conditions where not indicated. Joints to be caulked or sealed include through-bolt holes, door frames, louver and ventilator frames, joints between openings where items pass through exterior walls, concrete masonry, or combination of these surfaces, and as otherwise indicated or required for watertightness, weatherproofing, or airtightness. Use sealing compound at both exterior and interior surfaces of exterior wall penetrations.

3.3 SEALANT FILLED JOINTS

A. Sealant: Sealant shall be used before expiration of shelf life. Multi-component sealants shall be mixed according to manufacturer's printed instructions. Sealant in guns shall be applied with a nozzle of proper size to fit the width of joint. Sealant shall be installed to the required depth without displacing the backing. Unless otherwise indicated or recommended by the manufacturer, the installed sealant shall be tooled so that the surface is uniformly smooth and free of wrinkles and to assure full adhesion to the sides of the joint. Sealants shall be installed free of air pockets, foreign embedded matter, ridges, and sags. Sealer shall be applied over the sealant if recommended by the sealant manufacturer.

B. Sealant Depth: Sealant depth in joints shall be 1/2 the width of joint, but not less than 1/8-inch deep and 1/4-inch wide nor more than 1/2-inch deep and 1-inch wide. All joints shall have a rigid filler material installed to proper depth prior to application of sealant.

C. Masking Tape: Masking tape shall be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking tape shall be removed within 10 minutes after joint has been filled and tooled.

D. Backing: Backing shall be installed to provide the indicated sealant depth. The installation tool shall be shaped to avoid puncturing the backing.

E. Bond-Breaker: Bond-breaker shall be applied to fully cover the bottom of the joint without contaminating the sides where sealant adhesion is required.

F. Primer: Primer shall be used on concrete masonry units, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces adjacent to joints shall not be primed.

G. Applications: A full bead of sealant shall be applied into the joint under sufficient pressure, with the nozzle drawn across sealant, to completely fill the void space and to ensure complete wetting of contact area to obtain uniform adhesion. During application, the tip of the nozzle shall be kept at the bottom of the joint thereby forcing the sealant to fill from the bottom to the top. Sealants shall be tooled immediately after exposure with a caulking tool or soft bristled brush moistened with solvent. The finished sealant-filled joint shall be slightly concave unless otherwise indicated.

3.4 CLEANING

A. After application of sealant and caulking materials, adjacent materials which have been soiled shall be cleaned and left in a neat, clean, undamaged, or unstained condition. On porous surfaces, excess sealant shall be removed per sealant or caulking manufacturer's printed instructions.

END OF SECTION 07920

SECTION 09800 – PROTECTIVE COATINGS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide protective coatings, complete and in place, in accordance with the Contract Documents.

B. Definitions

1. The term “paint,” “coatings,” or “finishes” as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and all other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat.

2. The term “DFT” means minimum dry film thickness, without any negative tolerance.

C. The following surfaces shall not be protective coated:

1. Concrete, unless required by items on the concrete coating schedule below or the Drawings.

2. Stainless steel

3. Machined surfaces

4. Grease fittings

5. Glass

6. Equipment nameplates

7. Platform gratings, stair treads, door thresholds, and other walk surfaces, unless specifically indicated to be coated.

D. The coating system schedules summarize the surfaces to be coated, the required surface preparation, and the coating systems to be applied. Coating notes on the Drawings are used to show or extend the limits of coating schedules, to show exceptions to the schedules, or to clarify or show details for application of the coating systems.

E. Where protective coatings are to be performed by a subcontractor, the subcontractor shall provide 5 references which show that the painting subcontractor has previous successful experience with the indicated or comparable coating systems. Include the name, address, and the telephone number for the owner of each installation for which the painting subcontractor provided the protective coating.

F. Where provisions of this section conflict with provisions specified in sections for packaged equipment, the provisions in those sections shall govern.

1.2 CONTRACTOR SUBMITTALS

A. General: Submittals shall be furnished in accordance with Section 01300 – Contractor Submittals, unless indicated otherwise below.

B. Submittals shall include the following information and be submitted at least 30 days prior to protective coating work:

1. Coating Materials List: Eight copies of a coating materials list showing the manufacturer and the coating number, keyed to the coating systems herein. The list shall be submitted prior to or at the time of submittal of samples.

2. Paint Manufacturer's Information: For each coating system to be used, the following data:

   a. Paint manufacturer's data sheet for each product proposed, including statements on the suitability of the material for the intended use.

   b. Technical and performance information that demonstrates compliance with the system performance and material requirements.

   c. Paint manufacturer's instructions and recommendations on surface preparation and application.

   d. Colors available for each product (where applicable)

   e. Compatibility of shop and field applied coatings (where applicable)

   f. Material Safety Data Sheet for each product used.

C. Samples

1. Two sets of color samples to match each color selected by the ENGINEER from the manufacturer's standard color sheets. If custom mixed colors are indicated, the color samples shall be made using color formulations prepared to match the color samples furnished by the ENGINEER. The color formula shall be shown on the back of each color sample.

1.3 SPECIAL CORRECTION OF DEFECTS REQUIREMENTS

A. Warranty Inspection: A warranty inspection may be conducted during the eleventh month following completion of all coating and painting work. The CONTRACTOR and a representative of the coating material manufacturer shall attend this inspection. All defective work shall be repaired in accordance with these specifications and to the satisfaction of the OWNER. The OWNER may, by written notice to the CONTRACTOR, reschedule the warranty inspection to another date within the one-year correction period, or may cancel the warranty inspection altogether. If a warranty inspection is not held, the CONTRACTOR is not relieved of its responsibilities under the Contract Documents.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Suitability: The CONTRACTOR shall use suitable coating materials as recommended by the manufacturer. Materials shall comply with Volatile Organic Compound (VOC) limits applicable at the Site.

B. Materials Sources: Where manufacturers and product numbers are listed, it is to show the type and quality of coatings that are required. If a named product does not comply with VOC limits in effect at the time of bid opening, that product will not be accepted, and the CONTRACTOR shall propose a substitution product of equal quality that does comply. Unless indicated otherwise, proposed substitute materials will be considered as indicated above. Coating materials shall be materials that have a record of satisfactory performance in industrial plants, manufacturing facilities, and water and wastewater treatment plants.

C. Compatibility: In any coating system only compatible materials from a single manufacturer shall be used in the work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

D. Containers: Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacturer, and name of manufacturer, all of which shall be plainly legible at the time of use.

E. Colors: All colors and shades of colors of all coats of paint shall be as indicated or selected by the ENGINEER. Each coat shall be of a slightly different shade, to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the ENGINEER.

F. Substitute or "Or-Equal" Products

1. To establish equality under Section 01600 – Products, Materials, Equipment, and Substitutions, the CONTRACTOR shall furnish satisfactory documentation from the manufacturer of the proposed substitute or "or-equal" product that the material meets the indicated requirements and is equivalent or better in the following properties:

    a. Quality

    b. Durability

    c. Resistance to abrasion and physical damage

    d. Life expectancy

    e. Ability to recoat in future

    f. Solids content by volume

    g. Dry film thickness per coat

    h. Compatibility with other coatings

    i. Suitability for the intended service

    j. Resistance to chemical attack

    k. Temperature limitations in service and during application

    l. Type and quality of recommended undercoats and topcoats

    m. Ease of application

    n. Ease of repairing damaged areas

    o. Stability of colors

    p. Test data as required by the engineer

2. Protective coating materials shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. Where requested, the CONTRACTOR shall provide the ENGINEER with the names of not less than 10 successful applications of the proposed manufacturer's products that comply with these requirements. No product will be considered that fails to meet the performance of the specified materials.

3. If a proposed substitution requires changes in the WORK, the CONTRACTOR shall bear all such costs involved as part of the WORK.

2.2 INDUSTRIAL COATING SYSTEMS

A. System 1 – Not Used

B. System 2 – Not Used

C. System 3 – Not Used

D. System 4 – Aliphatic Polyurethane: Two component aliphatic acrylic polyurethane coating material shall provide superior color and gloss retention, resistance to splash from acid and alkaline chemicals, resistance to chemical fumes and severe weathering and with a minimum solids content of 58 percent by volume. Primer shall be a rust inhibitive two component epoxy coating with a minimum solids content of 68 percent by volume.

1. Prime coat (Shop and Touch-Up Primer) DFT = 4-5 mils, Tnemec N69, or equal.

2. Intermediate Coat DFT = 4-6 mils, Tnemec N69, or equal.

3. Finish coat (one or more, DFT = 2-3 mils), Tnemec 1094, or equal.

4. Total system DFT = 10-14 mils.

5. More than one finish coat shall be applied as necessary to produce a finish with uniform color and texture.

E. System 5 – Not Used

F. System 6 – Not Used

G. System 7 – Acrylic Latex: Single component, water based acrylic latex with a fungicide additive shall have a minimum solids content of 40 percent by volume. Prime coat shall be as recommended by manufacturer. The coating material shall be available in ANSI safety colors.

1. Prime coat DFT = 2-3 mils, Tnemec 1028/1029, or equal.

2. Finish coat DFT = 2-3 mils, Tnemec 1028/1029, or equal.

3. Total system DFT = 4-6 mils.

H. System 8 – Epoxy, Equipment: Two component, rust inhibitive polyamide cured epoxy coating material shall provide a recoatable finish that is available in a wide selection of colors. The coating material shall have a minimum solids content of 66 percent by volume and be resistant to service conditions of condensing moisture, splash and spillage of lubricating oils, and frequent washdown and cleaning.

1. Prime coat DFT = 3-4 mils, Tnemec N69, or equal.

2. Finish coats (2 or more, DFT = 6-8 mils), Tnemec N69, or equal.

3. Total system DFT = 9-12 mils.

I. System 9 – Not Used

J. System 10 – Not Used

K. System 11 – Not Used

L. System 12 – Not Used

M. System 13 – Aliphatic Polyurethane, Galvanized Metal: Two component aliphatic acrylic polyurethane coating material shall provide superior color and gloss retention, resistance to splash from acid and alkaline chemicals, resistance to chemical fumes and severe weathering and with a minimum solids content of 58 percent by volume. Primer shall be a rust inhibitive two component epoxy coating with a minimum solids content of 68 percent by volume.

1. Prime coat DFT = 2-3 mils, Tnemec N69, or equal.

2. Finish coat (one or more, DFT = 2-3 mils), Tnemec 1094, or equal.

3. Total system DFT = 4-6 mils.

4. More than one finish coat shall be applied as necessary to produce a finish with uniform color and texture.

N. System 14 – Acrylic Latex, Galvanized Metal: Single component, water based acrylic latex shall have a minimum solids content of 40 percent by volume. Primer shall be a single component acrylic latex coating with a minimum solids content of 44 percent by volume.

1. Prime coat DFT = 2-3 mils, Tnemec 115, or equal.

2. Finish coat (one or more, DFT = 2-3 mils), Tnemec 1028, or equal.

3. Total system DFT = 4-6 mils.

2.3 SUBMERGED AND SEVERE SERVICE COATING SYSTEMS

A. Material Sources: The manufacturer's products listed in this paragraph are materials which satisfy the material descriptions of this paragraph and have a documented successful record for long term submerged or severe service conditions. Proposed substitute products will be considered as indicated above.

B. System 100 – 100% Solids Amine Cured Epoxy: High build, amine cured, epoxy resin shall have a solids content of at least 69 percent by volume, and shall be suitable for long-term immersion service in potable water and municipal wastewater.

1. Prime coat (Shop Primer and Field Touch-Up) Tnemec Series N69 (DFT = 3-5 mils), or equal.

2. Intermediate Coat: Tnemec Series 435 (DFT = 12-15 mils), or equal.

3. Finish Coat: Tnemec Series 435 (DFT = 12-15 mils), or equal.

C. System 101 – Amine Cured Epoxy: High build, amine cured, epoxy resin have a solids content of at least 69 percent by volume, and shall be suitable for long-term immersion service in potable water and municipal wastewater.

1. Prime coat (Shop Primer and Field Touch-Up) Tnemec Series N69 (DFT = 3-5 mils), or equal.

2. Intermediate Coat: Tnemec Series 104 (DFT = 6-8 mils), or equal.

3. Finish Coat: Tnemec Series 104 (DFT = 6-8 mils), or equal.

D. System 102 – Cold-Applied Tape: Tape coating materials and procedures shall be in accordance with ANSI/AWWA C209. Prefabricated tape shall be Type II. The system shall consist of a primer layer, inner layer tape (35 mils), and an outer layer tape (35 mils), Total system DFT = 70 mils.

E. System 103 – Polyamide Cured Epoxy: High build, polyamide epoxy resin shall have a solids content of at least 56 percent by volume, and shall be suitable for long-term immersion in potable water and municipal wastewater.

1. Prime coat and finish coats (3 or more, DFT = 12 mils), Tnemec Pota-Pox 104, or equal.

F. System 103 – Not Used

G. System 104 – Not Used

H. System 105 – Not Used

I. System 106 – Fusion Bonded Epoxy: The coating material shall be a 100 percent powder epoxy, certified as compliant with NSF Standard 61, applied in accordance with the ANSI/AWWA C213 – Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines, except that the surface preparation shall be as listed in the coating system schedule of this Section. The coating shall be applied using the fluidized bed or electrostatic spray process.

1. Coating DFT = 16 mils, Scotchkote 134 or 206N, or equal.

2. For coating of valves, DFT = 12 mils.

3. Liquid Epoxy: For field repairs, the use of a liquid epoxy will be permitted, applied in not less than 3 coats to provide a DFT of 15 mils. The liquid epoxy shall be a 100 percent solids epoxy recommended by the powder epoxy manufacturer.

J. System 107 – Not Used

2.4 SPECIAL COATING SYSTEMS

A. System 200 – PVC Tape: Prior to wrapping the pipe with PVC tape, the pipe and fittings first shall be primed using a primer recommended by the PVC tape manufacturer. After being primed, the pipe shall be wrapped with a 20-mil adhesive PVC tape, half-lapped, to a total thickness of 40 mils.

B. System 201 – Not Used

C. System 203 – Not Used

D. System 204 – Not Used

E. System 205 – Polyethylene Encasement: Application of polyethylene encasement shall be in accordance with ANSI/AWWA C105 using Method C.

F. System 206 – Not Used

G. System 207 – Not Used

H. System 208 – Aluminum Metal Isolation: Two coats of a high build polyamide epoxy paint, such as Tnemec 66, or equal (8 mils). Total thickness of system DFT = 8.0 mils.

I. System 209 – Not Used

J. System 210 – Not Used

K. System 211 – Acrylic Latex, Drywall: Single component, water-based acrylic latex coating material with a fungicide additive and a minimum solids content of 35 percent by volume. Primer shall be a PVA sealer as recommended by the manufacturer.

1. Prime coat DFT = 1.5 mils, Tnemec Series 51, or equal.

2. Finish coats (two or more, DFT = 6 mils), Tnemec 1029, or equal.

3. Total system DFT = 7.5 mils.

PART 3 -- EXECUTION

3.1 MANUFACTURER'S SERVICES

A. The CONTRACTOR shall require the protective coating manufacturer to furnish a qualified technical representative to visit the Site for technical support as may be necessary to resolve field problems attributable or associated with the manufacturer's products.

3.2 WORKMANSHIP

A. Skilled craftsmen and experienced supervision shall be used on all WORK.

B. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure thorough cleaning and an adequate thickness of coating material. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Special attention shall be given to insure that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas, and installations shall be protected by the use of drop cloths or other precautionary measures.

C. All damage to surfaces resulting from the WORK shall be cleaned, repaired, and refinished to original condition.

3.3 STORAGE, MIXING, AND THINNING OF MATERIALS

A. Manufacturer's Recommendations: Unless otherwise indicated, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating shall be strictly observed.

B. All protective coating materials shall be used within the manufacturer's recommended shelf life.

C. Storage and Mixing: Coating materials shall be stored under the conditions recommended by the Material Safety Data Sheets, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings of different manufacturers shall not be mixed together.

3.4 PREPARATION FOR COATING

A. General: All surfaces to receive protective coatings shall be cleaned as indicated prior to application of coatings. The CONTRACTOR shall examine all surfaces to be coated, and shall correct all surface defects before application of any coating material. All marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any coating application. Surfaces to be coated shall be dry and free of visible dust.

B. Protection of Surfaces Not to be Coated: Surfaces that are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations.

C. All hardware, lighting fixtures, switchplates, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked, or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of all mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.

D. Care shall be exercised not to damage adjacent work during blast cleaning operations. Spray painting shall be conducted under carefully controlled conditions. The CONTRACTOR shall be fully responsible for and shall promptly repair any and all damage to adjacent work or adjoining property occurring from blast cleaning or coating operations.

E. Protection of Painted Surfaces: Cleaning and coating shall be coordinated so that dust and other contaminants from the cleaning process will not fall on wet, newly coated surfaces.

3.5 SURFACE PREPARATION STANDARDS

A. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:

1. Solvent Cleaning (SSPC SP1): Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.

2. Hand Tool Cleaning (SSPC SP2): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing.

3. Power Tool Cleaning (SSPC SP3): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing, and grinding.

4. White Metal Blast Cleaning (SSPC SP5): Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.

5. Commercial Blast Cleaning (SSPC SP6): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area.

6. Brush-Off Blast Cleaning (SSPC SP7): Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust, and loose paint.

7. Near-White Blast Cleaning (SSPC SP10): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area.

3.6 METAL SURFACE PREPARATION (UNGALVANIZED)

A. The minimum abrasive blasting surface preparation shall be as indicated in the coating system schedules included at the end of this Section. Where there is a conflict between these specifications and the coating manufacturer's printed recommendations for the intended service, the higher degree of cleaning shall apply.

B. Workmanship for metal surface preparation shall be in conformance with the current SSPC Standards and this Section. Blast cleaned surfaces shall match the standard samples available from the National

Association of Corrosion Engineers, NACE Standard TM-01-70 - Visual Standard for Surfaces of New Steel Airblast Cleaned with Sand Abrasive and TM-01-75 - Visual Standard for Surfaces of New Steel Centrifugally Blast Cleaned with Steel Grit.

C. All oil, grease, welding fluxes, and other surface contaminants shall be removed by solvent cleaning per SSPC SP1 - Solvent Cleaning prior to blast cleaning.

D. All sharp edges shall be rounded or chamfered and all burrs, and surface defects and weld splatter shall be ground smooth prior to blast cleaning.

E. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendation for the particular coating and service conditions. Abrasives for submerged and severe service coating systems shall be clean, hard, sharp cutting crushed slag. Automated blasting systems shall not be used for surfaces that will be in submerged service. Metal shot or grit shall not be used for surfaces that will be in submerged service, even if subsequent abrasive blasting is planned to be one with hard, sharp cutting crushed slag.

F. The abrasive shall not be reused unless an automated blasting system is used for surfaces that will be in non-submerged service. For automated blasting systems, clean oil-free abrasives shall be maintained. The abrasive mix shall include at least 50 percent grit.

G. The CONTRACTOR shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.

H. Compressed air for air blast cleaning shall be supplied at adequate pressure from well-maintained compressors equipped with oil and moisture separators that remove at least 95 percent of the contaminants.

I. Surfaces shall be cleaned of all dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming, or another approved method prior to painting.

J. Enclosed areas and other areas where dust settling is a problem shall be vacuum cleaned and wiped with a tack cloth.

K. Damaged or defective coating shall be removed by the blast clearing to meet the clean surface requirements before recoating.

L. Shop applied coatings of unknown composition shall be completely removed before the indicated coatings are applied. Valves, castings, ductile or cast iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC SP1 before the abrasive blast cleaning work has been started.

M. All shop primed surface shall be thoroughly cleaned to remove all soluble surface contaminants prior to coatings.

N. All shop primed surfaces that will be submerged or intermittently submerged shall be brush blasted in accordance with SSPC-SP7 with a fine abrasive to properly de-gloss and profile.

3.7 SURFACE PREPARATION FOR GALVANIZED FERROUS METAL

A. Galvanized ferrous metal shall be alkaline cleaned per SSPC SP1 to remove oil, grease, and other contaminants detrimental to adhesion of the protective coating system to be used, followed by brush off blast cleaning per SSPC SP7.

B. Pretreatment coatings of surfaces shall be in accordance with the printed recommendations of the coating manufacturer.

3.8 SURFACE PREPARATION OF FERROUS SURFACES WITH EXISTING COATINGS, EXCLUDING STEEL RESERVOIR INTERIORS

A. General: All grease, oil, heavy chalk, dirt, or other contaminants shall be removed by solvent or detergent cleaning prior to abrasive blast cleaning. The generic type of the existing coatings shall be determined by laboratory testing.

B. Abrasive Blast Cleaning: The CONTRACTOR shall provide the degree of cleaning indicated in the coating system schedule for the entire surface to be coated. If the degree of cleaning is not indicated in the schedule, deteriorated coatings shall be removed by abrasive blast cleaning to SSPC SP6. Areas of tightly adhering coatings shall be cleaned to SSPC SP7, with the remaining thickness of existing coating not to exceed 3 mils.

C. Incompatible Coatings: If coatings to be applied are not compatible with existing coatings the CONTRACTOR shall apply intermediate coatings per the paint manufacturer's recommendation for the indicated coating system or shall completely remove the existing coating prior to abrasive blast cleaning. A small trial application shall be conducted for compatibility prior to painting large areas.

D. Unknown Coatings: Coatings of unknown composition shall be completely removed prior to application of new coatings.

E. Water Abrasive or Wet Abrasive Blast Cleaning: Where indicated or where Site conditions do not permit dry abrasive blasting for industrial coating systems due to dust or air pollution considerations, water abrasive blasting or wet abrasive blasting may be used. In both methods, paint-compatible corrosion inhibitors shall be used, and coating application shall begin as soon as the surfaces are dry. Water abrasive blasting shall be done using high pressure water with sand injection. In both methods, the equipment used shall be commercially produced equipment with a successful service record. Wet blasting methods shall not be used for submerged and severe service coating systems unless indicated.

3.9 CONCRETE AND CONCRETE BLOCK MASONRY SURFACE PREPARATION

A. Concrete Block

1. Allow new mortar to cure a minimum of 14 days prior to coating.

2. Level protrusions and mortar spatter.

B. Nonsubmerged Concrete

1. Surface preparation shall not begin until at least 28 days after the concrete or masonry has been placed. Verify moisture levels are within the limitations of the coating manufacturer.

2. All oil, grease, and form release and curing compounds shall be removed by detergent cleaning before abrasive blast cleaning.

3. Concrete surfaces to be coated shall be abrasive blast cleaned to remove existing coatings, laitance, deteriorated concrete, and to roughen the surface equivalent to the surface of the No. 80 grit flint sandpaper.

C. Submerged Concrete

1. Surface preparation shall not begin until at least 28 days after the concrete or masonry has been placed. Verify moisture levels are within the limitations of the coating manufacturer.

2. All oil, grease, and form release and curing compounds shall be removed by detergent cleaning before abrasive blast cleaning.

3. Concrete surfaces to be coated shall be abrasive blast cleaned to remove existing coatings, laitance, sealers, deteriorated concrete, and to roughen the surface equivalent to ICRI CSP 5.

D. Surfaces shall be clean and as recommended by the coating manufacturer before coating is started.

E. Unless required for proper adhesion, surfaces shall be dry prior to coating. The presence of moisture shall be determined with a moisture detection device such as Delmhorst Model DB, or equal.

3.10 PLASTIC, FIBER GLASS AND NONFERROUS METALS SURFACE PREPARATION

A. Plastic and fiber glass surfaces shall be sanded or brush off blast cleaned prior to solvent cleaning with a chemical compatible with the coating system primer.

B. Non-ferrous metal surfaces shall be solvent-cleaned to remove all soluble surface contaminants followed by brush-off blast cleaning to remove insoluble contaminants and to achieve a uniformly profiled surface.

C. All surfaces shall be clean and dry prior to coating application.

3.11 SHOP COATING REQUIREMENTS

A. Unless otherwise indicated, all items of equipment, or parts of equipment which are not submerged in service, shall be shop primed and then finish coated in the field after installation with the indicated or selected color. The methods, materials, application equipment and all other details of shop painting shall comply with this section. If the shop primer requires topcoating within a specified period of time, the equipment shall be finish coated in the shop and then touch-up painted after installation.

B. All items of equipment, or parts and surfaces of equipment which are submerged or inside an enclosed hydraulic structure when in service, with the exception of pumps and valves, shall have all surface preparation and coating work performed in the field.

C. The interior surfaces of steel water reservoirs, except for Part A surfaces, shall have all surface preparation and coating work performed in the field.

D. For certain pieces of equipment it may be undesirable or impractical to apply finish coatings in the field. Such equipment may include engine generator sets, equipment such as electrical control panels, switchgear or main control boards, submerged parts of pumps, ferrous metal passages in valves, or other items where it is not possible to obtain the indicated quality in the field. Such equipment shall be primed and finish coated in the shop and touched up in the field with the identical material after installation. The CONTRACTOR shall require the manufacturer of each such piece of equipment to certify as part of its Shop Drawings that the surface preparation is in accordance with these specifications. The coating material data sheet shall be submitted with the Shop Drawings for the equipment.

E. For certain small pieces of equipment the manufacturer may have a standard coating system that is suitable for the intended service conditions. In such cases, the final determination of suitability will be made during review of the Shop Drawing submittals. Equipment of this type generally includes only indoor equipment such as instruments, small compressors, and chemical metering pumps.

F. Shop painted surfaces shall be protected during shipment and handling by suitable provisions including padding, blocking, and the use of canvas or nylon slings. Primed surfaces shall not be exposed to the weather for more than 2 months before being topcoated, or less time if recommended by the coating manufacturer.

G. Damage to shop-applied coatings shall be repaired in accordance with this Section and the coating manufacturer's printed instructions.

H. The CONTRACTOR shall make certain that the shop primers and field topcoats are compatible and meet the requirements of this Section. Copies of applicable coating manufacturer's data sheets shall be submitted with equipment Shop Drawings.

3.12 APPLICATION OF COATINGS

A. The application of protective coatings to steel substrates shall be in accordance with SSPC PA1 – Paint Application Specification No. 1 and in accordance with manufacturer’s instructions.

B. Cleaned surfaces and all coats shall be inspected prior to each succeeding coat. The CONTRACTOR shall schedule such inspection with the ENGINEER in advance.

C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same working day.

D. Coatings shall be applied in accordance with the manufacturer's instructions and recommendations, and this Section, whichever has the most stringent requirements.

E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. Use stripe painting for these areas.

F. Special attention shall be given to materials that will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.

G. Finish coats, including touch-up and damage repair coats shall be applied in a manner that will present a uniform texture and color matched appearance.

H. Coatings shall not be applied under the following conditions:

1. Temperature exceeding the manufacturer's recommended maximum and minimum allowable.

2. Dust or smoke laden atmosphere.

3. Damp or humid weather.

4. When the substrate or air temperature is less than 5 degrees F above dewpoint.

5. When air temperature is expected to drop below 40 degrees F or less than 5 degrees F above the dewpoint within 8 hours after application of coating.

6. When wind conditions are not calm.

I. Dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Dept. of Commerce, Weather Bureau psychometric tables.

J. Unburied steel piping shall be abrasive blast cleaned and primed before installation.

K. The finish coat on all work shall be applied after all concrete, masonry, and equipment installation is complete and the work areas are clean and dust free.

L. Follow manufacturer's requirements for recoat windows.

3.13 CURING OF COATINGS

A. The CONTRACTOR shall maintain curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the most stringent, prior to placing the completed coating system into service.

B. In the case of enclosed areas, forced air ventilation, using heated air if necessary, may be required until the coatings have fully cured.

C. Forced Air Ventilation of Steel Reservoirs and Enclosed Hydraulic Structures: Forced air ventilation is required for the application and curing of coatings on the interior surfaces of steel reservoirs and enclosed hydraulic structures. During application and curing periods, continuously exhaust air from a manhole in the lowest shell ring, or in the case of an enclosed hydraulic structure, from the lowest level of the structure using portable ducting. After all interior coating operations have been completed, provide a final curing period for a minimum of 10 days, during which the forced ventilation system shall operate continuously. For additional requirements, refer to the specific coating system requirements in Part 2 above.

3.14 IDENTIFICATION OF PIPING

A. Identification of piping shall be in accordance with Section 15005 - Piping Identification Systems.

B. Every valve or connection, where it may be possible for a worker to be exposed to a hazardous substance, shall be labeled per Occupational Safety and Health Standards 29CFR1910.1200.

3.15 SHOP AND FIELD INSPECTION AND TESTING

A. General: The CONTRACTOR shall give the ENGINEER a minimum of 3 days advance notice of the start of any field surface preparation work or coating application work, and a minimum of 7 days advance notice of the start of any shop surface preparation work.

B. All such work shall be performed only in the presence of the ENGINEER, unless the ENGINEER has granted prior approval to perform such work in its absence.

C. Inspection by the ENGINEER, or the waiver of inspection of any particular portion of the WORK, shall not relieve the CONTRACTOR of its responsibility to perform the work in accordance with these Specifications.

D. Scaffolding shall be erected and moved to locations where requested by the ENGINEER to facilitate inspection. Additional illumination shall be furnished to cover all areas to be inspected.

E. Inspection Devices: The CONTRACTOR shall furnish, until final acceptance of such coatings, inspection devices in good working condition for the detection of holidays and measurement of dry-film thicknesses of protective coatings. Dry-film thickness gauges shall be made available for the ENGINEER'S use at all times while coating is being done, until final acceptance of such coatings. The CONTRACTOR shall furnish the services of a trained operator of the holiday detection devices until the final acceptance of such coatings. Holiday detection devices shall be operated only in the presence of the ENGINEER.

F. Holiday Testing: The CONTRACTOR shall holiday test all coated ferrous surfaces inside a steel reservoir, other surfaces which will be submerged in water or other liquids, or surfaces which are enclosed in a vapor space in such structures and surfaces coated with any of the submerged and severe service coating systems.

Areas that contain holidays shall be marked and repaired or recoated in accordance with the coating manufacturer's printed instructions and then retested.

1. Coatings With Thickness Exceeding 20 Mils: For surfaces having a total dry film coating thickness exceeding 20 mils: pulse-type holiday detector such as Tinker & Rasor Model AP-W, D.E. Stearns Co. Model 14/20, or equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the required coating thickness.

2. Coatings With Thickness of 20 Mils or Less: For surfaces having a total dry film coating thickness of 20 mils or less: Tinker & Rasor Model M1 non-destructive type holiday detector, K-D Bird Dog, or equal shall be used. The unit shall operate at less than 75-volts. For thicknesses between 10 and 20 mils, a non-sudsing type wetting agent, such as Kodak Photo-Flo, or equal, shall be added to the water prior to wetting the detector sponge.

G. Film Thickness Testing: On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC "Paint Application Specification No. 2" using a magnetic-type dry film thickness gauge such as Mikrotest model FM, Elcometer model 111/1EZ, or equal. Each coat shall be tested for the correct thickness. No measurements shall be made until at least 8 hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.

H. Surface Preparation: Evaluation of blast cleaned surface preparation work will be based upon comparison of the blasted surfaces with the standard samples available from the NACE, using NACE standards TM-01-70 and TM-01-75.

3.16 COATING SYSTEM SCHEDULES – FERROUS METALS

A. Coating System Schedule, Ferrous Metal – Not Galvanized:

	Item	Surface Prep.	System No.
FM-1	Surfaces of indoor equipment and piping, not submerged; and all other indoor surfaces not indicated otherwise.	Steel: Commercial blast cleaning SSPC SP6; Ductile iron pipe: Clean as required to remove all soluble surface contaminants. Abrasive blast all surfaces to be coated in accordance with NAPF 500-03-04 to remove all insoluble surface contaminants and to achieve a minimum surface profile of 1.5 mils.	(8) epoxy, equipment
FM-2	Surfaces in chlorination rooms, chlorine storage rooms.	Commercial blast cleaning SSPC SP6	(101) amine-cured epoxy
FM-3	Ferrous metal surfaces and piping submerged or intermittently submerged in wastewater including walls and floors of all treatment structures except the chlorine contact chamber	White metal blast cleaning SSPC SP5 and to achieve a minimum 3.0 mil angular surface profile.	(100) 100% solids amine-cured epoxy
FM-3A	Wall and floors of chlorine contact chamber and all piping that is submerged or intermittently submerged in wastewater.	White metal blast cleaning SSPC SP5 and to achieve a minimum 3.0 mil angular surface profile. Ductile iron pipe: Clean as required to remove all soluble surface contaminants. Abrasive blast all surfaces to be coated in accordance with NAPF 500-03-04 to remove all insoluble surface contaminants and to achieve a minimum surface profile of 1.5 mils.	(101) amine-cured epoxy
FM-4	Buried small steel pipe.	Removal of dirt, grease, oil	(200) PVC tape
FM-5	Where indicated, ferrous surfaces in water passages of all valves 2-inch size and larger,	White metal blast cleaning SSPC SP5	(103) polyamide-cured epoxy

	exterior surfaces of submerged valves.		
FM-6	Where indicated, ferrous surfaces in water passages and submerged surfaces of all pumps which have discharge size of 4 inches or larger.	White metal blast cleaning SSPC SP5	(103) amine-cured epoxy
FM-7	Ferrous surfaces of sleeve couplings.	Solvent cleaning SSPC SP1, followed by white metal blast cleaning SSPC-SP10	(106) fusion-bonded epoxy
FM-8	Buried surfaces that are not indicated to be coated elsewhere.	Near white metal blast cleaning SSPC SP10	(101) amine-cured epoxy
FM-9	Buried pipe, pipe couplings, valves, and flanged joints (where piping is ductile or cast iron, not tape-coated), including factory-coated surfaces	As specified by reference specification	(205) polyethylene encasement
FM-10	Surfaces of exterior exposed equipment, piping and tanks not submerged; and all other outdoor surfaces not indicated otherwise.	Steel: Commercial blast cleaning SSPC SP6; Ductile iron pipe: Clean as required to remove all soluble surface contaminants. Abrasive blast all surfaces to be coated in accordance with NAPF 500-03-04 to remove all insoluble surface contaminants and to achieve a minimum surface profile of 1.5 mils.	(4) aliphatic polyurethane

B. Coating System Schedule, Ferrous Metal – Galvanized: Pretreatment coatings, barriers coatings, or washes shall be applied as recommended by the coating manufacturer. All galvanized surfaces shall be coated except for the following items which shall be coated only if required by other Sections: (1) Floor gratings and frames, (2) Handrails, (3) Stair treads, (4) Chain link fencing and appurtenances.

	Item	Surface Prep.	System No.
FMG-1	All exposed surfaces outdoors, except those indicated otherwise.	Solvent cleaning SSPC SP1 followed by brush-off grade blast cleaning SSPC SP7	(13) aliphatic polyurethane, galvanized
FMG-2	All exposed surfaces indoors, except those indicated otherwise.	Clean as required to remove all soluble contaminants; power tool clean as required to remove all insoluble contaminants; treat with Great Lakes Clean 'N Etch, or equal, per manufacturer's recommendations	(14) acrylic latex, galvanized
FMG-2	Surfaces in chlorinator room, chlorine storage room.	Solvent cleaning SSPC SP1 followed by brush-off grade blast cleaning SSPC SP7	(101) amine-cured epoxy
FMG-3	Buried small galvanized steel pipe.	Removal of dirt, grease, oil	(200) PVC tape
FMG-4	Surfaces buried or submerged in water or wastewater, including all surfaces lower than two feet above high water level and all surfaces inside enclosed hydraulic structures and vents.	Solvent cleaning SSPC SP1 followed by brush-off grade blast cleaning SSPC SP7	(101) amine-cured epoxy

3.17 COATING SYSTEM SCHEDULE, NON-FERROUS METAL, PLASTIC, FIBER GLASS

A. Where isolated non-ferrous parts are associated with equipment or piping, the CONTRACTOR shall use the coating system for the adjacent connected surfaces. Do not coat handrails, gratings, frames or hatches. Only primers recommended by the coating manufacturer shall be used.

	Item	Surface Prep.	System No.
NFM-1	All exposed surfaces, indoors and outdoors, except those included below.	Solvent cleaned SSPC SP1	(4) aliphatic polyurethane
NFM-2	Chlorination room, chlorine storage room.	Solvent cleaned SSPC SP1	(101) amine-cured epoxy
NFM-3	Aluminum surfaces in contact with concrete, or with any other metal except galvanized ferrous metal.	Solvent cleaned SSPC SP1	(208) aluminum metal isolation
NFM-4	Polyvinyl chloride plastic piping, indoors and outdoors, or in structures, not submerged.	Solvent cleaned SSPC SP1	(7) acrylic latex
NFM-5	Buried non-ferrous metal pipe.	Removal of dirt, grease, oil	(200) PVC tape

END OF SECTION 09800

SECTION 11000 - EQUIPMENT GENERAL PROVISIONS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide equipment and appurtenant WORK, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to all equipment except where otherwise indicated.

C. Equipment Arrangement: Unless specifically indicated otherwise, the arrangement of equipment shown on the Drawings is based upon information available at the time of design and is not intended to show exact dimensions particular to a specific manufacturer in all cases. Some aspects of the Drawings are diagrammatic and some features of the illustrated equipment arrangement may require revision to meet the actual equipment requirements. Structural supports, foundations, piping and valve connections, and electrical and instrumentation connections indicated may have to be altered to accommodate the equipment provided. No additional payment will be made for such revisions and alterations. Substantiating calculations and drawings shall be submitted prior to beginning the installation of equipment.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Equipment shall be in accordance with the following standards, as applicable and as indicated in each equipment specification:

1. American Society for Testing and Materials (ASTM).

2. American National Standards Institute (ANSI).

3. American Society of Mechanical Engineers (ASME).

4. American Water Works Association (AWWA).

5. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).

6. American Welding Society (AWS).

7. National Fire Protection Association (NFPA).

8. Federal Specifications (FS).

9. National Electrical Manufacturers Association (NEMA).

10. Manufacturer's published recommendations and specifications.

11. General Industry Safety Orders (OSHA).

B. The following standards are referenced in this Section:
ASME B16.1 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800

ASME B16.5	Pipe Flanges and Flanged Fittings, Steel, Nickel Alloy and other Special Alloys
ASME B46.1	Surface Texture
ANSI S12.6	Method for the Measurement of the Real-Ear Attenuation of Hearing Protectors
ASME B1.20.1	General Purpose Pipe Threads (Inch)
ASME B31.1	Power Piping
AWWA C206	Field Welding of Steel Water Pipe
AWWA C207	Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm through 3,600 mm)
AWWA D100	Welded Steel Tanks for Water Storage
ASTM A 48	Gray Iron Castings
ASTM A 108	Steel Bars, Carbon, Cold-Finished, Standard Quality

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: Furnish complete drawings and technical information for equipment, piping, valves, and controls. Where indicated or required by the ENGINEER, Shop Drawings shall include clear, concise calculations showing equipment anchorage forces and the capacities of the anchorage elements proposed by the CONTRACTOR.

C. Spare Parts List: The CONTRACTOR shall obtain from the manufacturer and submit at the same time as Shop Drawings a list of suggested spare parts for each piece of equipment. CONTRACTOR shall also furnish the name, address, and telephone number of the nearest distributor for each piece of equipment.

D. Torsion and Vibration Analyses

1. The CONTRACTOR shall arrange for and submit torsional and lateral vibration analyses for the following equipment types:

a. Engine drives except engine generators.

b. Pumps, blowers, and compressors with constant speed drives of 500 horsepower and greater.

c. Pumps, blowers and compressors with variable speed drives of 100 horsepower and greater.

d. Vertical pumps with universal joints and extended shafts.

e. Other equipment as indicated.

2. An experienced specialist from the equipment manufacturer shall perform a complete torsional and lateral vibration analysis of each distinct equipment, motor, and variable speed drive. These analyses shall identify the dry and wet lateral critical speeds plus the torsional critical speeds of the system. Appropriate lateral and critical speed maps shall be produced and submitted.

3. No active critical speed shall be allowed within 25 percent of the operating speed range. No fabrication of the equipment shall be started until the analyses have been approved by the ENGINEER.

E. Certifications that equipment and equipment supports comply with seismic and wind design criteria from Code.

1.4 QUALITY ASSURANCE

A. Costs: Responsibility shall be the CONTRACTOR's for performing and paying the costs of inspection, startup, testing, adjustment, and instruction services performed by factory representatives. The OWNER will pay for costs of power and water. If available, the OWNER's operating personnel will provide assistance in the field testing.

B. Inspection: The CONTRACTOR shall inform the local authorities, such as building and plumbing inspectors, fire marshal, OSHA inspectors, and others, to witness required tests for piping, plumbing, fire protection systems, pressure vessels, safety systems, and related items to obtain required permits and certificates, and shall pay inspection fees.

C. Quality and Tolerances: Tolerances and clearances shall be as shown on the Shop Drawings and shall be closely adhered to.

1. Machine work shall be of high-grade workmanship and finish, with due consideration to the special nature or function of the parts. Members without milled ends and which are to be framed to other steel parts of the structure may have a variation in the detailed length of not greater than 1/16-inch for members 30-feet or less in length, and not greater than 1/8-inch for members over 30-feet in length.

2. Castings shall be homogeneous and free from non-metallic inclusions and defects. Surfaces of castings which are not machined shall be cleaned to remove foundry irregularities. Casting defects not exceeding 12.5 percent of the total thickness and where defects will not affect the strength and serviceability of the casting may be repaired by approved welding procedures. The ENGINEER shall be notified of larger defects. No repair welding of such defects shall be carried out without the ENGINEER'S written approval. If the removal of metal for repair reduces the stress resisting cross-section of the casting by more than 25 percent or to such an extent that the computed stress in the remaining metal exceeds the allowable stress by more than 25 percent, then the casting may be rejected. Costs of casting new material shall be the CONTRACTOR'S responsibility as part of the WORK.

3. Materials shall meet the physical and mechanical properties in accordance with the reference standards.

D. Machine Finish: The type of finish shall be the most suitable for the application and shall be shown in micro-inches in accordance with ANSI B46.1. The following finishes shall be used:

1. Surface roughness not greater than 63 micro-inches shall be required for surfaces in sliding contact.

2. Surface roughness not greater than 250 micro-inches shall be required for surfaces in contact where a tight joint is not required.

3. Rough finish not greater than 500 micro-inches shall be required for other machined surfaces.

4. Contact surfaces of shafts and stems which pass through stuffing boxes and contact surfaces of bearings shall be finished to not greater than 32 micro-inches.

E. Manufacturer's Experience: Equipment manufacturer shall have a record of at least 5 years of successful, trouble free operation in similar applications and size equal or larger than the equipment in this contract.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Noise Level: When in operation, no single piece of equipment shall exceed the OSHA noise level requirement of 105 dBA for one hour exposure per day.

B. High Noise Level Location: The CONTRACTOR shall provide one personal hearing protection station at each high noise level location. Locations are defined as follows:

1. Outdoor Location: Any single equipment item or any group of equipment items that produce noise exceeding OSHA noise level requirements for a 2 hour exposure. Where such equipment is separated by a distance of more than 20-feet, measured between edges of footings, each group of equipment shall be provided with a separate hearing protection station.

2. Indoor Location

a. Any single equipment item or any group of equipment items located within a single room not normally occupied, that produces noise exceeding OSHA noise level requirements for a 2 hour exposure.

b. Any single equipment item or any group of equipment items located within a single room normally occupied by workers that produces noise exceeding OSHA noise level requirements for an 8 hour exposure.

C. Personal Hearing Protection: The CONTRACTOR shall furnish 3 pairs of high attenuation hearing protectors in the original unopened packaging. The ear protectors shall be capable of meeting the requirements of ANSI S12.6 and shall produce a noise level reduction of 25 dBA at a frequency of 500 Hz. The hearing protectors shall have fluid filled ear cushions and an adjustable, padded headband. The protectors shall be stored in a weatherproof, labeled, steel cabinet, provided at an approved location near the noise producing equipment.

D. Drive Trains and Service Factors: Service factors shall be applied in the selection or design of mechanical power transmission components. All components of drive train assemblies between the prime mover and the driven equipment shall be designed and rated to deliver the maximum peak or starting torque, speed, and horsepower. All of the applicable service factors shall be considered, such as mechanical (type of prime mover), load class, start frequency, ventilation, ambient temperature, and fan factors. Drive train components include couplings, shafts, gears and gear drives, drive chains, sprockets, and V-belt drives. Unless otherwise indicated, the following load classifications shall apply in determining service factors:

Type of Equipment	Service Factor	Load Classification
Blowers		
centrifugal or vane	1.0	Uniform
lobe	1.25	Moderate Shock
Centrifugal Fans	1.0	Uniform
Reciprocating Air Compressors		
multi-cylinder	2.0	Heavy Shock
single-cylinder	2.0	Heavy Shock
Pumps		
centrifugal or rotary	1.0	Uniform
reciprocating	1.8	Moderate Shock
progressing cavity	1.0	Uniform
Mixers		
constant density	1.0	Uniform
variable density	1.25	Moderate Shock
rapid mixer	1.25	Moderate Shock
flocculator	1.25	Moderate Shock
sludge mixer	2.5	Moderate Shock
surface aerator	2.5	Heavy Shock
Clarifiers	1.0	Uniform
Sludge Thickeners	1.25	Moderate Shock
Vacuum Filters	1.25	Moderate Shock
Dewatering Screws	1.25	Moderate Shock
Grit Handling Equipment	1.25	Moderate Shock
Mechanical Bar Screens	1.0	Uniform
Scum Breakers	1.25	Moderate Shock
Cranes or Hoists	1.25	Moderate Shock

E. Mechanical Service Factors

	Mechanical Service Factors	
	Electric Motor	Internal Combustion Engine
Uniform	1.25	1.50
Moderate Shock	1.50	1.75
Heavy Shock	2.00	2.25

F. For thermal rating adjustments such as start frequency, ambient temperature, and hourly duty cycle factor, ventilation factor, and fan factor, refer to gear manufacturer sizing information.

G. For service factors of electric motors, see equipment specification sections.

H. Where load classifications are not indicated, service factors shall be for standard load classifications and for flexible couplings.

I. Welding: Unless otherwise indicated, welding shall conform to the following:

1. Latest revision of AWWA D100.

2. Latest revision of AWWA C206.

3. Composite fabricated steel assemblies that are to be erected or installed inside a hydraulic structure, including any fixed or movable structural components of mechanical equipment, shall have continuous seal welds to prevent entrance of air or moisture.

4. Welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards.

5. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS code. Upon completion of welding, weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. Sharp corners of material that is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

J. Protective Coatings: Equipment shall be painted or coated in accordance with Section 09800 - Protective Coatings, unless otherwise indicated. Non-ferrous metal and corrosion-resisting steel surfaces shall be coated with grease or lubricating oil. Coated surfaces shall be protected from abrasion or other damage during handling, testing, storing, assembly, and shipping.

K. Protection of Equipment: Equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. Equipment shall be protected from exposure to corrosive fumes and shall be kept thoroughly dry at all times. Pumps, motors, drives, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weather-tight storage facilities prior to installation. For extended storage periods, plastic equipment wrappers should be avoided, to prevent accumulation of condensate in gears and bearings. In addition, motor space heaters shall be energized and shafts shall be rotated. Equipment delivered to the Site with rust or corroded parts shall be rejected. If equipment develops defects during storage, it shall be disassembled, cleaned, and recoated to restore it to original condition.

L. Identification of Equipment Items

1. At the time of shipping, each item of equipment shall have a legible identifying mark corresponding to the equipment number in the Contract Documents for the particular item.

2. After installation, each item of equipment shall be given permanent identification.

a. Pumps, compressors, and blowers smaller than 10 horsepower shall receive acrylic plastic nametags.

b. Pumps, compressors, and blowers 10 horsepower and larger shall receive stainless steel plate nametags.

M. Vibration Isolators: Air compressors, blowers, engines, inline fans shall be provided with restrained spring-type vibration isolators or pads per manufacturer's written recommendations. Vibration isolations shall be provided with seismic restraint.

N. Shop Fabrication: Shop fabrication shall be performed in accordance with the Contract Documents and the Shop Drawings.

O. Controls: Equipment and system controls shall be in accordance with Division 17 - Instrumentation.

2.2 EQUIPMENT SUPPORTS AND FOUNDATIONS

A. Equipment Supports: Unless otherwise indicated, equipment supports, anchors, and restrainers shall be adequately designed for static, dynamic, wind, and seismic loads. The design horizontal seismic force shall be the greater of: that noted in the general structural notes or as required by the governing building code, or 10 percent of gravity. Submitted design calculations for equipment supports shall bear the signature and seal of an engineer registered in the State wherein the project is to be built, unless otherwise indicated. Calculations shall account for forces and distribution of forces on supporting structures resulting from normal operation, normal operation plus seismic loadings, and normal operation plus wind loadings.

1. Wall-mounted equipment weighing more than 250 pounds or which is within 18-inches above the floor shall be provided with fabricated steel supports. Pedestals shall be of welded steel. If the supported equipment is a panel or cabinet or is enclosed with removable sides, the pedestal shall match the supported equipment in appearance and dimensions.

2. Seismic requirements: Freestanding and wall-hung equipment shall be anchored in place by methods that satisfy the building code. Calculations shall be performed and signed and stamped for equipment weighing more that 400 pounds. Calculations shall analyze lateral and overturning forces and shall

include a factor of safety against overturning equal to 1.5. Calculations shall include the distribution of forces imposed on the supporting structure and anchors, verifying that each anchor can develop the required resistance forces.

3. Wind requirements: Exterior freestanding equipment shall be anchored in place by methods that satisfy the building code. Calculations shall be performed and signed and stamped, analyzing lateral and overturning forces and shall include a factor of safety against overturning equal to 1.5. Calculations shall include the distribution of forces imposed on the supporting structure and anchors, verifying that each anchor can develop the required resistance forces.

B. Anchors: Anchor bolts shall be in accordance with Section 05500 - Miscellaneous Metalwork. CONTRACTOR shall determine the size, type, capacity, location, and other placement requirements of anchorage elements. Anchoring methods and leveling criteria in the manufacturer's literature shall be followed. Submit methods and criteria with the Shop Drawings.

C. Equipment Foundations: Mechanical equipment, tanks, control cabinets, enclosures, and related equipment shall be mounted on minimum 3.5-inch high concrete bases, unless otherwise indicated. Equipment foundations are indicated on Drawings. The CONTRACTOR through the equipment manufacturer shall verify the size and weight of equipment foundation to insure compatibility with equipment.

2.3 COUPLINGS

A. Mechanical couplings shall be provided between the driver and the driven equipment. Flexible couplings shall be provided between the driver and the driven equipment to accommodate slight angular misalignment, parallel misalignment, end float, and to cushion shock loads. Unless otherwise indicated or recommended by the equipment manufacturer, coupling type shall be furnished with the respective equipment as follows:

Equipment Type	Coupling Type
Horizontal and end suction pumps	Gear or flexible spring
Vertical turbine pumps	3 piece spacer for solid shaft or double nut for hollow shaft
Vertical non-clog pumps, close coupled	Flexible disc pack
Screw pumps	Flexible spring, gear coupling, fluid coupling
Vertical non-clog pumps with extended shaft	Flexible disc pack or Universal joint with carbon fiber composite shaft and steady bearing support(s)
Belt conveyors	Gear coupling for fractional to 7.5 horsepower, Silicone filled fluid coupling for 10 hp and larger
Sludge collector	Gear coupling or jaw clutch
Engine driven pumps	Universal joint type or elastomeric flexible type

Single stage centrifugal blowers	Flexible disc pack
Air compressors	Gear or flexible disc pack

B. Each coupling size shall be determined based on the rated horsepower of the motor, speed of the shaft, and the load classification service factor. The CONTRACTOR shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application.

C. Differential Settlement: Where differential settlement between the driver and the driven equipment may occur, 2 sets of universal type couplings shall be provided.

D. Taper-Lock or equal bushings may be used to provide for easy installation and removal of shafts of various diameters.

2.4 SHAFTING

A. General: Shafting shall be continuous between bearings and shall be sized to transmit the power required. Keyways shall be accurately cut in line. Shafting shall not be turned down at the ends to accommodate bearings or sprockets whose bore is less than the diameter of the shaft. Shafts shall rotate in the end bearings and shall be turned and polished, straight, and true.

B. Design Criteria: All shafts shall be designed to carry the steady state and transient loads suitable for unlimited number of load applications, in accordance with ASME B106.1M - Design of Transmission Shafting. Where shafts are subjected to fatigue stresses, such as frequent start and stop cycles, the mean stress shall be determined by using the modified Goodman Diagram. The maximum torsional stress shall not exceed the endurance limit of the shaft after application of the factor of safety of 2 in the endurance limit and the stress concentration factor of the fillets in the shaft and keyway. Stress concentration factor shall be in accordance with ASME Standard B17.1 - Keys and Keyseats.

C. Materials: Shafting materials shall be appropriate for the type of service and torque transmitted. Environmental elements such as corrosive gases, moisture, and fluids shall be taken into consideration. Materials shall be as indicated unless furnished as part of an equipment assembly.

1. Low carbon cold-rolled steel shafting shall conform to ASTM A 108, Grade 1018.

2. Medium carbon cold-rolled shafting shall conform to ASTM A 108, Grade 1045.

3. Other grades of carbon steel alloys shall be suitable for service and load.

4. Corrosion-resistant shafting shall be stainless steel or Monel, whichever is most suitable for the intended service.

D. Differential Settlement: Where differential settlement between the driver and the driven equipment may occur, a shaft of sufficient length with 2 sets of universal type couplings shall be provided.

2.5 GEARS AND GEAR DRIVES

A. Unless otherwise indicated, gears shall be of the spur, helical, or spiral-bevel type, designed and manufactured in accordance with AGMA Standards, with a service factor suitable for load class, mechanical service and thermal rating adjustment, a minimum L-10 bearing life of 60,000 hours, and a minimum efficiency of 94 percent. Peak torque, starting torque, and shaft overhung load shall be checked when selecting the gear reducer. Worm gears shall not be used unless specifically approved by the ENGINEER.

B. Gear speed reducers or increasers shall be of the enclosed type, oil- or grease-lubricated and fully sealed, with a breather to allow air to escape but keep dust and dirt out. The casing shall be of cast iron or heavy-duty steel construction with lifting lugs and an inspection cover for each gear train. An oil level sight glass and an oil flow indicator shall be provided, located for easy reading.

C. Gears and gear drives that are part of an equipment assembly shall be shipped fully assembled for field installation.

D. Material selections shall be left to the discretion of the manufacturer, provided the above AGMA values are met. Input and output shafts shall be adequately designed for the service and load requirements. Gears shall be computer-matched for minimum tolerance variation. The output shaft shall have 2 positive seals to prevent oil leakage.

E. Oil level and drain locations shall be easily accessible. Oil coolers or heat exchangers with all required appurtenances shall be provided when necessary.

F. Where gear drive input or output shafts from one manufacturer connect to couplings or sprockets from a different manufacturer, the CONTRACTOR shall have the gear drive manufacturer furnish a matching key taped to the shaft for shipment.

2.6 DRIVE CHAINS

A. Power drive chains shall be commercial type roller chains meeting ASME Standards.

B. A chain take-up or tightener shall be provided in every chain drive arrangement to provide easy adjustment.

C. A minimum of one connecting or coupler link shall be provided in each length of roller chain.

D. Chain and attachments shall be of the manufacturer's best standard material and be suitable for the process fluid.

2.7 SPROCKETS

A. General: Sprockets shall be used in conjunction with chain drives and chain-type material handling equipment.

B. Materials: Unless otherwise indicated, materials shall be as follows:

1. Sprockets with 25 teeth or less, normally used as a driver, shall be made of medium carbon steel in the 0.40 to 0.45 percent carbon range.

2. Type A and B sprockets with 26 teeth or more, normally used as driven sprockets, shall be made of minimum 0.20 percent carbon steel.

3. Large diameter sprockets with Type C hub shall be made of cast iron conforming to ASTM A 48, Class 30.

C. Sprockets shall be accurately machined to ASME Standards. Sprockets shall have deep hardness penetration in tooth sections.

D. Finish bored sprockets shall be furnished complete with key seat and set screws.

E. To facilitate installation and disassembly, sprockets shall be of the split type or shall be furnished with Taper-Lock bushings as required.

F. Idler sprockets shall be provided with brass or Babbitt bushings, complete with oil hole and axial or circumferential grooving with stainless steel tubing and grease fitting extended to an accessible location. Steel collars with set screws may be provided in both sides of the hub.

2.8 V-BELT DRIVES

A. V-belts and sheaves shall be of the best commercial grade and shall conform to ASME, MPTA, and RMA Standards.

B. Unless otherwise indicated, sheaves shall be machined from the finest quality gray cast iron.

C. Sheaves shall be statically balanced. In some applications where vibration is a problem, sheaves shall be dynamically balanced. Sheaves operating at belt speeds exceeding 6,500 fpm may be required to be of special materials and construction.

D. To facilitate installation and disassembly, sheaves shall be provided complete with Taper-Lock or QD bushings as required.

E. Finish bored sheaves shall be complete with keyseat and set screws.

F. Sliding motor bases shall be provided to adjust the tension of V-belts.

2.9 DRIVE GUARDS

A. Power transmission trains, prime movers, machines, shaft extensions, and moving machine parts shall be guarded to conform to OSHA Safety and Health Standards (29CFR1910). The guards shall be constructed of minimum 10 gauge expanded, flattened steel with smooth edges and corners, galvanized after fabrication, and securely fastened. Where required for lubrication or maintenance, guards shall have hinged and latched access doors.

2.10 BEARINGS

A. General: Bearings shall conform to the standards of the American Bearing Manufacturers Association, Inc. (ABMA).

B. To assure satisfactory bearing application, fitting practice, mounting, lubrication, sealing, static rating, housing strength, and lubrication shall be considered in bearing selection.

C. Re-lubricatable type bearings shall be equipped with a hydraulic grease fitting in an accessible location and shall have sufficient grease capacity in the bearing chamber.

D. Lubricated-for-life bearings shall be factory-lubricated with the manufacturer's recommended grease to insure maximum bearing life and best performance.

E. Anti-Friction Type Bearing Life: Except where otherwise indicated, bearings shall have a minimum L-10 life expectancy of 5 years or 20,000 hours, whichever occurs first. Where so indicated, bearings shall have a minimum rated L-10 life expectancy corresponding to the type of service, as follows:

Type of Service	Design Life, years	L-10 Design Life, hours
	(whichever comes first)	
8-hour shift	10	20,000
16-hour shift	10	40,000
Continuous	10	60,000

F. Bearing housings shall be of cast iron or steel and bearing mounting arrangement shall be as indicated or as recommended in the published standards of the manufacturer. Split-type housings may be used to facilitate installation, inspection, and disassembly.

G. Sleeve Type Bearings: Sleeve-type bearings shall have a cast iron or ductile iron housing and Babbitt or bronze liner. Bearing housing shall be bolted and doweled to the lower casing half. These housings shall be provided with cast iron caps bolted in place and the bearing end caps shall be bored to receive the bearing shells. Sleeve bearings shall be designed on the basis of the maximum allowable load permitted by the bearing manufacturer. If the sleeve bearing is connected to an equipment shaft with a coupling, the coupling transmitted thrust will be assumed to be the maximum motor or equipment thrust. Lubricant, lubrication system, and cooling system shall be as recommended by the bearing manufacturer.

H. Plate Thrust Bearings: Thrust bearings shall be the Kingsbury Type, designed and manufactured to maintain the shaft in the fixed axial position without undue heating or the necessity of adjustment or attention. Bearings shall be oil lubricated to suit the manufacturer's standard method of lubrication for the specific bearing. If bearing cooling is required, manufacturer shall provide necessary piping, filters, and valves.

2.11 PIPING CONNECTIONS

A. Pipe Hangers, Supports, and Guides: Pipe connections to equipment shall be supported, anchored, and guided to avoid stresses and loads on equipment flanges and equipment. Supports and hangers shall be in accordance with Section 15006 - Pipe Supports.

B. Flanges and Pipe Threads: Flanges on equipment and appurtenances shall conform to ASME B16.1, Class 125, or B16.5, Class 150, unless otherwise indicated. Pipe threads shall be in accordance with ASME B1.20.1 and Section 15000 - Piping, General.

C. Flexible Connectors: Flexible connectors shall be installed in all piping connections to engines, blowers, compressors, and other vibrating equipment and in piping systems in accordance with the requirements of Section 15000. Flexible connectors shall be harnessed or otherwise anchored to prevent separation of the pipe where required by the installation.

D. Insulating Connections: Insulating bushings, unions, couplings, or flanges, as appropriate, shall be used in accordance with the requirements of the Section 15000.

2.12 GASKETS AND PACKINGS

A. Gaskets shall be in accordance with Section 15000.

B. Packing around valve stems and reciprocating shafts shall be of compressible material, compatible with the fluid being used. Chevron-type "V" packing shall be Garlock No. 432, John Crane "Everseal," or equal.

C. Packing around rotating shafts (other than valve stems) shall be "O"-rings, stuffing boxes, or mechanical seals, as recommended by the manufacturer and approved by the ENGINEER, and in accordance with Section 11100 - Pumps, General, for pumps.

2.13 NAMEPLATES

A. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the machine performance ratings.

2.14 TOOLS AND SPARE PARTS

A. Tools: The CONTRACTOR shall furnish one complete set of special wrenches and other special tools necessary for the assembly, adjustment, and dismantling of the equipment. Tools shall be of best quality hardened steel forgings with bright finish. Wrench heads shall have work faces dressed to fit nuts. Tools shall be suitable for professional work and manufactured by Snap On, Crescent, Stanley, or equal. The set of tools shall be neatly mounted in a labeled toolbox of suitable design provided with a hinged cover.

2.15 EQUIPMENT LUBRICANTS

A. The CONTRACTOR shall install lubricants for all equipment during storage and prior to initial testing of the equipment. After successful initial testing, final testing, and satisfactory completion startup testing as specified in Section 01660 - Equipment Testing and Plant Startup, the CONTRACTOR shall conduct one complete lubricant change on all equipment. In addition, the CONTRACTOR shall be responsible for the proper disposal of all used lubricants. The OWNER will then be responsible for subsequent lubricant changes

PART 3 -- EXECUTION

3.1 SERVICES OF MANUFACTURER

A. Inspection, Startup, and Field Adjustment: Where required by individual sections, an authorized, experienced, and competent service representative of the manufacturer shall visit the Site for the number of days indicated in those sections to witness or perform the following and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.

1. Installation of equipment

2. Inspection, checking, and adjusting the equipment and approving its installation

3. Startup and field testing for proper operation, efficiency, and capacity

4. Performing field adjustments during the test period to ensure that the equipment installation and operation comply with requirements

B. Instruction of the Owner's Personnel

1. Where required by the individual equipment sections, an authorized training representative of the manufacturer shall visit the Site for the number of days indicated in those sections to instruct the OWNER's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with necessary test equipment. Instruction shall be specific to the models of equipment provided.

2. The representative shall have at least 2 years experience in training. A resume of the representative shall be submitted.

3. Training shall be scheduled 3 weeks in advance of the scheduled session.

4. Proposed training material and a detailed outline of each lesson shall be submitted for review. Review comments from the ENGINEER shall be incorporated into the material.

5. The training materials shall remain with the trainees after the session.

6. The OWNER may videotape the training for later use by the OWNER's personnel.

C. Vibration Monitoring: For the equipment types listed in paragraph 1.3D, the CONTRACTOR shall arrange for at least two Site visits by the manufacturer's specialist during testing of the equipment covered by torsional and vibration analysis submittals to measure the amount of vibration and prepare written recommendations for keeping the vibration within acceptance limits. If vibration readings exceed the specified or the applicable referenced standard vibration limits for the type of equipment, the CONTRACTOR shall make necessary corrections for the equipment to meet the acceptance criteria.

3.2 INSTALLATION

A. General: Equipment shall be installed in accordance with the manufacturer's written recommendations.

B. Alignment: Equipment shall be field tested to verify proper alignment.

3.3 PACKAGED EQUIPMENT

A. When any system is furnished as pre-packaged equipment, the CONTRACTOR shall coordinate all necessary space and structural requirements, clearances, utility connections, signals, and outputs with subcontractors to avoid later change orders.

B. If the packaged system has any additional features (as safety interlocks, etc.) other than required by the Contract Documents, the CONTRACTOR shall coordinate such features with the ENGINEER and provide all material and labor necessary for a complete installation as required by the manufacturer.

3.4 FIELD ASSEMBLY

A. Studs, cap screws, bolt and nuts used in field assembly shall be coated with “Never Seize” compound or equal.

3.5 WELDING

A. Welds shall be cleaned of weld-slag, splatter, etc. to provide a smooth surface.

3.6 FIELD TESTS

A. Where indicated by the individual equipment sections, equipment shall be field tested after installation to demonstrate satisfactory operation without excessive noise, vibration, or no overheating of bearings or motor.

B. The following field testing shall be conducted:

1. Start equipment, check, and operate the equipment over its entire operating range. Vibration level shall be within the amplitude limits as indicated or as recommended by the reference applicable Standards.

2. Obtain concurrent readings of motor voltage, amperage, capacity, vibration and bearing temperatures.

3. Operate equipment indicated in Section 01660.

C. The ENGINEER shall witness field-testing. The CONTRACTOR shall notify the ENGINEER of the test schedule three days in advance.

D. In the event that any equipment fails to meet the test requirements, the equipment shall be modified and resettled until it satisfies the requirement.

END OF SECTION 11000

SECTION 11100 - PUMPS, GENERAL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide pumps and pumping appurtenances, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to pumps and pumping equipment except where otherwise indicated in the Contract Documents.

C. The requirements of Section 11000 – Equipment General Provisions apply to this Section.

D. Unit Responsibility: The pump manufacturer shall be made responsible for furnishing the WORK and for coordination of design, assembly, testing, and installation of the WORK of each pump Section; however, the CONTRACTOR shall be responsible to the OWNER for compliance with the requirements of each pump Section.

E. Single Manufacturer: Where 2 or more pump systems of the same type or size are required, the pumps shall be produced by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: Shop Drawings shall contain the following information:

1. Pump name, identification number, and specification section number.

2. Performance data curves showing head, capacity, horsepower demand, NPSH required, and pump efficiency over the entire operating range of the pump. The head, capacity, horsepower demand, overall efficiency, and minimum submergence required at the design flow conditions and the maximum and minimum flow conditions shall be separately indicated. Performance curves at intervals of 100 rpm from minimum speed to maximum speed shall be furnished for each centrifugal pump equipped with a variable speed drive.

3. The CONTRACTOR shall require the manufacturer to indicate the limits on the performance curves recommended for stable operation without surge, cavitation, or excessive vibration. The stable operating range shall be as wide as possible based on actual hydraulic and mechanical tests.

4. Assembly and installation drawings including shaft size, seal, coupling, bearings, anchor bolt plan, part nomenclature, material list, outline dimensions, and shipping weights.

5. Data for the electric motor proposed for each type of pump.

6. Elevation of proposed local control panel showing panel-mounted devices, details of enclosure type, single line diagram of power distribution, and current draw of panel, and list of terminals required to receive inputs or to transmit outputs from the local control panel.

7. Wiring diagram of field connections with identification of terminations between local control panels, junction terminal boxes, and equipment items.

8. Complete electrical schematic diagram.

C. Technical Manual: The Technical Manual shall contain the required information for each pump section.

D. Spare Parts List: A spare parts list shall contain the required information for each pump section.

E. Factory Test Data: Signed, dated, and certified factory test data for each pump system which requires factory testing, submitted before shipment of equipment.

F. Certifications

1. Manufacturer's certification of proper installation.

2. CONTRACTOR'S certification of satisfactory field testing.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Compliance with the requirements of the individual pump sections may necessitate modifications to the manufacturer's standard equipment.

B. Performance Curves: Unless indicated otherwise, the required pump shaft horsepower at any point on the performance curve shall not exceed the rated horsepower of the motor or engine or encroach on the service factor.

C. Components of each pump system provided under the pump Sections shall be entirely compatible. Each unit of pumping equipment shall incorporate basic mechanisms, couplings, electric motors or engine drives, variable speed controls, necessary mountings, and appurtenances.

2.2 MATERIALS

A. Materials shall be suitable for the intended application; materials not indicated shall be high-grade, standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended, and shall conform to the following requirements:

1. Cast iron pump casings and bowls shall be of close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or equal.

2. Bronze pump impellers shall conform to ASTM B 62 - Composition Bronze or Ounce Metal Castings, or B 584 - Copper Alloy Sand Castings for General Applications, where dezincification does not occur.

3. Stainless steel pump shafts shall be Type 416, or Type 316, or as otherwise specified. Miscellaneous stainless steel parts shall be Type 316.

4. Anchor bolts, washers, and nuts shall be Type 316 stainless steel in accordance with Section 05500.

B. Materials in contact with potable water shall be listed as compliant with NSF Standard 61.

2.3 PUMP COMPONENTS - GENERAL

A. Flanges and Bolts: Suction and discharge flanges shall conform to ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800 or ASME B16.5 - Pipe Flanges and Flanged Fittings dimensions. Bolts shall be in accordance with Section 05500.

B. Lubrication: Vertical pump shafts of clean water pumps shall be product water-lubricated, unless otherwise indicated. Deep well pumps and pumps with dry barrels shall have water- or oil-lubricated bearings and seals and enclosed line shafts. Pumps for sewage, sludge, and other process fluids shall be lubricated as indicated.

C. Handholes: Handholes on pump casings shall be shaped to follow the contours of the casing to avoid any obstructions in the water passage.

D. Drains: Gland seals, air valves, cooling water drains, and drains from variable speed drive equipment shall be piped to the nearest floor sink or drain with appropriately sized galvanized steel pipe or copper tube, and properly supported with brackets.

E. Stuffing Boxes: Where stuffing boxes are indicated for the pump seal, they shall be of the best quality, using the manufacturer's suggested materials best suited for the specific application. For sewage, sludge, drainage, and liquids containing sediments, the seals shall be fresh-water flushed, using lantern rings. If fresh water is not available, the seal shall be flushed with product water cleaned by a solids separator as manufactured by John Crane Co., Lakos (Claude Laval Corp.), or equal.

1. Conventional Packing Gland Type Seal: Unless otherwise indicated, the packing material shall be interlaced Teflon braiding, containing 50 percent ultrafine graphite impregnation to satisfy the following. Acceptable ring materials are asbestos-free die-molded packing rings of braided graphite material free of PTFE, Chesterton 1400R, or equal for non-potable water service and braided PTFE material, Chesterton 1725 or equal that is listed under NSF Standard 61 for potable water service.

Shaft speeds	up to 2500 fpm
Temperature	up to 500 degrees F
pH range	0-14

2. Mechanical Seals (Conventional Non-Split Type): Mechanical seals shall be fresh water-flushed unless indicated otherwise; in which case product water cleaned by a solids separator shall be used. Mechanical seals shall be as manufactured by the following, or equal:

Sewage, Sludge, or Wastewater Pumps	Double seals	John Crane Type 88, Flowserve Type ISCPP, Chesterton Type GDS or 255
Abrasives, Grit, or Lime Slurry Pumps	Double seals	John Crane Type 88 (hard faces), Flowserve Type ISCPP or SLC (check with pump manufacturer), Chesterton Type GDS or 255

Chemicals or Corrosive Liquid Pumps	Single seals	John Crane Type 8-1 or 9, Flowserve Type ISCPX, or Chesterton Type UV, GSS, or 155
Water Pumps (hot and cold)	Single seals	John Crane Type 88SRS, Flowserve Type ISCPX, Chesterton Type UV, GSS, or 155

F. Where indicated, a buffer fluid must be circulated a minimum 20 psi above discharge pressure, or as required by the manufacturer, in order to maintain reliable seal performance.

G. Mechanical seals shall be equipped with nonclogging, flexible–mounted seats with elastomer secondary seals. Wetted metal parts shall be Type 316 stainless steel, Alloy 20, or Hastelloy B or C, whichever has the best corrosion resistance to the pumped fluid. Dual cartridge seals shall be double balanced to allow for seal integrity in case of flush water pressure reversal. Single and double seals shall have springs in the non-wetted end of the seal.

H. Fresh water shall be delivered to the seals through appropriate size piping with gate valves, check valves, and electrically operated solenoid valves. Wiring shall comply with Division 16 and solenoid control shall comply with Division 17.

2.4 PUMP APPURTENANCES

A. Nameplates: Each pump shall be equipped with a stainless steel nameplate indicating serial numbers, rated head and flow, impeller size, pump speed, and manufacturer's name and model number.

B. Solenoid Valves: The pump manufacturer shall provide solenoid valves on water and oil lubrication lines and on cooling water lines. Solenoid valve electrical ratings shall be compatible with the motor control voltage. Solenoid valves shall be provided in accordance with Section 15230 – Miscellaneous Valves.

C. Gauges

1. Pumps (except sample pumps, sump pumps, and hot water circulating pumps) shall be equipped with pressure gauges installed at pump discharge lines. Pump suction lines shall be provided with compound gauges. Gauges shall be located in a representative location, where not subject to shock or vibrations, in order to achieve true and accurate readings.

2. Where subject to shock or vibrations, the gauges shall be wall-mounted or attached to galvanized channel floor stands and connected by means of flexible connectors.

3. Pressure and compound gauges shall be provided in accordance with Section 15183 – Gauges and Section 17100 – Instrumentation.

2.5 FACTORY TESTING

A. The following tests shall be conducted on each indicated pump system:

1. Motors: Electric motors shall be tested per NEMA MG-1 and IEEE 112. Test results shall be furnished to the pump manufacturer prior to the pump test.

2. Pump Systems: Centrifugal pump systems with drives 10 hp up to and including 125 hp shall be tested at the pump factory in accordance with the American National Standard for Centrifugal Pump Tests

(ANSI/HI 1.6) acceptance Level "A" or the American National Standard for Vertical Pump Tests (ANSI/HI 2.6) as approved by ANSI and published by the Hydraulic Institute. For sump pumps, acceptance shall be in accordance with Level "B" of ANSI/HI 1.6 unless indicated otherwise. Tests shall be performed using the complete pump system to be furnished, including the project motor and variable speed drive if equipped with variable speed drive. For pumps with motors smaller than 100 hp, the manufacturer's certified test motor will be acceptable. Testing of prototype models shall not be used. The following minimum test results shall be submitted:

a. Hydrostatic test results

b. At maximum speed, a minimum of 5 hydraulic test readings between shutoff head and 25 percent beyond the maximum indicated capacity, recorded on data sheets as defined by the Hydraulic Institute. For variable speed driven pumps, each pump shall be tested between maximum and minimum speed at 100 rpm increments.

c. Pump curves showing head, flow, brake horsepower, and efficiency requirements.

d. NPSH required test curve if required by the pump specification. Otherwise, a calculated NPSH required curve may be submitted.

e. Certification that the pump shaft horsepower demand did not exceed the rated motor horsepower of 1.0 service rating at any point on the curve.

3. Factory Witnessed Tests: Pumps, variable speed drives, and motors, 150 hp and larger shall be factory-tested as complete assembled systems and may be witnessed by the OWNER and ENGINEER. The CONTRACTOR shall give the ENGINEER a minimum of 2 weeks notification prior to the test. Costs for OWNER and ENGINEER shall be borne by the CONTRACTOR and shall be included in the bid price. Such costs shall include travel and subsistence for 2 people excluding salaries. Test results shall be submitted to the ENGINEER. No equipment shall be shipped until the test data have been approved by the ENGINEER.

4. Acceptance: In the event of failure of any pump to meet any of the requirements, the CONTRACTOR shall make necessary modifications, repairs, or replacements to conform to the requirements of the Contract Documents and the pump shall be re-tested until found satisfactory.

PART 3 -- EXECUTION

3.1 SERVICES OF MANUFACTURER

A. Inspection, Startup, and Field Adjustment: Where required by the individual pump sections, an authorized service representative of the manufacturer shall visit the Site for the number of Days indicated in those sections to witness the following and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.

1. Installation of the equipment

2. Inspection, checking, and adjusting the equipment

3. Startup and field testing for proper operation

4. Performing field adjustments to ensure that the equipment installation and operation comply with requirements

B. Instruction of the OWNER's Personnel

1. Where required by the individual pump sections, an authorized training representative of the manufacturer shall visit the Site for the number of Days indicated in those sections to instruct the OWNER's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with necessary test equipment. Instruction shall be specific to the models of equipment provided.

2. The representative shall have at least 2 years experience in training. A resume for the representative shall be submitted.

3. Training shall be scheduled a minimum of 3 weeks in advance of the first session.

4. Proposed training material and a detailed outline of each lesson shall be submitted for review. Comments shall be incorporated into the material.

5. The training materials shall remain with the trainees.

6. The OWNER may videotape the training for later use with the OWNER's personnel.

3.2 INSTALLATION

A. General: Pumping equipment shall be installed in accordance with the manufacturer's written recommendations.

B. Alignment: Equipment shall be field tested to verify proper alignment and freedom from binding, scraping, shaft runout, or other defects. Pump drive shafts shall be measured just prior to assembly to ensure correct alignment without forcing. Equipment shall be secure in position and neat in appearance.

C. Lubricants: The CONTRACTOR shall provide any necessary oil and grease for initial operation.

3.3 PROTECTIVE COATING

A. Materials and equipment shall be coated as required in Section 09800 - Protective Coating.

3.4 FIELD TESTS

A. Each pump system shall be field tested after installation to demonstrate:

1. Satisfactory operation without excessive noise and vibration.

2. No material loss caused by cavitation.

3. No overheating of bearings.

4. Indicated head, flow, and efficiency at design point.

B. The following field testing shall be conducted:

1. Startup, check, and operate the pump system over its entire speed range. If the pump is driven by a variable speed drive, the pump and motor shall be tested at 100 RPM increments. If the pump is driven at constant speed, the pump and motor shall be tested at max RPM. Unless otherwise indicated, vibration shall be within the amplitude limits recommended by the Hydraulic Institute Standards at a minimum of four pumping conditions defined by the ENGINEER.

2. Obtain concurrent readings of motor voltage, amperage, pump suction head, and pump discharge head for at least 4 pumping conditions at each pump rotational speed if variable speed at 100 RPM increment or at max RPM if constant speed. Check each power lead to the motor for proper current balance.

3. Determine bearing temperatures by contact type thermometer. A run time until bearing temperatures have stabilized shall precede this test, unless insufficient liquid volume is available.

4. Electrical and instrumentation tests shall conform to the requirements of the sections under which that equipment is specified.

C. Field testing will be witnessed by the ENGINEER. The CONTRACTOR shall furnish a minimum 1 week advance notice of field testing to the ENGINEER.

D. In the event any pumping system fails to meet the indicated requirements, the pump shall be modified or replaced and re-tested as above until it satisfies the requirements.

E. After each pumping system has satisfied the requirements, the CONTRACTOR shall certify in writing that it has been satisfactorily tested and that final adjustments have been made. Certification shall include the date of the field tests, a listing of persons present during the tests, and the test data.

F. The CONTRACTOR shall be responsible for costs of field tests, including related services of the manufacturer's representative, except for power and water, which the OWNER will bear. If available, the OWNER's operating personnel will provide assistance in field testing.

END OF SECTION 11100

SECTION 11139 - HORIZONTAL SCREW-CENTRIFUGAL PUMPS

PART 1 -- GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all materials, equipment, transportation, tools and labor necessary and complete the installation with all pump/motors, controls, piping, valves, wiring, etc. necessary for a complete and operating effluent pumping system. The transfer pump station shall be outfitted with two (2) horizontal screw-centrifugal pumps. The pumps shall be of heavy-duty construction intended for services requiring reliable solids handling, gentle pumping action, high efficiency, and low positive suction head requirements. Equipment shall be new, suitable for intended usage, and installed in complete conformance with the manufacturer's instructions and these specifications.

1.2 SUBMITTALS

A. Copies of all materials required to establish compliance with the specifications shall be submitted in accordance with the provisions of the General Conditions. Submittal shall include at least the following:

B. Certified shop and erection drawings showing all important details of construction, dimensions, and anchor bolt locations.

C. Descriptive literature, bulletins, and/or catalogs of the equipment.

D. Data on characteristics and performance of the pump. Data shall include guaranteed performance curves, based on actual shop tests of duplicate units, which show that they meet the specified requirements for head, capacity, efficiency, allowable NPSH, allowable suction lift, and horsepower. Curves shall be submitted on separate 8 ½ inch by 11 inch sheets. Curves for multiple speed pumps shall be provided with curves plotted for each specified rpm.

E. The total weight of the equipment including the weight of the single largest items.

F. A complete total bill of materials for all equipment.

G. A list of the manufacturer's recommended spare parts with the manufacturer's current price for each item. Include gaskets, packing, and related items on the list. List bearings by the bearing manufacturer's number only.

1.3 OPERATING INSTRUCTIONS

A. Copies of an operating and maintenance manual for each pump shall be furnished to the Engineer as provided for in General Requirements. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, and other material required to instruct operating and maintenance personnel unfamiliar with such equipment.

B. A factory representative who has complete knowledge of proper operation and maintenance shall be provided for one (1) day to instruct representatives of the Owner and the Engineer on proper operation and maintenance of this equipment. This work may be conducted in conjunction with the inspection of the installation and test run. If there are difficulties in operation of the equipment due to the manufacturer's design of fabrications, additional service shall be provided at no cost to the Owner.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. Electrical Work and controls.

1.5 WARRANTY

A. Contractor shall warrant equipment and installation to be free from defects for a period of one (1) year from the date of acceptance, excepting only those items normally consumed in service.

B. Components which fail under this warranty shall be repaired or replaced without cost of labor or materials to the owner.

C. The pump manufacturer shall provide a minimum 4-year warranty on the pumps.

PART 2 -- PRODUCTS

2.1 SCREW CENTRIFUGAL PUMPS

A. Pumps model shall be Vaughan Model HSC8FCSB, or equal.

B. It is the express intent of these specifications to accurately describe equipment that is a regular production item of the manufacturer, and that has a proven record of performance in identical or similar applications in other municipal wastewater treatment facilities. The pump manufacturer shall have a minimum of twenty (20) years of documented experience in the design and production of wastewater pumps.

2.2 SERVICE CONDITIONS

A. The pumps specified in this section shall transfer wastewater using the following design flow criteria:

B. GPM: 1250

C. TDH: 25 feet

D. MOTOR SIZE: 20 HP, 1200 RPM

E. PUMP SPEED: VARIABLE

F. MIN. SPHERICAL SOLID SIZE: 4.5”

2.3 PUMP CONSTRUCTION

A. Casing, Back Plate and Wear Plate: The pump casing shall be of volute design, spiraling outward to the 125 lb. flanged centerline discharge. Back pull-out design shall incorporate adjusting sleeves for accurate adjustment of impeller-to-suction cone clearance and shall allow removal of pump components without requiring disconnection of casing from inlet or discharge piping. A ½"-NPT pressure tap shall be included on or near the discharge flange. Casing and back plate shall be ductile cast iron with all water passages to be smooth, and free of blowholes and imperfections for good flow characteristics. The replaceable wear plate shall be heat treated alloy steel plate with cutting groove to cut against insert cutter in the impeller hub.

B. Inlet Suction Cone: The inlet suction cone shall be cast ductile iron with all water passages to be smooth, and free of blowholes and imperfections for good flow characteristics. The suction cone shall incorporate a spiral groove to channel into the casing trapped fiber that would otherwise bind between the impeller OD and the inlet cone ID. The clearance of the impeller to the cone shall be externally adjustable without requiring pump or piping disassembly or special tools.

C. Impeller: Shall be open channel, screw-centrifugal type. The impeller shall be cast ductile iron and shall

be dynamically balanced. The single-passage impeller shall combine the action of a positive displacement screw and a single-vane centrifugal impeller.

D. Insert Cutter: Shall be installed in the impeller hub, designed to cut against the cutter groove in the replaceable wear plate, reducing and removing stringy materials from between the impeller and wear plate and from the mechanical seal area. Insert cutter shall be steel, heat treated to minimum Rockwell C 60. The insert cutter clearance from the impeller hub to wear plate shall be externally adjustable without requiring pump disassembly.

E. Upper Cutter: Shall be threaded into the back pullout adapter plate behind the impeller, designed to cut against the pump-out vanes and the impeller hub, reducing and removing stringy materials from the mechanical seal area. Upper cutter shall be cast steel heat treated to minimum Rockwell C 60. The upper cutter clearance from the impeller shall be externally adjustable without requiring pump disassembly.

F. Pump Shafting: The pump shaft and impeller shall be supported by ball and tapered roller bearings. Shafting shall be heat treated steel.

G. Stuffing Box: The stuffing box shall be ductile cast iron. The stuffing box shall be designed to accommodate the mechanical seal.

H. Seal: The single mechanical seal shall be specifically designed to require no seal water flush. The mechanical seal shall be located immediately behind the impeller hub to minimize the depth of the stuffing box and maximize the flushing available from the impeller pump-out vanes. The seal shall be cartridge-type with Viton O-rings and controlled silicon carbide or tungsten carbide faces. This cartridge seal shall be a pre-assembled, pre-tested so that no seal settings or adjustments are required from the installer. Any springs used to push the seal faces together must be shielded from the fluid to be pumped. The cartridge shall also include a 17-4PH, heat-treated seal sleeve and an ASTM A536 ductile iron seal gland.

I. Bearings: Shaft thrust in both directions shall be taken up by two back-to-back mounted single-row angular contact ball bearings. Roller bearings shall be provided for radial loads. Bearings shall be rated with a minimum B10 bearing life of 100,000 hours at the operating point, which must include the effects of belt loading from the belt drive system, if applicable.

J. Bearing Housing: Shall be cast iron and machined with piloted bearing fits for concentricity of all components. Bearing housing shall have oil bath lubrication using ISO Gr. 46 turbine oil and a side mounted site glass to provide a permanently lubricated assembly. Fill and drain ports shall be provided. Viton® double lip seals riding on stainless steel shaft sleeves are to provide sealing at each end of the bearing housing. Bearing housing shall include a cast-in lifting eye to aid in removing the back-pullout assembly from the pump casing during maintenance.

K. Belt Drive Assembly: Adjustable brackets shall be used to support a side-mounted mounted motor. Sheaves and belts shall be properly sized for horsepower ratings with a service factor of at least 1.5, and all guards are to be supplied with the belt drive system and shall meet the requirements of ANSI B15.1.

L. Stainless Steel Nameplates: Shall be attached to the pump and drive motor giving the manufacturer's model and serial number, rated capacity, head, pump and motor speed, motor power, and plant pump number (if applicable).

2.4 MOTOR REQUIREMENTS

A. Drive motor shall be 20 HP, 1200 RPM, 460 volts, 3 phase, 60 hertz, Inverter Duty rated, 1.0 service factor, foot mounted, TEFC enclosure. The motor shall be sized for non-overloading conditions.

2.5 SURFACE PREPARATION

A. Pump shall be SSPC-SP5 sandblasted and primed with a single coat of Tnemec Zinc-filled Primer and finish coat of Tnemec 27WB Epoxy. (Except Motor)

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Installation of pumping equipment shall be in strict accordance with the manufacturer's instructions and recommendation in the locations shown on the drawings.

3.2 TESTING AND ACCEPTANCE

A. Factory Tests: Each pump being furnished under these specifications shall be factory tested. Certified copies of the Hydrostatic Test Report shall be supplied prior to conducting a pump performance test.

B. Installation & Field Acceptance Tests: The pumps and motors shall be installed in accordance with the instructions of the manufacturer and as indicated on the Drawings. In addition, the pumps and motors shall be installed under the supervision of a factory representative of the manufacturer supplying the equipment.

C. The Contractor shall submit certification by the equipment manufacturer that their equipment has been satisfactorily installed and ready for operation and that the operating personnel have been adequately instructed in the operation, lubrication, and maintenance of their equipment.

D. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations. Furnish all anchor bolts, temporary lifting equipment, power, water, labor and all other incidentals required for the proper installation of the pumps.

E. Furnish the services of a factory representative who has complete knowledge and experience in the proper installation, operation, and maintenance of the pumping equipment, to inspect the final installation and supervise the field acceptance tests of the equipment. These services shall be provided for a minimum of one (1) day with additional time provided, if required by the Engineer, to correct problems or deficiencies. These services shall be combined with those provided under Paragraph 1.5, Operating Instructions.

F. Field testing shall be conducted after the installation of all equipment has been completed, and the equipment operated for a sufficient period to make all desirable corrections and adjustments. Each pumping unit and all associated equipment shall be given a field test to determine that operation is satisfactory and in compliance with the Specification.

END OF SECTION 11139

SECTION 11151 – SELF PRIMING CENTRIFUGAL PUMPS

PART 1 -- GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all materials, equipment, transportation, tools and labor necessary and complete the installation with all pump/motors, controls, piping, valves, wiring, etc. necessary for a complete and operating effluent pumping system. The effluent pump station shall be outfitted with two (2) horizontal self-priming solids handling centrifugal pumps. Equipment shall be new, suitable for intended usage, and installed in complete conformance with the manufacturer's instructions and these specifications.

1.2 SUBMITTALS

A. Copies of all materials required to establish compliance with the specifications shall be submitted in accordance with the provisions of the General Conditions. Submittal shall include at least the following:

B. Certified shop and erection drawings showing all important details of construction, dimensions, and anchor bolt locations.

C. Descriptive literature, bulletins, and/or catalogs of the equipment.

D. Data on characteristics and performance of the pump. Data shall include guaranteed performance curves, based on actual shop tests of duplicate units, which show that they meet the specified requirements for head, capacity, efficiency, allowable NPSH, allowable suction lift, and horsepower. Curves shall be submitted on separate 8 ½ inch by 11 inch sheets. Curves for multiple speed pumps shall be provided with curves plotted for each specified rpm.

E. The total weight of the equipment including the weight of the single largest items.

F. A complete total bill of materials for all equipment.

G. A list of the manufacturer's recommended spare parts with the manufacturer's current price for each item. Include gaskets, packing, and related items on the list. List bearings by the bearing manufacturer's number only.

1.3 OPERATING INSTRUCTIONS

A. Copies of an operating and maintenance manual for each pump shall be furnished to the Engineer as provided for in General Requirements. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, and other material required to instruct operating and maintenance personnel unfamiliar with such equipment.

B. A factory representative who has complete knowledge of proper operation and maintenance shall be provided for one (1) day to instruct representatives of the Owner and the Engineer on proper operation and maintenance of this equipment. This work may be conducted in conjunction with the inspection of the installation and test run. If there are difficulties in operation of the equipment due to the manufacturer's design of fabrications, additional service shall be provided at no cost to the Owner.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. Electrical Work and controls.

1.5 WARRANTY

A. Contractor shall warrant equipment and installation to be free from defects for a period of one (1) year from the date of acceptance, excepting only those items normally consumed in service.

B. Components which fail under this warranty shall be repaired or replaced without cost of labor or materials to the owner.

C. The pump manufacturer shall provide a minimum 4-year warranty on the self priming pumps

PART 2 -- PRODUCTS

2.1 SELF-PRIMING PUMPS

A. Performance Criteria. Self-priming pumps must be designed to handle raw, unscreened, domestic sanitary sewage. Each pump shall be guaranteed to perform at the following conditions: 1) 2500 GPM @ 52.5 feet TDH at 1160 RPM, minimum hydraulic efficiency of 65%, 2) 2000 GPM @ 43 feet TDH at 1160 RPM, minimum hydraulic efficiency of 60%. The minimum shut off head for each pump shall be 48 feet. The motors shall be suitable for 3 phase, 60 hertz, 480 volt, 4 wire power supply. The motors shall be 50 horsepower. Pump performance shall be stable and free from cavitation and noise throughout the entire specified operating range.

B. Solids Handling Capability.

1. All internal passages, impeller vanes, and recirculation ports shall pass a 3” spherical solid. Smaller internal passages that create a maintenance nuisance or interfere with priming and pump performance shall not be permitted. Certified drawings showing size and location of the recirculation port(s) shall be submitted for approval.

C. Reprime Performance.

1. Consideration shall be given to the sanitary sewage service anticipated, in which debris is expected to lodge between the suction check valve and its seat, resulting in the loss of the pump suction leg, and siphoning of liquid from the pump casing to the approximate center line of the impeller. Such occurrence shall be considered normal, and the pump must be capable of automatic, unattended operation with an air release line installed.

2. During unattended operation, the pump shall retain adequate liquid in the casing to insure automatic repriming while operating at its rated speed in a completely open system. The need for a suction check valve or external priming device shall not be required.

3. Pump must reprime the vertical distance shown on the plans at the specified speed and impeller diameter. Reprime lift is defined as the static height of the pump suction above the liquid, while operating with only one-half of the liquid remaining in the pump casing. The pump must reprime and deliver full capacity within five minutes after the pump is energized in the reprime condition. Reprime performance must be confirmed with the following test set-up:

D. A check valve to be installed downstream from the pump discharge flange. The check valve size shall be equal (or greater than) the pump discharge diameter.

E. A length of air release pipe shall be installed between pump and the discharge check valve. This line shall be open to atmosphere at all times duplicating the air displacement rate anticipated at a typical pump station fitted with an air release valve.

F. The pump suction check valve shall be removed. No restrictions in the pump or suction piping will prevent the siphon drop of the suction leg. Suction pipe configuration for reprime test shall incorporate a 2 feet minimum horizontal run, a 90^{o} elbow and vertical run at the specified lift. Pipe size shall be equal to the pump suction diameter.

G. Impeller clearances shall be set as recommended in the pump service manual.

H. Repeatability of performance shall be demonstrated by testing five consecutive reprime cycles. Full pump capacity (flow) shall be achieved within five minutes during each cycle.

I. Liquid to be used for reprime test shall be water.

J. Upon request from the Engineer, certified reprime performance test results, prepared by the manufacturer, and certified by a registered professional engineer, shall be submitted for approval prior to shipment.

K. Manufacturer, or Equal

1. All Prime

2.2 Pump Design.

A. Pumps shall be horizontal, self-priming centrifugal type, designed specifically for handling raw, unscreened, domestic sanitary sewage. Pump solids handling capability and performance criteria shall be in accordance with requirements listed herein.

B. Materials and Construction Features.

1. Pump casing: Casing shall be cast iron Class 30 with integral volute scroll. Casing shall incorporate following features:

2. Mounting feet sized to prevent tipping or binding when pump is completely disassembled for maintenance.

3. Fill port cover plate, 3 1/2" diameter, shall be opened after loosening a hand nut/clamp bar assembly. In consideration for safety, hand nut threads must provide slow release of pressure, and the clamp bar shall be retained by detente lugs. A Teflon gasket shall prevent adhesion of the fill port cover to the casing.

4. Casing drain plug shall be at least 1 1/4" NPT to insure complete and rapid draining.

C. Liquid volume and recirculation port design shall be consistent with performance criteria listed herein.

D. Cover plate: Cover plate shall be cast iron Class 30. Design must incorporate following maintenance features:

E. Retained by hand nuts for complete access to pump interior. Cover plate removal must provide ample clearance for removal of stoppages, and allow service the impeller, seal, wear plate or check valve without removing suction or discharge piping.

F. A replaceable wear plate secured to the cover plate by weld studs and nuts shall be AISI 1018 HRS.

G. In consideration for safety, a pressure relief valve shall be supplied in the cover plate. Relief valve shall open at 75-200 PSI.

H. O-ring of Buna-N material shall seal cover plate to pump casing.

I. Rotating Assembly: A rotating assembly, which includes impeller, shaft, mechanical shaft seal, lip seals, bearings, seal plate and bearing housing, must be removable as a single unit without disturbing the pump casing or piping. Design shall incorporate following features:

J. Seal plate and bearing housing shall be cast iron Class 30. Separate oil filled cavities, vented to atmosphere, shall be provided for shaft seal and bearings. Cavities must be cooled by the liquid pumped and lip seals will prevent leakage of oil. The bearing cavity to have an oil level sight gauge and fill plug check valve. The check valve shall vent the cavity but prevent introduction of moist air to the bearings.

K. Impeller shall be ductile iron, two-vane, semi-open, non-clog, with integral pump out vanes on the back shroud. Impeller shall thread onto the pump shaft and be secured with a lockscrew and conical washer.

L. Shaft shall be AISI 17-4 PH stainless steel.

M. Bearings shall be anti-friction ball or tapered roller type of proper size and design to withstand all radial and thrust loads expected during normal operation. Bearings shall be oil lubricated from a dedicated reservoir. Pump designs which use the same oil to lubricate the bearings and shaft seal shall not be used.

N. Shaft seal shall be oil lubricated mechanical type. The stationary and rotating seal faces shall be tungsten titanium carbide alloy. Each mating surface shall be lapped to three light band flatness, as measured by an optical flat under monochromatic light. The stationary seal seat shall be double floating by virtue of a dual O-ring design; an external O-ring secures the stationary seat to the seal plate, and an internal O-ring holds the faces in alignment during periods of mechanical or hydraulic shock (loads which cause shaft deflection, vibration, and axial/radial movement). Elastomers shall be viton. Cage and spring to be AISI 316 stainless steel. Seal shall be oil lubricated from a dedicated reservoir. The same oil shall not lubricate both shaft seal and shaft bearings. Seal shall be warranted in accordance with requirements listed herein.

O. Adjustment of the impeller face clearance (distance between impeller and wear plate) shall be accomplished by external means. Stainless steel adjusting shims shall be used to move the entire rotating assembly as a unit when adjusting the working clearances. Clearance adjustment which requires movement of the shaft only, thereby adversely affecting seal working length or impeller back clearance, shall not be used.

P. Suction check valve shall be molded Neoprene with integral steel and nylon reinforcement. A blow-out center shall protect pump casing from hydraulic shock or excessive pressure. Removal or installation of the check valve must be accomplished through the cover plate opening, without disturbing the suction piping. Sole function of check valve shall be to save energy by eliminating need to reprime after each pumping cycle. Pumps requiring a suction check valve to assist reprime shall not be used.

Q. Spool flanges shall be one-piece cast iron, Class 30 fitted to suction and/or discharge ports. Each spool shall have one 1-1/4" NPT and one 1/4" NPT tapped hole with pipe plugs for mounting gauges or other equipment.

R. A cast iron flare fitting shall be used at the end of the suction line in the wetwell.

S. Anchor Bolts: Anchor bolts shall be Type 304 Stainless Steel.

2.3 CONTROLS

A. Controls shall be as specified in Section 17110 - Control Panels.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Installation of pumping equipment shall be in strict accordance with the manufacturer's instructions and recommendation in the locations shown on the drawings.

3.2 TESTING AND ACCEPTANCE

A. Factory Tests: Each pump being furnished under these specifications shall be factory tested. Certified copies of the Hydrostatic Test Report shall be supplied prior to conducting a pump performance test.

B. Installation & Field Acceptance Tests: The pumps and motors shall be installed in accordance with the instructions of the manufacturer and as indicated on the Drawings. In addition, the pumps and motors shall be installed under the supervision of a factory representative of the manufacturer supplying the equipment.

C. The Contractor shall submit certification by the equipment manufacturer that their equipment has been satisfactorily installed and ready for operation and that the operating personnel have been adequately instructed in the operation, lubrication, and maintenance of their equipment.

D. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer=s recommendations. Furnish all anchor bolts, temporary lifting equipment, power, water, labor and all other incidentals required for the proper installation of the pumps.

E. Furnish the services of a factory representative who has complete knowledge and experience in the proper installation, operation, and maintenance of the pumping equipment, to inspect the final installation and supervise the field acceptance tests of the equipment. These services shall be provided for a minimum of one (1) day with additional time provided, if required by the Engineer, to correct problems or deficiencies. These services shall be combined with those provided under Paragraph 1.5, Operating Instructions.

F. Field testing shall be conducted after the installation of all equipment has been completed, and the equipment operated for a sufficient period to make all desirable corrections and adjustments. Each pumping unit and all associated equipment shall be given a field test to determine that operation is satisfactory and in compliance with the Specification.

END OF SECTION 11151

SECTION 11333 – STATIC SCREENS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR will furnish and install the static screen and associated piping, valves, controls, wiring, and appurtenances as specified and shown on the drawings. A single manufacturer to ensure coordination and compatibility of equipment will provide the static screen specified in this section. Compliance with the requirements and stipulations specified herein may necessitate modifications to the manufacturer's standard equipment. In addition, the contractor will be responsible for ensuring a complete and operable static screen and will establish the exact limits of work between the contractor and static screen supplier.

1.2 REFERENCES

A. The design, manufacture, and installation of this equipment will meet or exceed the applicable provisions and recommendations of the following codes and standards:

1. ASME, American Society of Mechanical Engineers

2. ASTM, American Society of Testing and Materials

3. ANSI, American National Standards Institute

4. AWS, American Welding Society

5. IEEE, Institute of Electrical and Electronics Engineers

6. NEC, National Electrical Code

7. OSHA, Occupational Safety and Health Act

1.3 SUBMITTALS

A. The following will be submitted for the static screen furnished under this specification

1. Certificate of Compliance or complete list of all deviations from the drawings and specifications.

2. Complete installation and assembly drawings, showing the manufacturer's dimensions, weights, and loadings.

3. Detailed specifications and data covering materials used, parts, instrumentation devices, and other accessories forming a part of the equipment furnished will be submitted for review.

4. Manufacturer's installation instruction and certification.

5. Operation and maintenance manual.

6. Manufacturer's warranty agreement.

7. Electrical/pneumatic requirements, schematic diagrams, and details of components including.

8. Manufacturer's spare parts.

1.4 QUALITY ASSURANCE

A. In order to assure uniform quality, ease of maintenance and minimal parts storage, it is the intent of these Specifications that all equipment called for under this Section will be supplied by a single manufacturer.

B. No equipment will be supplied by any manufacturer not regularly engaged in the manufacturing and production of the static screen equipment for a minimum of five (5) years. The manufacturer must have installed and had in satisfactory use in this application a minimum of ten (10) installations of similar size units and screen openings to the unit specified.

C. The Contract Documents represent the minimum acceptable standards for static screen for this project. All equipment will conform fully in every respect to the requirements of the respective parts and sections of the drawings and specifications. Equipment which is a "standard project" with the manufacturer will be modified, redesigned from the standard mode, and will be furnished with the special features, accessories, materials of construction or finishes as may be necessary to conform to the quality mandated by the technical and performance requirements of the specification.

D. All manufacturers proposing equipment described herein, will provide a detailed submittal package, which will consist, at a minimum, of all information and details prescribed in Section 1.3 of this specification.

E. If submitted equipment requires arrangement differing from that indicated on the drawings or specified, prepare and submit for review complete structural, mechanical, and electrical drawings and equipment lists showing all necessary changes and embodying all special features of equipment proposed. Any changes are at no additional compensation and the Contractor will be responsible for all engineering costs of redesign by the Engineer, if necessary.

1.5 DELIVERY, STORAGE, & HANDLING

A. Items to be shipped as complete assemblies except where partial disassembly is required by transportation regulations or for protection of components.

1.6 CONDITIONS OF SERVICE

A. Condition of influent is based on the following design requirements as specified by the customer:

1. Applications:	Sanitary Wastewater	
2. Objective:	Solids removal	
3. Total Flow per Screen:	Peak:	1,200 gpm
	Avg:	435 gpm

4.	Type/Composition of Solids:	Municipal Wastewater
5.	Maximum Total Suspended Solids (TSSS):	250 PPM or mg/L
6.	Size of Solids:	Maximum: N/S Inch
7.	Maximum Total fats, oils, greases (FOG):	150 PPM or mg/L
8.	Number of Screens:	2 120”
9.	Design Flow per Screen:	1200 gpm
10.	Screen Opening:	0.10 Inch

N/S = Information not specified by customer

1.7 WARRANTY

A. The manufacturer will warrant against any defects in material or workmanship to the screen frame and panel. This warranty will commence upon delivery of the products and will expire on the earlier to occur of one (1) year from initial operation of the product or 18 months from delivery thereof (the “Warranty Period”). Initial operation will be deemed to take place when the products are first in production or, if applicable, when the product passes or is deemed to pass a performance test, whichever comes first.

B. The environment or materials the equipment may be exposed to may be abrasive or corrosive. This warranty does not cover the service life of the equipment against such abrasive or corrosion.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. The static screen will be as manufactured by IPEC, Andritz, or equal.

2.2 MATERIALS

A. All components of the static screen will be 304 stainless steel. No carbon steel, wetted or non-wetted will be permitted.

B. All structural stainless steel components will be fabricated in the United States and will conform to the requirements of “Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings” published by the American Institute of Steel Construction.

C. Fabricate all frame parts and assemblies from sheets and plates of 304 stainless steel with a 2B finish conforming to ASTM A240

D. All welding in the factory will used shielded arc, inert gas, MIG or TIG method. Add filler wire 304 stainless steel to all welds to provide for a cross section equal to or greater than the parent metal. Fully penetrate butt welds to the interior surface and provide gas shielding to interior and exterior of the joint. All welds will be finished to include the following as a minimum:

1. Remove all pointed protrusions from underside and face of welds and remove all weld spatter.

E. Field welding of stainless steel will not be permitted, except to connect customer piping to frame influent and effluent connections.

F. Bolts, nuts and washers will be ANSI 316 stainless steel.

2.3 EQUIPMENT

A. Each static screen will consist of:

1. Screen frame with inlet

2. Outlet and drain connections

3. Influent distribution chamber

4. Screen panel with parabolic shape

2.4 CONSTRUCTION

A. The static screen will be designed and built to withstand maximum possible static and hydraulic forces exerted by the liquid. All structural and functional parts will be sized for the loads encountered during the screening operations.

B. Frame

1. The frame will be constructed of minimum 10 gauge 304 stainless steel material. The side panels will support the screen, headbox, and discharge hopper. The side panels will be flanged and will have predrilled mounting holes.

a. The frame will have a 12 inch diameter flanged end influent connection and a 16-inch diameter flanged end effluent connection.

b. The influent and effluent pipes will be constructed of a minimum 12 gauge 304 stainless steel. Longitudinal seams will be welded continuous inside and out, with external welds ground flush.

c. The influent and effluent pipes will be secured to the lower back panel with full penetration welds.

d. Back panel will reinforce with a minimum of three (3) formed stiffeners to prevent deflection and/or movement.

e. Stiffeners will not impede movement of water or solids through the headbox, nor will they provide a ledge for solids to stagnate.

2. Each side frame panel will be fitted with a 6-inch diameter hole to serve as an observation point.

3. The frame will include four (4) 304 stainless steel rods, 3/8-inch diameter, with threaded ends. The rods will be positioned and utilized to pull the side panel tight against the screen. They will not impede the flow of water or solids, nor will they interfere with screen. Rods will be assembled to the frame with 3/8-16 NC nuts and jam nuts on each end.

4. After final weld and weld clean up, frame will be cleaned to uniform finish. Entire exterior surface, including inlet and discharge connections, will have weld discoloration removed.

C. Influent Distribution Chamber (Headbox)

1. The screen will have an integral influent distribution chamber constructed of 304 stainless steel. The chamber will receive the incoming flow and evenly distribute the flow to the weir. The discharge weir be the full width of the frame, having a well radiused crown with a 14-inch long screen approach apron.

2. The influent chamber will have a 3-inch NPT drain, 304 stainless steel, with a PVC pipe plug for periodic draining of the headbox.

D. Flow Distribution Baffle (Vane Deflector)

1. A fully hinged flow distribution baffle extending the full width of the weir will be furnished. The baffle will be constructed of 16 gauge, 304 stainless steel. The baffle will be accurately positioned and located so that the contoured extension lip is parallel with the weir approach apron.

2. The baffle (vane deflector) will distribute the influent over the width of the screen after it has flowed over the weir.

E. Screen Panel

1. The screen element will be a single panel following a parabolic contour and positioned in the frame in the direction of the slurry flow. The screen panel will measure 120-inches wide by 54-inches long. The screen panel will be constructed of 304 stainless steel transverse bars having a triangular cross section and a 360 degree looped attachment of each bar to the longitudinal .25 inch diameter support rods. The stainless steel support rods will be on 2-3/4” centers and be constructed of 304 stainless steel. The screen opening will be 0.10 inches. The coined transverse bars will have a minimum face width of 0.074 inches and a minimum depth of 0.137 inches.

2. Top and bottom of screen panel will be reinforced with minimum 3/8 inch by 1 inch bars running full width of screen panel. Each longitudinal support rod will be welded to top and bottom reinforcing bar.

3. Bottom of screen panel will have minimum 10 gauge by 2-1/2 inch wide sheet running full width of screen panel, to serve as solids discharge lip. The solids discharge lip will be welded continuous to bottom reinforced bar. Topside (screen surface) weld will be ground smooth.

4. The wedge wire screen panel will be pivot-mounted at the center, on the horizontal axis, to allow for inspection and cleaning the backside of the screen panel.

5. Backside of screen panel will be adequately reinforced to allow screen pivot without sagging, bending or deflection of screen during cleaning or operation of unit.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Static screens shall be installed in complete accordance with the manufacturer's recommendation.

3.2 START-UP and TESTING

A. Manufacturer's Representative for Start-up and Testing

1. The services of the manufacturer's technical representative are offered for pre-start-up installation checks, start-up assistance, troubleshooting, testing, and training of Owner's operating personnel.

B. Functional Test

1. Functional testing is offered for each static screen installed. Prior to system start-up, system components will be inspected for proper alignment, proper connection, and satisfactory operation. The manufacturer's representative can inspect installation, provide certification that the system components have been installed correctly and are ready for operation. The performance test will not begin until functional testing has been completed to the owner's and engineer's satisfaction.

C. Performance

1. Performance testing is offered for the static screen installation. After plant start-up, the manufacturer could conduct a performance test using the owner's liquid to determine the actual system operating conditions and verify that the unit meets the requirements specified in 1.6A.

2. Should the static screen fail to meet requirements of 1.6A, manufacturer will, at its own expense, make all necessary modifications to the equipment until such tests can be passed.

D. Travel and On-Site Requirements for Manufacturer's Rep

1. One (1) trip with one (1) eight-hour day(s) on site for start-up assistance, troubleshooting, testing, training owner's operating personnel, and performance testing.

END OF SECTION 11333

SECTION 11390 – PACKAGE PLANT SYSTEM

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide all labor, materials and equipment necessary to install the Package Plant System in accordance with the Contract Documents. The Package Plant System (System) is a compact water treatment system that produces clarified, filtered water from raw water. The package plant treatment equipment shall be provided by a single Package Plant System Supplier (Supplier) as specified herein.

B. Related Sections:

1. Section 11000 – Equipment General Provisions

2. Section 11100 – Pumps, General

3. Section 11501 – Positive Displacement Blowers

C. Unit Responsibility: The CONTRACTOR shall require the Supplier to be responsible for designing and furnishing the System equipment, and for coordination of assembly, testing, and startup of the System; however, the CONTRACTOR shall install, test, and startup all System components and related items. The CONTRACTOR shall provide and install all interconnecting piping, piping appurtenances, and supports. The CONTRACTOR shall provide and install all equipment supports including anchor bolts and nuts. The CONTRACTOR shall provide and install all electrical equipment supports, including anchor bolts and nuts, and all electrical interconnections including conduit and wiring.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals for System equipment in accordance with Section 01300 - Contractor Submittals.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Components of the System provided by the CONTRACTOR shall be entirely compatible with the Supplier furnished items.

2.2 MATERIALS

A. Materials shall be suitable for the intended application; materials not indicated shall be high-grade, standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended, and shall conform to the following requirements:

1. Anchor bolts, washers, and nuts shall be Type 316 stainless steel in accordance with Section 05500.

2. Piping and piping appurtenances shall be fully compatible with the fluids being conveyed.

3. All materials in contact with process water and utility water shall be NSF 61 certified for potable water use.

2.3 SYSTEM COMPONENTS

A. TANK CONSTRUCTION

1. The work covered in these specifications consist of furnishing all labor and materials, required to manufacture a factory fabricated sewage treatment plant; including all treatment components, piping, equipment, and appurtenances as shown on the drawings and/or as specified herein to provide a satisfactorily operating sewage treatment plant.

2. The wastewater treatment system shall be of the activated sludge type, specifically known as "Complete Mix/ Extended Aeration Activated Sludge ", the system shall be designed for treating a total of 750,000 gallons per day of 240 mg/l-BOD5; 240 mg/l TSS domestic sewage based on composite sewage samples of the average daily flow. No substances shall be introduced in quantities, which are toxic to biological organisms. The plant shall be designed to handle average daily flows fluctuating over the range of 60% to 100% of design flow and peak hourly flow rates not to exceed 300% of design flow, with an effluent quality of 10 mg/l-BOD5; 15 mg/l TSS. The complete system shall include all necessary equipment for efficient plant operation.

B. GENERAL DESCRIPTION

1. The plant shall be fabricated complete with all treatment components, equipment and appurtenances that may be required to accomplish aeration and mixing, clarification, sludge activation, activated sludge recirculation and aerobic sludge digestion – all in one single steel structure having separate compartments.

2. The composite structure shall consist of two concentric steel tanks forming an inner chamber and an outer annulus. The inner chamber shall serve as a clarifier or settling basin. The outer annulus shall be divided into compartments or chambers to form a mixing chamber, a sludge activation chamber and an aerobic digester. The structure shall be fabricated and erected as shown on the drawings.

3. The principle items of equipment to be supplied as follows: Complete aeration assemblies and facilities, complete clarification equipment and appurtenances, sludge airlifts, air blowers and accessories and all other items of equipment and accessories required to provide a complete installation as specified herein.

C. TANK CONSTRUCTION (STEEL)

1. All structural plates associated with the outer and inner vertical tank walls and all partition walls shall be carbon steel plate conforming to ASTM A-36. Wall thickness shall be determined by the Supplier’s Engineer, but shall not be less than 1/4 inch; All walls shall be continuous and watertight and shall be supported by structural reinforcing members where required. Fabrication and erection shall conform to the appropriate requirements of "AISC Specification for Buildings". Connection shall conform to the requirements of the American Welding Society's Code and shall develop the full strength of the member. Tank welding shall meet American Welding Society AWS D1.1 - Structural Welding Code: Steel. Weld materials shall conform to AWS A5.18. Welding operators shall be qualified in accordance with AWS D1.1.

2. Plant Supplier shall provide design for steel base channels for outer circular walls and for each partition wall.

3. A steel bridge shall be provided. This bridge shall span the clarifier and shall extend to the outer tank wall meeting the access stairway. The bridge shall be designed to safely support all normal operating loads plus a 1000 pound concentrated live load. The walkway surfaces shall be as listed herein.

D. D. AEROBIC SLUDGE DIGESTOR

1. An aerated aerobic digester chamber shall be provided as specified and shown on the plans. It shall have a minimum volume of 170,000 gallons.

2. The digester chamber shall be constructed as an integral part of the wastewater treatment system. The chamber shall have the same protective coating as specified for the treatment plant. It shall also have the same structural requirements as the wastewater treatment plant.

3. The chamber shall be of the aerated type. Diffused air shall be supplied by the plant blower system supplying one scfm of air per foot of tank length. The diffusers shall be located parallel to and near the bottom of the tank. All piping and valves within the chamber shall be factory installed.

4. An airlift pump with vertically adjustable intake and air control valve shall be provided for the purpose of decanting supernatant from the aerobic digester. The airlift piping shall be schedule 40 painted steel piping, and neoprene bands shall isolate the piping from all steel surfaces. The pipe shall pivot on a swivel joint. The intake elevation adjustment shall allow the water level in the digester to be lowered a minimum of 48 inches.

5. The digester chamber shall be set on the same concrete foundation pad as the wastewater treatment plant and set at the location as shown on the plans.

E. AERATION CHAMBER

1. There shall be supplied, an aeration chamber to work in conjunction with the clarifier chamber. The aeration chamber shall conform to the following specifications:

2. The aeration chamber shall be of sufficient capacity to provide a minimum of 24 hours retention of the average daily flow, and/or a minimum chamber volume of 750,000 gallons. The vessel shall be so shaped on each side to prevent sludge accumulation, to enhance rotation of the vessel contents, and to prevent scum and froth accumulation. To insure maximum retention and eliminate short circuiting of raw sewage particles, the aeration chamber shall be constructed with air diffusers, placed longitudinally along one side of the chamber so as to, in conjunction with the flow control baffles, enhance the spiral rotation of the chamber contents. To ensure adequate circulation velocity, the proportion of the chamber width to depth, in the direction of rotation, shall not exceed 1.33 to 1. The velocity of rotation shall be sufficient to scour the bottom and prevent sludge filleting as well as to prevent the escape to the surface of minuscule air diffusion bubbles and by so causing their entrapment to provide maximum oxygenation efficiency.

3. An air distribution manifold shall be installed longitudinally on one side of the tank with diffuser drop assemblies connected thereto.

4. Each diffuser drop assembly shall be equipped with an air regulating and/or shutoff valve, a disconnecting union and a diffuser bar with non-clog air diffuser nozzles mounted thereon at approximately 70" centers. With this spacing, the airflow per diffuser shall range from 1 to 30 SCFM. This minimum air velocity shall be maintained to insure sufficient velocity for self- cleaning. The

diffusers shall be parallel to and near the base of the vessel sidewall and at an elevation, which will provide the optimum diffusion and mixing of the vessel contents. The oxygen transfer capacity of each diffuser shall be such that an adequate supply of oxygen will be maintained in the aeration chamber to meet treatment requirements of the design sewage load.

5. The diffusers will be manufactured to produce a double shear when air is released. The air is sheared as it discharges the air orifice of the air diffuser body and again as it crosses over the diaphragm baffle. The air check diaphragm located on top of the diffuser is molded directly to the diffuser body, preventing the cap from blowing off when excess CFM is delivered to the diffuser. The diffuser will be supplied with standard male pipe thread connections.

F. CIRCULAR MECHANICAL CLARIFIER

1. There shall be furnished a clarifier chamber to work in conjunction with the aeration chamber of that system. The clarifier shall conform to the following specifications:

2. The clarifier chamber shall be of such size as to provide a minimum of four (4) hours retention, based upon the same design flow rate governing the aeration chamber, and shall have proper baffling to prevent short circuiting and to provide maximum uniform retention. The clarifier inlet shall be baffled to prevent short-circuiting and provide maximum uniform solids settling area. The slope of the clarifier grout shall not be less than 1 vertical to 12.0 horizontal. Settled sludge shall be returned from the clarifier sludge hopper to the aeration chamber by the positive sludge return system, consisting of an airlift pump. The clarifier effluent shall pass over the edge of the baffled adjustable effluent weir into the effluent trough and then out of the chamber. The weir plate will be constructed of 10 gauge galvanized steel and will be gasketed with 1/4" neoprene.

G. SUPPORT BRIDGE

1. The drive unit support and bridge shall consist of two beams spanning the top of the tank including cross-supporting members, handrails, and grating walkway. The 1-1/2” handrails shall be anchored to the structural beams.

H. INLET STILLING WELL

1. An influent well of 12 feet in diameter by 3'-0" feet depth shall be provided to cut down the influent velocity and prevent short circuitry. The stilling well shall be a rotating type supported off the torque tube.

2. The inlet stilling well shall be fabricated of 1/4" steel plate and painted the same as the main vessel.

I. SLUDGE SCRAPER ASSEMBLY (RAKE ARMS)

1. The sludge scraper assembly shall consist of two scraping arms fabricated of steel angles and a central torque cage.

2. The scraper arm assembly shall be adjusted vertically and horizontally by means of threaded rods attached to the torque cage.

3. Each scraper arm shall be fabricated from steel angle and have a neoprene squeegee blade attached to each angle to allow for sufficient movement of sludge into the center sludge collector pit.

4. The bottom of the clarifier shall be grouted concrete which conforms to the dimensions shown on the Drawings.

5. There shall be installed within the clarifier chamber, a positive sludge recirculation system, consisting of 10” diameter airlift sludge return assembly, meeting the following specifications: The airlift pump system shall have the recirculation capacity ranging from 0% to 150% of the design flow. The airline supplying air to the pump shall be equipped with a needle valve varying the capacity of the pump. The airlift pump shall be firmly supported and shall be equipped with a clean-out plug to allow for easy cleaning and maintenance.

J. SURFACE SKIMMER ARM AND SCUM TROUGH

1. A surface skimmer consisting of a steel angle with neoprene blade attached shall be provided to move the surface scum to the scum trough.

2. The surface skimmer shall be attached to the torque and shall rotate with the sludge scraper assembly.

3. A scum trough shall be fabricated of 1/4" steel plate and shall be provided to collect the scum from the surface skimmer and remove the scum by means of a 4" diameter scum discharge pipe.

4. There shall be installed within the clarifier chamber a positive scum and skimming recirculation system consisting of 4” diameter airlift skimming device (s) meeting the following specifications: The skimming device shall be of the positive airlift pump type, located in a position to skim and return floating material to the aeration chamber. The airline supplying air to the skimming device shall be equipped with a needle valve to regulate the rate of return.

K. EFFLUENT WEIR ASSEMBLY

1. Supplier shall furnish a steel weir trough with serrated weir plates fabricated from 10 gauge galvanized steel plate allowing up to an including 2 inches of adjustment. The weir trough shall be firmly fastened to the clarifier wall.

L. DRIVE UNIT

1. Product: Gear reducers or gear motors supplied shall be of such design that helical gears shall be the standard acceptable unit. Other types of gear reduction systems are acceptable provided the losses are not greater than helical gearing, which provides 98.5% efficiency up to a 200:1 gear ratio. Worm gearing, bevel gearing, and spur gearing are acceptable provided efficiencies are equal to helical gearing at the same gear ratios.

2. Gear motors are preferred and are to be manufactured by the same company and provided as an integral unit completely assembled. If c-face type of reducers and motors are supplied, they are to be connected with an external three-piece flexible coupling. Hollow shafts or quill design input shafts are not acceptable. All materials is to be of the highest quality and shall meet the intended use as described within the complete project specifications, and meet or exceed current NEMA, AGMA, and IEEE standards for material, capacity ratings, and testing procedures.

3. Electrical Specifications:

    a. The motors shall be squirrel cage design, NEMA design B or C, TEFC enclosures, Class F insulation 1.15 service factor suitable for 3/460 operation, continuous duty. The motors shall be protected with the manufacturer's standard treatment for corrosive/moist environments and to include (a) weep holes in end brackets and conduit box for condensate drainage (b) stator bore, rotor o.d., and all interior metal surfaces are to be coated with polyurethane (c) stainless steel nameplates and attachment screw pins (d) plastic non-corrosive fan (e) cadmium plated fan cover.

4. Mechanical Specifications (Gear Reducer):

    a. The gear unit shall be manufactured of cast iron equal to SAE Grade #27 for rigid support and high strength. The gear material shall be SAE 4140 drop forged steel and carbonized to a 58-62 Rc hardness with a finishing grinding to meet AGMA Quality Class 10 finish for low noise, minimum backlash, and maximum efficiency. The primary gear stage shall have a 30º helix angle for low noise operation. The interior of the reducer shall be painted with a non-corrosive material for protection from oil contaminates. Twin lipped oil seals shall be provided on input and output shafts to prevent oil leakage, with one lip spring loaded to assure contact. Maximum ambient is 40º c.

    b. Gears are to be pressed fit and secured with keys and snap rings or shaft steps. Shrink fit gears are not acceptable. The gear reducer or gear motors shall be suitable to be mounted in any position regardless of initial mounting position without adding special parts or modifications. The unit shall utilize either roller or ball bearings as manufactured and rated in according to current AFBMA standards and with a minimum of 125,000 hours. Bearings can be either splash or grease lubricated. Lubricating as with an oil pump are not acceptable. The thermal capacity of the reducer at rated load conditions shall exceed the mechanical capacity with relying upon auxiliary means for reducer. All reducers shall be supplied with an initial oil fill for the specified mounting position.

5. Service Factor:

    a. All process drives shall be selected an the basis of AGMA application tables, reference AGMA420.04 December, 1975 but with a minimum of class II or 1.41 service factor for drives operating 10 hours per day, AGMA Class III or 2.0 service factor shall be the minimum acceptable. The service factor or gear class shall be stamped on the nameplate and be based upon motor horsepower.

6. Torque Limiter:

    a. Torque limiting device is to be factory set to specified torque limits for alarm and shutdown. The drive and torque unit will be designed to prevent over-torquing of the torque cage. The torque control unit shall include contacts for remote hook-up of an alarm light or bell for indication of an overload condition if one occurs.

    b. System components for torque indication, shutdown and alarms shall operate from reactive mechanical torque. Devices which read motor load are not acceptable.

    c. Torque indication is to be simple mechanical device, suitable for ambient conditions. Dial indicators, meters, etc. are not acceptable

d. Torque limiter must be able to operate bi-directionally as required.

e. The torque limiting system must be intrinsically safe (if specified) for environments where UL (or other specified body) requirements for “Explosion Proof” are necessary.

f. Torque monitoring or limiting shall be obtained from the reactive torque and motions on a freely rotating gear housing which will vary in direct proportion to the applied load torque. The reactive motion shall be restrained by an external torque arm with compression springs. Accuracy of the torque limiting system shell be ±10% of the set points.

g. The torque limiting system shall be completely external to the gear reducers. Gear housings and internal parts shall be manufacture’s standard and readily available. To ensure proper performance, sizing, selections, and warranty responsibility, the torque limiting components shall be supplied and mounted by the manufacturer of the reducer.

M. MAIN AERATION AIR SUPPLY BLOWER MOTOR UNITS

1. For supplying the air requirement of this wastewater treatment system, three (3) blower motor units shall be furnished and installed at the location shown on the drawings. All units shall be completely factory built and tested before shipping to the project site. The units shall be completely factory built and tested before shipping to the project site. The blower shall be of the regenerative side channel type design complete with the accessories described below.

2. The units shall be capable of delivering 990 scfm when operating at 9 psig. The blowers shall be manufactured by FPZ, Inc., Saukville, Wisconsin; or approved equal.

3. Impeller case shall be strongly ribbed to prevent distortion when operating at rated pressure, and be constructed of low weight cast aluminum construction, quiet operation with integral inlet and outlet muffling.

4. The units shall be high efficiency / low noise impeller design, no lubrication and/or maintenance required.

5. The blowers shall operate within +5 degrees F to +104 degrees F allowed ambient, mountable on any plane.

6. The motors shall be75 hp for operation on 480 Volt, 3 Phase, 60 Cycle Service, 3500 RPM @ 60 Hz. Service and 2900 RPM @ 50 Hz. service. It shall be of the totally enclosed fan type, and will be directly mounted to the blower housing.

7. Regenerative blowers are to provide oil-free, odor-free, non-pulsating air pressure and operate at a design rating not to exceed 90% of the aeration system normal operating conditions.

8. The blowers shall be of aluminum construction, including cast aluminum, dynamically balanced impeller, directly mounted to the motor shaft. The impeller shall be straddle mounted and include a bearing support on both sides of the impeller. Overhung impeller designs are unacceptable.

9. The blower motors shall be directly connected to the blower impellers and rated for a 40 Deg F ambient, TEFC (IP54) enclosure, 1.15 SF, Class H insulation and rated for service on the specified plant voltage supply.

10. The blower and motor noise level shall not exceed OSHA's maximum exposure level for an eight (8) hour day level of db(A) at one (1) meter distance.

11. The blower bearings shall be rated for a minimum of 25,000 hours, average life.

12. An inlet filter shall be installed with the blower. The filter shall be of heavy duty steel construction, with a polyester filter media rated 5 micron at 99.5% efficiency.

13. A pressure relief valve shall be installed an shall be of brass construction, field adjustable and set to release at a maximum of 90% of the blower and motor maximum rating.

14. A check valve of the split flapper design shall be installed, with an aluminum body, EPDM seals, suitable for continuous duty up to 300 Deg F. Manufacturer shall be US Valve or equal.

15. Blowers will receive factory mechanical run and amperage to be checked for compliance with standards.

16. Blowers will have minimum 3-year warranty (from date of installation).

N. AERATION ELECTRICAL CONTROL CONSOLE

1. An electrical control panel shall be installed within a NEMA 3R/4X weatherproof enclosure with a locking hasp. The control console shall be provided for mounting as indicated on the plans. Any exterior mounting hardware shall be stainless steel or other corrosion resistant material.

2. The control console shall be completely factory assembled and tested prior to shipment. The control console shall be furnished with all necessary controls for each blower motor unit and associated plant equipment. Control voltage shall be 120 VAC, 1 Phase.

3. Controls shall be mounted to a removable sub-panel within the enclosure and shall be wired and spaced in accordance with the latest National Electrical Code. The control console shall be supplied with a properly sized magnetic-circuit breaker to act as the main disconnects for the control console. Magnetic starters with overload protection shall be supplied for all blower motor units. To vary the air supply, a program timer shall be supplied. An electrical alternator shall be furnished to alternate the operation of each blower motor unit. An electrical alternator shall be provided with a manual selector switch to allow manual selection of the lead blower if desired.

4. The 24-hour, 7-day time clock shall be capable of being programmed to control the blower run cycle and to adjust both the start set point and the blower run time. The clock shall also include a skip-a-day feature which will allow a separate program for weekends (when required). The clock shall be by Paragon, Model #1015.

5. All wiring conductors within the control console shall be U.L. type THHN, stranded #14 AWG minimum, rated at 600 volts. Control wiring shall be numbered on each end.

6. All wire and conduit required between the control panel and the electrical power service should be furnished and installed by the purchaser. Wiring and conduit between the control panel and plant equipment shall be furnished by the manufacturer of the wastewater treatment plant. The panel may be detached for shipping. The main power supply shall be 480 Volt,3 Phase, 60 Cycle. The control voltage shall be 120 Volt, single Phase.

O. ACCESS BRIDGE

1. The main Access Bridge with a 36” wide access platform shall be made of structural steel shapes 1/4" minimum thickness and shall be supported on the plant walls. The bridge shall extend across the tanks as shown on the drawings.

2. The bridge shall have a 36" wide deck made of, 1"x 3/16" galvanized or aluminum bar grating and shall be designed to withstand a uniform live load of 75 lbs. per square foot plus the dead load of the structure. The deflection shall not exceed L/360 of the unsupported span when the design loads are applied. The bridge shall be provided with handrails on both sides consisting of an upper and intermediate rail and vertical posts fabricated of 1-1/2” diameter anodized aluminum pipe. 4” x ¼” painted steel or aluminum toe plates shall also be provided.

3. 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.

4. All other walkways shall be a minimum of 24 inches wide and shall be of 1" x 3/16" galvanized or aluminum bar grating adequately supported to withstand a live load of 75 lbs. per square foot. All walkways shall be provided with handrails on both sides consisting of an upper, intermediate rail, and vertical posts fabricated from 1-1/2" diameter schedule 40, painted steel or anodized aluminum pipe. 4 x ¼” painted steel or aluminum toe plates shall also be provided.

P. EFFLUENT CONNECTION

1. The effluent connection of the wastewater treatment system shall be located as shown on the plans and shall consist of one, 12” diameter 150# standard flange.

Q. PLANT START-UP

1. At the time the wastewater treatment system is filled with water or sewage, and all power connections have been completed, and all equipment is approved for service, the contractor shall provide the services of a representative of the manufacturer who shall instruct the owner's representative in the proper operation and maintenance of the wastewater treatment system, including instructions in conducting all required operational tests. The manufacturer's representative shall furnish at this time, a service manual on the equipment installed within the wastewater treatment system.

R. MANUFACTURER QUALIFICATIONS

1. The manufacturer of specified equipment must have a minimum of five (5) years active experience in the design and manufacture of similar wastewater treatment equipment, and upon request, furnish supporting evidence.

2. The manufacturer of specified equipment must have a minimum of five-(5) year's active experience in the design and manufacture of similar wastewater treatment equipment, and upon request, furnish supporting evidence. Consideration will be given only to products of manufacturers who can demonstrate that their equipment fully complies with all requirements of the specifications and contract documents. 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, operating in the U.S., with similar characteristics

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General: Equipment and System components shall be installed in accordance with the manufacturer's written recommendations.

B. Alignment: Equipment shall be field tested to verify proper alignment and freedom from binding, scraping, or other defects. Equipment shall be secure in position and neat in appearance.

C. Lubricants: The CONTRACTOR shall provide any necessary oil and grease for initial operation.

D. Piping: Piping shall comply with Division 15. All piping shall be well supported as shown on the Drawings and as specified in Section 15006 - Pipe Supports. All equipment drains shall be routed to the trench drains in the building. All tank drains shall be routed to the drain boxes on each tank pad. All exterior pressure piping shall be insulated.

E. Piping appurtenances: Valves, instruments and other piping appurtenances provided by the Supplier shall be installed by the CONTRACTOR in strict accordance with the manufacturer's recommendations.

F. Electrical and control items provided by the Supplier shall be installed by the CONTRACTOR as shown in the Contract Drawings. Conduit and wiring shall comply with Division 16.

3.2 TESTING AND STARTUP

A. The CONTRACTOR shall test and start-up the System with the supervision and assistance of the Supplier provided manufacturer's representatives as specified in Division 11.

3.3 TECHNICAL MANUALS

A. The CONTRACTOR shall provide technical manuals in DVD format for the entire package plant system including all components. The manuals shall be complete and include the items listed below as a minimum.

1. Individual mechanical equipment sections with installation, operation, and maintenance materials. Complete spare parts listing for each equipment item.

2. Instrumentation and controls equipment section.

3. Process operation section including system optimization and troubleshooting.

4. Installation instructions

5. Safety materials

6. Warranty information

END OF SECTION 11390

SECTION 11400 – FLOW EQUALIZATION TANK

PART 1 -- GENERAL

1.1 DESCRIPTION

A. The CONTRACTOR shall furnish a Flow Equalization Tank as specified in the enclosed specification.

B. The Flow Equalization Tank shall consist of a circular welded steel tank. Tank diameter shall be 85 feet and the overall tank height shall be 13 feet. Useable water depth and useable tank volume shall be as shown on the plans. A bolted steel field erected tank wall shall not be accepted as equal.

C. In addition to the above mentioned equipment, the following principal items of equipment shall be included.

1. Access Manway with Davit

2. Air Distribution System with Coarse Bubble Diffusers

D. The above equipment shall be as manufactured by Evoqua Water Technologies LLC, Thomasville, Georgia, or equal.

1.2 PRE-BID SUBMITTAL REQUIREMENTS

A. The EQ Tank shall include as a minimum the components described in following pages of these specifications. Interested EQ Tank manufacturers may submit, provided the conditions of the following “Qualifications” are met.

B. An EQ Tank manufacturer is allowed to submit a bid on their system, provided the system has been pre-approved as an equal by the ENGINEER. It is the ENGINEER’s sole discretion if the system proposed, and submitted upon, is an equal to the system specified.

C. Submittal of partial segments of the specifications will not be acceptable. The EQ Tank manufacturer must submit a minimum of two (2) sets of data on the complete system, including as a minimum all the above listed equipment, and qualification information showing references of similar experiences as an EQ Tank supplier (minimum 10 installations), references of the installations. Installations shown must be EQ Tanks installed by the EQ Tank manufacturer for the installation to be acceptable as a reference. Installations installed by someone other than the EQ Tank manufacturer shall not be acceptable as a reference.

D. All documents supporting an “or equal” evaluation shall be submitted to the ENGINEER no later than 14 days prior to the bid date.

E. Each set of data shall include but not necessarily be limited to:

1. Drawings showing dimensions and details of all steel units and minimum recommended spacing.

2. Performance data for coarse bubble diffusers.

3. Installation list of similar installations.

4. All other information necessary to enable the Engineer to determine whether the proposed equipment meets the specified requirements.

F. Regardless of the outcome of the review, the EQ Tank manufacturer requesting the "or equal" consideration shall be responsible for the cost of the ENGINEER's evaluation. A cashier's check in the amount of $2,500.00 is to accompany the pre-submittal package. If the costs are less, a refund will be allowed to the EQ Tank manufacturer, any increase in cost is to be paid in full by the EQ Tank manufacturer prior to being accepted as an "or equal".

1.3 SUBMITTAL SHOP DRAWINGS

A. The contractor shall submit a minimum of six (6) copies of all shop drawings to the engineer for approval. Of these, two (2) copies will be returned to the contractor with appropriate action taken. Receipt of less than the minimum required number of copies will be cause for withholding the shop drawings from being checked until receipt of the necessary additional copies.

B. Each set of shop drawings shall include but not necessarily be limited to:

1. Drawings showing dimensions of all steel units and minimum recommended spacing.

2. All other information necessary to enable the ENGINEER to determine whether the proposed equipment meets the specified requirements.

PART 2 -- – PRODUCTS

2.1 DESIGN REQUIREMENTS

A. All components supplied shall conform to the size requirements as set forth in the plans, to the requirements included in other sections of this specification, and to the following broad design parameters.

2.2 STRUCTURAL

A. The circular welded steel wall shall be of a thickness designed to withstand a full hydrostatic internal loading causing a hoop stress of less than 24,000 psi with a weld efficiency of 75%. Minimum wall plate thickness shall be ¼"-inch.

B. The circular steel wall shall also be designed to withstand a wind load of 150 MPH. Minimum ¼" thick steel reinforcing wind girder shall be provided and installed completely around the top of the tank wall as shown on the drawings. The wind girder shall be gusseted to develop the full strength of the reinforcing girder.

C. The full wall height shall be developed utilizing no more than two (2) 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. All chain or skip welds on surfaces above water level or on an outer surface shall be caulked prior to painting.

E. The method used to initially fill the tank 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 PLANT FABRICATION AND INSTALLATION

A. Each tank component shall be prefabricated in the factory of the manufacturer and shall be shipped in assemblies complete and operable as detailed on the drawings and specified herein. Each component assembly shall be erected in the field in accordance with the manufacturer's installation drawings.

B. The field installation shall be performed by the equipment manufacturer's personnel, directly employed by the equipment manufacturer and normally engaged in the field installation of the equipment specified herein.

C. Any field welding accomplished on surfaces down to a point two (2) feet below the top of the plant shall have weld spatter and burrs removed by chipping and grinding to prevent operator injury. Any accessories mounted on or attached to the exterior of the tank and supplied by the plant manufacturer will be considered part of the manufacturer's erection responsibility. The manufacturer shall also be responsible for furnishing all necessary construction equipment for erection of the basin as supplied by the manufacturer. Installation shall encompass the total basin including but not limited to manway, diffusers, flood grid piping with pipe supports and drop pipe.

D. Field painting of the basin and any accessories mounted on or attached to the exterior of the tank and supplied by the manufacturer shall be performed by the equipment manufacturer and shall include masking of all aluminum, galvanized steel and stainless steel surfaces.

E. These requirements shall be met so that discrepancies between erector and manufacturer will be totally avoided with the end result being a trouble free installation with single source responsibility for the finished product.

3.2 COMPONENT CONSTRUCTION

A. A steel base channel rolled to the circular dimension of the tank wall shall be provided for installation into the slab. These channels shall be ASTM A36, 8" x 13.75 lbs/ft. and shall be embedded 4" deep in the slab. Base ring hooks shall be provided for the tank wall base channels. The installing slab contractor will be required to field weld the hooks to the base ring channels. Delivery of the base channels and base ring hooks shall be coordinated with the contractor and furnished with detailed installation drawings. The base ring channels shall be used as a base for welding the upright steel wall of the EQ Tank. A keyway in the slab shall not be required or accepted as equal.

B. A trim channel rolled to the circular dimension of the tank wall shall be provided to form the top wall perimeter. The channel shall be ASTM A36, 4" x 5.4 lbs/ft.

C. A 36-inch diameter fabricated steel access manway with davit shall be provided in the tank wall, near the bottom of the tank wall for access into the Flow Equalization Tank.

D. The air distribution system shall consist of a drop-pipe, floor grid piping with pipe supports and coarse bubble diffusers.

E. An 8-inch diameter Sch. 10 304SS diffuser drop-pipe shall be provided. The drop-pipe shall be provided with a flanged connection at the top of the tank wall as shown on the drawing. The drop-pipe shall extend to the bottom of the tank and shall be connected to the center floor grid header as shown on the drawing.

F. An 8-inch diameter Sch. 10 304SS center flood grid header shall be provided and shall be connected to the bottom of the drop-pipe as shown on the drawing. A sufficient number of 4-inch diameter Sch. 10 304SS branch laterals shall be provided and connected to the center floor grid header as shown on the drawing. The branch laterals shall be fabricated with a sufficient number of diffuser connections so a sufficient number of coarse bubble diffusers will be supplied for proper operation.

G. A sufficient number of 304SS pipe supports with 304SS anchor bolts shall be provided to support the center floor grid header and branch laterals.

H. The coarse bubble air diffusers shall be of a non-clog, multi-leaf spring design, each with a capacity of not less than 30 CFM. The diffuser shall be fabricated of 304SS with 0.20 inch minimum wall thickness.

I. Each diffuser shall have three (3) stainless steel leaf springs fastened to the body with 3/16” stainless steel blind rivets and each covering four (4), 7/8 inch diameter air discharge ports. The spring shall act as a check valve to eliminate plugging. The leaf spring deflects only slightly, oscillating at a high frequency, shearing the air as it is released to provide optimum bubble size and high oxygen transfer. The springs automatically produce a controlled back pressure to assure uniform air discharge through the entire diffuser network without the use of air restrictors, balancing inserts, or orifices in the header system.

J. The aeration system shall be designed based on an air flow rate of 25 CFM per diffuser with a maximum pressure loss of 14” of water. Guaranteed oxygen transfer efficiency shall be 9.3% minimum at a diffuser submergence of 13.75’ and air flow rate as stated. Oxygen transfer efficiency shall be guaranteed and substantiated by submission of test data compiled by a nationally recognized independent testing laboratory.

3.3 SURFACE PREPARATION AND CORROSION PROTECTION (SHOP)

A. Refer to Section 09800 for specified surface preparation and coatings.

3.4 SURFACE PREPARATION AND CORROSION PROTECTION (FIELD)

A. Refer to Section 09800 for specified surface preparation and coatings.

3.5 FASTENERS

A. All fasteners shall be 304SS.

3.6 INSTALLATION DRAWINGS

A. The equipment manufacturer shall provide a minimum of two (2) bound sets of installation drawings.

3.7 WARRANTY

A. Seller shall furnish its standard warranty against defects in material and workmanship for all Equipment provided by Seller under this Section. The Seller shall warrant the Equipment, or any components thereof, through the earlier of: (i) eighteen (18) months from delivery of the Equipment or (ii) twelve (12) months from initial operation of the Equipment.

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

C. 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 expanded during operation, the manufacturer shall provide a replacement part without cost to the owner.

D. This warranty shall be valid only if the product is properly serviced and operated under normal conditions and in accordance with the manufacturer's instructions.

3.8 EQUIPMENT MANUFACTURER

A. In order to establish a standard of quality and to insure a uniform basis of bidding, the equipment furnished shall be as manufactured by Evoqua Water Technologies LLC, Thomasville, Georgia, or equal as detailed in pre-bid submittal requirements.

END OF SECTION 11400

SECTION 11501 – POSITIVE DISPLACEMENT BLOWERS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide all labor, materials, equipment and services necessary for furnishing and installing complete positive displacement blower units as shown on the Drawings and specified herein. Each blower shall be furnished completely packaged with all accessories, factory tested and ready for operation, as a single comprehensive unit. The blower units shall be assembled by the blower manufacturer at the manufacturers' facility. The blower units shall be provided by the manufacturer, as specified in Section 11390 - Package Plant System.

1.2 SUBMITTALS

A. Submittal sheets shall be 8½ x 11 inches, or if larger, shall be folded to 8½ x 11 inches so that the title block is clearly visible without unfolding. Drawings shall be similarly folded and inserted in pockets as appropriate. Paper copies shall be contained in a soft cover binder.

B. Shop Drawings: The CONTRACTOR shall submit an integrated shop drawing for the blower system. All mechanical and electrical equipment and components specified herein shall be included to be considered a complete shop drawing.

C. Installation, Operation, and Maintenance Manuals: The CONTRACTOR shall submit required number of copies of the manuals within eight (8) weeks of receiving approved shop drawings.

1.3 TESTING

A. A certified factory slip test report form shall be submitted for each blower.

PART 2 -- PRODUCTS

2.1 DESIGN CRITERIA

A. Schedule:

Name	Equalization Tank Blower	Aeration Blower	Digester Blower
Quantity	2 (1 duty, 1 standby)	3 (2 duty, 1 standby)	2 (1 duty, 1 standby)
Tag number	01-E3, 01-E4	02-E2, 02-E3, 02-E4	02-E5, 02-E6
Discharge Pressure	6 PSIG	9 PSIG	9 PSIG
Required Volume, SCFM	650	990	685
Max Speed, RPM	4,270	3,530	3,720
Motor Horsepower	30	75	50

B. Operating Conditions:

1.	Elevation, Feet, NAVD88	28
2.	Inlet Air Temperature, ° F	100
3.	Inlet Air Humidity, %	90

2.2 POSITIVE DISPLACEMENT BLOWERS

A. General: Each blower shall be of the horizontal, rotary, positive displacement type. Each assembly shall be rugged in construction and of such design that it may be disassembled and inspected without disturbing the inlet or discharge piping.

B. Casing: Casing shall be of one piece with separate head plates, and shall be made of close grained gray cast iron suitably ribbed to prevent distortion under service conditions.

C. Head Plates: Drive end and gear end head plates shall be fabricated of close grained cast iron which are precision machined for exact bearings housing fit.

D. Impeller and Shaft: Impeller and shaft shall be made from common cast iron. Impeller shall be of the two lobe involute type and shall operate without rubbing and shall be positively timed by a pair of accurately machined heat-treated alloy steel, spur tooth, timing gears. Impeller shall be 15 inches in length.

E. Bearings: Each impeller/shaft shall be supported by double row ball or spherical roller bearings sized for a minimum of 50,000 hours of B-10 life.

F. Bearing Seals: A lip type oil seal shall be provided at each bearing, designed to prevent lubricant from leaking into the air stream. Provisions shall be made to vent the lubrication system to prevent any possible carryover of lubricant into air stream.

G. Lubrication: The timing gears and the bearings shall be splash oil lubricated from oil slingers mounted on the drive shaft and dipping in the oil. Sight glasses for oil level observation shall be provided. Gear diameter shall be equal to or greater than 6 inches.

2.3 ELECTRIC MOTORS

A. Motors: A single speed, constant torque, TEFC 3600 RPM motor, 1.15 Service Factor, Premium Efficiency suitable for mounting on a slide base and connecting to the blower shaft by a V- belt and sheave drive assembly, shall be provided. Motor shall have a cast iron frame and brackets. Motors shall be inverter duty.

2.4 BLOWER PACKAGE ACCESSORIES

A. General: The blower packages shall be fabricated and assembled with the following accessories and shipped complete as a unit.

B. Equipment Base: The base shall be built so that the blower and the motor are mounted to provide for horizontal tensioning of the v-belt drive. The base shall be a minimum of 3/8” plate steel with angle legs and gussets. These items shall also have a minimum thickness of 3/8". The blower package base shall weigh at least 80% of the blower weight.

C. Drive: Drive shall be V-belt assembly consisting of sheaves, quick detachable bushings, V-belts, and sliding motor base. Drive assembly shall have a 1.4 service factor based on motor nameplate horsepower.

D. Guard: An OSHA style steel belt guard to enclose drive and belts, designed for easy removal, shall be provided. The guard shall be constructed to allow visual inspection of the drive system without removing the guard.

E. Intake Filter: Each blower shall be provided with a suitably sized in-line air filter. Filters shall be Model CCF-8 as manufactured by Universal Silencer, or equal.

F. Intake Silencer: A heavy duty, all welded, noise attenuation unit constructed of carbon steel sheet and plate and featuring an acoustically treated outlet for pulse control, shall be provided for each blower. Silencers shall Universal Silencer Model R1SY-8, or equal.

G. Discharge Silencer: A heavy duty, all welded, noise attenuation unit constructed of carbon steel sheet and plate and featuring an acoustically treated outlet for pulse control, shall be provided for each blower. Silencers shall be Universal Silencer Model SDY-8, or equal.

1. Supports: Two (2), carbon steel, clamp type supports at each end of all silencers for rigidly mounting silencer horizontally to the blower package base shall be provided.

H. Expansion Joints: Threaded sleeved cylindrical type, three ply bias fiberglass reinforced silicone rubber connectors for blower inlet and discharge connections shall be provided. Units shall be capable of withstanding 25 psi and operating temperatures of 250°F.

I. Pressure Relief Valve: A weight type relief valve with proper sizing and weights for set point pressure shall be provided for each blower.

J. Check Valves: Wafer type, cast iron body check valve, with aluminum internals, shall be provided for each blower.

K. Discharge Pressure Gauge: Stem mounted 2.5”, 0-15 psig discharge pressure gauges shall be provided for each blower package.

2.5 SHOP PAINTING

A. Shop Prime Coating: Factory applied prime coat shall be equal or greater than required in Section 09800.

B. Shop Finish Coating: Factory applied finish coat shall be equal or greater than required in Section 09800.

2.6 SOUND REDUCTION ENCLOSURE

A. Each blower assembly shall be furnished with a weather tight, sound attenuating enclosure. The enclosure shall be manufactured of 16 gage aluminum, and shall be lined with 3” of acoustical foam and 20 gauge galvanized perforated steel; sufficient to meet an 85 DBA attenuation requirement at one meter from any exterior surface of the enclosure. The enclosure shall have removable side panels which will allow full access to the assembly for maintenance or repair.

B. An air ventilation fan shall be mounted on the enclosure and sized as necessary to keep the assembly at a temperature needed to maintain proper operation as recommended by the assembly manufacturer. The ventilation fan motor shall be 115V/1Ph/60 Hz; sized to provide approx. 10 CFM/motor HP.

C. The two side panels shall provide for a minimum of 50% of each side to be removed for access. The panels shall include two locking latch assemblies and a minimum of two lifting handles. The doors shall be removable for easy access.

D. Any pipe penetration holes in the enclosure shall be sized to allow for passage of pipe flanges. All penetration holes shall have flash rings installed to seal around the pipe.

E. The enclosure shall be free standing and not attached or mounted onto the blower package frame in any way. The enclosure will require field assembly and shall be supplied with manufacturer's installation instructions as well as all special tools and fasteners required for assembly.

2.7 MANUFACTURERS OR EQUAL

A. Kaeser

B. Aerzen

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General: The CONTRACTOR shall install the preassembled blower packages on concrete housekeeping pads at the locations shown on the drawings. The CONTRACTOR shall install any accessory times shipped loose.

3.2 MANUFACTURER'S REPRESENTATIVE

A. General: The CONTRACTOR shall provide the services of a qualified factory certified representative for the required days as specified herein and in Section 11000.

1. Initial Operation and Training: A minimum of two (2) day(s) for blower equipment installation inspection, certification, start-up, training, and corrective adjustments.

2. Revisit: A separate visit of a minimum of one (1) day for re-inspecting of the blower packages after they have been in operation one (1) month. The factory authorized representative shall perform a vibration test, as well as verify RPM, and discharge temperature.

END OF SECTION 11501

SECTION 15000 - PIPING, GENERAL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide the piping systems indicated, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to piping sections in Divisions 2 and 15.

C. The mechanical Drawings define the general layout, configuration, routing, method of support, pipe size, and pipe type. The mechanical Drawings are not pipe construction or fabrication drawings. Where pipe supports and spacing are indicated on the Drawings and are referenced to a Standard Detail, the CONTRACTOR shall use that Detail. Where pipe supports are not indicated on the Drawings, it is the CONTRACTOR's responsibility to develop the details necessary to design and construct mechanical piping systems to accommodate the specific equipment provided, and to provide spacers, adapters, and connectors for a complete and functional system.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: Shop Drawings shall contain the following information:

1. Drawings: Layout drawings including necessary dimensions, details, pipe joints, fittings, specials, bolts and nuts, gaskets, valves, appurtenances, anchors, guides, and material lists. Fabrication drawings shall indicate spacers, adapters, connectors, fittings, and pipe supports to accommodate the equipment and valves in a complete and functional system.

2. Thermoplastic Pipe Joints: Submit solvent cement manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.

3. Gasket Material: Submit gasket manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.

4. Modular Seals for Pipe: Manufacturer's catalog sheet showing materials and installation procedures.

C. Samples: Performing and paying for sampling and testing as necessary for certifications are the CONTRACTOR'S responsibility.

D. Certifications

1. Necessary certificates, test reports, and affidavits of compliance shall be obtained by the CONTRACTOR.

2. A certification from the pipe fabricator that each pipe will be manufactured subject to the fabricator’s or a recognized Quality Control Program. An outline of the program shall be submitted to the ENGINEER for review prior to the manufacture of any pipe.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Extent of Work: Pipes, fittings, and appurtenances shall be provided in accordance with the requirements of the applicable Sections of Divisions 2 and 15 and as indicated. Materials in contact with potable water shall be NSF 61 certified.

B. Pipe Supports: Pipes shall be adequately supported, restrained, and anchored in accordance with Section 15006 - Pipe Supports, and as indicated.

C. Lining: Application, thickness, and curing of pipe lining shall be in accordance with the applicable Sections of Division 2, unless otherwise indicated.

D. Coating: Application, thickness, and curing of coating on buried pipe shall be in accordance with the applicable Sections of Division 2, unless otherwise indicated. Pipes above ground or in structures shall be coated in accordance with Section 09800 - Protective Coating.

E. Pressure Rating: Piping systems shall be designed for the maximum expected pressure as defined in Section 01656 - Pressure Pipe Testing, or as indicated on the Piping Schedule, whichever is greater.

F. Inspection: Pipe shall be subject to inspection at the place of manufacture. During the manufacture, the ENGINEER shall be given access to areas where manufacturing is in progress and shall be permitted to make inspections necessary to confirm compliance with requirements.

G. Tests: Except where otherwise indicated, materials used in the manufacture of the pipe shall be tested in accordance with the applicable specifications and standards. Welds shall be tested as indicated. The CONTRACTOR shall be responsible for performing material tests.

H. Welding Requirements: Qualification of welding procedures used to fabricate pipe shall be in accordance with the provisions of AWS D1.1 - Structural Welding Code. Welding procedures shall be submitted for the ENGINEER's review.

I. Welder Qualifications: Welding shall be done by skilled welders and welding operators who have adequate experience in the methods and materials to be used. Welders shall be qualified under the provisions of AWS D1.1 or the ASME Boiler and Pressure Vessel Code, Section 9, by an independent local, approved testing agency not more than 6 months prior to commencing WORK on the piping. Machines and electrodes similar to those used in the WORK shall be used in qualification tests. Qualification testing of welders and materials used during testing is part of the WORK.

2.2 PIPE FLANGES

A. General: Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise indicated. Attachment of the flanges to the pipe shall conform to the applicable requirements of AWWA C207. Flange faces shall be perpendicular to the axis of the adjoining pipe. Flanges for miscellaneous small diameter pipes shall be in accordance with the standards indicated for these pipes.

B. Pressure Ratings

1. 150 psi or less: Flanges shall conform to either AWWA C207 - Steel Pipe Flanges for Waterworks Service--Sizes 4 In. Through 144 In., Class D, or ASME B16.5 - Pipe Flanges and Flanged Fittings, 150 lb class.

2. 150 psi to 275 psi: Flanges shall conform to either AWWA C207 Class E or Class F, or ASME B16.5 150 lb class.

3. 275 psi to 700 psi: Flanges shall conform to ASME B16.5, 300 lb class.

4. Selection based on test pressure: AWWA flanges shall not be exposed to test pressures greater than 125 percent of rated capacity. For higher test pressures, the next higher rated AWWA flange or an ANSI-rated flange shall be selected.

C. Blind Flanges: Blind flanges shall be in accordance with AWWA C207, or as indicated for miscellaneous small pipes. Blind flanges for pipe sizes 12-inches and greater shall be provided with lifting eyes in the form of welded or screwed eye bolts.

D. Flange Coating: Machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.

E. Flange Bolts: Bolts and nuts shall conform to Section 05500 - Miscellaneous Metalwork. All-thread studs shall be used on valve flange connections where space restrictions preclude the use of regular bolts.

F. Insulating Flanges: Insulated flanges shall have bolt holes 1/4-inch diameter greater than the bolt diameter.

G. Insulating Flange Sets: Insulating flange sets shall be provided where indicated. Each insulating flange set shall consist of an insulating gasket, insulating sleeves and washers, and a steel washer. Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2 inch or smaller and shall be made of acetal resin. For bolt diameters larger than 1-1/2 inch, insulating sleeves and washers shall be 2 piece and shall be made of polyethylene or phenolic material. Steel washers shall be in accordance with ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength. Insulating gaskets shall be full-face.

H. Insulating flange manufacturers, or equal

1. JM Red Devil, Type E

2. Maloney Pipeline Products Co., Houston

3. PSI Products, Inc., (Frost Engineering Service Co., Costa Mesa, California.)

I. Flange Gaskets

1. Gaskets for flanged joints used in general water and wastewater service shall be full-faced type, with material and thickness in accordance with AWWA C207, suitable for temperatures to 700 degrees F, a pH of one to 11, and pressures to 1000 psig. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange. Ring gaskets shall not be permitted unless otherwise indicated. Flange gaskets shall be as manufactured by John Crane, Style 2160, Garlock, Style 3000, or equal.

2. Gaskets for flanged joints used in water with chloramines shall be Gylon, Style 3500 as manufactured by Garlock, or equal.

3. Gaskets for flanges for PVC and CPVC piping used in general water and wastewater service shall be full faced, 1/8-inch thick, made of ethylene propylene rubber (EPR) having a Type A durometer hardness of 50 to 70 when tested in accordance with ASTM D 2240. When the mating flange has a raised face, provide a flat ring gasket filler between the PVC flange and gasket and the adjacent flange.

4. Gaskets for flanged joints used in chemicals, air, solvents, hydrocarbons, steam, chlorine and other fluids shall be made of materials compatible with the service, pressure, and temperature.

2.3 THREADED INSULATING CONNECTIONS

A. General: Threaded insulating bushings, unions, or couplings, as appropriate, shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.

B. Materials: Threaded insulating connections shall be of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

2.4 SLEEVE-TYPE COUPLINGS

A. General: Sleeve-type couplings shall be provided where indicated. The CONTRACTOR will not be allowed to substitute a sleeve-split coupling for the sleeve coupling unless approved by the ENGINEER.

B. Construction: Sleeve couplings shall be in accordance with AWWA C219 - Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe. Couplings shall be steel with steel bolts, without pipe stop. Couplings shall be of sizes to fit the pipe and fittings indicated. The middle ring shall be not less than 1/4-inch thick or at least the same wall thickness as the pipe to which the coupling is connected. If the strength of the middle ring material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe. The coupling shall be either 5- or 7-inches long for sizes up to and including 30-inches and 10-inches long for sizes greater than 30-inches, for standard steel couplings, and 16-inches long for long-sleeve couplings. The followers shall be single-piece contoured mill sections welded and cold-expanded as required for the middle rings, and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket. Bolts and nuts shall conform to the requirements of Section 05500. Buried sleeve-type couplings shall be epoxy-coated at the factory as indicated.

C. Pipe Preparation: Where indicated, the ends of the pipe shall be prepared for flexible steel couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12-inches from the ends of the pipe, with outside diameter not more than 1/64-inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subjected to air test for porosity.

D. Gaskets

1. Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for wastewater and sewerage

applications shall be Buna "N," Grade 60, or equivalent suitable elastomer. The rubber in the gasket shall meet the following specifications:

a. Color - Jet Black

b. Surface - Non-blooming

c. Durometer Hardness - 74 plus and minus 5

d. Tensile Strength - 1000 psi Minimum

e. Elongation - 175 percent Minimum

2. The gaskets shall be immune to attack by impurities normally found in water or wastewater. Gaskets shall meet the requirements of ASTM D 2000 - Classification System for Rubber Products in Automotive Applications, AA709Z, meeting Suffix B13 Grade 3, except as noted above. Where sleeve couplings are used in water containing chloramine or other fluids which attack rubber materials, gasket material shall be compatible with the piping service and fluid utilized.

3. Gasket materials used in water with chloramines shall be Gylon Style 3500 by Garlock, or equal.

E. Piping Connection to Equipment: Where piping connects to mechanical equipment such as pumps, compressors, and blowers, the piping shall be brought to the equipment connection aligned and perpendicular to the axis of the flange or fitting for which the piping is to be connected. The piping shall not impose excessive stress to the equipment connection to cause misalignment of the equipment. The CONTRACTOR shall assign the responsibility to the equipment manufacturer to review the piping connection to the equipment and submit any modifications to the ENGINEER for review.

F. Insulating Sleeve Couplings: Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket which assembles over a sleeve of an insulating compound material compatible with the fluid service in order to obtain insulation of coupling metal parts from the pipe.

G. Restrained Joints: Sleeve-type couplings on pressure lines shall be harnessed unless thrust restraint is provided by other means. Harnesses shall be designed by the pipe manufacturer in accordance with Manual M11, or as indicated. Harness sets shall be designed for the maximum test pressure of the pipe in which they are installed. Where harness sets are installed near the suction and discharge of the pump, harness bolts shall have zero elongation to prevent misalignment of the pump imparted by the thrust within the piping system.

H. Manufacturers, or equal

1. Dresser, Style 38

2. Ford Meter Box Co., Inc., Style FC1 or FC3

3. Smith-Blair, Style 411

2.5 FLEXIBLE CONNECTORS

A. Low Temperatures: Flexible connectors shall be installed in piping connections to engines, blowers, compressors, and other vibrating equipment, and where indicated. Flexible connectors for service temperatures up to 180 degrees F shall be flanged reinforced Neoprene or Butyl spools, rated for a working pressure of 40 to 150 psi, or reinforced flanged duck and rubber, as best suited for the application. Flexible connectors for service temperatures above 180 degrees F shall be flanged, braided stainless steel spools with inner, annular, corrugated stainless steel hose, rated for minimum 150 psi working pressure, unless otherwise indicated. The connectors shall be a minimum of 9-inches long, face-to-face flanges, unless otherwise indicated. The final material selection shall be approved by the manufacturer. The CONTRACTOR shall submit manufacturer's Shop Drawings and calculations.

B. High Temperature: Flexible connectors shall be installed in engine exhaust piping and where indicated. Connectors shall be sufficient to compensate for thermal expansion and contraction and also to isolate vibration between the engine and the exhaust piping system. Connectors shall be stainless steel bellows type, flanged, and rated for minimum 150 psi, 2000 degrees F.

C. Flexible Coupling For Vertical Pumps: Flexible couplings for vertical pumps shall be flexible expansion couplings. Flexible expansion couplings shall be elastomeric flanged and arched couplings designed for expansion and contraction. Couplings shall be concentric reducers for dissimilar size pump and discharge piping. Sizes shall be as indicated on the Drawings. The flanges shall be designed to meet ANSI Class 125 drilling. Body shall be constructed with an elastomer NSF 61 certified for contact with potable water, and with stainless steel retainer rings.

2.6 EXPANSION JOINTS

A. Piping subject to expansion and contraction shall be provided with sufficient means to compensate for such movement without exertion of undue forces to equipment or structures. This may be accomplished with expansion loops, bellow-type expansion joints, or sliding-type expansion joints. Expansion joints shall be flanged end, stainless steel, Monel, rubber, or other materials best suited for each individual service. The CONTRACTOR shall submit detailed calculations and manufacturer's Shop Drawings of proposed expansion joints, piping layouts, and anchors and guides, including information on materials, temperature, and pressure ratings.

2.7 PIPE THREADS

A. Pipe threads shall be in accordance with ASME B1.20.1 - Pipe Threads, General Purpose (inch), and be made up with Teflon tape unless otherwise indicated.

2.8 QUICK CONNECT COUPLINGS

A. Couplings shall be of the cam and groove type consisting of a male adapter conforming to MIL-C-27487. Male adapters shall be designed to receive a female coupler without requiring threading, bolting, or tools. Connections shall remain tight and leak-proof under pressures up to 100 psig. Each adapter shall be furnished with a dust cap complete with a 18-in long security chain, both of same material as the coupling. Adapters shall be furnished in accordance with the Drawings, or as required by the installation. Couplings shall be of 316 stainless steel construction, except couplings for sodium hypochlorite shall be titanium, or other material specifically designated as appropriate for sodium hypochlorite. Couplings shall be EVER-TITE, PT Coupling Co., or equal.

2.9 MODULAR MECHANICAL SEALS FOR PIPING PENETRATIONS

A. Where indicated and where required to prevent flow of water or air, the passages of piping through wall sleeves and cored openings shall be sealed with modular interlocking link mechanical closures. Individual links shall be constructed of EPDM rubber, be suitable for temperatures between minus 40 and plus 250 degrees F, and be shaped to fill the annular space between the outside of the pipe and the inside of the wall sleeve or cored opening. Links shall be assembled with type 316 stainless steel bolts and nuts to form a continuous rubber belt around the pipe. Pressure plates under each bolt and nut shall be fabricated of a corrosion-resistant composite material. After the seal assembly is positioned in the sleeve, tighten the bolts against the pressure plates to expand the rubber links and form the watertight seal. Sizing and installation of sleeves and assemblies shall be in accordance with the manufacturer's recommendations.

B. Manufacturers, or equal

1. Thunderline Corporation, Link-Seal

PART 3 -- EXECUTION

3.1 MATERIAL DELIVERY, STORAGE, AND PROTECTION

A. Piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact. Defective or damaged materials shall be replaced with new materials.

3.2 GENERAL

A. Piping, fittings, and appurtenances shall be installed in accordance with the requirements of applicable Sections of Division 2 and Division 15. Proprietary manufactured couplings shall be installed in accordance with the coupling manufacturer's recommendation.

B. Care shall be taken to insure that piping flanges, mechanical-type couplings, sleeve-type couplings, flexible connectors, and expansion joints are properly installed as follows:

1. Gasket surfaces shall be carefully cleaned and inspected prior to making up the connection. Each gasket shall be centered properly on the contact surfaces.

2. Connections shall be installed to prevent inducing stress to the piping system or the equipment to which the piping is connected. Contact surfaces for flanges, couplings, and piping ends shall be aligned parallel, concentric, and square to each axis at the piping connections.

3. Bolts shall be initially hand-tightened with the piping connections properly aligned. Bolts shall be tightened with a torque wrench in a staggered sequence to the AISC recommended torque for the bolt material.

4. Groove ends shall be clean and free from indentations, projections, and roll marks in the area from the pipe end to the groove.

5. After installation, joints shall meet the indicated leakage rate. Flanges shall not be deformed nor cracked.

C. Lined Piping Systems: The lining manufacturer shall take full responsibility for the complete, final product and its application. Pipe ends and joints of lined pipes at screwed flanges shall be epoxy-coated to assure continuous protection.

D. Core Drilling: Where core drilling is required for pipes passing through existing concrete, core drilling locations shall be determined by radiograph of concrete construction to avoid damage to embedded raceways and reinforcing bars.

E. Cleanup: After completion of the WORK, cuttings, joining and wrapping materials, and other scattered debris shall be removed from the Site. The entire piping system shall be handed over in a clean and functional condition.

END OF SECTION 15000

SECTION 15005 - PIPING IDENTIFICATION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide identification for exposed piping and valves, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

1. ANSI A13.1 Scheme for the Identification of Piping Systems

1.3 CONTRACTOR SUBMITTALS

A. Submittals shall be in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: A list of suggested wording for each valve tag, prior to fabrication.

C. Samples

1. One sample of each type of identification device.

2. Sample of each proposed color required by the pipe color schedule.

PART 2 -- PRODUCTS

2.1 IDENTIFICATION OF PIPING

A. Except as indicated below for very short pipe lengths, identify exposed piping larger than 2-inches nominal size for the pipe contents and direction of flow.

1. Marker Type

a. Stencil: Lettering painted directly on surface of pipe inside color coded marker area.

2. Marker Area: Sized per pipe size according to ANSI A13.1; color from the table below.

3. Lettering: Sized per pipe size according to ANSI A13.1; color from the table below.

4. Arrows: at least two (2) arrows at each marker area, showing direction of flow.

B. Pipe 2-inches and smaller shall be identified by plastic plates made from laminated 3-layer plastic with engraved black letters on white background.

C. Pipe identification shall be as manufactured by **Brady, Seton,** or equal.

2.2 EXISTING IDENTIFICATION SYSTEMS

A. In installations where existing piping identification systems have been established, the CONTRACTOR shall follow the existing system. Where existing identification systems are incomplete, utilize the existing system as far as practical and supplement with the indicated system.

2.3 IDENTIFICATION OF VALVES AND SHORT PIPE LENGTHS

A. Identifying devices for valves and the sections of pipe that are too short to be identified with markers and arrows shall be identified with metal or plastic tags.

B. Metal tags shall be stainless steel with embossed lettering. Plastic tags shall be solid black plastic laminate with white embossed letters. Tags shall be designed to be firmly attached to the valves or short pipes or to the structure immediately adjacent to such valves or short pipes.

C. Wording on the valve tags shall describe the exact function of each valve, e.g., "HWR-BALANCING," "CLS THROTTLING", "RAS-PUMP SHUT-OFF," etc.

PART 3 -- EXECUTION

3.1 GENERAL

A. Markers and identification tags shall be installed in accordance with the manufacturer's printed instructions, and shall be neat and uniform in appearance. Tags and markers shall be readily visible from all normal working locations.

3.2 VALVE TAGS

A. Valve tags shall be permanently attached to the valve or structure by means of 2 stainless steel bolts or screws.

3.3 MARKER LOCATIONS

A. Each pipe shall be marked at:

1. Intervals of 20-feet in straight runs.

2. At least once in every room.

3. Within 2-feet of turns, elbows, and valves.

4. On the upstream side of tees, branches, and other distribution points.

5. On both sides of walls and floors through which the piping passes.

3.4 IDENTIFICATION COLORS

A. Conform to the following color codes.

Color Schedule				
Pipe Contents		Pipe Color	**Marker Color**	**Letter Color**
Abbreviation	**Identification**			
A	Air		blue	white
AC	Activated carbon solution		green	white
AW	Filter air wash		blue	white
BD	Bottom drain		green	white
BBD	Boiler blow-down		yellow	black
BP	Plant bypass		green	white
BW	Filter backwash		green	white
C	Condensate		yellow	black
CD	Chemical drain and vent		yellow	black
CL	Chlorine (gas or liquid state)		yellow	black
CLS	Chlorine solution		yellow	black
CLV	Chlorine gas under vacuum		yellow	black
CN	Centrate		green	white
CS	Caustic soda		yellow	black
CSL	Circulated sludge		yellow	black
CV	Chlorine vent & detection line		yellow	black
CWR	Chilled water return		green	white
CWS	Chilled water supply		green	white
DCS	Defoaming chemical solution		green	white
DN	Decant		green	white
DSL	Digested sludge		yellow	black
DW	Demineralized water		green	white
EE	Engine exhaust		yellow	black
EWR	Engine cooling water return		green	white

EWS	Engine cooling water supply		green	white
F	Froth (scum)		yellow	black
FC	Ferric chloride		yellow	black
FE	Final effluent		green	white
FI	Filter influent		green	white
FOR	Fuel oil return		yellow	black
FOS	Fuel oil supply		yellow	black
FS	Froth spray		green	white
FSP	Fire protection sprinkler system		red	white
G	Grit		yellow	black
HR	Heating water return		yellow	black
HS	Heating water supply		yellow	black
HWR	Domestic hot water return		yellow	black
HWS	Domestic hot water supply		yellow	black
IA	Instrument air		blue	white
IE	Intermediate effluent		green	white
LA	Liquid alum		yellow	black
LE	Lagoon effluent		green	white
LO	Lube oil		yellow	black
LPG	Liquified petroleum gas		yellow	black
LS	Lime slurry		yellow	black
LSP	Landscape sprinkler system		green	white
ML	Mixed liquor (aeration tank effluent)		yellow	black
NG	Natural gas		yellow	black
O	Ozone		yellow	black
OF	Overflow		green	white
OX	Oxygen		yellow	black
PA	Plant air		blue	white
PD	Plant drain		green	white
PEA	Polymer-anionic		green	white

PEC	Polymer-cationic		green	white
PEN	Polymer-nonionic		green	white
PEF	Primary effluent		yellow	black
PI	Plant influent		yellow	black
PO	Plant overflow		green	white
PW	Potable water		green	white
RAS	Return activated sludge		yellow	black
REW	Reclaimed water		purple	white
RSL	Raw sludge (primary sludge)		yellow	black
RW	Raw water		green	white
RWL	Rain water leader		green	white
S	Scum		yellow	black
SA	Sample lines		yellow	black
SC	Spare chemical		yellow	black
SD	Sanitary drains and vents		yellow	black
SDR	Storm drain		green	white
SE	Secondary effluent		yellow	black
SF	Sludge filtrate		yellow	black
SG	Sludge gas		yellow	black
SI	Sodium silicate		yellow	black
SL	Sludge		yellow	black
SN	Supernatant		yellow	black
SO	Sulfur dioxide (gas or liquid state)		yellow	black
SOW	Softened water		green	white
SOS	Sulfur dioxide solution		yellow	black
SOV	Sulfur dioxide gas under vacuum		yellow	black
SPD	Sump pump discharge		green	white
SS	Sanitary sewer		yellow	black
ST	Steam		yellow	black
SUC	Structure underdrain collector		green	white

SV	Sulfur dioxide vent		yellow	black
SW	Filter surface wash		green	white
TFE	Trickling filter effluent		yellow	black
TPI	Tertiary plant influent		yellow	black
TPR	Thickener pressurized recycle (DAF)		yellow	black
TS	Thickener subnatant (DAF)		yellow	black
TSL	Thickened sludge (DAF)		yellow	black
TSO	Thickener subnatant overflow (DAF)		yellow	black
UW	Utility water (non-potable water)		yellow	black
V	Vacuum		blue	white
WAS	Waste activated sludge		yellow	black
WLO	Waste lube oil		yellow	black
WW	Filter waste wash water		yellow	black

END OF SECTION 15005

SECTION 15006 - PIPE SUPPORTS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide pipe supports, hangers, guides, and anchors, complete and in place, in accordance with the Contract Documents.

B. Where pipe support systems are not indicated on the Drawings, the CONTRACTOR shall design and provide the supports in accordance with this Section.

C. Pipe support details in the Contract Drawings are not designed to resist seismic and wind forces. CONTRACTOR shall design and provide additional supports as needed to resist such forces.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: Shop Drawings shall include the following information:

1. Drawings of pipe supports, hangers, anchors, and guides

2. Calculations for special supports and anchors.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Code Compliance: Piping systems and pipe connections to equipment shall be properly anchored and supported to prevent undue deflection, vibration, and dislocation due to seismic events, line pressures, pipe weight, fluid weight, liquid movement, thermal changes, vibration, probable forces applied during construction, and stresses on piping, equipment, and structures. Supports and parts thereof shall conform to the requirements of ASME B31.1 - Power Piping, except as supplemented or modified below. Supports for plumbing piping shall be in accordance with the latest edition of the applicable plumbing code or local administration requirements.

B. Structural Members: Wherever possible, pipes shall be supported from structural members. Where it is necessary to frame structural members between existing members, such supplementary members shall be provided by the CONTRACTOR. Supplementary members shall be in accordance with the requirements of the building code and the American Institute of Steel Construction and shall be as acceptable to the ENGINEER.

C. Pipe Hangers: Pipe hangers shall be capable of supporting the pipe in all conditions of operation, allowing free expansion and contraction of the piping and preventing excessive stress on equipment. Hangers shall have a means of vertical adjustment after erection. Hangers shall be designed to prevent becoming disengaged by any movement of the supported pipe. Hangers subject to shock, seismic disturbances, or thrust imposed by the actuation of safety valves shall include hydraulic shock suppressors. Hanger rods shall be subject to tensile loading only.

D. Hangers Subject to Horizontal Movements: At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit such movement. Where horizontal pipe movement is greater than 1/2-inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from the cold to the hot position of the pipe, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the hot position.

E. Spring-Type Hangers: Spring-type pipe hangers shall be provided for piping subject to vibration or vertical expansion and contraction, such as engine exhausts and similar piping. Spring-type hangers shall be sized to the manufacturer's printed recommendations and the loading conditions encountered. Variable spring supports shall be provided with means to limit misalignment, buckling, eccentric loading, or to prevent overstressing of the spring, and with means to indicate the compression of the spring. Supports shall be capable of accommodating at least 4 times the maximum travel due to thermal expansion.

F. Thermal Expansion: Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or expansion joints shall be provided, together with the necessary rolling or sliding supports, anchors, guides, pivots, and restraints permitting the piping to expand and contract freely away from the anchored points. Components shall be structurally suitable to withstand loads imposed.

G. Heat Transmission: Supports, hangers, anchors, and guides shall be so designed and insulated that excessive heat will not be transmitted to the structure or to other equipment.

H. Riser Supports: Where practical, risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.

I. Freestanding Piping: Free-standing pipe connections to equipment such as chemical feeders and pumps shall be firmly attached to steel frames fabricated from angles, channels, or I-beams anchored to the structure. Exterior, free-standing overhead piping shall be supported on fabricated pipe stands consisting of pipe columns anchored to concrete footings, or with horizontal, welded steel angles, and U-bolts or clamps securing the pipes.

J. Materials of Construction

1. General: Piping shall be supported with support assemblies, including framing, hardware, and anchors constructed of Type 316 stainless steel, unless otherwise indicated.

K. Point Loads: Any meters, valves, heavy equipment, and other point loads on PVC, FRP, and other plastic pipes, shall be supported on both sides, according to manufacturer's recommendations to avoid undue pipe stresses and failures. To avoid point loads, supports on PVC, FRP, and other plastic piping shall be equipped with extra wide pipe saddles or shields.

L. Concrete Anchors: Unless otherwise indicated, concrete anchors for pipe supports shall be according to the following table and Section 05500. Anchor embedment shall comply with Section 05500.

Pipe Support Application	Type of Concrete Anchor
New Concrete	Use embedded concrete insert anchors on a grid pattern. Use Grinnell (Anvil International), Tolco, or equal.
Existing Concrete	Use non-shrink grouted anchors, metallic type expansion anchors, or epoxy anchors.

	Exceptions: Metallic type expansion anchors and epoxy anchors shall not be used for pipe supports subject to vibrating loads. Epoxy anchors shall not be used where the concrete temperature is in excess of 100 degrees F or higher than the limiting temperature recommended by the manufacturer. Epoxy anchors shall not be used where anchors are subject to vibration or fire.
Vibratory Loads and High Temperature Conditions	Use non-shrink grouted anchors

M. Noise Reduction: To reduce transmission of noise in piping systems, copper tubes in buildings and structures shall be wrapped with a 2-inch wide strip of rubber fabric or similar, suitable material at each pipe support, bracket, clip, or hanger.

2.2 SUPPORT SPACING

A. Supports for piping with the longitudinal axis in approximately a horizontal position shall be spaced to prevent excessive sag, bending, and shear stresses in the piping, with special consideration given where components such as flanges and valves impose concentrated loads. Pipe support spacing shall not exceed the maximum spans in the tables below. For temperatures other than ambient temperatures or those listed, and for other piping materials or wall thicknesses, the pipe support spacings shall be modified in accordance with the pipe manufacturer's recommendations. Vertical supports shall be provided to prevent the pipe from being overstressed from the combination of loading effects.

B. Where support spacing is not indicated on the Drawings, the CONTRACTOR shall use the spacing below.

1. Support Spacing for Schedule 80 PVC/CPVC Pipe:

Nominal Pipe Diameter, in	Maximum Span At 100 degrees F, ft
1/2	4
3/4	4.5
1	5
1-1/4	5.5
1-1/2	5.75
2	6.25
3	7.5
4	8.25
6	10
8	11

10	12.25
12	13.25

2. Support Spacing for Steel Pipe

Nominal Pipe Diameter, in	Maximum Span, ft
1/2	6
3/4 and 1	8
1-1/4 to 2	10
3	12
4	14
6	17
8 and 10	19
12 and 14	23
16 and 18	25

3. Support Spacing for Copper Tubing

Nominal Pipe Diameter, in	Maximum Span, ft
1/2 to 1-1/2	6
2 to 4	10
6 and greater	12

2.3 MANUFACTURED SUPPORTS

A. Stock Parts: Where not specifically indicated, designs that are generally accepted as exemplifying good engineering practice and using stock or production parts shall be utilized wherever possible. Such parts shall be locally available, new, of best commercial quality, designed and be rated for the intended purpose.

B. Manufacturers, or Equal

1. Grinnell Corp. (Anvil International), Cranston, RI

2. Tolco Incorporated, Corona, CA

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General: Pipe supports, hangers, brackets, anchors, guides, and inserts shall be fabricated and installed in accordance with the manufacturer's printed instructions and ASME B31.1 - Power Piping. Concrete inserts for pipe hangers and supports shall be coordinated with the formwork.

B. Appearance: Pipe supports and hangers shall be positioned to produce an orderly, neat piping system. Hanger rods shall be vertical, without offsets. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings or roofs as possible, without interference with other WORK.

3.2 FABRICATION

A. Quality Control: Pipe hangers and supports shall be fabricated and installed by experienced welders and fitters, using the best welding procedures available. Fabricated supports shall be neat in appearance without sharp corners, burrs, and edges. Stainless steel shall not be field welded.

END OF SECTION 15006

SECTION 15030 – STAINLESS STEEL PIPE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide stainless steel pressure pipe, complete and in place, in accordance with the Contract Documents.

B. The requirements of Section 15000 - Piping, General, apply to the WORK of this Section.

C. This Section includes stainless steel pressure pipe with flanged and welded joints.

PART 2 -- PRODUCTS

2.1 PIPE MATERIAL

A. Stainless steel pipe shall be made from all new materials, in accordance with ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications. Stainless steel pipe for sizes 4 inches and larger shall be Type 304L, Schedule 10S, unless otherwise indicated or specified, in accordance with ASTM A 312 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipe.

2.2 PIPE JOINTS

A. Flanged joints shall be made with stainless steel flanges, drilled to ANSI/ASME B 16.5 - Pipe Flanges and Flanged Fittings, Class 150, unless otherwise indicated. Gaskets shall be ANSI 150 lb. full face, 1/8-inch thick elastomer suitable for wet air service.

B. All welded joints shall be made in the factory by the pipe manufacturer.

2.3 FITTINGS

A. Flanged Fittings: Flanged fittings shall be Schedule 10 fabricated stainless steel fittings with 150 lb. flanges to ANSI/ASME B 16.5, in accordance with ASTM A 403 - Standard Specification for Wrought Austenitic Stainless Steel Pipe Fittings.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General: Stainless steel pipe shall be installed in a neat and workmanlike manner, properly aligned, and located to avoid interferences with structural members and equipment. Exposed pipe shall afford maximum headroom and access to equipment, and where necessary, piping shall be installed with sufficient slopes for venting or drainage of liquids and condensate to low points. The CONTRACTOR shall obtain the assistance of the pipe manufacturer's field representative to instruct the pipefitters in the correct installation and support of stainless steel piping.

B. Supports and Anchors: Piping shall be firmly supported with fabricated or commercial hangers or supports in accordance with Section 15006 - Pipe Supports. Where necessary to avoid stress on equipment or

structural members, the pipe shall be anchored or harnessed. Expansion joints and guides shall compensate for pipe expansion due to temperature changes.

3.2 PIPE PREPARATION

A. Prior to installation, each pipe length shall be carefully inspected, flushed clean of any debris or dust, and be straightened, if not true. Pipe fittings shall be equally cleaned before assembly.

3.3 PIPE JOINTS

A. Flange Joints: All field joints shall be flanged and shall be made with gaskets and Type 316 stainless steel bolts and nuts. Care shall be taken not to over-torque the bolts, in accordance with the manufacturer's written recommendations.

3.4 INSPECTION AND FIELD TESTING

A. Inspection: Finished installations shall be carefully inspected for proper joints and sufficient supports, anchoring, interferences, and damage to pipe, fittings, and coating. Damage shall be repaired to the satisfaction of the ENGINEER.

B. Field Testing: Prior to enclosure or burying, piping systems shall be pressure tested as required in the Piping Schedule, for a period of not less than one hour, without exceeding the tolerances listed in the Piping Schedule. The CONTRACTOR shall use water, not air or gas, for testing. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the maximum working pressure. The CONTRACTOR shall furnish all test equipment, labor, materials, and devices.

C. Leakage shall be determined by loss of pressure. Fixtures, devices, or other accessories that would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines shall be plugged or capped as appropriate during the testing procedures.

D. Leaks shall be repaired to the satisfaction of the ENGINEER, and the system shall be re-tested until no leaks are found.

END OF SECTION 15030

SECTION 15060 - PVC PRESSURE PIPE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide polyvinyl chloride (PVC) pressure pipe, complete and in place, in accordance with the Contract Documents.

B. The requirements of Section 15000 - Piping, General, apply to the WORK of this Section.

C. This Section includes PVC pressure pipe with solvent-welded, flanged, or screwed joints.

PART 2 -- PRODUCTS

2.1 PIPE MATERIAL

A. PVC pipe shall be made from all new rigid unplasticized polyvinyl chloride and shall be normal impact Type 1, Grade 1, class 12454, Schedule 80, unless otherwise indicated, in accordance with ASTM D 1785-Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120. PVC pipe shall be NSF 61 certified for potable water use.

2.2 PIPE JOINTS

A. Pipe joints shall be solvent-welded type with solvent cement and primer as recommended by the pipe manufacturer for the chemical in the pipe.

B. Screwed joints that are necessary to match up to threaded valves or fittings shall be made up with appropriate thread sealant, either paste or tape.

C. Flanged joints shall be made with solvent-welded PVC flanges, drilled to ANSI/ASME B 16.5 - Pipe Flanges and Flanged Fittings, Class 150, unless otherwise indicated. Gaskets shall be ANSI 150 lb. full face, 1/8-inch thick Neoprene for water or wastewater service. Gasket material for chemicals shall be suitable for the chemical service.

2.3 FITTINGS

A. Solvent Welded and Threaded Fittings: Solvent-welded and threaded fittings shall be Schedule 80 PVC fittings in accordance with ASTM D 2467 - Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

B. Flanged Fittings: Flanged fittings shall be Schedule 80 fabricated PVC fittings with 150 lb. flanges to ANSI/ASME B 16.5.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General: PVC pipe shall be installed in a neat and workmanlike manner, properly aligned, and cut from measurements taken at the Site to avoid interferences with structural members, architectural features,

openings, and equipment. Exposed pipe shall afford maximum headroom and access to equipment, and where necessary, piping shall be installed with sufficient slopes for venting or drainage of liquids and condensate to low points. It is recommended that the CONTRACTOR obtain the assistance of the pipe manufacturer's field representative to instruct the pipefitters in the correct installation and support of PVC piping.

B. Supports and Anchors: Piping shall be firmly supported with fabricated or commercial hangers or supports in accordance with Section 15006 - Pipe Supports. Where necessary to avoid stress on equipment or structural members, the pipe shall be anchored or harnessed. Expansion joints and guides shall compensate for pipe expansion due to temperature changes.

C. Valves and Unions: Unless otherwise indicated, connections to fixtures, groups of fixtures, and equipment shall be provided with a shutoff valve and union, unless the valve has flanged ends. Unions shall be provided at threaded valves, equipment, and other devices requiring occasional removal or disconnection. Valves and flanges attached to PVC pipe shall be provided with adequate supports.

3.2 PIPE PREPARATION

A. Prior to installation, each pipe length shall be carefully inspected, flushed clean of any debris or dust, and be straightened, if not true. Ends of threaded pipes shall be reamed and filed smooth. Pipe fittings shall be equally cleaned before assembly.

3.3 PIPE JOINTS

A. Threaded Joints: Pipe threads shall conform to ASTM F 1498 - Taper Pipe Threads 60 Degrees for Thermoplastic Pipe and Fittings, and shall be full and cleanly cut with sharp dies or molded. Joints shall be made with Teflon tape or thread sealant.

B. Solvent-Welded Joints: Solvent-welded joints shall be made with fresh primer and solvent cement on clean, dry pipe ends. The primer and cement cans shall be kept closed at all times and the joints shall be made up at the recommended ambient temperatures, to the pipe or cement manufacturer's written recommendations. Pipe ends shall be inserted to the full depth of the socket.

C. Flange Joints: Flanged joints shall be made with gaskets and Type 316 stainless steel bolts and nuts. Care shall be taken not to over-torque the bolts, in accordance with the manufacturer's written recommendations.

3.4 INSPECTION AND FIELD TESTING

A. Inspection: Finished installations shall be carefully inspected for proper joints and sufficient supports, anchoring, interferences, and damage to pipe, fittings, and coating. Damage shall be repaired to the satisfaction of the ENGINEER.

B. Field Testing: The CONTRACTOR shall allow adequate time for the solvent cement joints to cure. Curing time shall be per the solvent cement manufacturer's recommendation. Prior to enclosure or burying, piping systems shall be pressure tested as required in the Piping Schedule, for a period of not less than one hour, without exceeding the tolerances listed in the Piping Schedule. Caution - Do not use air or gas for testing PVC pipe. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the maximum working pressure. The CONTRACTOR shall furnish all test equipment, labor, materials, and devices.

C. Leakage shall be determined by loss of pressure. Fixtures, devices, or other accessories that would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines shall be plugged or capped as appropriate during the testing procedures.

D. Leaks shall be repaired to the satisfaction of the ENGINEER, and the system shall be re-tested until no leaks are found.

END OF SECTION 15060

SECTION 15183 - GAUGES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide pressure and vacuum gauges and appurtenances, complete and operable, in accordance with the Contract Documents.

PART 2 -- PRODUCTS

2.1 PRESSURE AND VACUUM GAUGES

A. General: Pressure gauges shall be provided on suction and discharge connections to pumps as indicated in the pump specifications; on discharge connections from blowers and compressors; each side of pressure reducing valves; and wherever indicated. Vacuum gauges shall be provided for vacuum pumps and wherever indicated. In all locations (such as certain pump suction connections) where pressures may vary from below to above atmospheric head, compound gauges shall be installed.

B. Gauge Construction: Gauges shall be industrial quality type with Type 316 stainless steel movement and stainless steel or alloy case. Unless otherwise indicated, gauges shall have a 3-1/2-inch dial, 1/4-inch threaded connection, a Type 316 stainless steel snubber adapter, and a shut-off valve. Gauges shall be calibrated to read in applicable units, with an accuracy of plus and minus 1 percent, to 150 percent of the working pressure or vacuum of the pipe or vessel to which they are connected. All gauges shall be vibration and shock resistant.

C. Diaphragm Seal: Gauges attached to systems involving chemical solutions, corrosive fluids, sludge, sewage, or other liquids containing solids at less than 1 percent dry solids shall be equipped with diaphragm seals, or equal protective pressure or vacuum sensing devices, as follows:

1. For: sewage, sludge, liquids containing solids, pulsating flow	Seals of all Type 316 stainless steel, with stainless steel diaphragm for pressures over 15 psi, and elastomer diaphragm for pressures of 15 psi and below, Type 316 stainless steel nuts and bolts, fill connection and valved flush port size 1/4-inch NPT, capable of disassembly without loss of filler fluid. Manufacturers, or Equal: Ashcroft, model 101; U.S. Gauge (Ametek), SG; Marshalltown, Series 225-01.
2. For: chlorine and sulfur dioxide under pressure	Seals of carbon steel with silver diaphragm of 800 psi rating. Manufacturers, or Equal: Pennwalt (W&T); Fischer and Porter.

3.	For: chemical solutions, sewage, sludge, etc., where breakage does not create a major shutdown	Seals with PVC body for removable mounting rated at 200 psi, with Type 316 stainless steel bolts and nuts, 1/2-inch inlet, 1/4-inch outlet, liquid-filled with Teflon diaphragm for pressure, and suitable elastomer diaphragm for vacuum service. Manufacturers, or Equal: Plast-O-Matic Valves, Inc.; Harrington Ind. Plastics, Inc.; Utilities Supply.

D. Gauge Manufacturers, or Equal

1. Marsh Instrument Company;

2. Ashcroft Industrial Instruments (Dresser);

3. Foxboro/Jordan, Inc.;

4. Marshalltown Instruments, Inc.;

5. U.S. Gauge Div. of Ametek.

E. Snubber Manufacturers, or Equal

1. Cajon Company;

2. Weksler Instruments, Corp.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Gauges shall be installed with the face in the vertical position, at the locations indicated and in strict accordance with the manufacturer's printed instructions. Care shall be taken to minimize the effect of water hammer or vibrations on the gauges. In extreme cases, the gauges may have to be mounted independently, with flexible connectors.

END OF SECTION 15183

SECTION 15200 - VALVES, GENERAL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide valves, actuators, and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 11000 - Equipment General Provisions, apply to the WORK of this Section.

C. The provisions of this Section shall apply to valves and valve actuators except where otherwise indicated. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls indicated in other Sections of the Specifications.

D. Where a valve is to be supported by means other than the piping to which it is attached, the CONTRACTOR shall obtain from the valve manufacturer a design for support and foundation that satisfies the criteria in Section 11000. The design, including drawings and calculations sealed by an engineer, shall be submitted with the Shop Drawings. When the design is approved, the support shall be provided.

E. Unit Responsibility: A single manufacturer shall be made responsible for coordination of design, assembly, testing, and furnishing each valve; however, the CONTRACTOR shall be responsible to the OWNER for compliance with the requirements of each valve section. Unless indicated otherwise, the responsible manufacturer shall be the manufacturer of the valve.

F. Single Manufacturer: Where 2 or more valves of the same type and size are required, the valves shall be furnished by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: Shop Drawings shall contain the following information:

1. Valve name, size, Cv factor, pressure rating, identification number (if any), and specification section number.

2. Complete information on valve actuator, including size, manufacturer, model number, limit switches, and mounting.

3. Cavitation limits for control valves.

4. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, handwheels, position indicators, limit switches, integral control systems, needle valves, and control systems.

5. Complete wiring diagrams and control system schematics.

6. Valve Labeling: A schedule of valves to be provided with stainless steel tags, indicating in each case the valve location and the proposed wording for the tag.

C. Technical Manual: The Technical Manual shall contain the required information for each valve.

D. Spare Parts List: A Spare Parts List shall contain the required information for each valve assembly, where indicated.

E. Factory Test Data: Where indicated, signed, dated, and certified factory test data for each valve requiring certification shall be submitted before shipment of the valve. The data shall also include certification of quality and test results for factory-applied coatings.

PART 2 -- PRODUCTS

2.1 PRODUCTS

A. General: Valves and gates shall be new and of current manufacture. Shut-off valves 6-inches and larger shall have actuators with position indicators. Gate valves 18-inches and larger or where chain wheel is required, shall be furnished with spur gear and hand wheel. Buried valves shall be provided with valve boxes and covers containing position indicators and valve extensions. Manual shut-off valves mounted higher than 7-feet above working level shall be provided with chain actuators.

B. Valve Actuators: Unless otherwise indicated, actuators shall be in accordance with Section 15201 - Valve and Gate Actuators.

C. Protective Coating: The exterior surfaces of valves and the wet interior surfaces of ferrous valves of sizes 4-inches and larger shall be coated in accordance with Section 09800 - Protective Coating. The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications. Flange faces of valves shall not be epoxy coated.

D. Valve Labeling: Except when such requirement is waived by the ENGINEER in writing, a label shall be provided on shut-off valves and control valves except for hose bibbs and chlorine cylinder valves. The label shall be of 1/16-inch plastic or stainless steel, minimum 2-inches by 4-inches in size, as indicated in Section 15005 - Piping Identification Systems, and shall be permanently attached to the valve or on the wall adjacent to the valve as directed by the ENGINEER.

E. Valve Testing: As a minimum, unless otherwise indicated or recommended by the reference standards, valves 3-inches in diameter and smaller shall be tested in accordance with manufacturer's standard and 4-inches in diameter and larger shall be factory tested as follows:

1. Hydrostatic Testing: Valve bodies shall be subjected to internal hydrostatic pressure equivalent to twice the water rated pressure of the valve. Metallic valve rating pressures shall be at 100 degrees F and plastic valves shall be 73 degrees, or at higher temperature according to type of material. During the hydrostatic test, there shall be no leakage through the valve body, end joints, or shaft seals, nor shall any part of the valve be permanently deformed. The duration shall be sufficient time to allow visual examination for leakage. Test duration shall be at least 10 minutes.

2. Seat Testing: Valves shall be tested for leaks in the closed position with the pressure differential across the seat equal to the water rated pressure of the valve. The duration of test shall be sufficient time to allow visual examination for leakage. Test duration shall be at least 10 minutes. Leakage past the closed valve shall not exceed 1 fluid ounce per hour per inch diameter for metal seated valves. Resilient-seated valves shall be drop-tight.

3. Performance Testing: Valves shall be shop-operated from fully closed to fully open position and reverse under no-flow conditions in order to demonstrate the valve assembly operates properly.

F. Certification: Prior to shipment, the CONTRACTOR shall submit for valves over 12-inches in size, certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, or ASTM.

G. Valve Marking: Valve bodies shall be permanently marked in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

H. Manufacturers, or Equal

1. Golden Anderson

2.2 MATERIALS

A. General: Materials shall be suitable for the intended application. Materials in contact with potable water shall be listed as compliant with NSF Standard 61. Materials not indicated shall be high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended. Unless otherwise indicated, valve and actuator bodies shall conform to the following requirements:

1. Cast Iron: Close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

2. Ductile Iron: ASTM A 536 - Ductile Iron Castings, or to ASTM A 395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

3. Steel: ASTM A 216 - Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service, or to ASTM A 515 - Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service.

4. Bronze: ASTM B 62 - Composition Bronze or Ounce Metal Castings, and valve stems not subject to dezincification shall conform to ASTM B 584 - Copper Alloy Sand Castings for General Applications.

5. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A 351 - Steel Castings, Austenitic, for High-Temperature Service, Grade CF8M, or shall be Type 316 stainless steel.

6. PVC: Poly vinyl chloride materials for valve body, flanges, and cover shall conform to Cell Classification 12454.

7. CPVC: Chlorinated poly vinyl chloride materials for valve body, flanges, and cover shall conform to Cell Classification 23447.

8. NSF Standard 14: Materials shall be listed for use in contact with potable water.

2.3 VALVE CONSTRUCTION

A. Bodies: Valve bodies shall be cast, molded (in the case of plastic valves), forged, or welded of the materials indicated, with smooth interior passages. Wall thicknesses shall be uniform in agreement with the applicable standards for each type of valve, without casting defects, pinholes, or other defects that could weaken the body. Welds on welded bodies shall be done by certified welders and shall be ground smooth. Valve ends shall be as indicated, and be rated for the maximum temperature and pressure to which the valve will be subjected.

B. Valve End Connections: Unless otherwise indicated, valves 2-1/2 inches diameter and smaller may be provided with threaded end connections. Valves 3-inches and larger shall have flanged end connections.

C. Bonnets: Valve bonnets shall be clamped, screwed, or flanged to the body and shall be of the same material, temperature, and pressure rating as the body. The bonnets shall have provision for the stem seal with the necessary glands, packing nuts, or yokes.

D. Stems: Valve stems shall be of the materials indicated, or, if not indicated, of the best commercial material for the specific service, with adjustable stem packing, O-rings, Chevron V-type packing, or other suitable seal. Where subject to dezincification, bronze valve stems shall conform to ASTM B 62, containing not more than 5 percent of zinc or more than 2 percent of aluminum, with a minimum tensile strength of 30,000 psi, a minimum yield strength of 14,000 psi, and an elongation of at least 10 percent in 2 inches. Where dezincification is not a problem, bronze conforming to ASTM B 584 may be used, except that zinc content shall not exceed 16 percent.

E. Stem Guides: Stem guides shall be provided, spaced 10-feet on centers unless the manufacturer can demonstrate by calculation that a different spacing is acceptable. Submerged stem guides shall be 304 stainless steel.

F. Internal Parts: Internal parts and valve trim shall be as indicated for each individual valve. Where not indicated, valve trim shall be of Type 316 stainless steel or other best suited material.

G. Nuts and Bolts: Nuts and bolts on valve flanges and supports shall be in accordance with Section 05500 - Miscellaneous Metalwork.

2.4 VALVE ACCESSORIES

A. Valves shall be furnished complete with the accessories required to provide a functional system.

2.5 SPARE PARTS

A. The CONTRACTOR shall furnish the required spare parts suitably packaged and labeled with the valve name, location, and identification number. The CONTRACTOR shall also furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve. Spare parts are intended for use by the OWNER, after expiration of the correction of defects period.

2.6 MANUFACTURERS

A. Manufacturer's Qualifications: Valve manufacturers shall have a successful record of not less than 5 years in the manufacture of the valves indicated.

PART 3 -- EXECUTION

3.1 VALVE INSTALLATION

A. General: Valves, actuating units, stem extensions, valve boxes, and accessories shall be installed in accordance with the manufacturer's written instructions and as indicated. Gates shall be adequately braced to prevent warpage and bending under the intended use. Valves shall be firmly supported to avoid undue stresses on the pipe.

B. Access: Valves shall be installed with easy access for actuation, removal, and maintenance and to avoid interference between valve actuators and structural members, handrails, or other equipment.

C. Valve Accessories: Where combinations of valves, sensors, switches, and controls are indicated, the CONTRACTOR shall properly assemble and install such items so that systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on Shop Drawing submittals.

END OF SECTION 15200

SECTION 15201 - VALVE AND GATE ACTUATORS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide valve and gate actuators and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to valves and gates except where otherwise indicated in the Contract Documents.

C. Unit Responsibility: The valve or gate manufacturer shall be made responsible for coordination of design, assembly, testing, and installation of actuators on the valves and gates; however, the CONTRACTOR shall be responsible to the OWNER for compliance of the valves, gates, and actuators with the Contract Documents.

D. Single Manufacturer: Where 2 or more valve or gate actuators of the same type or size are required, the actuators shall be produced by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals and Section 15200 - Valves, General.

B. Shop Drawings: Shop Drawing information for actuators shall be submitted together with the valve and gate submittals as a complete package.

C. Calculations: Selection calculations showing dynamic seating and unseating torques versus output torque of actuator.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Unless otherwise indicated, shut-off and throttling valves and externally actuated valves and gates shall be provided with manual or power actuators. The CONTRACTOR shall furnish actuators complete and operable with mounting hardware, motors, gears, controls, wiring, solenoids, hand wheels, levers, chains, and extensions, as applicable. Actuators shall have the torque ratings equal to or greater than required for valve seating and dynamic torques, whichever is greater, and shall be capable of holding the valve in any intermediate position between fully-open and fully-closed without creeping or fluttering. Wires of motor-driven actuators shall be identified by unique numbers.

B. Manufacturers: Where indicated, certain valves and gates may be provided with actuators manufactured by the valve or gate manufacturer. Where actuators are furnished by different manufacturers, the CONTRACTOR shall coordinate selection to have the fewest number of manufacturers possible.

C. Materials: Actuators shall be current models of the best commercial quality materials and be liberally-sized for the required torque. Materials shall be suitable for the environment in which the valve or gate is to be installed.

D. Actuator Mounting and Position Indicators: Actuators shall be securely mounted by means of brackets or hardware specially designed and sized for this purpose and be of ample strength. The word "open" shall be cast on each valve or actuator with an arrow indicating the direction to open in the counter-clockwise direction. Gear and power actuators shall be equipped with position indicators. Where possible, manual actuators shall be located between 48- and 60-inches above the floor or the permanent working platform.

E. Standard: Unless otherwise indicated and where applicable, actuators shall be in accordance with AWWA C 540 - Power-Actuating Devices for Valves and Sluice Gates.

F. Functionality: Electric, pneumatic, and hydraulic actuators shall be coordinated with the power requirements of Division 16 and instrumentation equipment indicated in Section 17100 - Instrumentation and Control Equipment, and the control requirements of Section 17110 – Control Panels.

G. Fasteners shall be in accordance with Section 05500 - Miscellaneous Metalwork.

H. Protective coatings shall be in accordance with Section 09800 - Protective Coatings.

2.2 MANUAL ACTUATORS

A. General: Unless otherwise indicated, valves and gates shall be furnished with manual actuators. Valves in sizes up to and including 4-inches shall have direct acting lever or hand wheel actuators of the manufacturer's best standard design. Larger valves and gates shall have gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the hand wheel. Buried and submerged gear-assisted valves, gates, gear-assisted valves for pressures higher than 250 psi, valves 30-inches in diameter and larger, and where so indicated, shall have worm gear actuators, hermetically-sealed water-tight and grease-packed. Other valves 6-inches to 24-inches in diameter may have traveling-nut actuators, worm gear actuators, spur or bevel gear actuators, as appropriate for each valve.

B. Buried Valves: Unless otherwise indicated, buried valves shall have extension stems to grade, with square nuts or floor stands, position indicators, and cast-iron or steel pipe extensions with valve boxes, covers, and operating keys. Where so indicated, buried valves shall be in cast-iron, concrete, or similar valve boxes with covers of ample size to allow operation of the valve actuators. Covers of valve boxes shall be permanently labeled as required by the local Utility Company or the ENGINEER. Wrench-nuts shall comply with AWWA C 500 - Metal - Seated Gate Valves for Water Supply Service.

C. Chain Actuator: Manually-activated valves with the stem located more than 7-feet above the floor or operating level shall be provided with chain drives consisting of sprocket-rim chain wheels, chain guides, and operating chains provided by the valve manufacturer. The wheel and guide shall be of ductile iron, cast iron, or steel, and the chain shall be hot-dip galvanized steel or stainless steel, extending to 5-feet 6-inches above the operating floor level. The valve stem of chain-actuated valves shall be extra strong to allow for the extra weight and chain pull. Hooks shall be provided for chain storage where chains interfere with pedestrian traffic.

D. Floor Boxes: Hot-dip galvanized cast iron or steel floor boxes and covers to fit the slab thickness shall be provided for operating nuts in or below concrete slabs. For operating nuts in the concrete slab, the cover shall be bronze-bushed.

E. Tee Wrenches: Buried valves with floor boxes shall be furnished with 2 operating keys or 1 key per 10 valves, whichever is greater. Tee wrenches sized so that the tee handle will be 2 to 4 feet above ground, shall fit the operating nuts.

F. Manual Worm Gear Actuator: The actuator shall consist of a single or double reduction gear unit contained in a weather-proof cast iron or steel body with cover and minimum 12-inch diameter hand wheel. The actuator shall be capable of 90-degree rotation and shall be equipped with travel stops capable of limiting the valve opening and closing. The actuator shall consist of spur or helical gears or worm gearing. The gear ratio shall be self-locking to prevent "back-driving." The spur or helical gears shall be of hardened alloy steel and the worm gear shall be alloy bronze. The worm gear shaft and the hand wheel shaft shall be of 17-4 PH or similar stainless steel. Gearing shall be accurately cut with hobbing machines. Ball or roller bearings shall be used throughout. Output shaft end shall be provided with spline to allow adjustable alignment. Actuator output gear changes shall be mechanically possible by simply changing the exposed or helical gearset ratio without further disassembly of the actuator. Gearing shall be designed for a 100 percent overload. The entire gear assembly shall be sealed weatherproof.

2.3 ELECTRIC MOTOR ACTUATORS

A. General

1. Equipment Requirements: Where electric motor actuators are indicated, an electric motor-actuated valve control unit shall be attached to the actuating mechanism housing by means of a flanged motor adapter piece.

2. Gearing: The motor actuator shall include the motor, reduction gearing, reversing starter, torque switches, and limit switches in a weather-proof NEMA 4 assembly. The actuator shall be a single or double reduction unit consisting of spur or helical gears and worm gearing. The spur or helical gears shall be of hardened alloy steel and the worm gear shall be alloy bronze. Gearing shall be accurately cut with hobbing machines. Power gearing shall be grease- or oil-lubricated in a sealed housing. Ball or roller bearings shall be used throughout. Actuator output speed changes shall be mechanically possible by simply removing the motor and changing the exposed or helical gearset ratio without further disassembly of the actuator.

3. Starting Device: Except for modulating valves, the unit shall be so designed that a hammer blow is imparted to the stem nut when opening a closed valve or closing an open valve. The device should allow free movement at the stem nut before imparting the hammer blow. The actuator motor must attain full speed before stem load is encountered.

4. Switches

a. Electronic Type Switches: Limit switches or valve position shall be sensed by a 15 bit, optical, absolute position encoder. The open and closed positions shall be stored in a permanent, non-volatile memory. The encoder shall measure valve position continuously, including both motor and hand wheel operation, with or without use of battery. An electronic torque sensor shall be furnished. The torque limit may be adjusted from 40 to 100 percent of rating in 1 percent increments. The motor shall be de-energized if the torque limit is exceeded. A boost function shall be included to prevent torque trip during initial valve unseating, and a “jammed valve” protection feature with automatic retry sequence shall be incorporated to de-energize the motor if no movement occurs.

b. The actuator shall be wired in accordance with the schematic diagram. Wiring for external connections shall be connected to marked terminals. One 1-inch and one 1-1/4-inch conduit connection shall be provided in the enclosing case. A calibration tag shall be mounted near each switch correlating the dial setting to the unit output torque. Switches shall not be subject to breakage or slippages due to over-travel. Traveling-nuts, cams, or micro switch tripping mechanisms shall not be used. Limit switches shall be of the heavy-duty open contact type with rotary wiping action.

5. Hand wheel Operation: A permanently attached hand wheel shall be provided for emergency manual operation. The hand wheel shall not rotate during electrical operation. The maximum torque required on the hand wheel under the most adverse conditions shall not exceed 60-lb.ft, and the maximum force required on the rim of the hand wheel shall not exceed 60-lb. An arrow and either the word "open" or "close" shall be cast or permanently affixed on the hand wheel to indicate the appropriate direction to turn the hand wheel. A clutch lever shall be provided to put actuator into hand wheel operation. Valves with electric motor actuators having stems more than 7-feet above the floor shall be provided with chain activator hand wheels. The clutch lever shall be provided with a cable secured to the chain to allow disengagement for manual operation.

6. Motor: The motor shall be of the totally enclosed, non-ventilated, high-starting torque, low-starting current type for full voltage starting. It shall be suitable for operation on 480-volt, 3-phase, 60-Hz current, and have Class F insulation and a motor frame with dimensions in accordance with the latest revised NEMA MG Standards. The observed temperature rise by thermometer shall not exceed 55 degrees C above an ambient temperature of 40 degrees C when operating continuously for 15 minutes under full rated load. With a line voltage ranging between 10 percent above to 10 percent below the rated voltage, the motor shall develop full rated torque continuously for 15 minutes without causing the thermal contact protective devices imbedded in the motor windings to trip or the starter overloads to drop-out. Bearings shall be of the ball type and thrust bearings shall be provided where necessary. Bearings shall be provided with suitable seals to confine the lubricant and prevent the entrance of dirt and dust. Motor conduit connections shall be watertight. Motor construction shall incorporate the use of stator and rotor as independent components from the valve operation such that the failure of either item shall not require actuator disassembly or gearing replacement. Two Class B thermal contacts or solid state thermistors imbedded within the motor windings shall be provided to protect against over-temperature damage. The motor shall be provided with a 120VAC space heater, powered from the actuator transformer, unless the entire actuator is a hermetically sealed, non-breathing design with a separately sealed terminal compartment which prevents moisture intrusion. Each electric motor actuator shall be provided with a local disconnect switch or circuit breaker to isolate power from the motor and controller during maintenance activities.

7. Open/Close Operating Speed: Unless otherwise indicated, electric actuators shall provide a full close to full open or full open to full close operating time range from 5 to 10 seconds.

8. Valves with electric motor actuators where the valve centerline is located at a height greater than 6-feet above the floor shall provide a remote actuator control station at a location no higher than 4-feet above the floor. The CONTRACTOR shall provide conduit and wiring between the actuator controls and the valve actuator for these applications. The actuator controls shall be wall-mounted beneath the valve at a location approved by the ENGINEER.

B. Electric Motor Actuators (AC Reversing Control Type)

1. General: Where indicated, electric motor actuators shall be the AC reversing type complete with local control station with open/close and local/remote selector switches.

2. Actuator Appurtenances: The actuator for each valve shall be supplied with open and close status lights; open, close and lockout/stop push buttons; and other devices indicated.

3. Starter: The starter shall be a suitably sized amperage rated reversing starter with its coils rated for operation on 480 volt, 3 phase, 60 Hz current. A control power transformer shall be included to provide a 120 volt source, unless otherwise indicated. The starter shall be equipped with 3 overload relays of the automatic reset type. Its control circuit shall be wired as indicated. The integral weatherproof compartment shall contain a suitably sized 120 volt ac, single phase, 60-Hz space heater to prevent moisture condensation on electrical components. A local power disconnect switch, of NEMA 4X stainless steel, shall be provided with each actuator. A close-coupled, padlockable switch shall be provided with each actuator.

4. Local Control Station: Each actuator shall be provided with a local control station with the valve actuator assembly. The station shall include open, close, and stop push buttons, and a local/remote selector switch. The local control station and local power disconnect may be provided as an integral part of the actuator or as otherwise indicated or required to permit operation by a person at floor elevation and within sight of the valve actuator.

5. Manufacturers, or equal

    a. Limitorque Corp

    b. Rotork

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Valve and gate actuators and accessories shall be installed in accordance with Section 15200 - Valves, General. Actuators shall be located to be readily accessible for operation and maintenance without obstructing walkways. Actuators shall not be mounted where shock or vibrations will impair their operation, nor shall the support systems be attached to handrails, process piping, or mechanical equipment.

3.2 MANUFACTURER FIELD SERVICES

A. Inspection, Startup, and Field Adjustment: An authorized representative of the manufacturer shall visit the Site and witness the following:

    1. Inspection, checking, and adjusting the equipment for not less than one Day.

    2. Startup and field-testing for proper operation for not less than one Day.

B. Instruction of OWNER's Personnel: The authorized service representative shall visit the Site for not less than one Day to instruct the OWNER'S personnel in the operation and maintenance of the equipment including step-by-step troubleshooting procedures with necessary test equipment.

END OF SECTION 15201

SECTION 15202 - BUTTERFLY VALVES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide butterfly valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 11000 – Equipment General Provisions apply to this Section.

C. The requirements of Section 15200 - Valves, General apply to this Section.

D. The requirements of Section 15201 - Valve and Gate Actuators apply to this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300.

B. Shop Drawings

1. Complete Shop Drawings of butterfly valves and actuators.

2. Drawings showing valve port diameter complete with dimensions, part numbers, and materials of construction.

3. Dynamic seating and unseating torque for motor actuated valves.

4. Certified statement of proof-of-design tests from the valve manufacturer. Valve manufacturer shall state that the valves proposed for this project will be manufactured with identical basic type of seat design and materials of construction to the prototype evaluated under the proof of design testing.

5. Manufacturer's certification that the valve complies with applicable provisions of AWWA C504 – Rubber-Seated Butterfly Valves.

1.3 QUALITY ASSURANCE

A. Valves shall be subjected to performance, leakage, and hydrostatic tests in accordance with procedures and acceptance criteria established by AWWA C504.

PART 2 -- PRODUCTS

2.1 RUBBER SEATED BUTTERFLY VALVES 25 TO 150 PSI (AWWA)

A. General: Butterfly valves for steady-state water working pressures and steady-state differential pressure up to 150 psi and for fresh water service having a pH range from 6 to 10 and temperature range from 33 to 125 degrees F shall conform to AWWA C504 and be as indicated. Valves subjected to steady state working pressures and steady state differential pressures from 25 to 150 psi in sizes 3-inches through 24-inches shall be rated for Class 150B with actuator sized for Class 150B. Valves 30 inches through 72-inches shall be of the class indicated. Valves larger than 72-inches shall be of the class indicated, designed in accordance with the intent of AWWA C504. If the operating conditions such as flow, velocity, and differential pressures are not indicated, the valve body and shaft shall be sized for the pressure class rating of the valve. Valves shall be of the body type, pressure class, end joint, and actuator indicated on the Drawings.

B. Construction: Unless otherwise indicated, materials of construction shall be in accordance with AWWA C504, suitable for the service. Seats shall be positively clamped or bonded into the disc or body of the valve, but cartridge-type seats that rely on a high coefficient of friction for retention shall not be acceptable. Seat material shall be guaranteed to last for at least 75 percent of the number of cycles in the AWWA C504 proof-of-design test without premature damage.

Description	Material Standards
Valve bodies	Ductile iron, ASTM A 536, grade 65-45-12
End flanges	Same material as valve bodies
Valve shafts	Stainless steel ASTM A 240 or A 276, Type 316
Valve discs	Same material as valve bodies.
Rubber seats	New natural or synthetic rubber
Seat mating surfaces	Stainless steel, ASTM A 240 or A 276, Type 316
Clamps and retaining rings	Type 316 retaining rings and cap screws.
Valve bearings	Self-lubricating materials per AWWA C504
Shaft seals	Resilient non-metallic materials suitable for service
Painting and coating	Refer to Section 09800 – Protective Coating

C. Manual Actuators: Unless otherwise indicated, manually-actuated butterfly valves shall be equipped with a handwheel and 2-inch square actuating nut and position indicator. Screw-type (traveling nut) actuators will not be permitted for valves 30-inches in diameter and larger.

D. Worm Gear Actuators: Valves 30-inches and larger, as well as submerged and buried valves, shall be equipped with worm-gear actuators, lubricated and sealed to prevent entry of dirt or water into the housing.

E. Electric Actuators: Electric actuators shall meet the requirements of AWWA C540. Electric actuators in open and close service shall be rated to produce output torque of at least 1.5 times the required valve maximum seating or maximum dynamic torque, whichever is greater. For valves in modulating service with dynamic torque exceeding the seating torque, the rated output torque of the actuator shall be twice the dynamic torque required by the valve. Actuator rated torque is defined as pullout torque rated at 10 percent below the rated voltage of the motor. The torque switch shall be field set at no greater than 60 percent and 50 percent of the maximum actuator rated torque for open/close service and modulating service, respectively. After plant startup, the manufacturer shall prepare a certification including a torque curve to demonstrate that the torque requirements have been met.

F. Manufacturers, or Equal

1. Golden Anderson

2. Mueller Company

2.2 PVC BUTTERFLY VALVES

A. General: PVC butterfly valves shall be pressure rated at 150 psi for water at 73°F

B. Body: The valve body shall be of PVC Type I Cell Classification 12454 or CPVC Type IV Cell Classification 23447. Valve bodies shall accept field installable lug inserts. Bolt hole patterns shall conform to ANSI/ASME B-16.5 CL 150.

C. Disc: The disc shall be of PVC.

D. Seat: The elastomer seat shall be in the body. The seat material shall be Viton, to provide a tight shut-off at the temperatures above.

E. Shaft: The valve shaft shall be of Type 316 stainless steel.

F. Seals: The seals shall be Viton O-ring, suitable for the temperature and service conditions.

G. Manual Actuators: Unless otherwise indicated, manually-actuated butterfly valves shall be lever operated valves equipped with high impact polypropylene handle having built-in lockout capability.

H. Manufacturers, or Equal

1. Spears Manufacturing Company

2. Hayward Industries, Inc.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Exposed butterfly valves shall be installed with a means of removing the complete valve assembly without dismantling the valve or operator. Installation shall be in accordance with Section 15200.

END OF SECTION 15202

SECTION 15203 - CHECK VALVES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide check valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 15200 - Valves, General apply to this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 15200.

PART 2 -- PRODUCTS

2.1 SWING CHECK VALVES (3-INCH AND LARGER)

A. General: Swing check valves for water, sewage, sludge, and general service shall be of the outside lever and spring or weight type, in accordance with AWWA C 508 - Swing-Check Valves for Waterworks Service, 2-in. through 24-in. NPS, unless otherwise indicated, with full-opening passages, designed for a water-working pressure of 150 psi. They shall have a flanged cover piece to provide access to the disc. Where indicated, swing check valves shall be furnished with position indicators and 2 flanged connections for attachment of dashpots or hydraulic snubbers.

B. Body: The valve body and cover shall be of cast iron conforming to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with flanged ends conforming to ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800, or mechanical joint ends, as indicated.

C. Disc: The valve disc shall be of cast iron, ductile iron, or bronze conforming to ASTM B 584 - Copper Alloy Sand Castings for General Applications.

D. Seat and Rings: The valve seat and rings shall be of bronze conforming to ASTM B 584 or B 148 - Aluminum-Bronze Castings, or of Buna-N.

E. Hinge Pin: The hinge pin shall be of bronze or stainless steel.

F. Manufacturers, or Equal

1. American Flow Control (Darling)

2. APCO (Valve and Primer Corp.)

3. Mueller Company

4. Golden Anderson

2.2 SWING CHECK VALVES (2-1/2 INCH AND SMALLER)

A. General: Swing check valves for steam, water, oil, or gas in sizes 2-1/2 inch and smaller shall be suitable for a steam pressure of 150 psi and a cold water pressure of 300 psi. They shall have screwed ends unless otherwise indicated, and screwed caps.

B. Body: The valve body and cap shall be of bronze conforming to ASTM B 763 - Copper Alloy Sand Castings for Valve Application, or ASTM B 584 with threaded ends conforming to ASME B1.20.1 - Pipe Threads, General Purpose (inch).

C. Disc: Valves for steam service shall have bronze or brass discs conforming to ASTM B 16 - Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines, and for cold water, oil, and gas service replaceable composition discs.

D. Hinge Pin: The hinge pins shall be of bronze or stainless steel.

E. Manufacturers, or Equal

1. Crane Company

2. Milwaukee Valve Company

3. Stockham Valves and Fittings

4. Wm. Powell Company

2.3 SLANTING DISC CHECK VALVES

A. General: Slanting disc check valves for water service shall have a seating angle of approximately 55 degrees. Valves shall have replaceable seat rings and disc rings. The water passage cross-sectional area shall be equal to the full pipe area. Valves shall have sufficient clearance around the pivot pins to permit free seating of the disc without binding and shall be guaranteed not to stick in the closed position. Slanting disc check valves shall have position indicators. The valves shall be designed for a water working pressure of 150 psi, unless otherwise indicated.

B. Body: The valve body shall be of cast iron conforming to ASTM A 48 - Gray Iron Castings, or A 126, Class B, with flanged ends conforming to ASME B 16.1, Class 125, unless otherwise indicated.

C. Disc: The valve disc shall be designed with an "aerofoil" configuration of cast iron or ductile iron, with bronze seating face, except for valves 10-inches or smaller, which may have solid bronze or aluminum bronze discs. The disc shall be partially balanced with a short travel, to resist slamming.

D. Seat Ring: The seat ring shall be of centrifugally cast bronze, aluminum bronze, or stainless steel, with beveled edges, firmly clamped or screwed into the valve body.

E. Pins: The pivot pins and bushings shall be of stainless steel, bronze, or aluminum bronze, to allow free movement of the disc without binding.

F. Manufacturers, or Equal

1. Golden Anderson

2. Crane Company (Without Dashpot, Only)

2.4 PLASTIC SPRING LOADED WYE-CHECK VALVES

A. General: Plastic spring loaded wye-check valves for corrosive fluids, in sizes up to 8-inches or as available, may be used for horizontal or vertical up-flow conditions.

B. Construction: The valve bodies and discs or piston shall be of PVC construction. They shall have true union or flanged ends conforming to ASME B16.5 Class 150, and flanged top access covers. Valves shall shut

positively at no-flow conditions. The seats and seals shall be of Viton. The PVC valves shall be rated for a maximum non-shock working pressure of 150 psi at 73 degrees F for sizes 3-inch and smaller. For larger sizes and temperatures the pressure rating may be lower.

C. Manufacturers, or Equal

1. ASAHI-AMERICA

2. George Fischer, Inc.

3. Hayward

4. Spears Mfg. Co.

PART 3 -- EXECUTION

3.1 GENERAL

A. Valves shall be installed in accordance with provisions of Section 15200 - Valves, General.

END OF SECTION 15203

SECTION 15204 - BALL VALVES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide ball valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 15200 - Valves, General apply to this Section.

C. The requirements of Section 15201 - Valve and Gate Actuators apply to this Section.

1.2 CONTRACTOR SUBMITTALS

A. The CONTRACTOR shall furnish submittals in accordance with Section 15200 - Valves, General.

PART 2 -- PRODUCTS

2.1 PLASTIC BALL VALVES

A. General: Plastic ball valves shall be constructed from PVC Type I, ASTM D 1784 Cell Classification 12454 or CPVC Type IV, ASTM D 1784 Cell Classification 23447. Valves shall have manual actuators in accordance with Section 15201 - Valve and Gate Actuators, unless otherwise indicated.

B. Construction: Plastic ball valves shall have union ends or flanged ends to mate with ANSI B 16.5, class 150 flanges for easy removal. All union end valves shall be manufactured to ASTM F 1970. The balls shall have full size ports and Teflon seats. Body seals, union O-ring seals, and stem seals shall be Viton. All handles shall be polypropylene. All 1/2" - 2" valves shall be pressure rated to 235 psi, and all 2-1/2" - 4" and all flanged valves to 150 psi for water at 73°F. Ball valves used in hypochlorite solution service shall have a vented ball to prevent gas buildup.

C. Manufacturers, or Equal

1. ASAHI-America

2. George Fischer, Inc.

3. Hayward

4. Spears Mfg. Co.

2.2 METAL BALL VALVES (4-INCHES AND SMALLER)

A. General: Unless otherwise indicated, general purpose metal ball valves in sizes up to 4- inches shall have actuators in accordance with Section 15201 - Valve and Gate Actuators.

B. Body: Ball valves up to and including 1-1/2 inches in size shall have bronze or stainless steel 2 or 3 piece bodies with screwed ends for a pressure rating of not less than 600 psi WOG. Valves 2-inches to 4-inches in size shall have bronze or stainless steel 2 or 3 piece bodies with flanged ends for a pressure rating of ANSI 125 psi or 150 psi unless otherwise indicated.

C. Balls: The balls shall be solid chrome-plated brass or bronze, or stainless steel, with standard port (single reduction) or full port openings.

D. Stems: The valve stems shall be of the blow-out proof design, of bronze, stainless steel, or other acceptable construction, with reinforced Teflon seal.

E. Seats: The valve seats shall be of Teflon or Buna-N, for bi-directional service and easy replacement.

F. Manufacturers, or Equal

1. Conbraco Industries, Inc. (Apollo)

2. ITT Engineered Valves

3. Neles-Jamesbury, Inc.

4. Watts Regulator

PART 3 -- EXECUTION

3.1 GENERAL

A. Valves shall be installed in accordance with Section 15200. Care shall be taken that valves in plastic lines are well supported at each end of the valve.

END OF SECTION 15204

SECTION 15206 - GATE VALVES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide gate valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 15200 - Valves, General apply to this Section.

C. The requirements of Section 15201 - Valve and Gate Actuators apply to this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 15200.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Buried valves shall be of the inside screw, non-rising stem type. The valve actuators shall be as indicated, with counter-clockwise opening stems, in accordance with Section 15201.

2.2 RESILIENT-SEATED WEDGE GATE VALVES (3- to 24-inch)

A. General: Resilient-seated wedge gate valves shall provide 100% bubble tight closure.

B. Construction: Resilient-seated wedge gate valves shall conform to AWWA C509 - Resilient-Seated Gate Valves for Water and Sewerage Systems. The valves shall be suitable for a design working water pressure of 250 psig, with flanged, bell and spigot, or mechanical joint ends. The valve body, bonnet, and wedge shall be of cast iron or ductile iron and the wedge shall be rubber-encapsulated. Body and bonnet wall thickness shall be equal to or greater than the minimum wall thickness as listed in Table 2 of AWWA C509. The stem, stem nuts, glands, and bushings shall be bronze. The stem shall be sealed with triple O-rings.

C. Protective Coating: Valves shall be factory coated inside and outside with fusion bonded epoxy.

D. Actuators: Unless otherwise indicated, resilient-seated gate valves shall have manual actuators in accordance with Section 15201.

E. Manufacturers, or Equal

1. American Flow Control

2. Mueller Company

2.3 GATE VALVES (SMALLER THAN 3-INCH)

A. Construction: Gate valves smaller than 3-inch, for general purpose use, shall be non-rising stem, heavy-duty type for industrial service, with screwed or soldered ends to match the piping. The bodies shall have

union bonnets of bronze conforming to ASTM B 62 - Composition Bronze or Ounce Metal Castings. The stems shall be of bronze conforming to ASTM B 62, or ASTM B 371 - Copper-Zinc-Silicon Alloy Rod. The solid wedges shall be of bronze conforming to ASTM B 62. The valves shall have malleable iron hand wheels, unless otherwise indicated, and stem seals shall be of Teflon-impregnated or other acceptable non-asbestos packing. Valves shall have a pressure rating of minimum 125 psi steam, and 200 psi cold water, unless otherwise indicated.

B. Manufacturers, or Equal

1. Crane Company

2. Milwaukee Valve Company

3. Wm. Powell Company

4. Stockham Valves and Fittings

5. Walworth Company

2.4 PLASTIC GATE VALVES (1-1/2 TO 14-INCH)

A. Construction: Plastic gate valves shall have PVC bodies with ANSI 150 lb. flanged ends, and polypropylene or CPVC-SBR-lined wedges for tight shut-off. The non-rising stem shall be of PVC or Type 304 stainless steel construction, with O-ring seal. The valves shall have a cold water pressure rating of 150 psig for sizes 1-1/2- through 8-inch, 110 psig for size 10-inch, and 70 psig for sizes 12- and 14-inch.

B. Actuators: Unless otherwise indicated, PVC gate valves shall have manual hand wheel actuators with position indicators, in accordance with Section 15201.

C. Manufacturers, or Equal

1. ASAHI/America

2. Spears Mfg. Co.

PART 3 -- EXECUTION

3.1 GENERAL

A. Gate valves shall be installed in accordance with the provisions of Section 15200. Care shall be taken that valves in plastic lines are well supported at each end of the valve.

END OF SECTION 15206

SECTION 15230 - MISCELLANEOUS VALVES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide miscellaneous valves, complete and operable, in accordance with the Contract Documents. All miscellaneous small valves not specified shall be provided as indicated in the piping Schedule on the Drawings.

B. The requirements of Section 15200 - Valves, General, apply to this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 15200.

PART 2 -- PRODUCTS

2.1 AIR-VACUUM AND AIR-RELEASE VALVES

A. Air and Vacuum Valves: Air and vacuum valves shall be capable of venting large quantities of air while pipelines are being filled, and allowing air to re-enter while pipelines are being drained. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron. The float, seat, and all moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise indicated.

B. Air-Release Valves: Air-release valves shall vent accumulating air while system is in service under pressure and be of the size indicated. Valves shall meet the same general requirements as indicated for air and vacuum valves except that the vacuum feature will not be required. Valves shall be designed for a minimum water-working pressure of 150 psi, unless otherwise indicated.

C. Combination Air Valves: Combination air valves shall combine the characteristics of air and vacuum valves and air release valves by exhausting accumulated air in systems under pressure and releasing or re-admitting large quantities of air while a system is being filled or drained, respectively. Valves shall have the same general requirements as indicated for air and vacuum valves. Combination valves for water service shall be single body design.

D. Sewage Air Release Valves: Sewage air release valves shall vent accumulating gases during system operation. Valves shall have long float stems and bodies to minimize clogging. The same general requirements shall apply as indicated for air and vacuum valves. Each sewage air release valve shall be furnished with the following backwash accessories, fully assembled on the valve:

1. Inlet shut-off valve.

2. Blow-off valve.

3. Clear water inlet valve.

4. Rubber supply hose.

5. Quick disconnect couplings.

E. Manufacturers, or Equal

1. APCO (Valve and Primer Corporation)

2. GA Industries

3. Val-Matic (Valve and Manufacturing Corporation)

2.2 BACKFLOW PREVENTER VALVES

A. General: Backflow preventers shall work on the reduced pressure principle. They shall consist of 2 spring-loaded check valves, automatic differential pressure relief valve, drain valves, and shut-off valves. The body material shall be bronze or cast iron for a working pressure of not less than 150 psi, with bronze or stainless steel trim. Drain lines with air gaps shall be provided. The backflow preventer valves shall be in accordance with AWWA C511 standard.

B. Manufacturers, or Equal

1. Cla-Val Company

2. Febco, (CMB Industries)

3. Watts, ACV

4. Wilkins Regulator Division (Zurn Industries)

2.3 CORPORATION STOPS

A. Unless otherwise indicated, corporation stops shall be made of solid brass for key operation, with screwed ends with corporation thread or iron pipe thread, as required.

B. Manufacturer, or Equal

1. Ford Meter Box Company, Inc.

2. James Jones Company (Watts, ACV)

3. Mueller Company

2.4 SOLENOID VALVES

A. Solenoid valves shall be of the size, type, and class indicated and shall be designed for not less than 150 psi water-working pressure. Valves for water, air, or gas service shall have brass or bronze body with screwed ends, stainless steel trim and spring, Teflon or other resilient seals with material best suited for the temperature and fluid handled. Unless otherwise indicated, for chemicals and all corrosive fluids, solenoid valves with PVC, CPVC, polypropylene (PP), polyvinylidene fluoride (PVDF), or Teflon materials of construction, suitable for the specific application shall be provided. Enclosures shall be NEMA rated in

accordance with the area designations of Section 16050 - Electrical Work, General. All coil ratings shall be for continuous duty. For electrical characteristics see electrical drawings or specifications.

B. Manufacturers, or Equal

1. For general duty

a. Automatic Switch Co. (ASCO), Model "RED HAT"

b. Skinner Valve (Parker Hannifin Corporation)

c. Magnatrol Valve Corporation

d. J. D. Gould Co.

2. Plastic valves for corrosive fluids

a. +GF+ Plastic Systems, Inc.

b. Spears Mfg. Co.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Backflow preventers shall be installed in potable water lines where required by applicable codes or regulations, and wherever there is any danger of contamination, and where indicated.

B. Valves shall be installed in accordance with the manufacturer's printed recommendations, and with provisions of Section 15200.

C. Backflow preventers, as well as air and vacuum release valves, shall have piped outlets to the nearest acceptable drain, firmly supported, and installed in such a way as to avoid splashing and wetting of floors and obstruction of traffic.

END OF SECTION 15230

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide hydraulic gates with appurtenances, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to all flap gates, slide gates, stop gates, sluice gates, and shear gates, except where otherwise indicated in the Contract Documents.

C. The requirements of Section 11000 - Equipment, General apply to this Section.

D. The requirements of Section 15201 - Valve and Gate Actuators apply to this Section.

E. The CONTRACTOR shall assign to a single manufacturer responsibility for furnishing and functional operation of the hydraulic gates including operators and accessories. The designated single manufacturer, however, need not manufacture more than one part of the units but shall coordinate the design, assembly, testing, and installation of the units.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

AWWA C501	Cast Iron Sluice Gates
AWWA C 513	Open Channel Fabricated Metal Slide Gates
ASTM A 276	Stainless Steel Bars and Shapes
ASTM B 21	Naval Brass Rod, Bar, and Shapes
ASTM B 584	Copper Alloy Sand Castings for General Applications

1.3 CONTRACTOR SUBMITTALS

A. General: Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: Shop Drawings of all hydraulic gates.

C. Technical Manuals: Complete technical manuals, including printed instructions for proper maintenance, lubrication, and complete parts list indicating the various parts by name, number, and exploded view where necessary. A list of recommended spare parts for the OWNER to store at the facility shall be included

D. Certification: The CONTRACTOR shall obtain written certification from the designated single manufacturer, addressed to the OWNER, stating that the equipment will efficiently and thoroughly perform the required functions in accordance with these Contract Documents, and that the designated single manufacturer accepts the CONTRACTOR's assignment of responsibility for coordination of gate equipment, including operators, controls, and services required for proper installation and operation. The CONTRACTOR shall submit all such certificates to the ENGINEER.

E. Field Procedures: Instructions for field procedures for installation, adjustments, inspection, and testing shall be provided prior to installation of the gates.

PART 2 -- PRODUCTS

2.1 GENERAL

A. All equipment provided under this Section shall be new, of current manufacture, and shall be the products of reputable manufacturers specializing in the manufacture of such products.

B. All combinations of manufactured equipment which are provided under these Specifications shall be entirely compatible, and the CONTRACTOR and the manufacturer shall be responsible for the compatible and successful operation of the various components of the units. All necessary mountings and appurtenances shall be included.

2.2 MATERIALS

A. Materials employed in the manufacture and installation of the hydraulic gates and operators shall be suitable for the intended application. Material not specifically called for shall be high-grade, standard commercial quality, free from defects and imperfection that might affect the serviceability of the product for the purpose for which it is intended.

2.3 HARDWARE

A. Bolts and nuts shall comply with Section 05500 - Miscellaneous Metalwork.

2.4 PROTECTIVE COATING

A. Coat ferrous metal in accordance with Section 09800 - Protective Coating

2.5 TOOLS AND SPARE PARTS

A. Tools: Furnish special tools necessary for maintenance and repair of the gates. Such tools shall be suitably stored in metal tool boxes and identified with the equipment number by means of stainless steel or solid plastic name tags attached to the box.

B. Spare Parts: Furnish the following spare parts in a box as described above for tools, for air or hydraulic actuated gates for each type and size of gate:

1. One set of directional valves, solenoid or pilot actuated

2. One set of cylinder actuator seals

3. One set of filters

4. One repair kit for the hydraulic pump, containing seals or packing, gaskets, and O-rings.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Sluice and shear gates shall be installed in strict accordance with the manufacturer's printed recommendations and the requirements herein. Operators shall be located to avoid interference with handrails and structural members.

B. If wall thimbles are used, shortly before setting each gate, a 1/8-inch thick layer of mastic grade polysulfide elastomeric sealant shall be applied to the back of the gate frame. After setting the gate, the nuts shall be turned down on the anchor bolts just far enough to make them snug and to cause the rubber sealant to begin to ooze out, but not far enough to produce any significant stress to the frame. Excess sealant at the edges shall be removed. The sealant shall be allowed to cure for at least 7 days,

after which the anchor bolt nuts shall be tightened to their final positions. If gaskets are being used, they shall be installed over the studs in one piece, or dovetailed and cemented with a liquid-type gasket material.

C. Damage to surface coatings incurred during shipment and/or installation shall be repaired to the satisfaction of the ENGINEER prior to installation.

3.2 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Installation and Startup Assistance: Service and testing assistance by the manufacturer's engineering representative for each gate and valve shall be furnished by the CONTRACTOR during installation and startup.

B. Instruction of OWNER's Personnel: The CONTRACTOR shall arrange for the services of a factory service representative to instruct the OWNER's personnel in the operation and maintenance of the equipment.

3.3 QUALITY ASSURANCE

A. Equipment Field Testing: The CONTRACTOR shall be responsible for the coordination of the tests of each hydraulic gate in the presence of the manufacturer's factory service representative. Excessive leaks shall be corrected and the equipment retested until found satisfactory.

END OF SECTION 15250

SECTION 15254 - SLIDE GATES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide slide gates, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 15250 - Hydraulic Gates, General apply to this Section.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

AWWA C 561	Fabricated Stainless Steel Slide Gates
ASTM A 240	Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM A 276	Stainless Steel Bars and Shapes
ASTM B 584	Copper Alloy Sand Castings for General Applications
ASTM D 2000	Standard Classification System for Rubber Products in Automotive Applications
ASTM D 4020	Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300 - Contractor Submittals.

B. Shop Drawings: Drawings of gates, frames, slides, and actuators, as well as design load calculations for deflection at the maximum expected head, and calculations for the lifting force generated by 40 pounds effort on the handwheel or crank to operate the gate.

1. Complete description of all materials including the material thickness of all structural components of the frame and slide.

2. Installation drawings showing all details of construction, details required for installation, dimensions and wall attachment bolt locations.

C. Certificates: Factory test certificates.

1.4 QUALITY ASSURANCE

A. The leakage allowance for slide gates under the design seating and unseating head shall not exceed 0.05 gpm/ft of seating perimeter or the leakage rate of AWWA C 561, whichever is the most stringent.

B. Factory Testing: Gates shall be factory-assembled and functional-tested prior to delivery to the Site. Test certificates shall be submitted.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Identification

Name	Weir gate
Equipment Numbers	02-WG1, 02-WG2
Quantity	2
Location	Splitter Box
Size	See Schedule

B. Schedule

Equipment Number	02-WG1	02-WG2
Width, inch	24	18
Height, inch	18	18
Adjacent walkway elevation, feet	47.0	47.0
Splitter box top elevation, feet	49.0	49.0
Invert elevation (weir), feet	47.0	47.0
Unseating head, feet	2.0	2.0
Seating head, feet	2.0	2.0

C. Gates shall comply with AWWA C561 unless indicated otherwise.

D. Gates shall be new and of current manufacture, adequately braced to prevent warpage and bending under the intended use.

E. Gate actuators shall be sized, selected, and furnished by the gate manufacturer. Gate actuators shall be products of a single manufacturer.

F. Guide frames shall be extended 3-feet 6-inches above the walkway or operating floor or to match the height of the handrail. Where a gate is mounted in an opening between 2 sections of handrail, additional horizontal members shall be added to the gate frame to match the handrail, guardrail, and kickplate spacing of the adjacent railing. Horizontal members shall be arranged so that the railing will not interfere with operation of the actuator.

2.2 STAINLESS STEEL SLIDE GATES

A. Construction: Unless otherwise indicated, materials of construction shall be in accordance with AWWA C561, suitable for the service. Materials used in the fabrication of the slide gates shall conform to the requirements of the standards designated for each material indicated below:

Description	Material Standards
Slide	Stainless Steel, ASTM A 240, Type 316, or Type 316 L
Frame	Stainless Steel, ASTM A 240, Type 316, or Type 316 L
Stem and coupling	Stainless Steel, ASTM A 276, Type 316
Hardware	Stainless Steel, ASTM A 276, Type 316
Stem Cover	Aluminum pipe with slots and indicator
Operator Housing	Cast Aluminum, or Ductile Iron
Operating Nut	Bronze, ASTM B 584
Guides and seats	UHMW Polyethylene, ASTM D 4020
Slide Seals	UHMW Polyethylene, ASTM D 4020
Wall Seals	Neoprene, ASTM D 2000, or EPDM

B. Lifting Devices: Lifting devices shall be provided complete with stem, lifting nut, stem cover, indicator, and crank or handwheel. Lifting devices shall be weatherproof and shall be mounted on the frame. The frame shall have an ample base or bracket area to evenly distribute the load to the supporting concrete structure. Operating thrust shall be taken on roller or ball bearings. All parts shall be provided with an alternate lubrication system. The unit shall be designed for a maximum of 40 pound effort on the crank or handwheel to operate the gate. Clockwise movement of the crank or handwheel shall lower the gate downward for weir gates. An arrow with the word "OPEN" shall be permanently attached or cast onto the operator to indicate the direction or rotation to open the gate.

C. Finish: Mill finish on stainless steel. Welds shall be sandblasted to remove weld burn and scale. All iron and steel components shall be properly prepared and shop coated with a primer in accordance with Section 09800 – Protective Coatings.

D. Manufacturers, or Equal

1. Whipps, Inc.

2. Rodney Hunt

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Slide gates shall be installed in strict accordance with Section 15250, and as shown on the Drawings.

B. Gate frames shall be mounted to the steel splitter box walls as shown on the Drawings with bolts, nuts, and gaskets for a watertight seal.

3.2 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Installation, Testing, and Startup Assistance: The CONTRACTOR shall provide a minimum of 4 hours onsite for the services required in Section 15250, Paragraph 3.2.A, and Paragraph 3.3.A.

B. Instruction of OWNER's Personnel: The CONTRACTOR shall provide a minimum of 2 hours onsite for the services required in Section 15250, Paragraph 3.2.B.

END OF SECTION 15254

SECTION 16010 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

RELATED DOCUMENTS

All drawings and general provisions of the contract, including General Conditions, Supplementary Conditions, and other Division 1 Specifications, apply to this section.

Separation of Specifications into Sections is for convenience only and is not intended to establish limits of work or liability. The following sections apply to this project:

16010 – Basic Electrical Requirements
16100 – General Specifications for Electrical Installation
16200 - Detailed Specifications for Electrical Installation
16540 – Multi Conductor Instrument Cable
16550 – Single Conductor Wire
16600 – PVC Conduit
16610 – Rigid Aluminum Conduit
16800 – Grounding
17100 – Instrumentation
17110 – Control Panels

NOT FOR CONSTRUCTION

DESCRIPTION OF WORK

Furnish all labor, tools, materials, fixtures, equipment, accessories, transportation, etc., required for a complete electrical lighting and power systems, complete with necessary auxiliaries as indicated on the drawings and specifications.

Also included in the work is the power wiring for connection of items indicated on the architectural plans, as well as power wiring for the equipment specified in DIVISION 15 – MECHANICAL.

Removal of existing electrical equipment not being reused.

DRAWINGS AND SPECIFICATIONS

The drawings showing the layout of electrical work indicate the approximate location of transformers, switchboards, panelboards, disconnects, outlets, and conduit routing. The contractor shall refer to architectural, structural, and mechanical drawings as well as equipment manufacturer's shop drawings and rough-in drawings, and adjust work accordingly to provide a coordinated installation. All adjustments and minor deviations necessary shall be made without additional cost to the owner. It shall be the electrical contractor's responsibility to see that all equipment such as pull boxes, junction boxes, panelboards, and other apparatus, that may require maintenance from time to time, is made accessible. Any condition that may occur during construction which conflicts with accessibility to the proposed installation of the electrical equipment, shall be brought to the Architect's attention prior to the point at which a change in location would require additional cost and delays to construction. The contractor shall install fire alarm devices as near as possible to the locations indicated on the drawings but shall move them as necessary to avoid conflicts with existing equipment and to be located sufficiently away from heat producing objects.

All electrical gear shall be mounted at or above the first floor slab or base flood elevation, whichever is higher, unless noted otherwise.

The drawings and specifications are complementary and what is shown and/or called for on one shall be furnished and installed the same as if shown and/or called for on the other.

Where the Contractor is not certain about the method of installation, he shall ask the Architect for further installation details. Lack of details, not requested, will not be an excuse for improper installation.

When a color or other condition for a product is specified to be determined by the architect, the submittal for that item shall be clearly marked with the available options. (Do not select a color or other condition in the submittal) The architect shall be specifically asked by the contractor to provide the required information, and that product shall not be manufactured prior to obtaining such information.

LAWS, CODES, AND PERMITS

The latest accepted edition of the National Electrical Code (NFPA 70), National Fire Alarm Code (NFPA 72), and all State, Parish, City, and local building codes shall be considered a part of these specifications, and pertinent articles will not be repeated herein. These codes establish the minimum acceptable criteria where more stringent requirements have not been defined in these specifications and/or drawings.

The Contractor shall apply for all permits and pay all fees incidental to completing the electrical work. This Contractor shall give notice to the proper authorities in ample time for the work to be inspected and approved as it progresses, and no work shall be concealed until inspected and approved by authorized inspectors. If the plans or these specifications in any way conflict with the Code, State or Local Rules, these latter are to be followed, without expense to the Owner, but the Architect shall be notified of this condition and approval secured before changes are made.

Comply with utility company standards. Coordinate all work for installation of metering and all aspects of the service with the utility company prior to roughin.

Upon completion and before acceptance of work, a certificate of approval from the appropriate regulatory agency shall be furnished to the Architect.

No work shall be concealed until approved by the local inspector. Local regulations shall be adhered to.

The contractor shall assure that he does not install electrical equipment including raceways in or through areas restricted by the international building code and local building codes.

JOB SITE

Prior to submitting quotation for electrical work, Contractor shall visit and examine the job site with all authorities concerned in order to become familiar with all existing conditions pertinent to the work to be performed thereon. No additional compensation will be allowed for failure to be so informed.

Where existing equipment including raceways and wiring is in conflict with work of this project, the contractor shall rework/reroute/relocate this equipment as necessary.

TEMPORARY POWER

The Contractor shall be responsible for providing temporary light and power to the construction site as necessary to meet all of the OSHA requirements for construction, and as required by the general

contractor and various sub-contractors.

SERVICE INTERRUPTIONS

Services to the pumps shall be kept in operation at all times during construction. If a situation occurs that the service needs to be interrupted, the Contractor shall be responsible for contacting the proper authorities to schedule the outage at a time that is convenient to the occupants. It shall be understood that this outage may have to be scheduled after regular working hours or on the weekends. Allowances shall be added to the Contractors bid to cover the cost of any overtime work. This shall come at no additional cost to the Owner after the bid date.

WARRANTY

The contractor shall guarantee all labor and materials for a period of twelve (12) months from the date of final acceptance. All defective materials and work shall be replaced with new materials or equipment. This shall come at no additional cost to the Owner.

PART 2 – PRODUCTS

MATERIALS

Equipment and materials shall be new and shall be listed by Underwriters Laboratories for the purpose for which they are being used. All material of similar use shall be of the same manufacturer.

Substitutions to materials listed on the drawings and specifications can be made as long as they are approved as acceptable by the Architect. Requests for prior approval shall be submitted no later than seven working days prior to bidding. All requests for prior approval shall be in writing by providing a hard copy of the submittal data to the engineer's office.

All termination lugs shall be rated 75 degree C minimum and shall be compatible with the number and size of wires to be terminated.

SUBSTITUTIONS

Names of manufacturers or catalog numbers are mentioned herein in order to establish a standard as to design quality. Other products similar in design and of equal quality may be used if submitted to the architect and found acceptable by him. Refer to the general conditions for additional information.

Any substitution to items specified, that are not approved prior to bidding, shall be brought to the attention of the architect and engineer as an alternative product prior to the official submittal of electrical products along with the specific reason for the proposed substitution. Refer to the general conditions for additional information.

When the contractor elects to use an acceptable alternate manufacturer's equipment, the contractor shall be responsible to coordinate the change with all trades affected and pay for any additional work required under this or any other division affected by the substitution.

SUBMITTALS

Within thirty days of the award of the contract, the Contractor shall be responsible for submitting six (6) copies of submittals containing catalog cuts and performance data for all material and equipment proposed for use. These submittals shall be reviewed by the Architect for general compliance to the contract documents. The Architect's review of these submittals in no way modifies the contract or relieves the Contractor from compliance with the contract unless a difference is clearly stated in the submission and specific acceptance is given by the Architect as a change to the contract.

Submittals shall be identified with the project name and the contractor's name and have the contractor's stamp showing that he has reviewed the submittal and found it to be in accordance with the plans and specifications. Submittals shall be bound.

The complete arc flash hazard study shall be included in the gear and control panel submittal.

Items of division 16 shall be submitted in one package.

Submittals that do not comply with the above may be returned, without review, for resubmission.

All shop drawings must be reviewed before the various factories start fabrication. The contractor shall allow a minimum of 30 days for this review.

Developing electronic or CAD files shall be the responsibility of the contractor. Electronic CAD drawings will not be provided to the contractor.

PART 3 – EXECUTION

INSTALLATION

Ask for details whenever uncertain about installation methods. Lack of details requested shall not excuse proper installation and corrections shall be the responsibility of the contractor.

AS-BUILT DRAWINGS & OPERATING INSTRUCTIONS

The Contractor shall be responsible for providing As-Built drawings to the Architect at the completion of the project. The Contractor shall make a reproducible set of the original contract drawings, and in a neat and understandable manner, show any significant changes made during construction. Unless noted otherwise in the contract documents, the Contractor shall provide one additional copy of these drawings to the Architect. The Contractor shall pay for all reproduction costs. Final payment shall be withheld until these drawings are accepted by the Architect.

The Contractor shall furnish two bound sets of any operating instructions and maintenance manuals to the Architect upon completion of the project.

CUTTING AND PATCHING

The Contractor shall be responsible for all cutting and patching that is required to complete the installation of the electrical systems. All work shall be coordinated between trades with strict accordance with the requirements of the General Conditions. Structural members shall not be cut or modified without the approval of the architect.

The Contractor shall be responsible for covering, caulking, or otherwise to make weatherproof all openings left in the structure for electrical work. This includes openings around conduit penetrations.

EXCAVATING AND BACKFILLING

The Contractor shall be responsible for all excavating and backfilling required to complete the installation of the electrical systems. All excess material and debris shall be removed. All backfilling shall be with sand. Backfilling shall be thoroughly tamped and compacted.

It shall be the Contractor's responsibility to locate all underground utilities before trenching and excavating. Care shall be taken to avoid damage to the existing utilities. Any damage shall be repaired or replaced by the Contractor at no expense to the Owner.

PAINTING

No painting shall be required under DIVISION 16, except for factory-finished items. Any damaged surfaces of factory items shall be repaired by the Contractor to an acceptable level determined by the Architect.

EXISTING EQUIPMENT

The Contractor shall be responsible for the removal and reinstallation of any electrical equipment, such as light fixtures, that shall be reused. Any existing electrical equipment that is removed and not reused shall be returned to the Owner. Any material that the Owner does not wish to keep shall be removed from the site by the Contractor.

When existing electrical items such as outlets are removed from service, care shall be taken to keep the integrity of the remaining electrical systems.

SERVICE EQUIPMENT MARKING

In addition to other marking requirements, all service equipment shall be marked with the available fault current and the date of calculation of the fault current. See other areas of these specifications for additional labeling requirements. Labels shall be engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

END OF SECTION 16010

SECTON 16100 – GENERAL SPECIFICATIONS FOR ELECTRICAL INSTALLATION

PART 1 – GENERAL

1.1 GENERAL

A. The Electrical Drawings and Specifications under this division are an integral part of the Contract Documents. The Drawings and Specifications of other divisions of this contract, as well as supplements issued thereto, information to bidders and pertinent documents issued by the Owner's representative are a part of these drawings and specifications and shall be complied with in every respect. All the above documents will be on file at the office of the Owner's representative and shall be examined by all bidders. Failure to examine all Contract Documents shall not relieve the responsibility or be used as a basis for additional compensation due to omission of details of other requirements in these Contract Documents from the Division 16 documents.

B. The Contractor shall furnish all work, labor, tools, superintendence, material, equipment and operations necessary to provide for complete and workable electrical systems as defined by the contract documents.

C. The Contractor shall be responsible for inspecting the project site and checking the existing conditions and ascertaining the conditions to be met for installing the work and adjusting his bid accordingly.

D. It is the intent of the Contract Documents that upon completion of the electrical work, each entire system shall be in a finished, workable condition.

E. All work that may be called for in the Specifications but not shown on the Drawings; or, all work that may be shown on the drawings but not called for in the Specifications, shall be performed by the Contractor as if described in both. Should work be required which is not set forth in either document, but which work is nevertheless required for fulfilling of the intent thereof; then, the Contractor shall perform all work as fully as if it were specifically set forth in the Contract Documents.

F. The definition of terms used throughout the contract documents shall be as specified by the following agencies:

1. Underwriters Laboratories (UL)
2. National Electrical Manufacturers Association (NEMA)
3. American National Standards Institute (ANSI)
4. Insulated Cable Engineers Association (ICEA)
5. National Electrical Code (NEC)
6. National Fire Protection Association (NFPA)

G. The use of the terms: "as (or where) indicated"; "as (or Where) shown"; "as (or Where) specified"; or "as (or where) scheduled" shall be taken to mean that the reference is made to the Contract Documents, either on the drawings or in the specifications, or both documents.

H. The use of the words "furnish," provide," or "install" shall be taken to mean that the item or facility is to be both furnished and installed under this Section unless stated to the contrary that the item or facility is to be either furnished under another Section or under another Contract, furnished under this Section and installed under another Section or under another Contract.

1.2 PERMITS, CODES AND REGULATIONS

A. Secure all permits, licenses, and inspection as required by all authorities having jurisdiction. Give all notices and comply with all laws, ordinances, rules, regulations and contract requirements bearing on the work.

B. The minimum requirements of the electrical systems installations shall conform to the latest edition of the National Electrical Code as well as state and local codes.

C. Codes and ordinances having jurisdiction and specified codes shall serve as minimum requirements; but, if the Contract Documents indicate requirements which are in excess of those minimum requirements, then the requirements of the Contract Documents shall be followed. Should there be any conflicts between the Contract Documents and codes, or any ordinances, report these with bid.

D. Determine the exact requirements for the utility service connections and metering facilities as set forth by the utilities that will serve the project, and pay for and perform all work as required by those utilities.

1.3 STANDARDS

A. All materials and equipment shall conform to the requirements of the Contract Documents. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:

1. Underwriters Laboratories, Inc. (UL)
2. National Electrical Manufacturer's Association (NEMA)
3. American National Standards Association (ANSI)
4. Insulated Cable Engineers Association (ICEA)

B. All material and equipment, of the same class shall be supplied by the same manufacturer, unless specified to the contrary.

C. All products shall bear UL labels where standards have been set for listing.

1.4 SHOP DRAWINGS AND SUBMITTALS

Shop drawings and submittals shall conform to the quality and quantity requirements detailed in other sections of these specifications.

1.5 RECORD DRAWINGS

The Contractor shall keep one separate set of blue-line prints for making construction notes and mark-ups and shall include the following:

A. Show conduit routing and wiring runs as constructed and identify each.

B. Show all terminal number and schematic changes.

C. Record all deviations from the Contract Documents.

D. Submit set of marked-up drawings for review with necessary details and clarity to have an auto-cad operator transfer the mark-ups to permanent drawings without intervention with others.

1.6 OPERATIONS AND MAINTENANCE MANUALS

A. Submit operation and maintenance data as detailed in Division 01.

1.7 ACCEPTANCE AND SUBSTITUTIONS

A. All manufacturers named are a basis as a standard of quality and substitutions of any equal product will be considered for acceptance unless prohibited under other divisions of these Specifications. The judgement of equality of product substitutions shall be made by the Engineer.

B. Substitutions after award of contract shall be made after the award of contract. Furnish all required supporting data. The submittal of substitutions for review shall not be cause for time extensions.

C. Where substitutions are offered, the substituted product shall meet the product performance as set forth in the specified manufacturer's current catalog literature, as well as meeting the details of the contract documents.

D. The details on the drawings and the requirements of the specifications are based on the first listed item of material or equipment; if any other than the first listed materials or equipment is furnished, then contractor shall assume responsibility for the correct function, operation, and accommodation of the substituted item. In the event of misfits or changes in work required, either in this Section or other Sections of the contract, or in both; bear all costs in connection with all changes arising out of the use of other than the first listed item specified.

E. Substitutions of products under another Section may occur. Make necessary adjustments and additions to work under this Section to accommodate those substitutions. Such adjustments and additions shall be performed in compliance with specifications at no additional charge.

1.8 CERTIFICATIONS

The Contractor shall submit the following certifications upon completion of the project:

A. All motor overload heaters and circuit breakers have been properly selected and installed. Attach a completed form "Motor Overload Heater and Circuit Breaker Data Sheet".

B. All wiring has been properly connected to all equipment in accordance with the manufacturer’s recommendations and the plans and specifications.

C. All electrical systems and subsystems are operating properly and have been operationally tested by simulations of all possible operating conditions.

D. All electronic instruments and switches are calibrated and functioning properly.

E. The emergency generation system and transfer switch (if specified) is operating properly and has been tested at maximum expected operating conditions.

F. The Graphic Display Panel (if specified) has been tested and is functioning properly.

G. The Distributed Control System (if specified) has been properly connected to all required equipment, is operating properly and has been operationally tested by simulation of all possible operating conditions.

H. Other certifications as to proper electrical operation as deemed necessary by the Engineer.

1.9 COOPERATION

A. Cooperate with all other trades so as to facilitate the general progress of the work. Allow all other trades every reasonable opportunity for the installation of their work and the storage of their materials.

B. The work under this section shall follow the general building construction closely. Set all pipe sleeves, inserts, etc., and see that openings for cases, pipes, etc. are provided before concrete is placed or masonry installed.

C. Work with other trades in determining exact locations or outlets, conduits, fixtures, and pieces of equipment to avoid interference with lines as required to maintain proper installation of other work.

D. Make such progress in work that will not delay the work of other trades. Schedule the work so that completion dates as established by the Engineer are met. Furnish sufficient labor or work overtime to accomplish these requirements if necessary or directed to do so.

1.10 ADDITIONAL REQUIREMENTS

A. Electrical wire and conduit schedules, and interconnection drawings are prepared by the Engineer to assist the electrical subcontractors in estimating the cost of the project and are based on the latest information available from the vendors at the time of design. Once shop drawings are received, changes may be required on the project external wiring to accommodate their latest design and to make the system function properly.

B. It shall be the Contractors responsibility to check with the various vendors before bidding the project and to include monies in his bid to accommodate these requirements since no changes to the contract price will be allowed for these changes.

1.11 ELECTRICAL EQUIPMENT REQUIREMENTS

A. The plant electrical system is custom designed to the specific requirements of the Owner and the Engineer using a sophisticated control system. The vendors shall custom design their electrical equipment and panels to match these electrical requirements. This means that it is highly unlikely that the vendor’s standard panels and electrical equipment will be compatible with the requirements of this project. Shop drawings shall be submitted showing external wiring terminals and shall properly identify the devices to which that they are to be interconnected. At a minimum the drawings shall be prepared with the same engineering effort as can be expected to be utilized in motor control center class 2, type B wiring. Wiring and elementary and control drawings shall be prepared using drawing sizes sufficient to show wiring details clearly and shall have the Owner's name and project on each sheet. All options furnished shall be identified. Any item not furnished shall be entirely deleted from the drawing. Drawings that indicate such things as "if supplied" "these models only" "optional" etc. will be rejected. Any drawings submitted where it is obvious that no effort was made to properly prepare them for easy checking by the Engineer will be rejected.

B. Shop drawings, unless mark-ups are very trivial, will not be returned "approved as noted". They will be returned for resubmittal as many times as necessary. Therefore make every effort to comply with the requirements of this project on the first submittal in order to avoid project delays.

C. The Contractor shall include monies in his bid to strictly adhere to the above.

PART – 2 – PRODUCTS

2.1 WIRE AND CABLE

See other sections of these specifications for wire and cable to be used on this project.

2.2 CONNECTORS

A. Mechanical connectors shall be copper alloy bolted pressure type with bronze hardware. Such connectors unless otherwise indicated shall be Square D, OZ/Gedney, T&B, or equal.

TYPE	MANUFACTURER
Single conductor to flat plate connector	Square Type LU OZ Type XLH, or equal
Multiple conductor to flat place connector	Square LU Series T&B Type 32000 DB, or equal
One-bolt parallel connector	Type T or equal
Split-bolt parallel connector	Square D Type CPS, T&B Type TP or equal
Two-bolt parallel connector	Square D Type K.R., OZ Type 5TS or equal
Splice connector	Square D Type SS OZ Type XW or equal
Cross-connector	Square D Type XP OZ Type T, or equal
Ground rod connector	Square D Type CG OZ Type ABG, or equal
Flush floor connector	Square D Type GCJ OZ Type VG, or equal

B. Insulated spring wire connectors shall be plated spring steel with thermoplastic jacket. Connectors shall be rated at 150 degrees C continuous.

C. Insulated set-screw connectors shall consist of copper body with flame retardant, 600 V class insulated shell that threads over set-screw body.

D. Terminal connectors for flat-head terminal screws shall be locking spade type with vinyl insulated compression indent tubular wire shaft.

E. Terminal strip connectors shall be channel-mounted type with tin-plated solderless box lugs contained within nylon-insulated separable carriers.

F. Furnish terminal strips complete with channels, channel mounting hardware, and closures, and fittments.

2.3 INSULATING PRODUCTS

A. General purpose electrical tape shall be 7-mil thick stretchable vinyl plastic with pressure adhesive backing, 3M "Scotch #33, Plymouth "Slipknot Grey", or equal.

B. Insulating void-filling tape shall be stretchable ethylene propylene rubber with high-tack and fast fusing surfaces. Tape shall be rated for 90 degrees C continuous, 130 degrees C overload and it shall be moisture-proof. Void-filling tape shall be 3M "Scotch #23," Plymouth "Plysafe", or equal.

C. Arc-proof tape shall be flame-retardant, self-extinguishing compound. Tape shall be resistant to ultraviolet, water, salt water, raw sewage and acids. Arc-proof tape shall be "3M" Scotch #7700, Plymouth "Plyarc", or equal.

D. Insulation putty filler tape shall be elastic, moisture proof rubber compound suitable for bedding and rounding out irregular surfaces.

E. Conduit insulation putty shall be waterproof, stretchable, non-hardening compound suitable for duct seal.

2.4 CONDUIT:

A. Detail Specifications will indicate the type of conduit system to be used. Liquid tight flexible metallic conduit shall be U.L. listed and shall consist of a metallic interlocking core with an extruded thermoplastic cover.

2.5 CONDUIT FITTINGS

A. Conduit fittings shall be compatible with the conduit system used. Outdoor enclosures shall be weatherproof. Insulating bushings shall be non-combustible high-impact thermosetting phenolic with 150 degrees C temperature rating and shall not support combustion.

2.6 CONDUIT BODIES AND BOXES

Conduit bodies and boxes for pulling and installation of outlets shall be compatible with the conduit system and shall be as follows:

CONDUIT SYSTEM

Item	Galvanized Rigid Steel	Rigid Aluminum
Outlet Bodies	Threaded Zinc Coated Malleable Iron w/ Gasketed Cast Metal Crouse Hinds Form 7 Or Equal	Threaded Copper Free Aluminum w/Gasketed Sheet Aluminum Covers. Crouse Hinds Form 9 or Equal
Outlet Boxes	Same as Above Except Crouse Hinds FD, FS and DS or Equal. Outdoor or Wet Locations To Have Outdoor Covers.	Threaded Copper Free Aluminum w/Gasketed Cast Aluminum Outdoor Covers Crouse-Hinds FD, FS and DS or Equal

2.7 SUPPORT DEVICES

A. Single opening slotted channel supports shall be 2" deep x 1 5/8" wide. Double opening slotted channel supports shall be 4" deep x 1 5/8" wide. All slotted channel members shall be manufactured of ASTM 6063-T-6 aluminum. Furnish nuts, clamps, and hardware that shall be compatible with the slotted channel members.

B. Conduit clamps for use with slotted channel members shall consist of locking aluminum straps with aluminum hardware. All such straps and hardware shall be manufactured of hardened aluminum alloy with less than 0.5% copper content.

C. After-set concrete inserts shall be expansion-shield type with stainless steel hardware, 500 pounds minimum pull-out resistance.

D. Beam clamps shall be hot-dipped galvanized malleable iron. Furnish right angle, edge, or parallel types as required.

E. Nest-back supports shall consist of one-hole pipe clamp with conduit wall spacer clamp-back, all manufactured of hot-dipped galvanized malleable iron.

F. One-hole pipe clamps shall be manufactured of hot-dipped galvanized malleable iron.

G. Surface mounted swivel joints shall be double closed "U" brackets of plated malleable iron with attachment openings top and bottom.

H. Adjustable screw-mounted swinging hangers shall be manufactured of plated steel. Mounting bracket shall have four screw-holes.

I. All thread rod shall be stainless steel, 3/8" diameter (min. size).

2.8 CONNECTING LUGS

A. In many instances, due to the long distances between equipment and voltage drop limitation, larger wire sizes may be required that would normally be expected for some items of equipment. The Contractor and equipment vendor shall identify these requirements and provide proper lugs to match the wire sizes.

2.9 IDENTIFYING AND TAGGING

A. Individual phases and routing of each power and control circuit shall be identified by appropriate identifying permanent tags, at points near each end of the cables.

B. All equipment and electrical devices shall be identified. The Contractor and manufacturer shall be responsible for properly identifying and tagging equipment as to safe operation under adverse conditions by personnel normally associated with the proposed facility. Additional signs as the Engineer may require for safety shall be furnished and installed by the Contractor at no additional costs.

C. Voltage warning labels where shown or required by N.E.C or local codes shall be waterproof vinyl with permanent red letters "DANGER 480V (or 240V)", or with other voltage designations. Letters shall be at least 2" high.

2.10 WIRING DEVICES

All wiring devices shall be specification grade and shall meet NEMA WD1-1971 requirements. Furnish types of wiring devices as follows:

A. 2P/3W grounding, 20A/125V, NEMA 6-20R; Single receptacle: Hubbell #5361, Arrow Hart #5361, or equal.

B. GFCI receptacle shall be Square D "GFSR-115-B" with NEMA 5-15R style receptacle or "GFSR-120-B" with NEMA 6-20R style receptacle. GFCI receptacle shall be in duplex configuration; that is, top half shall contain test and reset button and bottom half shall contain protected receptacle.

C. Single-pole, single-throw 20A tumbler switch: Hubbell #1223, Arrow Hart #1992, or equal.

D. Single-pole, double-throw (three-way) 20A tumbler switch: Hubbell #1224, Arrow Hart #1993, or equal.

E. Double-pole, double-throw (four-way) 20A tumbler switch: Hubbell #1224, Arrow Hart #1994, or equal.

F. Double-pole, single-throw 20A, tumbler switch: Hubbell #1222, Arrow Hart #1992 or equal.

G. Single-pole, single-throw, momentary center - off 20A tumbler switch: Hubbell #1556, Arrow Hart #1995, or equal.

H. Manual motor starters shall be furnished complete with overloads and shall be Square D Type KO-Z, Westinghouse MS-TO1, or equal.

I. Furnish other types of wiring devices as may be indicated and specified on the drawings.

2.11 MISCELLANEOUS MATERIAL

A. Empty raceway pull cords shall be glass fiber reinforced tape that is foot-marked along its length, Thomas "True Tape", Greenlee "Foot-Marked", or equal.

B. Conduit thread compound for use with joining dissimilar metals and aluminum threads shall be conductive, non-galling, and corrosion inhibiting lithium-based compound.

C. Cable pulling compound shall be non-injurious to raceways, conductors, and insulation. Compound shall be non-toxic, non-hardening type.

D. Ground rods shall be copper-clad steel in lengths and diameters as indicated and shall be Blackburn, Hubbard, or equal.

PART – 3 – EXECUTION

3.1 INSTALLATION

A. Except where specifically noted or shown, the locations and elevations of equipment are approximate and are subject to small revisions as may prove necessary or desirable at the time the work is installed. Final locations shall be confirmed with the Engineer in advance of construction.

B. Where equipment is being furnished under another Section, request from the Engineer accepted drawings that will show exact dimensions of required locations of connections. Install the required facilities to the exact requirements of the accepted drawings.

C. All work shall be done in the best and most workmanlike manner by qualified, careful electricians who are skilled in their trade. The standards of work required throughout shall be of the first class. All work must meet the approval of the Engineer.

D. Unless shown in detail, the Drawings are diagrammatic and do not give exact details as to

elevations and routing of conduits, nor do they show all offsets and fittings; nevertheless, install the conduit system to conform to the structural and mechanical conditions of the construction. Unless locations and routing of exposed conduits are shown, confirm locations and routing prior to installation with the Engineer.

E. Holes for raceway penetration into sheet metal cabinets and boxes shall be accurately made with a hole punch. Cutting openings with a torch or other device that produces a jagged, rough-cut will not be acceptable.

F. Cabling inside equipment shall be carefully routed, trained and laced. Cables so placed that they obstruct equipment devices will not be acceptable.

G. Equipment shall be set level and plumb. Supporting devices installed shall be set and so braced that equipment is held in a rigid, tight fitting manner.

H. The Contractor shall verify the electrical capacities of all motors and electrical equipment furnished under other Sections, or furnished by the Owner, and request wiring information from the Engineer if wiring requirements are different from that specified under this Section. Do not make rough-ins until equipment verifications have been received.

I. The Contractor shall install all controllers, instruments, Distributed Control System Equipment (if specified), terminal boxes, pilot devices, and miscellaneous items of electrical equipment that are not integrally mounted with the equipment furnished under other Sections. All such equipment shall be securely mounted and adequately supported in a neat and workmanlike manner.

3.2 EXCAVATION AND BACKFILLING

A. All excavating and backfilling necessary for the installation of the work shall be performed. This shall include shoring and pumping in ditches to keep them dry until the work in question has been installed. All shoring required to protect the excavation and safeguard employees shall be properly performed.

B. All excavations shall be made to the proper depth, with allowances made for floors, slabs, forms, beams, piping, finished grades, etc. Ground under conduits shall be well compacted before conduits are installed.

C. All backfilling shall be made with selected soil, free of rocks and debris and shall be tamped as required to prevent settlement.

D. All excavated material not suitable and not used in the backfill shall be removed to the on-site disposal area. Area shall be as directed by the Engineer.

E. Field check and verify the locations of all underground utilities prior to any excavating. Avoid disturbing these as far as possible. In the event existing utilities are broken into or damaged, they shall be repaired so as to make their operation equal to that before the trenching was started.

F. Where the excavation required the opening of existing walks, drives, or other existing pavement, these facilities shall be cut as required to install new lines and to make connections to existing lines. The sizes of the cut shall be held to minimum consistent with the work to be installed. After installation of new work is completed and the excavation has been backfilled in accordance with above, repair existing walks, drives or other existing pavement to match existing installation.

3.3 CUTTING AND PATCHING

A. Cutting and patching required under this section shall be done in a neat workmanlike manner. Cutting lines shall be uniform and smooth.

B. Use concrete saws for large cuts in concrete and use core drills for small round cuts in concrete.

C. Where openings are cut through masonry walls, provide lintel or other structural supports to protect the remaining masonry. Adequate support shall be provided during the cutting operations to prevent damage to masonry.

D. Where large openings are cut through metal surfaces, attach metal angles around the opening.

E. Patch concrete openings that are to be filled with non-shrinking cementing compound. Finished concrete patching shall be trowled smooth and shall be uniform with surrounding surfaces.

3.4 WATERPROOFING

A. Provide waterproof flashing for each penetration of exterior walls and roofs.

B. Flashing for conduit penetrations through built-up roofs shall be made with pitch pans filled full with pitch. Conduit penetrations through poured concrete roofs shall be made with sleeves and annulus caulked.

C. Penetrations through walls at below ground elevations shall be waterproofed by conduit sealing fittings or other methods as indicated.

D. Interiors of raceways that are likely to have water ingress such as runs from handholes into below-grade installations shall have waterstops installed to prevent water from entering into installations.

3.5 PROTECTION

A. The Contractor shall provide suitable protection for all equipment, work and property against damage during construction.

B. The Contractor shall assume full responsibility for material and equipment stored at the site.

C. Conduit openings shall be closed with caps during installation. All outlet boxes and cabinets shall be kept free of concrete, plaster, dirt and debris.

D. Equipment shall be covered and tightly sealed against entrance of water, dust, dirt and debris.

E. All dry transformers prior to energization shall be protected against moisture and dirt absorption by a suitable covering. Also, maintain heat inside the covering by suitable means to prevent condensation.

F. Interiors of electrical equipment shall be kept clean and dry prior to energization.

3.6 DUCT LINES AND PULL BOXES

A. The Contractor shall excavate, backfill, remove excess soil, and furnish material for and install duct lines wherever shown on the plans. Conduit encased in concrete shall have three inch minimum covering of concrete on outside walls of ducts bank, and one inch minimum of concrete between the outside walls of adjacent conduits. The top of the ducts shall in general be 1'-6" below ground unless specifically shown otherwise on the drawings or is required to be deeper by N.E.C. or other codes.

B. It shall be the electrical subcontractor's responsibility to determine in advance any conflicts of duct banks with underground obstructions of electrical or any other disciplines and report these anticipated conflicts to the Engineer well in advance of operations such that the conflicts can be easily and economically resolved by all parties.

C. Conduit shall be firmly secured by driving reinforcing rod 12" in ground and tying with No. 10 wire or utilize plastic saddles with proper NEC spacing.

D. Where excavation has been made to a greater depth than that required, backfill shall be tamped solid and level to the required depth. All concrete forms shall be removed after the concrete has set, and all trenches shall be backfilled and tamped.

E. Pull boxes shall be installed as shown on the plans.

3.7 RACEWAY INSTALLATION

A. Install the raceway system to provide the facility with the utmost degree of reliability and maintenance-free operation. The raceway system shall have the appearance of having been installed by competent workmen. Kinked conduit, conduit inadequately supported or carelessly installed do not give such reliability and maintenance-free operation and will not be accepted.

B. Raceway shall be installed for all wiring runs except as otherwise indicated.

C. Exposed raceways shall be installed with their lines parallel to the lines of the building or structure to which they are attached.

D. Conduit runs that enter bottom of floor mounted enclosures that are open on the bottom shall be each equipped with grounding bushing on each conduit.

E. Conduit entries into sheet metal enclosures located inside shall be made with double locknuts and capped with molded bakelite grounding type bushings. Threaded penetration shall expose enough threads to adequately thread on bushing.

F. Conduit entries into NEMA 3, 3R, 4 or 12 enclosures located outside and in wet or damp location inside, shall be made with field-applied watertight hubs. Install locknut inside and cap each conduit with grounding bushing.

G. Conduit runs into boxes, cabinets, and the like shall be set in a neat manner. Vertical runs shall be set plumb. Conduits set crooked or out-of-plumb shall be replaced.

H. Conduits entrances into enclosures shall be carefully planned. Cutting away of enclosure structure, torching and/or cutting away sills, braces and structural members of the enclosure will not be acceptable.

I. Use approved hole cutting tools for entrances into sheet metal enclosures. Use of cutting torch or incorrect tools will not be acceptable. Holes shall be carefully planned and then cleanly cut and they shall be free from burrs, jagged edges, and torn metal.

J. Make-up of some conduit runs will require union fittings or split couplings. Install such fittings where required.

K. Liquidtight conduit shall be used for connections to motors, solenoids, pressure switches, limit switches, unit heaters, fans, motorized louvers, and other devices that may need to be removed for servicing. Each run of liquidtight flex shall be joined with liquidtight flex connectors. Make up each connection tightly; finished connector shall have minimum of 100 pounds pull-out resistance.

L. Empty conduits shall have pull tape installed the length of each run. Identify each terminal as to location of other end. Use blank waterproof label with waterproof ink. Cap exposed open ends of empty conduits.

M. Conduit bodies shall be installed in exposed runs of conduit where indicated and also wherever required to overcome obstructions and to provide access to wires. Covers for such fittings shall be accessible and unobstructed by the adjacent construction.

N. All raceway systems shall be adequately and safely supported. Loose, sloppy and inadequately supported raceways will not be acceptable and shall be replaced. Supports shall be installed at intervals not greater than those set forth under Article 300 of N.E.C. unless shorter intervals are otherwise indicated; or, unless conditions require shorter intervals of supports.

3.8 WIRING INSTALLATION

A. Conductors for power and control wiring shall be sized as indicated and where no size is given, the conductor size shall be #12 AWG minimum.

B. Color of power wire insulation and color of phase indicating tape shall be as follows:

Conductor	Wire Color	Tape Color 120/240v	Tape Color 120/208v	Tape Color 277/480v
Phase A	Black	Black	Black	Brown
Phase B	Black	Orange(H.L.)	Red	Orange
Phase C	Black	Blue	Blue	Yellow
Neutral (120v)	White			
Neutral (277v)	Gray			
Neutral (277v)	White/Red Stripe			
Equipment Ground	Green			

* Where in same conduit or box with 120/240 or 120/208 volt systems. Label

all panel boards with permanent tags as to the color coding.

C. All wiring shall be installed in raceways, except as otherwise specified. No wire or cable shall be drawn into a raceway until the raceway run has been completed, swabbed, and outfitted with specified bushings and fitments.

D. Do not exceed wire and cable manufacturer's recommended pulling tensions. Cable pulling compound shall be used as a lubricant for difficult pulls.

E. Carefully handle wire and cable, do not kink, scrape or damage conductors or their insulation.

F. Feeder and branch circuit wiring shall be installed from supply to load without splice, unless otherwise indicated. Branch circuits may be spliced for receptacle, lighting, and small appliance load inside appropriate junction boxes, and inside lighting fixtures.

G. Except as otherwise specified, taps and splices with #10 AWG, and smaller shall be made with insulated spring-wire connectors. Such connectors in damp or wet locations shall have opening in wire nut filled with silicone rubber cement and then wrapped with a layer of EPR tape or spring wire connectors manufactured for this use shall be used.

H. Motor connections made with #10 AWG and smaller wire shall be made up with set-screw copper lugs and with threaded-on set-screw copper lugs and with threaded-on insulating jacket. Where motors are located in damp or wet locations, fill opening under jacket with silicone rubber and cover connector with a layer of EPR tape.

I. Taps and splices in #8 AWG and larger wires shall be made up with copper alloy connectors. Apply over each connector a bedding of insulation putty. Then, apply at least four layers, half-lapped each layer of EPR tape. Finally, apply at least four layers half-lapped each layer of electrical tape.

J. Each wiring connection shall be made up tightly so that resistance of connection is as low as one-foot length of associated largest conductor resistance.

K. Numbered marking labels shall be installed to identify circuit numbers from panelboards and to identify control wiring. Install labels on each wire in each panelboard, junction, and pull box, and device connection. See "Identifying and Tagging" sections of these specifications.

L. Install numbered marking labels on each control wire termination at each terminal strip. Number selected shall correspond to manufacturer's terminal numbers.

M. Where control wiring terminates onto flat head type terminals, equip each such wire with crimp-type locking spade connector.

N. All wiring inside enclosure shall be neatly trained and laced. Bundle wires into groups and lace with plastic tie-wraps.

O. Install "DANGER 480V (or 240V)" labels on motor control equipment, and on other enclosures such as safety switches, wire-ways, and large enclosures that contain 480V (or 240V) wiring.

P. Install wiring devices where indicated. Each wiring device shall be set with axes plumb and installed with its yoke screws so as to adequately support device and provide grounding means to box. Where ganged devices are shown, install them into ganged boxes.

Q. Each item of equipment shall be adequately and thoroughly grounded. Comply with Article 250 of N.E.C.

R. Equipment grounding conductors into equipment shall be grounded to equipment ground bus or ground lug. Where no ground lugs are provided install ground lug and bond EGC thereto.

S. Where grounding bushings are installed, bond EGC there to end and furthermore ground each bushing lug to equipment ground bus or ground lug.

3.9 GROUNDING SYSTEM

A. The Contractor shall furnish and install a complete grounding system as shown on the Drawings consisting primarily of bare copper conductor and copper clad steel ground rods. All electrical equipment shall be tied to this system either with cable shown or the metallic conduit system per N.E.C. Attach grounding system to metallic buildings as required by N.E.C. weather specifically shown on drawings or not.

3.10 MANUFACTURING OF ELECTRICAL CONTROL PANELS

A. All electrical control panels including unit motor starters shall be factory assembled. In no case shall the electrician assemble and wire internal components in the field. The only onsite wiring that will be allowed inside panels is connections of external wiring to factory installed terminal strips.

3.11 NAMEPLATES

A. The electrical subcontractor shall install nameplates on all electrical equipment and devices including remote operating stations that clearly identifies the device. Nameplates shall be sized appropriately for the device and shall be attached with stainless steel screws or double sided tape suitable for outdoor use, 3M Scotch Brand Very High Bond 4930 or equal. Tape shall cover the entire surface of the nameplate.

B. A nameplate schedule indicating proposed wording and sizes shall be submitted to the Engineer for approval.

3.12 OVERLOAD HEATERS

A. The Contractor shall submit to the Engineer a form entitled "Motor Overload Heaters and Circuit Breaker Data Sheet" which shall contain actual nameplate information on the motors and motor starters which he shall inspect and record. He shall use the appropriate charts and tables supplied with the starting equipment and select, for approval by the Engineer, the manufacturer's recommended overload heaters and circuit breaker settings. Along with the data sheet he shall also submit a copy of the manufacturer's charts and tables. Motors shall not be started until overload heaters and circuit breaker settings are approved by the Engineer.

3.13 CLEAN- UP

A. Remove all temporary labels, dirt, paint, grease and stains from all exposed equipment. Upon completion of work clean equipment and the entire installation so as to present a first class job suitable for occupancy. No loose parts or scraps of equipment shall be left on the premises.

B. Equipment paint scars shall be repaired with paint kits supplied by the equipment manufacturer, or with an approved paint.

C. Clean interiors of each item of electrical equipment. At completion of work all equipment interior shall be free from dust.

3.14 TESTS

A. Each run of power and control wiring shall be tested prior to connection of line and load. Make tests with 1000V dc hand-crank megger. Each run of wiring shall be tested phase-to-phase and/or phase-to-neutral, and phase-to-ground. Test results for each test shall be equal to or greater than 5 megohms with 1000V dc applied. Defective wiring shall be replaced and retested. All tests shall be made in the presence of the Engineer.

B. High voltage cables, where used, shall be Hi-Pot tested in accordance with test procedures as outlined in other sections of these specifications or as directed.

C. All equipment shall be put through a trial run-in test to ascertain the performance complies with the intent of the specifications. All run-in tests shall be made in the presence of the Engineer.

END OF SECTION

SECTION 16200 - DETAIL SPECIFICATIONS FOR ELECTRICAL INSTALLATION

PART – 1 GENERAL

1.1 SCOPE

A. The work covered by this section shall include furnishing and/or installation and/or connection to all electrical equipment and necessary wiring systems required to provide the owner with a complete and operating system and shall consist of the following basic items of work:

1. Main distribution panel additions
2. Control panels
3. Instrumentation system
4. Circuit breakers
5. Mini power zone
6. Area lighting
7. Low voltage wire, conduit and fittings
8. Receptacles
9. Junction boxes
10. Duct lines and pull boxes
11. Grounding system
12. Support and mounting racks
13 Other equipment and work as shown on the drawings and as required for a complete and working installation

The above list is basic and general in nature. Refer to drawings and other sections and articles of the specifications.

B. All work shall be done in accordance with the equipment manufacturer's instructions and as indicated on the drawings and specified herein.

PART 2 – PRODUCTS

2.1 CONTROL PANELS

A. The Contractor shall furnish and install control panels for all equipment as indicated on the drawings. Control panels shall be as follows:

1. EQ Tank Blowers Control Panel (EQBCP). See specifications SECTION 17110.
2. Transfer Pumps Control Panel (TPCP). See specifications SECTION 17110.
3. Aeration Blowers Control Panel (ABCP). See specifications SECTION 17110.
4. Digestion Blowers Control Panel (DBCP). See specifications SECTION 17110.
5. Effluent Pumps Control Panel (EPCP). See specifications SECTION 17110.
6. Scraper Control Panel (SCP). See specifications SECTION 17110.

2.2 MAIN DISTRIBUTION PANEL (MDP)

A. Panel shall be fully rated with all copper bussing as manufactured by Square D.

2.3 MINI POWER ZONE

A. The Contractor shall furnish and install a single phase 480-120/240 volt mini power zone, as manufactured by Square D, as shown and specified on the drawings.

2.4 DISCONNECT SWITCHES

A. The Contractor shall furnish and install disconnect switches if and as shown and as sized on the drawings. All disconnect witches shall be NEMA 4X 316 stainless steel. Switches shall be heavy duty and horse power rated for the connected load applied. General purpose switches for motor loads are not acceptable. Provide disconnect switches at all locations as required by NEC.

2.5 CONDUIT

A. The Contractor shall furnish and install all conduit as shown on the drawings and as required. See specifications SECTION 16600 and 16610 for conduit specifications. All conduit on this project shall be of the following types:

1. Underground in trench – U.L. Listed Schedule 40 PVC installed in homogeneous red tinted reinforced concrete duct bank. Install duct bank 2'-0" below grade unless shown otherwise on drawings. Install electric warning tape 12" above duct bank. Underground stub up elbows shall be Schedule 80 long radius PVC.
2. Aboveground – U.L. Listed Schedule 40 rigid aluminum. Coat with coal tar epoxy where it is embedded in concrete. Do not use tape.
3. All metallic outlet boxes shall be cast aluminum.
4. Minimum conduit size shall be ¾".
5. Utilize Meyers hubs where conduit enters outdoor panels
6. All electrical mounting hardware and materials shall be non-corrosive. All conduit clamps, condulets, covers, unistrut and mounting hardware shall be aluminum or stainless steel. Anchor bolts shall be stainless steel. Many items of hardware may appear to be stainless steel and aluminum, therefore test each item before installing. No galvanized material shall be used. Where in conflict with any other wording in these specifications, this paragraph shall govern.

2.6 WIRE

A. The Contractor shall furnish and install wire and wiring systems as indicated on the drawings. Refer to the drawings for specific types of wire for each application and specifications SECTIONS 16540 and 16550 for wire specifications. All power, control and standard instrument wire shall be as recommended by the manufacturer or as follows:

1. 600 volt instrument cable – 2 conductor # 16 shielded. See specifications SECTION 16540.
2. 600 volt single conductor – XHHW-2. See specifications SECTION 16550

2.7 LIGHTING SYSTEMS

A. The Contractor shall furnish and install all lights and lighting systems as indicated on the drawings. The lighting system is to be a heavy-duty, heavyweight, industrial class system. The Contractor is cautioned that vendors routinely try to obtain approval on lightweight industrial or commercial systems with different materials, lenses, light distribution, ballasts etc. These will not be accepted. Only systems of at least equal quality as that specified will be approved. Install a poured seal-off fitting at each outdoor light.

Type G and G1 Stanchion Mount Units As Follows:

1.	Watts	74
2.	Lamp	LED
3.	Voltage	120 volt (or as required on drawings)
4.	Lens	Prismatic glass for long, narrow distribution along walkways and symmetrical distribution at other areas.
5.	Mtg. Access	Stanchion mount adapter for stanchion mounted units
6.	Type	G - Holophane PXLH-10000LM-ND-120-40K-80-XX-WG G1 - Holophane PXLH-10000LM-WD-120-40K-80-XX-WG

2.8 RACKS

A. The Contractor shall construct all equipment and mounting racks, including conduit support racks, as required for a complete and properly operating installation.

2.9 INSTRUMENTATION

A. The Contractor shall furnish and install instrumentation systems as specified in SECTIONS 17100 and 17110 and as required for proper operation of the plant.

2.10 CERTIFICATIONS

A. All electrical equipment shall be UL listed for its intended purpose.

PART 3 – EXECUTION

3.1 DEMOLITION

A. The Contractor shall disconnect and remove all existing electrical and instrumentation equipment that is not to remain in service at the completion of this project and which is l ocated in buildings or areas to be renovated. Verify that the equipment is not being used and not going to be used. All removed equipment shall be turned over to the Owner for selection of items that he wishes to keep in stores. All other items shall be properly disposed of by the Contractor.

3.2 COORDINATION WITH FACTORY SERVICEMAN

A. The Contractor shall coordinate his work with the factory serviceman of the various vendors and shall provide whatever assistance is necessary to place the entire system in operation.

3.3 COORDINATION WITH THE POWER COMPANY

A. All work on the service entrance from weather head or pad mounted transformer to utilization equipment shall be per local power company requirements. Where there is conflict with plans and specifications with the Cleco requirements, Cleco's requirements shall govern. The Contractor shall notify the Engineer in advance of making a change for the Engineer's approval.

B. The Contractor shall coordinate all work with the local power company including scheduling of service.

C. Seal all conduits entering panels with duct seal where it is possible that water or moisture

can enter electrical equipment.

3.4 Arc Flash Study

A. Provide a complete fault current coordination study and an arc flash A. hazard study and tag all gear accordingly, in compliance with NFPA 70, including the date of calculation. Provide labeling on all switchgear, motor control centers, switch boards, and additional equipment as required by NFPA 70. Adjust all trip and parameter settings in accordance with the calculations.

3.5 ELECTRICAL TECHNICIANS

A. The Contractor shall employ and pay for electrical technicians as necessary to insure proper installation, connection, testing, and placing of electrical and instrumentation systems into proper service. Coordinate all work with other vendor's technicians and service personnel. Utilize only personnel experienced in motors, motor controls, sophisticated electrical and instrumentation systems as well as installations in hazardous areas.

3.6 GROUNDING

A. The Contractor shall furnish and install a complete grounding system to provide a safe operating environment. See SECTION 16800.

3.7 SUBMITTALS

A. Submittal data shall include, but not be limited to the following requirements:

1. Complete materials list and items proposed to be furnished and installed.
2. Enclosure dimensions materials of construction and NEMA ratings.
3. Circuit breaker and other equipment interrupting ratings.
4. All electrical drawings so that the system can be checked for compatibility with other systems to which it interfaces.

B. Submittals sent to engineer for processing that require information on equipment that has not been previously submitted for approval may or may not be reviewed before dependent submittals are sent.

C. Each item of the submittal shall be marked as to the specification section and article.

D. Submittal sheets that have multiple specified and un-specified selections shall have the selected option clearly marked and the un-selected options marked out.

E. Submittals submitted via e-mail shall be marked such that they can be printed using a black and white printer.

F. Any submittals that are not complete, causes the engineer to ponder, or where it is obvious that no effort was made to properly prepare them for easy checking by the engineer will be rejected in their entirety.

3.8 SUBSTITUTIONS

A. On any proposed substitute to the specified item, it shall be the responsibility of the Contractor to show proof to the Engineer, that the proposed substitute is equal to the specified item by making written evaluation comparisons on material, performance, workmanship, maintenance features, energy use, durability, appearance, and the effect on compatibility with the other elements of the system which the item will be used. All changes required in the wiring and other electrical modifications shall be the responsibility of the Contractor.

3.9 GUARANTEE

A. All equipment shall be guaranteed against defects in material and workmanship for a period of one year from date of owner's final inspection and acceptance, except equipment specifically indicated in these specifications as having an extended warranty period, to the effect that any defective equipment shall be repaired or replaced without cost or obligation to the owner.

3.10 OTHER PROVISIONS

A. Where there are conflicts between various sections of the electrical specifications and/or drawings and/or other sections of the specifications, then the more stringent wording for a particular product, material, or item of work shall apply unless approved otherwise by the Engineer. Should a discrepancy occur, notify the Engineer before proceeding. The electrical drawings show the general locations of the equipment. The Contractor shall refer to the mechanical and civil drawings to obtain more accurate and the latest location of the equipment as well as to scale the drawings for distances. Equipment shown shall be mounted and placed so as not to violate any OSHA or NEC rules as to working space and obstruction clearance.

3.11 LIST OF SUBMITTALS

A. The following items shall be submitted for approval and /or records:

1. Control panels
2. Circuit breakers
3. Mini Power Zone
4. Disconnect switches
5. Area lighting
6. Low voltage wire, conduit and fittings
7. Receptacles
8. Junction boxes
9. Grounding materials and accessories
10. Any other items that require electrical connection or as requested by the Engineer

END OF SECTION

SECTION 16540 - 600 VOLT MULTI-CONDUCTOR INSTRUMENTATION CABLE

PART 1 – GENERAL

1.1 SCOPE

A. The Contractor shall furnish and install wire and cable as specified herein and as shown on the drawings.
B. This specification is for 600 volt multi-conductor cable tray rated instrumentation cable.

1.2 REFERENCES

1. UL83 – Thermoplastic Insulated Wires
2. UL 1277
3. UL 1581
4. UL 1685 – UL Flame Exposure Test.
5. IEEE 1202 - Flame Test
6. ICEA T--30-250 – Vertical Cable Tray Flame Test
7. ICEA T-29-520 – Vertical Cable Tray Flame Test

PART 2 – PRODUCTS

2.1 CONSTRUCTION

A. Each conductor shall be 7strand copper conductors insulated with nylon covered PVC.
B. Outer jacket shall be flame retardant polyvinyl Chloride (PVC) with nylon ripcord.
C. Conductors shall be color coded, twisted pairs.
D. Shield shall be aluminum polyester foil with 100% coverage and overall tinned drain wire.
E. Wire shall be rated for use in cable trays.
F. Wire shall be rated for 600 volts.

PART 3 EXECUTION

3.1 INSTALLATION

A. All conduit which will house the wire shall be completely in place before pulling wire.
B. Pull and terminate wire in accordance with manufacturer’s instructions.
C. After installing wire, test with a megger before energizing, record results and submit to the Engineer for approval.

END OF SECTION

SECTION 16550 - 600 VOLT SINGLE CONDUCTOR WIRE

PART 1 GENERAL

1.1 SCOPE

A. The Contractor shall furnish and install wire and cable as specified herein and as shown on the drawings.
B. This specification is for size 14 thru 1000 kcmil, single conductor 600 volt wire.

1.2 REFERENCES

1. UL 44 – Thermoset-insulated Wires and Cables.
2. ASTM - All applicable standards
3. NEMA WC 70
4. IEEE 1202/FT4 – Sizes 350 kcmil and larger
5. Federal Specification A-A-59544.
6. NFPA-70

PART 2 PRODUCTS

2.1 CONSTRUCTION

A. Wire shall be Type XHHW-2 soft annealed stranded copper rated for wet or dry locations at 90 degrees C.
B. Insulation shall be abrasion, moisture, heat and sunlight resistant, flame retardant cross-linked polyethylene (XLP).
C. Wire shall be stranded.
D. Wire shall be rated for 600 volts.

PART 3 EXECUTION

3.1 INSTALLATION

A. All conduit which will house the wire shall be completely in place before pulling wire.
B. Pull and terminate wire in accordance with manufacturer’s instructions.
C. After installing wire, test with a megger before energizing, record results and submit to the Engineer for approval.

END OF SECTION

SECTION 16600 - PVC CONDUIT

PART 1 – GENERAL

1.1 SCOPE

A. The Contractor shall furnish and install all electrical conduit as required for the project.

1.2 REFERENCES

A. All conduit shall be UL listed for its intended purpose.

1.3 SUBMITTALS - FOR REVIEW/APPROVAL

A. Submit all cut sheets and catalog data which clearly indicates what is proposed to be furnished.

1.4 QUALIFICATIONS

A. Only vendors with a minimum of five (5) years of specified conduit manufacturing experience will be considered.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, unload and store in a location that will prevent damage to and debris from entering the conduit.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Carlon
B. Cantex

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre- approved by the Engineer.

2.2 CONSTRUCTION

A. Conduit to be PVC Schedule 40 or schedule 80 as indicated on the drawings. Conduit shall be for application underground, encased or exposed applications in accordance with the National Electrical Code (Article 347).

B. Conduit shall be rated for use with 90° C conductors and UL Listed.

.

C. Material shall comply to NEMA Specification TC-2 (Conduit), TC-3 (Fittings) and UL 651 (Conduit) and 514b (Fittings).

D. Conduit and fittings shall carry a UL label (Conduit - on each 10 foot length; Fittings - stamped or molded on each fitting).

E. Conduit and fittings shall be identified for type and manufacturer and shall be traceable to location of plant and date manufactured. The markings shall be legible and permanent.

F. The Conduit shall be made from polyvinyl chloride compound (recognized by UL) which includes inert modifiers to improve weatherability and heat distortion.

G. The conduit and fittings shall be homogeneous plastic material free from visible cracks, holes or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks or other imperfections which could mar conductors or cables.

H. Conduit, fittings and cement shall be produced by the same manufacturer to assure system integrity.

2.3 TESTING AND ACCEPTANCE

A. Conduit and fittings shall be tested in accordance with the testing requirements defined in NEMA TC-2, NEMA TC-3 and UL-651 and 514. The acceptance criteria shall be given in the same standards.

2.4 CONNECTIONS

A. All conduit and fittings shall be solvent cemented in applications in accordance with instructions from the manufacturer.

PART 3 – EXECUTION

3.2 INSTALLATION

A. The Contractors shall install all conduit per the manufacturer's recommendations and the contract drawings.

END OF SECTION

SECTION 16610 - RIGID ALUMINUM CONDUIT

PART 1 – GENERAL

1.1 SCOPE

A. The Contractor shall furnish and install all electrical conduit as required for the project.

1.2 REFERENCES

A. All conduit shall be UL listed for its intended purpose.

1.3 SUBMITTALS - FOR REVIEW/APPROVAL

A. Submit all cut sheets and catalog data which clearly indicates what is proposed to be furnished.

1.4 QUALIFICATIONS

A. Only vendors with a minimum of five (5) years of specified conduit manufacturing experience will be considered.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, unload and store in a location that will prevent damage to and debris from entering the conduit.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Allied
B. Wheatland
C. Cooper Industries
D. Republic

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre- approved by the Engineer.

2.2 CONSTRUCTION

A. Conduit shall be rigid Schedule 40. Conduit shall be for above ground application exposed in accordance with the National Electrical Code.

B. Conduit shall be rated for use with 90° C conductors and UL Listed.

.

C. Material shall comply to ANSI Specification C80.5 and UL 6A.

D. Conduit and fittings shall carry a UL label.

E. The markings shall be legible and permanent.

F. The Conduit shall be made from 6063 aluminum alloy.

2.3 TESTING AND ACCEPTANCE

A. Conduit and fittings shall be tested in accordance with the testing requirements defined in the standards listed above.

PART 3 EXECUTION

3.1 INSTALLATION

A. The Contractors shall install all conduit per the manufacturer's recommendations and the contract drawings.

3.2 PROTECTION

A. Where aluminum conduit contacts concrete, coat conduit with coal tar epoxy. Tape wrap is not acceptable.

END OF SECTION

SECTION 16800 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies general grounding and bonding requirements of electrical equipment operations and to provide a low impedance path for possible ground fault currents.

B. Grounding electrode system" refers to all electrodes required by NEC, as well as made and supplementary grounding electrodes. It shall also apply to external ground wire systems which provide supplemental grounding of motors, steel structures, conveyors and other electrical equipment.

C. The terms "connect" and "bond" are used interchangeably in this specification and have the same meaning.

PART 2 – PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be UL 83 insulated stranded copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes #4 AWG and larger shall be permitted to be identified per NEC.

B. Bonding conductors shall be ASTM B8 bare stranded copper.

C. Electrical System Grounding: Conductor sizes shall not be less than what is shown on the drawings and not less than required by the NEC, whichever is greater.

2.2 GROUND RODS

A. Copper clad steel, 3/4 inch diameter by 10 feet long, conforming to UL 467.

B. Quantity of rods shall be as required to obtain the specified ground resistance.

2.3 GROUND CONNECTIONS

A. Below Grade: Exothermic-welded type connectors.

B. Above Grade: Mechanical pressure.

2.4 GROUND TERMINAL BLOCKS

A. At any equipment mounting location (e.g. backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

PART 3 - EXECUTION

3.1 GENERAL

A. Ground in accordance with the NEC, as shown on drawings, and as hereinafter specified.

B. System Grounding:

1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
3. Isolation transformers and isolated power systems shall not be system grounded.

C. Equipment Grounding: Metallic structures including ductwork, building steel), enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, conveyors, conveyor support structures, motors and other conductive items shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections, which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.3 SECONDARY EQUIPMENT AND CIRCUITS

A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.

B. Metallic Piping, Building Steel, and Supplemental Electrode(s):

1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water and gas pipe systems, building steel,

   and supplemental or made electrodes. Jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
2. Provide a supplemental ground electrode and bond to the grounding electrode system.

C. Service Disconnect (Separate Individual Enclosure): Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.

D. Switchgear, Switchboards, Unit Substations, and Motor Control Centers:
   1. Connect the various feeder equipment grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
   2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
   3. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground bus.

E. Transformers:
   1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer. Bond neutral to ground at transformer.
   2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest component of the grounding electrode system. Bond neutral to ground at transformer.

F. Conduit Systems:
   1. Ground all metallic conduit systems in accordance with accepted methods and NEC.
   2. Conduit containing only a grounding conductor, and which is provided for mechanical protection of the conductor, shall be bonded to that conductor at the entrance and exit from the conduit.

G. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders and power and lighting branch circuits.

H. Boxes, Cabinets, Enclosures, and Panelboards:
   1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes.
   2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
   3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.

I. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.

J. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.

K. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

L. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

3.4 CORROSION INHIBITORS

A. When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.5 WIREWAY GROUNDING

A. Ground and Bond Metallic Wireway Systems as follows:
   1. Bond the metallic structures of wireway to provide 100 percent electrical continuity throughout the wireway system by connecting a #6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
   2. Install insulated #6 AWG bonding jumpers between the wireway system bonded as required in paragraph 1 above, and the closest building ground at each end and approximately every 50 feet.
   3. Use insulated #6 AWG bonding jumpers to ground or bond metallic wireway at each end at all intermediate metallic enclosures and cross all section junctions.

3.7 GROUND RESISTANCE

A. Grounding system resistance to ground shall not exceed 5 ohms. Make necessary modifications or additions to the grounding electrode system for compliance without additional cost. Final tests shall assure that this requirement is met.

B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

C. Services at power company interface points shall comply with the power company ground resistance requirements.

D. Below-grade connections shall be visually inspected by the Owners representative prior to backfilling. The Contractor shall notify the

3.8 GROUND ROD INSTALLATION

A. Drive each rod vertically in the earth, not less than 10 feet in depth.

B. Where permanently concealed ground connections are required, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.

END OF SECTION

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SECTON 17100 – INSTRUMENTATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:

A. The Contractor shall furnish and install all instrumentation as shown on the drawings and as indicated herein.

PART 2 – PRODUCTS

2.1 MAGNETIC FLOW METERS AND ACCESSORIES

A. The Contractor shall furnish and install all instrumentation equipment as shown on the drawings and as specified herein and as required to provide a complete and operational system. The flow sensor tube shall be made of stainless steel with carbon steel or stainless steel flanges pressure rated as required for the piping system as specified in other sections of the specifications. A wafer style sensor will not be acceptable. The flow sensor shall be to NEMA 6 (IP-68) suitable for permanent submersion to 30 feet. The signal converter shall translate the signal induced in the flow sensor into proportional analog output. There shall also be provided a digital indicator representing actual flow and total flow. The converter shall be capable of remote mounting. Integral converters are not acceptable. The signal converter shall have automatic zero stability and built-in “zero”, “span”, and “calibration” check circuitry. There shall be no need for external calibration devices. The flow range shall be digitally adjustable from 0-33 fps with a $1/100^{th}$ resolution. The output signal shall represent the true volumetric flow with a maximum error under application conditions not only under “reference” or laboratory calibration conditions. Accuracy: ±0.5% of reading for flows 1.0 fps – 33 fps. The converter shall have bi-directional flow capability and provide isolated 4-20 ma and scaleable pulse frequency outputs from separate terminals. A reverse flow indicator shall be provided. The signal converter shall be “user friendly”. No programming knowledge shall be required for its operation. The enclosure shall meet NEMA 4X and IP65 standards. Furnish and install grounding rings where they are required or necessary for proper operation of the system such as where they are used in non-conductive piping or non-conductive piping lining systems. The contractor and vendor shall identify these locations and submit the ring drawings and installation instructions with flow meter submittals. Units and all accessories shall be rated for outdoor service with UV exposure.

B. Approved manufacturers are Rosemount and ABB or equal with polymer liner and remote converter/display or pre-approved equal. Display shall indicate totalized flow and instantaneous flow.

C. Magnetic flow meter shall be guaranteed for a period of 3 years after placing into operation. Flow range shall be as shown on drawings or determined during shop drawing review.

2.2 CIRCULAR CHART RECORDERS

A. The Contractor shall furnish and install a circular chart recorder for each magnetic flow meter.

B. Recorders shall be 10’ circular with a 1 year supply of charts scaled 0-100%. Charts shall be daily or weekly as selected by Owner. Recorder shall indicate instantaneous flow and totalized flow on an electronic display. Recorder shall be ABB C1300 or pre-approved equal. Case shall be for wall mounting. Supply 1 year supply of charts scaled 0-100%. Recorder shall have the capability of being switched from daily to weekly recording.

C. Each recorder shall be mounted in a separate NEMA 4X non-metallic enclosure with a

Plexiglas cutout for extra rain protection and for viewing from the outside.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the manufacturers recommendations.

B. Submittals shall be in accordance with SECTION 16200.

END OF SECTION

SECTION 17110 – CONTROL PANELS

PART – 1 GENERAL

1.1 SCOPE

A. The Contractor shall furnish and install control panels and systems as listed below. For single source responsibility and warranty considerations, these panels shall be supplied by the manufacturer/vendor of the of the equipment which it operates.

B. All free standing panels shall have legs and shall be between 6 feet and 7 feet tall including legs. Breakers and switch handles shall be no higher than 6'7" to the center of the handle.

PART - 2 PRODUCTS

2.1 TRANSFER PUMPS CONTROL PANEL (TPCP)

A. Transfer pumps control panel shall contain at a minimum the following basic components:

1. NEMA 4x stainless steel enclosure with 3 point latches, and inner swing-out panels - Hoffman or equal. Panel to be free standing on legs.
2. All controls and indicators to be mounted on inner swing-out panels. No equipment shall be mounted on the outer doors.
3. Three (3) VFD's, ABB ACS 550 or approved equal. VFD keypads to be mounted on inner swing out door
4. Circuit breakers for each motor
5. Surge protection - Square D SDSA 3650
6. Triplex alternator with pump out of service switch
7. One (1) 5,000 Btu/hour NEMA 4X stainless steel side mounted industrial control panel air conditioner - ICEqube IQ5000V
8. Control power transformer with 3 fuses
9. Two (2) set-point controllers Precision Digital or approved equal. One detecting EQ tank level and the other detecting transfer pump flow. Furnish a submersible transducer.
10. 22mm HOA switch and run lights for each pump
11. Analog splitters as required to avoid looped signals
12. Lugs to accept feeders as indicated on drawings
13. 20/1 CB for control power
14. Terminals for all external wiring
15. Aux contacts that close upon loss of power, pump running (3), VFD fail (3), high level in EQ tank, analog output terminals that indicate EQ tank level
16. Intrinsically safe barrier for the transducer
17. Camo system in control panel for easy maintenance
18. Alarm light with red glass globe and guard and mounting accessories to indicate general alarm
19. Repeat cycle timer to alternate the pumps every 24 hours.
20. Other devices as indicated on the drawings
22. Panel to be manufactured by a UL Certified UL 508A manufacturer. Panel to have serialized UL seal as proof of certification. Submit manufacturer's certification number with submittals

B. Operation shall be as follows:

1. The pumps shall try to maintain a set-point level in the EQ tank. As the level rises the pumps shall increase speed and as it falls the pumps shall decrease speed. The lead pump shall start first and attempt to maintain the level, however, if it reaches full speed, the lag pump shall start. All running pumps shall operate at the same speed and only 2 pumps shall be allowed to operate at a time.
All 3 pumps shall be in the alternation sequence. The alternator shall sequence when all pumps stop. The VFD's shall be set such that they have a minimum operating speed. All operating pumps shall pump to the stop level. In the event that a pump operates continuously in a 24 hour period then the control system shall cause the pumps to alternate.

2. The flow signal shall control the maximum pump speed. At critical flow set- points, the maximum pump speed of all pumps shall be reduced simultaneously to limit the flow to the treatment plant. The maximum speed adjustments shall occur at 3 different flows (flows 1, 2 and 3). It shall be re-adjusted to 60 hz after a lower reset flow (flow 4) is obtained.

2.2 EQ TANK BLOWERS CONTROL PANEL (EQBCP)

A. EQ tank blowers control panel shall contain at a minimum the following basic components:

1. NEMA 4x stainless steel enclosure with 3 point latches, and inner swing-out panels - Hoffman or equal.
2. All controls and indicators to be mounted on inner swing-out panels. No equipment shall be mounted on the outer doors.
3. Two (2) soft start motor starters with NEMA rated external bypass contactors and overloads. Soft starts shall have 3 SCR's and shall be Square D ATS 48, ABB PST or approved equal.
4. Circuit breakers for each motor
5. Phase monitor active only when in bypass mode
6. Surge protection - Square D SDSA 3650 or approved equal.
7. Duplex alternator with 1-ALT-2 switch
8. Control power transformer with 3 fuses
9. 22mm HOA switch and run lights for each pump
10. 22mm SS-ACL switch
11. Lugs to accept feeders as indicated on drawings
12. 20/1 CB for control power
13. Terminals for all external wiring
14. Aux contacts that close upon loss of power, pump running (2)
15. Camo system in control panel for easy maintenance
16. Repeat cycle timer to alternate blowers every 24 hours
17. Other devices as indicated on the drawings
18. Panel to be manufactured by a UL Certified UL 508A manufacturer. Panel to have serialized UL seal as proof of certification. Submit manufacturer's certification number with submittals

2.3 DIGESTION BLOWERS CONTROL PANEL (DBCP)

A. Digestion blowers control panel shall contain at a minimum the following basic

components:

1. NEMA 4x stainless steel enclosure with 3 point latches, and inner swing-out panels - Hoffman or equal.
2. All controls and indicators to be mounted on inner swing-out panels. No equipment shall be mounted on the outer doors.
3. Two (2) soft start motor starters with NEMA rated external bypass contactors and overloads. Soft starts shall have 3 SCR's and shall be Square D ATS 48, ABB PST or approved equal.
4. Circuit breakers for each motor
5. Phase monitor active only when in bypass mode
6. Surge protection - Square D SDSA 3650 or approved equal.
7. Duplex alternator with 1-ALT-2 switch
8. Control power transformer with 3 fuses
9. 22mm HOA switch and run lights for each pump
10. 22mm SS-ACL switch for each pump
11. Lugs to accept feeders as indicated on drawings
12. 20/1 CB for control power
13. Terminals for all external wiring
14. Aux contacts that close upon loss of power, pump running (2)
15. Camo system in control panel for easy maintenance
16. Repeat cycle timer to alternate blowers every 24 hours
17. Other devices as indicated on the drawings
18. Panel to be manufactured by a UL Certified UL 508A manufacturer. Panel to have serialized UL seal as proof of certification. Submit manufacturer's certification number with submittals

2.4 AERATION BLOWERS CONTROL PANEL (ABCP)

A. Digestion blowers control panel shall contain at a minimum the following basic components:

1. NEMA 4x stainless steel enclosure with 3 point latches, and inner swing-out panels - Hoffman or equal. Panel to be free standing on legs.
2. All controls and indicators to be mounted on inner swing-out panels. No equipment shall be mounted on the outer doors.
3. Three (3) soft start motor starters with NEMA rated external bypass contactors and overloads. Soft starts shall have 3 SCR's and shall be Square D ATS 48, ABB PST or approved equal.
4. Circuit breakers for each motor
5. Phase monitor active only when in bypass mode
6. Surge protection - Square D SDSA 3650 or approved equal.
7. Triplex alternator with pump out of service switch
8. Control power transformer with 3 fuses
9. 22mm HOA switch and run lights for each pump
10. 22mm SS-ACL switch for each pump
11. Lugs to accept feeders as indicated on drawings
12. 20/1 CB for control power
13. Terminals for all external wiring
14. Aux contacts that close upon loss of power, pump running (2)
15. Camo system in control panel for easy maintenance
16. Repeat cycle timer to alternate blowers every 24 hours
17. Circuit breaker to feed scraper drive control panel
18. Circuit breaker for panel for MPZ

18. Other devices as indicated on the drawings
19. Panel to be manufactured by a UL Certified UL 508A manufacturer. Panel to have serialized UL seal as proof of certification. Submit manufacturer's certification number with submittals

2.5 EFFLUENT PUMPS CONTROL PANEL (EPCP)

A. Effluent pumps control panel shall contain at a minimum the following basic components:

1. NEMA 4x stainless steel enclosure with 3 point latches, and inner swing-out panels - Hoffman or equal. Panel to be free standing on legs.
2. All controls and indicators to be mounted on inner swing-out panels. No equipment shall be mounted on the outer doors.
3. Two (2) VFD's, ABB ACS 550 or approved equal. VFD keypads to be mounted on inner swing out door
4. Circuit breakers for each motor
5. Surge protection - Square D SDSA 3650
6. Duplex alternator with 1-ALT-2 switch
7. One (1) 5,000 Btu/hour NEMA 4X stainless steel side mounted industrial control panel air conditioner - ICEqube IQ5000V
8. Control power transformer with 3 fuses
9. One (1) set-point controller with submersible transducer detecting level
10. 22mm HOA switch and run lights for each pump
11. Analog splitters as required to avoid looped signals
12. Lugs to accept feeders as indicated on drawings
13. 20/1 CB for control power
14. Terminals for all external wiring
15. Aux contacts that close upon loss of power, pump running (2), VFD fail (2), high level in wet-well, analog output terminals that indicate wet-well level
16. Intrinsically safe barrier for the transducer
17. Camo system in control panel for easy maintenance
18. Alarm light with red glass globe and guard and mounting accessories to indicate general alarm
19. Repeat cycle timer to alternate pumps every 24 hours.
20. Other devices as indicated on the drawings
21. Panel to be manufactured by a UL Certified UL 508A manufacturer. Panel to have serialized UL seal as proof of certification. Submit manufacturer's certification number with submittals

B. Operation shall be as follows:

1. The pumps shall try to maintain a set-point level in the wet-well. As the level rises the pumps shall increase speed and as it falls the pumps shall decrease speed. The lead pump shall start first and attempt to maintain the level, however, if it reaches full speed, the lag pump shall start. All running pumps shall operate at the same speed. The alternator shall sequence when all pumps stop. All operating pumps shall pump to the stop level. In the event that a pump operates continuously in a 24 hour period, then the control system shall cause the pumps to alternate.

2.6 SCRAPER CONTROL PANEL (SCP)

Scraper control panel shall contain at a minimum the following basic components:

1. NEMA 4x stainless steel enclosure with 3 point latches, and inner swing-out panels - Hoffman or equal.
2. All controls and indicators to be mounted on inner swing-out panels. No equipment shall be mounted on the outer doors.
3. Across the line motor starter with overloads
4. Circuit breakers for motor
5. Phase monitor
6. Surge protection - Square D SDSA 3650 or approved equal.
7. Control power transformer with 3 fuses
8. 22mm HOA switch and run light
9. Lugs to accept feeders as indicated on drawings
10. 20/1 CB for control power
11. Terminals for all external wiring
12. Aux contacts that close upon loss of power, drive running
13. Camo system in control panel for easy maintenance
14. Other devices as indicated on the drawings
15. Panel to be manufactured by a UL Certified UL 508A manufacturer. Panel to have serialized UL seal as proof of certification. Submit manufacturer's certification number with submittals

PART - 3 EXECUTION

3.1 INSTALLATION

A. Install all panels and interconnecting wiring in accordance with the manufacturer’s instructions

B. Store all panels in a weather protected area until installation.

3.2 SUBMITTALS

A. Provide submittals in accordance with SECTION 16200.

END OF SECTION

SECTION-11 CONTRACT DRAWINGS

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GC-2	CIVIL DETAILS - II
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C-2	OVERALL SITE PLAN
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C-6	EFFLUENT FORCE MAIN STA. 4+00 – STA. 9+00
C-7	EFFLUENT FORCE MAIN STA. 9+00 – STA. 14+00
C-8	EFFLUENT FORCE MAIN STA. 14+00 – STA. 19+00
C-9	EFFLUENT FORCE MAIN STA. 19+00 – STA. END
C-10	SITE GRADING PLAN

PROCESS-MECHANICAL

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GM-2	MECHANICAL DETAILS - II
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1M-2	EQUALIZATION TANK – PLAN
1M-3	EQ. TANK BLOWER STATION – PLAN AND SECTIONS
1M-4	TRANSFER PUMP STATION
2M-1	PACKAGE TREATMENT UNIT – PLAN
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2M-3	PACKAGE TREATMENT UNIT – SPLITTER BOX
2M-4	PTU – BLOWER STATION – PLAN AND SECTIONS
3M-1	CHLORINE CONTACT TANK MODIFICATIONS
4M-1	EFFLUENT PUMP STATION – PLAN AND SECTION

STRUCTURAL

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GS-2	STRUCTURAL – GENERAL DETAILS
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1S-2	INFLUENT SCREEN PLATFORM – FRAMING
1S-3	INFLUENT SCREEN PLATFORM -- DETAILS
1S-4	EQUALIZATION TANK – FOUNDATION PLAN
2S-1	PACKAGE TREATMENT UNIT – FOUNDATION PLAN
2S-2	PACKAGE TREATMENT UNIT – STAIR/WALKWAY PLAN
2S-3	PACKAGE TREATMENT UNIT – STAIR DETAILS

2S-4	PACKAGE TREATMENT UNIT – DETAILS
3S-1	CHLORINE CONTACT TANK MODIFICATIONS
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E-7	TREATMENT PLANT ELECTRICAL
E-8	ELECTRICAL SITE PLAN
E-9	DETAILS

SECTION 11
ST TAMMANY PARISH

SET: _____

WEST ST. TAMMANY WWTP EXPANSION

ST. TAMMANY PARISH PROJECT NO. TU 17000251
ST TAMMANY PARISH BID NO. 21-21-2

PARISH PRESIDENT

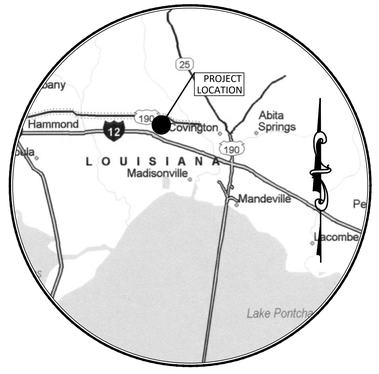
MICHAEL B. COOPER

COUNCIL MEMBERS

COUNCIL MEMBER - DISTRICT 1 MARTY DEAN
COUNCIL MEMBER - DISTRICT 2 DAVID R. FITZGERALD
COUNCIL MEMBER - DISTRICT 3 MARTHA J. CAZAUBON
COUNCIL MEMBER - DISTRICT 4 MICHAEL LORINO, JR, CHAIRMAN
COUNCIL MEMBER - DISTRICT 5 RYKERT O. TOLEDANO, JR
COUNCIL MEMBER - DISTRICT 6 CHERYL TANNER
COUNCIL MEMBER - DISTRICT 7 JAMES J. DAVIS
COUNCIL MEMBER - DISTRICT 8 CHRIS CANULETTE
COUNCIL MEMBER - DISTRICT 9 MIKE M. SMITH
COUNCIL MEMBER - DISTRICT 10 MAUREEN "MO" O'BRIEN
COUNCIL MEMBER - DISTRICT 11 STEVE STEFANCIK
COUNCIL MEMBER - DISTRICT 12 JERRY BINDER
COUNCIL MEMBER - DISTRICT 13 JAKE A. AIREY
COUNCIL MEMBER - DISTRICT 14 THOMAS J. "TJ" SMITH

SITE MAP
SCALE: 1 INCH = 500 FEET

0 500 1,000 1,500 2,000



VICINITY MAP
SCALE: 1 INCH = 15 MILES

JULY 30, 2021

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

STATE OF LOUISIANA
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PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

KYLE ASSOCIATES PROJECT NO. 14066

LIST OF DRAWINGS

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2S-4	PACKAGE TREATMENT UNIT - DETAILS
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E-7	TREATMENT PLANT ELECTRICAL
E-8	ELECTRICAL SITE PLAN
E-9	DETAILS

CADD FILE NAME: 14066 LOD.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
KMD	GAL	JEP	14066

SCALE: (22x34)	SCALE: (11x17)	DATE:
NTS	NTS	JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

LIST OF DRAWINGS

REVISIONS

NO.	DATE:	APP'D

STAMP: STATE OF LOUISIANA JAMES E. POWELL, JR. License No. 31063 PROFESSIONAL ENGINEER IN ENGINEERING

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

SHEET NO.

G-2

FLUID ABBREVIATION	FUNCTION THIS LIST INCLUDES SOME LINES NOT USED IN THIS PROJECT (* SEE NOTE 5)	PIPING MATERIALS (SEE SCH AT RIGHT)				FIELD TEST REQUIREMENTS (SEE NOTE 3 AND NOTE 4)		
		EXPOSED PIPING (SEE NOTE 14)		BURIED PIPING (SEE NOTE 13)		MINIMUM TEST PRESSURE PSI	TEST MEDIUM	LEAKAGE ALLOWANCE (SEE NOTE 2)
		4" DIA AND SMALLER	6" DIA AND LARGER	4" DIA AND SMALLER	6" DIA AND LARGER			
A	AERATION	1,14,16	11,15,16	1,16	11,16	25	AIR	(A)(D)
AW	FILTER AIR WASH	16	16	16	16	25	AIR	(A)(D)
B	BLEND	15	15	--	--	75	WATER	(A)
BD	BOTTOM DRAIN	--	26	--	26	50	WATER	(A)
BP	BLENDED PRODUCT	15	15,18	11	11	125	WATER	(A)
BYP	BYPASS	--	8	--	8	25	WATER	(A)
BW	FILTER BACKWASH	--	8	--	8	75	WATER	(A)
C	CONDENSATE	1*	1*	1*	1*	125	WATER	(A)
CAW	CHANNEL AGITATION WATER	16	16	16	16	25	WATER	(A)
CD	CHEMICAL DRAIN AND VENT	13,17	13,17	13,17	13,17	NOTE 7	--	--
CL	CHLORINE (GAS OR LIQUID STATE)	10	--	10	--	300	DRY AIR	(A)(D)
CLS	CHLORINE SOLUTION	16	16	16	16	125	WATER	(A)
CLV	CHLORINE GAS UNDER VACUUM	16	16	16	16	15 IN Hg	VACUUM	(A)(E)
CN	CENTRATE	--	26	--	26	50	WATER	(A)
CS	CAUSTIC SODA (SODIUM HYDROXIDE)	6,14,31	6,14,31	6,14,31	6,14,31	125	WATER	(A)
CSL	CIRCULATED SLUDGE	--	30	--	30	50	WATER	(A)
CV	CHLORINATOR VENT AND DETECTION LINE	16	16	16	16	NOTE 8	--	--
DCS	DEFOAMING CHEMICAL SOLUTION	16	16	16	16	125	WATER	(A)
DN	DECANT	--	26	--	26	50	WATER	(A)
DSL	DIGESTED SLUDGE	--	30	--	30	50	WATER	(A)
DW	DEMINERALIZED WATER	16,18	16,18	16,18	16,18	125	WATER	(A)
EE	ENGINE EXHAUST	14*	14*	14	14	NOTE 8	--	--
EFM	EFFLUENT FORCE MAIN	--	26	--	19,26	50	WATER	(A)
EWR	ENGINE COOLING WATER RETURN	1*	1*	1	1	125	WATER	(A)
EWS	ENGINE COOLING WATER SUPPLY	1*	1*	1	1	125	WATER	(A)
FR	FROTH	30	30	30	30	50	WATER	(A)
FA	FOUL AIR	--	18	--	18	10	AIR	(A)(D)
FE	FINAL EFFLUENT	--	8	--	8	50	WATER	(A)
FOR	FUEL OIL RETURN	9	9	9	9	125	AIR	(A)(D)
FOS	FUEL OIL SUPPLY	9	9	9	9	125	AIR	(A)(D)
FS	FROTH SPRAY	2	2	2	2	125	WATER	(A)
FSP	FIRE PROTECTION SPRINKLER SYSTEM	NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 9	WATER	--
FSW	FILTER SURFACE WASHWATER	14,16,18	8,14,15,16,18	2,16,18	2,8,15,16,18	125	WATER	(A)
FWW	FILTER WASTE WASHWATER	--	8	--	8	NOTE 6	WATER	(A)
G	GRIT	--	26	--	26	50	WATER	(A)
H	HYPOCHLORITE	16	16	16	16	125	WATER	(A)
HP	HYDROGEN PEROXIDE (30%-50%)	37	--	37	--	150	WATER	(A)
HWR	HEATING WATER RETURN	1*, 24*	1*, 11*	1*, 24*	1*, 11*	125	WATER	(A)
HWS	HEATING WATER SUPPLY	1*, 24*	1*, 11*	1*, 24*	1*, 11*	125	WATER	(A)
DHWR	DOMESTIC HOT WATER RETURN	1*, 24*	1*,11*	1*, 24*	1*, 11*	125	WATER	(A)
DHWS	DOMESTIC HOT WATER SUPPLY	1*, 24*	1*, 11*	1*, 24*	1*, 11*	125	WATER	(A)
IA	INSTRUMENT AIR	24	2	24	2	125	AIR	(A)(D)
IE	INTERMEDIATE EFFLUENT	--	8	--	8,28	50	WATER	8(A) 28(B)
LA	LIQUID ALUM	14,16,31,36	14,16,31,36	14,16,31,36	14,16,31,36	125	WATER	(A)
LO	LUBE OIL	9	9	9	9	125	AIR	(A) (D)
LOX	LIQUID OXYGEN	14*,24*	14*	14*,24*	14*	250	DRY N2	(A)
LPG	LIQUEFIED PETROLEUM GAS	3	3	3	3	NOTE 7	AIR	--
LS	LIME SLURRY	31,36,NOTE15	31,36,NOTE15	31,36,NOTE15	31,36,NOTE15	NOTE 8	--	--
LSP	LANDSCAPING SPRINKLER SYSTEM	2,16(NOTE20)	--	2,16(NOTE20)	--	NOTE 7	--	--
MC	MEMBRANE CONCENTRATE	14, 15	14, 15	31	31	NOTE 21	WATER	(A)
MCCR	MEMBRANE CLEANING CONCENTRATE RTN	36	36	--	--	125	WATER	(A)
MCPR	MEMBRANE CLEANING PERMEATE RETURN	36	36	--	--	125	WATER	(A)
MCR	MEMBRANE CLEANING RETURN	36	36	--	--	125	WATER	(A)
MCS	MEMBRANE CLEANING SUPPLY	36	36	--	--	125	WATER	(A)
MCW	MEMBRANE CLEANING WASTE	36	36	36	36	125	WATER	(A)
MF	MEMBRANE FEED	14	14	--	--	350	WATER	(A)
MP	MEMBRANE PERMEATE	15,36	15,36	--	--	125	WATER	(A)
MA	MURIATIC ACID	25	25	25	25	125	AIR	(A)(D)
ML	MIXED LIQUOR	2	2,8,26,28	2	2,8,26,28	50	WATER	2,8,26(A) 28(B)
NG	NATURAL GAS	9	9	9	9	NOTE 7	AIR	--
OF	OVERFLOW	--	8	--	8	25	WATER	(A)
OG	OFF GAS	18	18	18	18	15" WC	AIR	(A)
OTE	OXIDATION TOWER EFFLUENT	--	15	--	15	75	WATER	(A)
OW	OZONATED WATER	--	8,11	--	8,11	25	WATER	(A)
OX	OXYGEN	14,24	14	14,24	14	250	DRY N2	(A)
OZ	OZONE GAS	15	15	15	15	50	AIR	(A)(D)
PA	PLANT AIR	7,35	--	7,35	--	300,150(GR.35)	AIR	(A)(D)
PD	PLANT DRAIN OR DRAIN	2	8,12	2	8,12,22,28	NOTE 6	WATER	2,8(A) 12,28(B) 22(C)
PEA	POLYMER - ANIONIC	14,16,31,36	14,16,31,36	14,16,31,36	14,16,31,36	125	WATER	(A)
PEC	POLYMER-CATIONIC	14,16,31,36	14,16,31,36	14,16,31,36	14,16,31,36	125	WATER	(A)
PEF	PRIMARY EFFLUENT	--	8,26	--	8,26	25	WATER	(A)
PEN	POLYMER-NONIONIC	14,16,31,36	14,16,31,36	14,16,31,36	14,16,31,36	125	WATER	(A)
PI	PLANT INFLUENT	--	26	--	19,26	50	WATER	(B)
PO	PLANT OVERFLOW	2	8	2	8,28	NOTE 6	WATER	2,8(A) 28(B)
PW	POTABLE WATER	2,24	2	2,24	2,11,19	125	WATER	2,11,24(A) 19(B)
RAS	RETURN ACTIVATED SLUDGE	--	26	--	26	50	WATER	(A)
REW	RECLAIMED WATER	--	8	--	8	75	WATER	(A)
RSL	RAW SLUDGE	--	30	--	30	50	WATER	(A)
RW	RAW WATER	2	8	2	8,28	125	WATER	2,8(A) 28(B)
RWL	RAINWATER LEADER	4,12	4,12	12	12	NOTE 7	--	--
S	SCUM	--	30	--	30	50	WATER	(A)
SA	SAMPLE LINE (SEE LIST AT RIGHT)	16,18,24	--	16,18,24	--	125	WATER	(A)
SB	SODIUM BISULFITE	14,16,31,36	14,16,31,36	14,16,31,36	14,16,31,36	125	WATER	(A)
SC	SPARE CHEMICAL	16	16	16	16	125	WATER	(A)
SI	SCALE INHIBITOR	36	36	36	36	125	AIR	(A) (D)
SCV	SCAVENGER SYSTEM DISCHARGE	16,36	16,36	16,36	16,36	125	WATER	(A)
SD	SANITARY DRAIN AND VENT	4,12	12	12	12,21	NOTE 7	--	--
SDR	STORM DRAIN	--	8	--	22,28	NOTE 6	WATER	8(A) 28(B) 22(C)
SE	SECONDARY EFFLUENT	--	8,26	--	8,26	50	WATER	(A)
SF	SLUDGE FILTRATE	--	26	--	26	50	WATER	(A)
SG	SLUDGE GAS	14,15,37	14,15,37	14,15,37	14,15,37	125	AIR	(A)(D)
SHC	SODIUM HYPOCHLORITE	16,31,36	16,31,36	16,31,36	16,31,36	125	WATER	(A)
SN	SUPERNATANT	--	26	--	26	50	WATER	(A)
SO	SULFUR DIOXIDE (GAS OR LIQUID STATE)	10	--	10	--	300	DRY AIR	(A)(D)
SOA	SULFURIC ACID (93%-98%)	31,34	--	31,34	--	125	AIR	(A)(D)
SOS	SULFUR DIOXIDE SOLUTION	16	--	16	16	125	WATER	(A)
SOV	SULFUR DIOXIDE GAS UNDER VACUUM	16	16	16	16	15 IN Hg	VACUUM	(A)(E)
SPD	SUMP PUMP DISCHARGE	2, 16	16, 26	2, 16	16, 26	50	WATER	(A)
SS	SANITARY SEWER	--	26	--	12,21	NOTE 7	--	--
ST	STEAM (LOW PRESSURE TO 10 PSI)	1*	1*	1*	1*	125	WATER	(A)
SU	STRUCTURE UNDERDRAIN	--	--	23	23	NO	TEST	REQ'D
SUB	STARTUP BYPASS	14	14	--	--	75	WATER	(A)
SUC	STRUCTURE UNDERDRAIN COLLECTOR	--	--	23	23	NOTE 6	WATER	(C)
SWR	SCRUBBER WATER RETURN	16,18	16,18	16,18	16,18	15	WATER	(A)
TPR	THICKENER PRESSURIZED RECYCLE	--	26	--	26	50	WATER	(A)
TS	THICKENER SUBNATANT	--	26	--	26	50	WATER	(A)
TSL	THICKENED SLUDGE	--	30	--	30	50	WATER	(A)
TSO	THICKENER SUBNATANT OVERFLOW	--	26	--	26	50	WATER	(A)
UW	UTILITY WATER (NON-POTABLE WATER)	2,14,16,24	2,11,14,16	16,31	11,19,31	125	WATER	2,11,24(A) 19(B)
V	VACUUM	24	2	24	2	15 IN Hg	VACUUM	(A)(E)
WAS	WASTE ACTIVATED SLUDGE	--	26	--	26	50	WATER	(A)

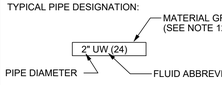
PIPING MATERIAL SCH (SEE NOTE 4 AND GENERAL NOTE AT RIGHT)

GROUP NO	PIPE (SEE NOTE 13)	FITTINGS	VALVES, 6" AND SMALLER (SEE NOTE 1, 11 & 16)
1	STEEL, ASTM A53, SCH 40, BLACK WELDED.	2 1/2" AND SMALLER, MALLEABLE IRON, ASME B16.3, THREADED, BANDED, BLACK, 150 PSI OR STEEL, ASME B16.9, BUTT-WELDED. 3" AND LARGER, CAST IRON, ASME B16.1, 125 PSI FLANGED OR MECHANICAL COUPLING.	BRONZE, THREADED, GATE: CRANE 428 UB OR STOCKHAM B-105. GLOBE: STOCKHAM B-37. CHECK: CRANE 37 OR STOCKHAM B-319Y. IRON PLUG VALVE: NORDSTROM FIG 142 OR 143. ECCENTRIC PLUG: DEZURIK PEC, CAST IRON OR MILLIKEN 603E. BALL: JAMESBURY FIG 351 OR WATTS #B-6080. LUBRICATED PLUG VALVE (FOR CONDENSATE ONLY): NORDSTROM FIG 114 OR 115.
2	STEEL, ASTM A53, SCH 40, BLACK WELDED, GALVANIZED	2 1/2" AND SMALLER, MALLEABLE IRON, ASME B16.3, THREADED, BANDED, GALVANIZED 150 PSI. 3" AND LARGER, CAST IRON, ASME B16.1, 125 PSI FLANGED OR MECHANICAL COUPLING.	2 1/2" AND SMALLER, ECCENTRIC PLUG, SYNTHETIC RUBBER FACED: DEZURIK PEC, CAST IRON, OR MILLIKEN 603E. BALL: JAMESBURY FIG 351 OR WATTS #B-6080. 3" AND LARGER, ECCENTRIC PLUG, SYNTHETIC RUBBER FACED: DEZURIK PEC, CAST IRON, OR MILLIKEN 601. GATE: AWWA C500. BUTTERFLY: AWWA, FLANGED
3	STEEL, ASTM A106 OR A53, SCH 80, SEAMLESS, BLACK.	FORGED STEEL, ASME B16.11, SOCKET WELDED OR THREADED, BLACK, 2000 PSI, OR STEEL, ASME B16.9, BUTT-WELDED, SCH 80.	CAST IRON, LUBRICATED PLUG: NORDSTROM FIG 214 OR 305
4	SAME AS GROUP NO. 1	CAST IRON, ASME B16.12, THREADED, DRAINAGE PATTERN.	--------
5	WELDED STEEL, AWWA C200, UNLINED.	WELDED STEEL, FABRICATED, AWWA C208, UNLINED.	AS INDICATED ON DRAWINGS
6	STEEL, ASTM A106, OR A53, SCH 40, SEAMLESS, BLACK.	STEEL, ASME B16.9, BUTT-WELDED. CAST IRON, ASME B16.1, 125 PSI, FLANGED FORGED STEEL, SOCKET WELDED, ASME B16.11, 2000 PSI OR STEEL, ASME B16.5, 150 PSI FLANGED.	CAST IRON, FLANGED, LUBRICATED PLUG: NORDSTROM FIG 143
7	SAME AS GROUP NO. 2.	MALLEABLE IRON, ASME B16.3, THREADED, BANDED, GALVANIZED, 300 PSI.	BRONZE THREADED, GLOBE: CRANE #212P OR STOCKHAM B-62 OR B-32T. BALL: JAMESBURY FIG 351 OR WATTS #B-6080. CHECK: CRANE #27TF OR STOCKHAM B-322T.
8	WELDED STEEL PIPE (AWWA C200 AND MODIFIED PER SECTION 02570)	WELDED STEEL, AWWA C208, FABRICATED.	AS INDICATED ON DRAWINGS.
9	SAME AS GROUP NO. 1.	2 1/2" AND SMALLER, MALLEABLE IRON, ASME B16.3, THREADED, BANDED, BLACK, 150 PSI. 3" AND LARGER, STEEL, ASME B16.9, BUTT-WELDED	ECCENTRIC PLUG: DEZURIK PEC, CAST IRON, OR MILLIKEN 603E. CHECK: CRANE 336E OR MILWAUKEE #544. BALL: JAMESBURY FIG 351 OR WATTS #B-6080.
10	SAME AS GROUP NO. 3.	1-1/4" AND SMALLER, FORGED STEEL, ASME B16.11, THREADED OR SOCKET WELDED, BLACK, 3000 PSI, WITH FLANGED AMMONIA UNIONS. 1-1/2" AND LARGER, STEEL, ASME B16.9, BUTT-WELDED OR FLANGED, SCHEDULE 80	SEMI-PLUG AND YOKE TYPE OR BALL FOR CHLORINE SERVICE, FORGED CARBON STEEL
11	DUCTILE IRON, ANSI A21.51, (AWWA C151 AND MODIFIED PER SECTION 02565), ENDS BELL AND SPIGOT, MECH. JOINTS OR 125 PSI FLGD. (TYPICAL SERVICE -WATER LINES).	DUCTILE IRON AWWA C110 AND MODIFIED PER SECTION 02565, BELL AND SPIGOT JOINTS (RESTRAINT OR NON-RESTRAINT), MECH CPLNG, FLGD OR MECH JTS, 250 PSI .(PRESS. RATING) 12" AND SMALLER, 150 PSI, (PRESS. RATING) 14" AND LARGER, WITH 125 PSI ASME B16.1 FLANGES. FOR HIGHER PRESS. RATING, REFER TO MFTR CATALOG.	GATE: AWWA C509, O-RING SEALS, MECHANICAL RESTRAINED JOINT ENDS, AMERICAN BUTTERFLY: AWWA C504. ECCENTRIC PLUG DEZURIK PEC, CAST IRON OR MILLIKEN 603E. BALL: PRATT OR APCO-WILLAMETTE.
12	CAST IRON SOIL. ANSI/ASTM A-74, SERVICE WEIGHT, BELL AND SPIGOT OR HUBLESS. AT THE OPTION OF THE CONTRACTOR, DUCTILE IRON (GROUP NO. 11) MAY BE SUBSTITUTED	CAST IRON SOIL. ANSI/ASTM A-74, SERVICE WEIGHT, BELL AND SPIGOT OR HUBLESS. AT THE OPTION OF THE CONTRACTOR, DUCTILE IRON (GROUP NO 11) MAY BE SUBSTITUTED.	AS INDICATED ON DRAWINGS.
13	CORROSION RESISTANT (HIGH SILICON CONTENT) CAST IRON, SERVICE WEIGHT, BELL AND SPIGOT OR HUBLESS.	CORROSION RESISTANT (HIGH SILICON CONTENT) CAST IRON, SERVICE WEIGHT, BELL AND SPIGOT OR HUBLESS.	--------
14	STAINLESS STEEL, TYPE 304, ASTM A312, SCHEDULE 40S.	STAINLESS STEEL, TYPE 304, SCREWED, WELDED SLIP-ON FLANGE ASME B16.3, OR SOCKET WELDED FITTINGS SCHEDULE 40S, (SCREWED JTS NOT ALLOWED FOR OZ, OX, LOX SERVICE)	STAINLESS STEEL, BALL, FLANGED: CONTROMATICS SERIES 2801 OR JAMESBURY SERIES 7150. CHECK: LADISH 5275 OR CRANE FIG 377 OR AS SHOWN ON DRAWINGS
15	STAINLESS STEEL, TYPE 304, ASTM A312, SCHEDULE 10S.	STAINLESS STEEL, TYPE 304 WELDED SLIP-ON FLG ASME B16.3, OR SOCKET WELDED FITTINGS SCHEDULE 40S, (NO SCREWED JOINTS ALLOWED)	STAINLESS STEEL, AS INDICATED ON DRAWINGS.
16	POLYVINYL CHLORIDE, SCHEDULE 40, NORMAL IMPACT. ASTM D1785. (SEE NOTE 18)	POLYVINYL CHLORIDE, SCH 40, NORMAL IMPACT, SOCKET SOLVENT WELD JOINTS, ASTM D2467. SOLVENT SHALL BE COMPATIBLE WITH FLUID SERVICE	POLYVINYL CHLORIDE, BALL, DIAPHRAGM, BUTTERFLY, OR LIFT CHECK: NIBCO/CHEMTROL, MCCANNA-MARPAC, OR GEORGE FISCHER SLOANE.
17	POLYPROPYLENE, ASTM D4101, SCHEDULE 40, WITH HEAT FUSED JOINTS.	POLYPROPYLENE, SCH 40, DRAINAGE TYPE WITH HEAT FUSED SOCKET JTS.	--------
18	FIBERGLASS REINFORCED PLASTIC, ASTM D2996, FILAMENT-WOUND, SOCKET AND SPIGOT ENDS, ADHESIVE BONDED.	FIBERGLASS REINFORCED PLASTIC, FILAMENT-WOUND, SOCKET ENDS, ADHESIVE BONDED, OR FIBERGLASS FLGD.	PLASTIC LINED, FLANGED. FLANGES TO MATCH 150 PSI ASME B16.5 DIMENSIONS, OR AS INDICATED ON DRAWINGS.
19	POLYVINYL CHLORIDE PRESSURE PIPE AWWA C900 (4"-12") OR AWWA C905 (14"-48") WITH BELL AND SPIGOT JOINTS.	DUCTILE IRON FITTINGS, 150 PSI, FOR POLYVINYL CHLORIDE PIPE, AWWA C110 CEMENT MORTAR LINED, AWWA C104.	SAME AS GROUP NO. 11.
20	VITRIFIED CLAY, PERFORATED, ASTM C 700, EXTRA STRENGTH, FLEXIBLE COMPRESSION JOINTS FOR BELL AND SPIGOT PIPE OR PLAIN END WITH MECHANICAL COMPRESSION JOINTS	VITRIFIED CLAY, ASTM C700, FLEXIBLE JOINTS FOR BELL AND SPIGOT PIPE OR PLAIN END WITH MECH COMPRESSION JOINTS.	--------
21	VITRIFIED CLAY, ASTM C700, EXTRA STRENGTH, FLEXIBLE COMPRESSION JOINTS FOR BELL AND SPIGOT PIPE OR PLAIN END WITH MECHANICAL COMPRESSION JOINTS	VITRIFIED CLAY, ASTM C700, FLEXIBLE JOINTS FOR BELL AND SPIGOT PIPE OR PLAIN END WITH MECH COMPRESSION JOINTS.	--------
22	REINFORCED CONCRETE, ASTM C76, O-RING BELL AND SPIGOT JOINTS.	USE MANHOLES.	--------
23	POLYVINYL CHLORIDE, CORRUGATED, GRAVITY SEWER PIPE, ASTM F794, F949, BELL AND SPIGOT, PERFORATED (FOR STRUCTURE UNDERDRAIN), NON-PERFORATED (FOR STRUCTURE UNDERDRAIN COLLECTOR).	POLYVINYL CHLORIDE, BELL AND/OR SPIGOT	--------
24	COPPER, ASTM B88, TYPE K, SOFT TEMPERED WHERE BURIED, HARD TEMPERED WHERE EXPOSED.	WROUGHT COPPER OR CAST BRONZE, ASME B16.22, SOLDER JOINT, 150 PSI, OR COMPRESSION FITTINGS. (FOR OXYGEN PIPING USE SILVER SOLDER, FOR COMPRESSED AIR PIPING USE 95-5 TIN-ANTIMONY SOLDER)	BRONZE, SOLDER JOINT, GLOBE: CRANE #1310 OR STOCKHAM B-14T. CHECK: CRANE #1342 OR 36, OR STOCKHAM B-309Y OR B-345. GATE: CRANE #426 OR STOCKHAM B-104 OR B-105.
25	STEEL, ASTM A106 OR A53, SCH 40, SEAMLESS, BLACK, PVDF OR PTFE LINED	STEEL, ASME B16.5, 150 PSI FLANGED, PVDF OR PTFE LINED	CAST STEEL PLUG, DIAPHRAGM OR CHECK, 150 PSI FLANGED, PVDF OR PTFE LINED.
26	SAME AS GROUP NO. 11 (TYPICAL SERVICE - SLUDGE AND SEWAGE LINES)	SAME AS GROUP NO. 11.	ECCENTRIC PLUG, SYNTHETIC RUBBER FACED: DEZURIK PEC, CAST IRON OR MILLIKEN 601. SWING TYPE CHECK: AWWA C508. BALL: PRATT OR APCO-WILLAMETTE.
27	POLYVINYL CHLORIDE GRAVITY SEWER PIPE, ASTM D3034, BELL AND SPIGOT.	POLYVINYL CHLORIDE, ANSI/ASTM D3034, BELL AND/OR SPIGOT.	--------
28	CONCRETE PRESSURE PIPE, AWWA C303, CLASS - SEE DRAWINGS (TYPICAL SERVICE - PRESSURE PIPELINES)	SAME AS GROUP NO. 8.	AS INDICATED ON DRAWINGS.
29	POLYETHYLENE PIPE AND TUBING, ASTM D2513, SDR FOR YARD PIPING PER PLUMBING CODE.	HEAT FUSION FITTINGS, PE 3406, PE 2306, PE 2406, OR PE 3406 COMPRESSION TYPE OR OTHER APPROVED JOINTS PER PLUMBING CODE.	POLYETHYLENE BALL VALVES APPROVED BY PLUMBING CODE.
30	SAME AS GROUP NO. 11, GLASS-LINED OR STEEL ASTM A53, SCH. 40, GLASS LINED.	SAME AS GROUP NO. 11, GLASS-LINED OR STEEL, ASME B16.9, SCH 40, GROOVED WITH MECH CPLG, GLASS-LINED.	SAME AS GROUP NO 26.
31	HIGH DENSITY POLYETHYLENE (HDPE) ASTM D3350 - SDR AS SPECIFIED.	HDPE THERMAL BUTT-FUSED FLANGE CONNECTIONS AT ALL VALVES AND TRANSITIONS.	--------
32	POLYVINYLIDENE FLUORIDE (PVDF), ASTM D3222, PRESS. RATING - ANSI SCHEDULE 80.	PVDF ASTM D3222, PRESSURE RATING ANSI SCHEDULE 80.	WETTED PARTS TO BE PVDF, CARPENTER 20, OR TEFLON.
33	HASTELLOY-C, ASTM B619, SCH. 40.	HASTELLOY-C, SOCKET WELDED FITTINGS, SCH. 40.	HASTELLOY-C, SOCKET OR FLANGED ENDS.
34	CARPENTER 20 (ALLOY 20), ASTM B472.	CARPENTER 20 (ALLOY 20) WELDED SOCKET END FITTINGS.	CARPENTER 20 (ALLOY 20) VALVES, VALVES 2-1/2" AND SMALLER SHALL HAVE FLANGED ENDS.
35	ABS THERMOPLASTIC, "CHEM-AIRE" OR APPROVED EQUAL, ASTM D3965.	CHEM-AIRE, SOLVENT WELDED JOINTS WHERE AVAILABLE OTHERWISE JOIN WITH BRONZE SOCKET UNION TO MALLEABLE IRON, ASME B16.3, THREADED, BANDED, GALVANIZED, 300 PSI.	BALL: CHEM-AIRE, GLOBE: CRANE #212P OR STOCKHAM B-62 OR B-32, CHECK: CRANE #27 OR STOCKHAM B-322.
36	CHLORINATED POLYVINYL CHLORIDE (CPVC) SCH. 80, ASTM DI 784 - CLASS 23447-B.	CPVC, SCHEDULE 80, SOCKET AND SOLVENT WELD JOINTS.	AS SPECIFIED AND INDICATED ON DRAWINGS.
37	SAME AS GROUP 14, EXCEPT TYPE 316L.	SAME AS GROUP 14, EXCEPT TYPE 316L.	SAME AS GROUP 14, EXCEPT USE 316L FOR WELDED END VALVES.

LIST OF SAMPLE LINES

PIPE DESIGNATION	SAMPLE POINT

TYPICAL PIPE DESIGNATION:



NOTES:

GENERAL NOTE
ALTHOUGH SEVERAL PIPE MATERIAL GROUPS MAY BE LISTED ON THIS SHEET FOR A GIVEN FLUID SERVICE, CONTRACTOR SHALL PROVIDE ONLY THE PIPE MATERIAL GROUP SHOWN ON THE DRAWINGS AND SPECIFIED FOR THAT FLUID SERVICE.

NOTE 1
PROPRIETARY NAMES HAVE BEEN QUOTED FOR IDENTIFICATION PURPOSES ONLY. SUBSTITUTIONS WILL BE PERMITTED SUBJECT TO PROVISIONS OF THE SPECIFICATIONS.

NOTE 2
LEAKAGE ALLOWANCE IS AS FOLLOWS:

(A) PIPES SO DESIGNATED SHALL SHOW ZERO LEAKAGE.
(B) PIPES SO DESIGNATED SHALL SHOW ZERO LEAKAGE FOR UNBURIED PIPE AND NOT MORE THAN 0.02 GALLON PER HOUR PER INCH DIAMETER PER 100 FEET OF BURIED PIPE.
(C) PIPES SO DESIGNATED SHALL NOT SHOW A LEAKAGE OF MORE THAN 0.15 GALLON PER HOUR PER INCH OF DIAMETER PER 100 FEET OF PIPE
(D) PIPES SO DESIGNATED SHALL NOT SHOW A LOSS OF PRESSURE OF MORE THAN 5 PERCENT
(E) PIPE SO DESIGNATED SHALL NOT SHOW A LOSS OF VACUUM OF MORE THAN 4 INCHES MERCURY COLUMN

NOTE 3
FOR FIELD TEST PROCEDURES AND ADDITIONAL TEST REQUIREMENTS, SEE PIPING SECTION OF SPECIFICATIONS.

NOTE 4
NO SUBSTITUTIONS UNLESS ACCEPTED BY THE ENGINEER PER THE SPECIFICATIONS.

NOTE 5
PIPING GROUP NUMBER SHOWN THUS * SHALL BE INSULATED. SEE PIPING SECTION OF SPECIFICATIONS FOR INSULATING MATERIALS.

NOTE 6
STATIC WATER TEST WITH SURFACE 5 FEET ABOVE HIGH POINT OF PIPE.

NOTE 7
INSPECTION AND TESTING SHALL BE IN ACCORDANCE WITH APPLICABLE PLUMBING CODE.

NOTE 8
NO APPARENT LEAKS UNDER NORMAL OPERATING CONDITIONS.

NOTE 9
INSPECTION AND TESTING SHALL BE IN ACCORDANCE WITH APPLICABLE NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS.

NOTE 10
PIPING MATERIALS SHALL BE IN ACCORDANCE WITH NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS.

NOTE 11
FOR VALVES 8" AND LARGER SEE VALVE SCH FOR SPECIAL VALVES SEE SPECIFICATIONS.

NOTE 12
CHANGE IN PIPING MATERIAL GROUP NUMBER IS INDICATED THUS: ——◆

NOTE 13
FOR PIPE LINING AND COATING, SEE SPECIFICATIONS.

NOTE 14
EXPOSED PIPING SHALL BE PAINTED IN ACCORDANCE WITH SPECIFICATIONS. COLORS TO BE SELECTED BY ENGINEER.

NOTE 15
FOR SHORT PIPE RUNS, LIME SLURRY PIPING MATERIAL SHALL BE NON-ABRASIVE FLEXIBLE RUBBER HOSE AND QUICK CONNECT COUPLINGS WITH GROUP NO. 1 AT EQUIPMENT.

NOTE 16
FOR VALVE ENDS, SEE SPECIFICATIONS.

NOTE 17
ALL RECLAIMED WATER PIPING SHALL BE COLOR CODED PURPLE OR AS REQUIRED BY LOCAL CODE.

NOTE 18
NOT USED.

NOTE 19
PROVIDE DOUBLE CONTAINMENT FOR ALL CHEMICAL PIPING PER CODE REQUIREMENTS.

NOTE 20
SIMILAR TO GROUP NO. 16, EXCEPT SCH. 40.

NOTE 21
FOR FIRST STAGE MEMBRANE CONCENTRATE TEST PRESSURE AT 250 PSI, FOR ALL OTHER LINES, 150 PSI

CADD FILE NAME: 14066-G3-ABBR.dwg

DESIGNED BY: KMD | DRAWN BY: GAL | CHECKED BY: JEP | JOB NO. 14066
SCALE: (22x34) NTS | SCALE: (11x17) NTS | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

ABBREVIATIONS AND PIPE SCHEDULE

NO.	DATE:	REVISIONS	APP'D

STAMP: STATE OF LOUISIANA — JAMES E. POWELL, JR. — LICENSE NO. 31063 — PROFESSIONAL ENGINEER — IN — CIVIL ENGINEERING

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
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SHEET NO.
G-3

Plot Date: Tuesday, August 3, 2021 5:08:55 PM
User: Gwen Ladner
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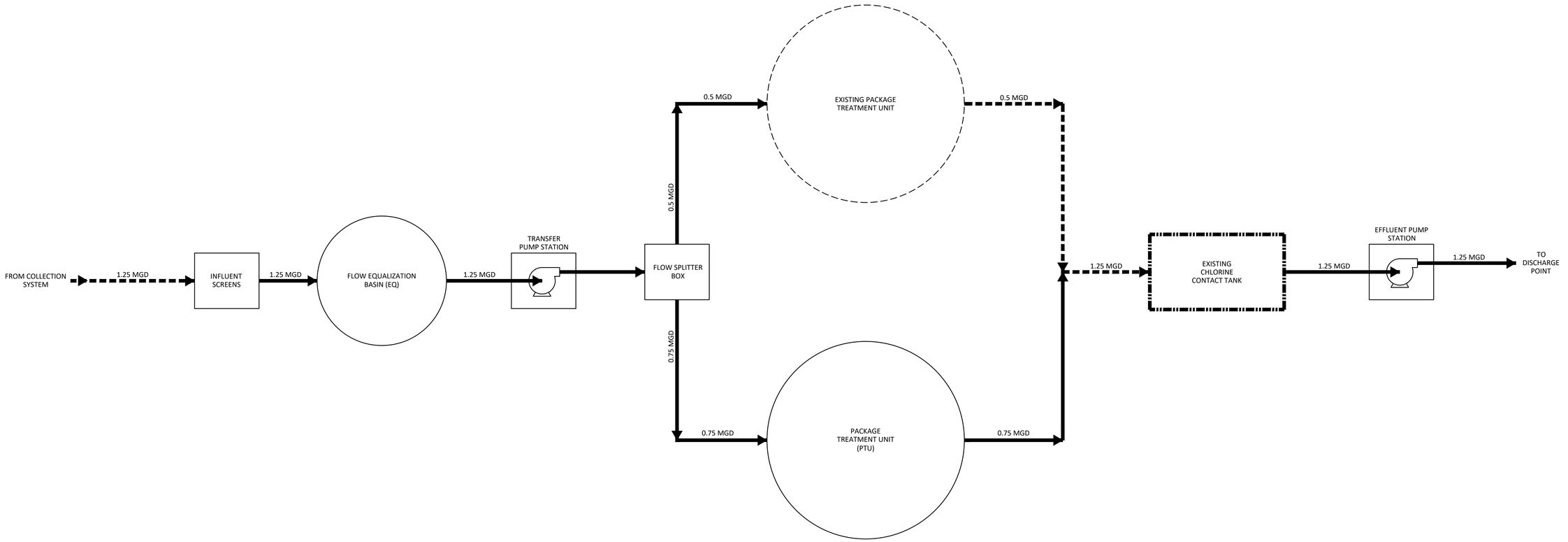

PROCESS FLOW DIAGRAM

PROCESS DESIGN INFORMATION

GENERAL

FLOW

EXISTING ADF	0.500 MILLION GALLONS PER DAY

EXPANSION DESIGN

PROCESS ADF	0.750 MILLION GALLONS PER DAY
PLANT TOTAL ADF	1.250 MILLION GALLONS PER DAY
PEAKING FACTOR	2.86
PROCESS PHF	2.145 MILLION GALLONS PER DAY
PLANT TOTAL PHF	3.575 MILLION GALLONS PER DAY
PROCESS POPULATION EQUIVALENT	7500

FLOW EQUALIZATION

USABLE VOLUME	400,000 GALLONS
DIAMETER	89.5 FEET
DEPTH	11 FEET
TOTAL VOLUME	517,600 GALLONS
MIXING AIR REQUIRED	647 CUBIC FEET PER MINUTE
BLOWERS	2 TOTAL; 1 DUTY + 1 STANDBY
CAPACITY, EACH	650 CUBIC FEET PER MINUTE
DISCHARGE PRESSURE	6 POUNDS PER SQUARE INCH

TRANSFER PUMPING

MAXIMUM FLOW	2483 GALLONS PER MINUTE
AVERAGE FLOW	868 GALLONS PER MINUTE
PUMPS	3 TOTAL; 2 DUTY + 1 STANDBY
CAPACITY, EACH	1,250 GALLONS PER MINUTE
TOTAL DYNAMIC HEAD	24.5 FEET

PACKAGE TREATMENT UNIT

EXTENDED AERATION PROCESS

VOLUME	750,000 GALLONS
DETENTION TIME AT ADF	24 HOURS
BOD LOADING AT ADF	1,275 POUNDS PER DAY
VOLUMETRIC BOD LOADING	12.7 POUNDS PER DAY PER 1000 CUBIC FEET
PROCESS AIR REQUIREMENT	1,815 CUBIC FEET PER MINUTE
MLSS	3,500 MILLIGRAMS PER LITER
RAS FLOW, MAXIMUM	780 GALLONS PER MINUTE
BLOWERS	3 TOTAL; 2 DUTY + 1 STANDBY
CAPACITY, EACH	990 CUBIC FEET PER MINUTE
DISCHARGE PRESSURE	9 POUNDS PER SQUARE INCH

AEROBIC SLUDGE DIGESTION

VOLUME	170,000 GALLONS
PROCESS AIR REQUIREMENT	682 CUBIC FEET PER MINUTE
BLOWERS	2 TOTAL; 1 DUTY + 1 STANDBY
CAPACITY, EACH	685 CUBIC FEET PER MINUTE
DISCHARGE PRESSURE	9 POUNDS PER SQUARE INCH

CLARIFICATION

DIAMETER	70 FEET
SIDE WATER DEPTH	12 FEET
SURFACE OVERFLOW RATE AT PHF	557 GALLONS PER DAY PER SQUARE FOOT
WEIR LOADING RATE AT PHF	10,200 GALLONS PER DAY PER LINEAR FOOT

CHLORINE CONTACT

LENGTH	51 FEET
WIDTH	11.67 FEET
DEPTH, MODIFIED	9.7 FEET
VOLUME, MODIFIED	43,180 GALLONS
DETENTION TIME AT PHF	17.3 MINUTES

EFFLUENT PUMPING

MAXIMUM FLOW	2483 GALLONS PER MINUTE
AVERAGE FLOW	868 GALLONS PER MINUTE
PUMPS	2 TOTAL; 1 DUTY + 1 STANDBY
CAPACITY, EACH	2,500 GALLONS PER MINUTE
TOTAL DYNAMIC HEAD	52.5 FEET

ADF = AVERAGE DAILY FLOW
BOD = BIOCHEMICAL OXYGEN DEMAND
MLSS = MIXED LIQUOR SUSPENDED SOLIDS
PHF = PEAK HOURLY FLOW
RAS = RETURN ACTIVATED SLUDGE

CADD FILE NAME: 14066 PFD.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
KMD	GAL	JEP	14066

SCALE: (22x34)	SCALE: (11x17)	DATE:
NTS	NTS	JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PROCESS FLOW DIAGRAM

REVISIONS

NO.	DATE:	APP'D

STAMP: STATE OF LOUISIANA — JAMES E. POWELL, JR. — License No. 31063 — PROFESSIONAL ENGINEER — ENGINEERING — 7/30/2021

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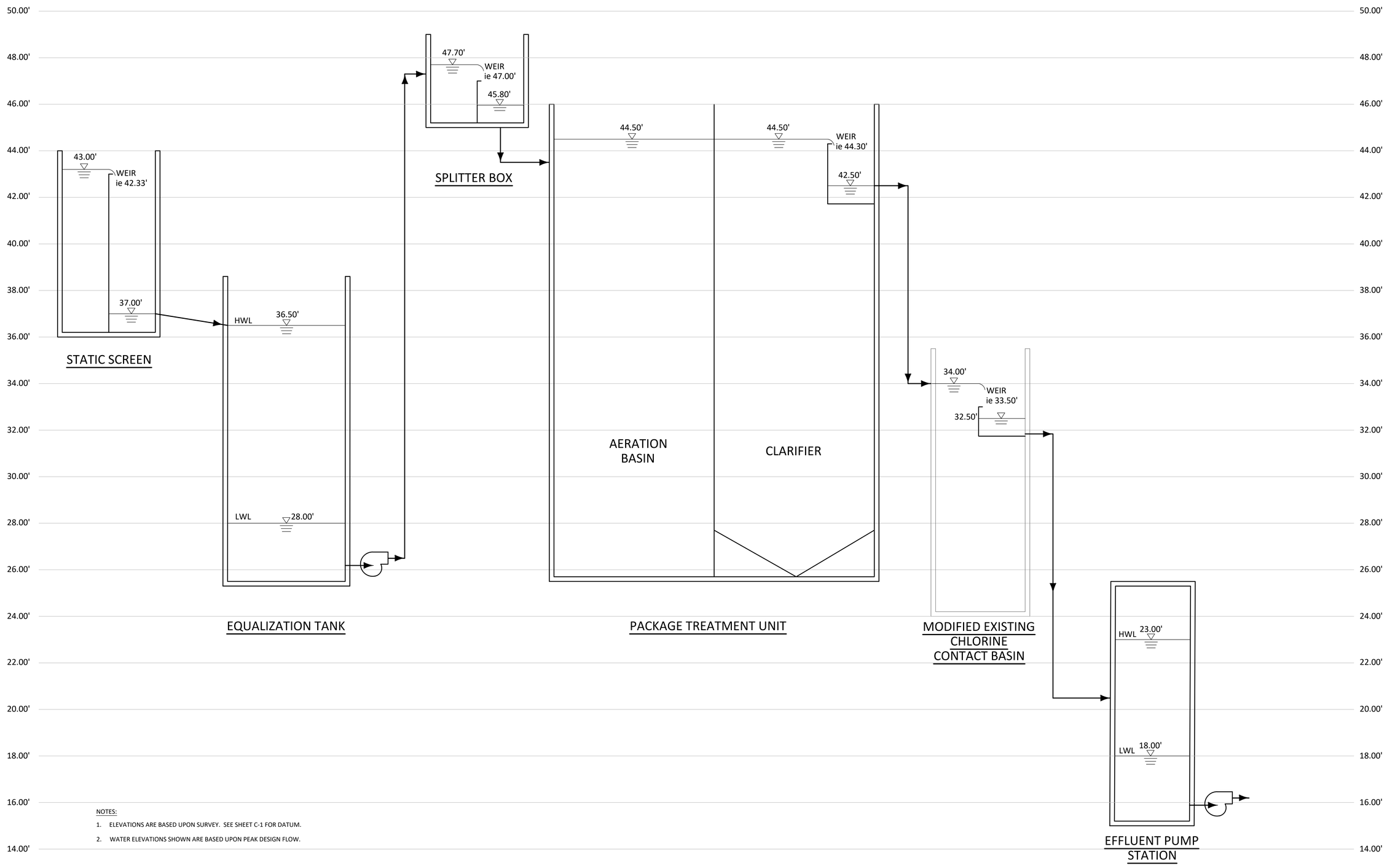
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

SHEET NO.
G-4



NOTES:

1. ELEVATIONS ARE BASED UPON SURVEY. SEE SHEET C-1 FOR DATUM.
2. WATER ELEVATIONS SHOWN ARE BASED UPON PEAK DESIGN FLOW.

CADD FILE NAME: 14066 HPRO.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) -	SCALE: (11x17) -	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

HYDRAULIC PROFILE

NO.	DATE:	REVISIONS	APP'D

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SHEET NO.

G-5

Plot Date: Tuesday, August 3, 2021 5:09:09 PM

User: Gwen Ladner

File:N:\2014\14066 - West St. Tammany WWTP Expansion\Drawings\General\14066 HPRO.dwg

CIVIL GENERAL NOTES

GENERAL

1. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE FROM DAMAGE. ALL IMPROVEMENTS DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE EXPEDITIOUSLY REPAIRED OR RECONSTRUCTED TO THE CLIENT'S SATISFACTION AT THE CONTRACTOR'S EXPENSE WITHOUT ADDITIONAL COMPENSATION.

2. THE CONTRACTOR SHALL PROPERLY DISPOSE AT AN APPROVED LANDFILL OR, OTHER SUITABLE DISPOSAL SITES ALL DEBRIS FROM DEMOLITION AT CONTRACTORS EXPENSE.

3. CONTRACTOR SHALL RESTORE ALL SURVEY MONUMENTS THAT ARE DAMAGED OR DESTROYED DURING CONSTRUCTION.

4. ALL ELEVATIONS ARE NAVD 88.

UTILITIES

1. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES IN AND AROUND THE AREAS OF NEW CONSTRUCTION. THE CONTRACTOR SHALL POTHOLE FOR EXISTING UTILITIES PRIOR TO SUBMITTAL OF SHOP DRAWINGS, FOR POINTS OF CONNECTIONS.

2. LOCATIONS OF UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM AVAILABLE RECORDS. THE CONTRACTOR SHALL VERIFY ALL LOCATIONS AND ELEVATIONS AND SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT UTILITY LINES WHETHER SHOWN OR NOT SHOWN.

3. PRIOR TO ANY CONNECTION TO AN EXISTING UTILITY, THE CONTRACTOR SHALL COORDINATE WITH THE UTILITY OWNER.

4. ALL KNOWN UTILITIES ARE SHOWN ON THE PROJECT DRAWINGS. ADDITIONAL CONFLICTS UNKNOWN TO THE OWNER MAY BE ENCOUNTERED DURING CONSTRUCTION. THE CONTRACTOR SHALL CONTACT LA-ONE CALL, PHONE 1-800-272-3020, FOR UTILITY LOCATION 72 HOURS PRIOR TO BEGINNING ANY CONSTRUCTION. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES.

PIPING

1. THE CONTRACTOR SHALL COMPLY WITH THE LOUISIANA DEPARTMENT OF HEALTH GUIDELINES FOR THE SEPARATION OF WATER MAINS AND SANITARY SEWERS.

2. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 30 INCHES OF COVER ON ALL PIPELINES UNLESS OTHERWISE SHOWN OR DIRECTED.

3. STRAIGHT SLOPES SHALL BE MAINTAINED BETWEEN INVERT ELEVATIONS SHOWN OR SPECIFIED.

4. THE CONTRACTOR SHALL ADJUST ALL VALVE BOXES, PULL BOXES AND MANHOLES TO FINISHED GRADE UNLESS OTHERWISE SHOWN OR SPECIFIED. MANHOLES IN OPEN FIELDS SHALL BE SET ONE FOOT ABOVE GRADE. APPROXIMATE RIM ELEVATIONS ARE SHOWN ON DRAWINGS.

5. ALL PIPE TRENCHING AND BACKFILL SHALL BE IN ACCORDANCE WITH DETAIL C-6 ON SHEET GC-2.

EROSION CONTROL

THE CONTRACTOR SHALL SUBMIT AN EROSION CONTROL PLAN FOR WORK DURING THE CONSTRUCTION PRIOR TO THE START OF CONSTRUCTION.

1.

a. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTATION AND MAINTENANCE OF EROSION CONTROL MEASURES CONTAINED WITHIN THE CONTRACT SPECIFICATIONS OR AS REQUIRED BY THE PARISH, DISTRICT, OR OTHER REGULATORY AUTHORITY. THE CONTRACTOR SHALL ALSO PROVIDE ANY ADDITIONAL EROSION CONTROL MEASURES (E.G. HYDROSEEDING, MULCHING OF STRAW, SAND BAGGING, DIVERSION DITCHES, ETC.) DICTATED BY FIELD CONDITIONS TO PREVENT EROSION OR THE INTRODUCTION OF DIRT, MUD, OR DEBRIS INTO EXISTING PUBLIC STREETS, WATERWAYS, OR ONTO ADJACENT PROPERTIES DURING ANY PHASE OF CONSTRUCTION OPERATIONS.

SUGGESTED SEQUENCE OF CONSTRUCTION:

THE FOLLOWING IS THE SUGGESTED SEQUENCE OF CONSTRUCTION FOR THE PROJECT IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS; HOWEVER, CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR PERFORMING THE WORK IN A REASONABLE, SEQUENTIAL MANNER THAT PROVIDES FOR THE COMPLETE INSTALLATION AND FUNCTION OF ALL PROPOSED INFRASTRUCTURE WHILE PROVIDING FOR PROPER CONSTRUCTION ACCESS. CONTRACTOR IS ALSO RESPONSIBLE FOR ENSURING THAT THE EXISTING WASTEWATER TREATMENT PLANT REMAINS IN OPERATION AND IS ACCESSIBLE BY THE OWNER THROUGOUT THE CONSTRUCTION.

1. PERFORM SITE CLEARING AND REMOVAL OF ALL SITE OBSTRUCTIONS AS INDICATED ON THE CONTRACT DOCUMENTS AS WELL AS INSTALL ALL NEW SITE FENCING TO ENSURE A PROPERLY SECURED SITE FOR THE CONTRACTOR AND OWNER.

2. PERFORM EXPLORATORY EXCAVATIONS AS NECESSARY TO VERIFY THE SIZE/LOCATION OF ALL UNDERGROUND PIPING INDICATED. COORDINATE WITH OWNER/ENGINEER TO ENSURE A COMPLETE UNDERSTANDING OF ALL PIPE ROUTING AND PROPER SEQUENCING OF EXISTING PIPE REMOVAL AND/OR RELOCATION.

3. INSTALL TEMPORARY SEWER FORCEMAINS AND WATER LINES AROUND SITE TO PROVIDE CONTINUOUS SERVICE TO EXISTING WASTEWATER TREATMENT PLANT AND REMOVE EXISTING LINES WITHIN FOOTPRINT OF NEW CONSTRUCTION. ROUTING OF TEMPORARY LINES SHALL BE DETERMINED BY CONTRACTOR AND SHALL BE DONE IN A MANNER THAT ENSURES THE LINES ARE PROPERLY PROTECTED FROM CONSTRUCTION TRAFFIC AND DO NOT INTERFERE WITH OTHER EXISTING INFRASTRUCTURE OR NEW INFRASTRUCTURE BEING CONSTRUCTED AS PART OF THIS PROJECT.

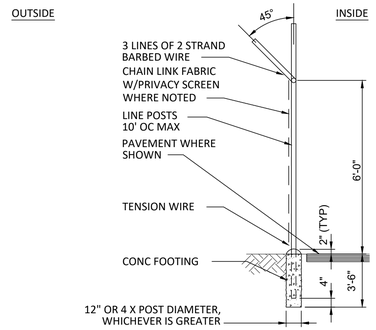
4. CONSTRUCT NEW WASTEWATER TREATMENT PLANT, EQALIZATION BASIN, INFLUENT SCREENS, ASSOCIATED FOUNDATIONS/SUPPORT STRUCTURES, EFFLUENT LIFT STATION, BLOWERS, TRANSFER PUMPS, SPLITTER BOX, STAIRS/LANDINGS/PLATFORMS, ON-SITE/OFF-SITE PIPING, ETC. PER THE CONTRACT DOCUMENTS.

5. INSTALL TEMPORARY CHLORINE CONTACT CHAMBER FOR EXISTING WASTEWATER TREATMENT PLANT INCLUDING ALL NECESSARY PIPING.

6. REFURBISH EXISTING CHLORINE CONTACT CHAMBER PER CONTRACT DOCUMENTS.

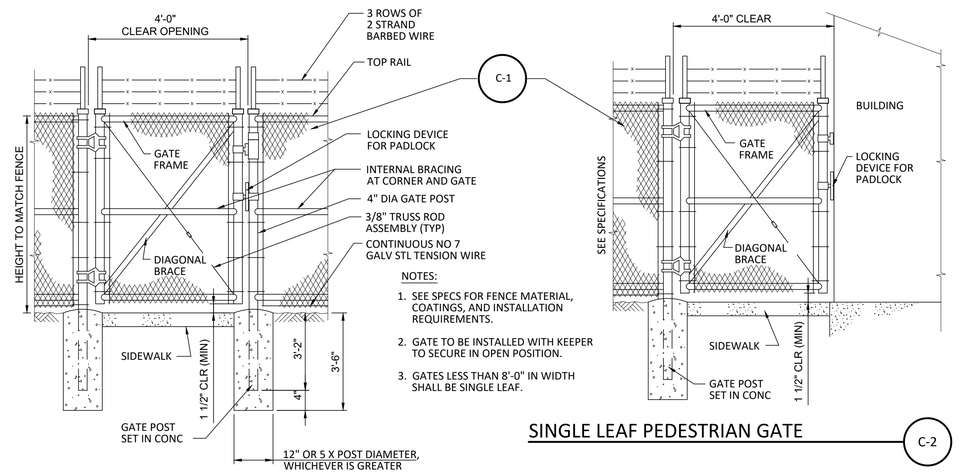
7. TESTING AND STARTUP OF COMPLETE, NEW WASTEWATER TREATMENT SYSTEM INCLUDING INFLUENT SCREENS, EQUALIZATION BASINS, WASTEWATER TREATMENT PLANT, BLOWERS, TRANSFER PUMPS, SPLITTER BOX, MODIFIED CHLORINE CONTACT CHAMBER AND EFFLUENT LIFT STATION.

8. SITE CLEANUP, FINAL LIMESTONE TOPPING OF SITE AND PUNCHLIST COMPLETION.



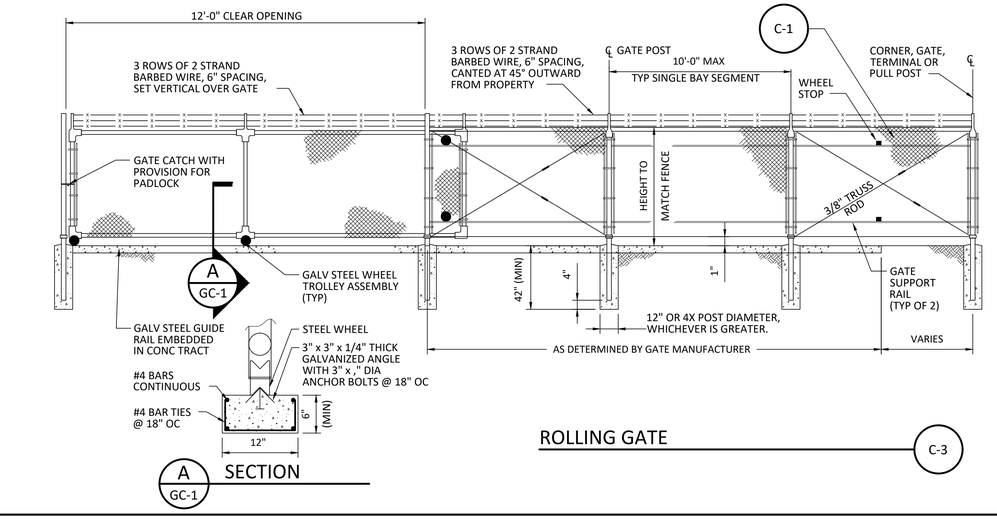
NOTES:
1. SEE SPECIFICATIONS FOR FENCE MATERIAL, COATINGS, AND INSTALLATION REQUIREMENTS.
2. EXTENSION ARM MAY BE TURNED IN AT OPTION OF OWNER.

CHAIN LINK FENCE — C-1



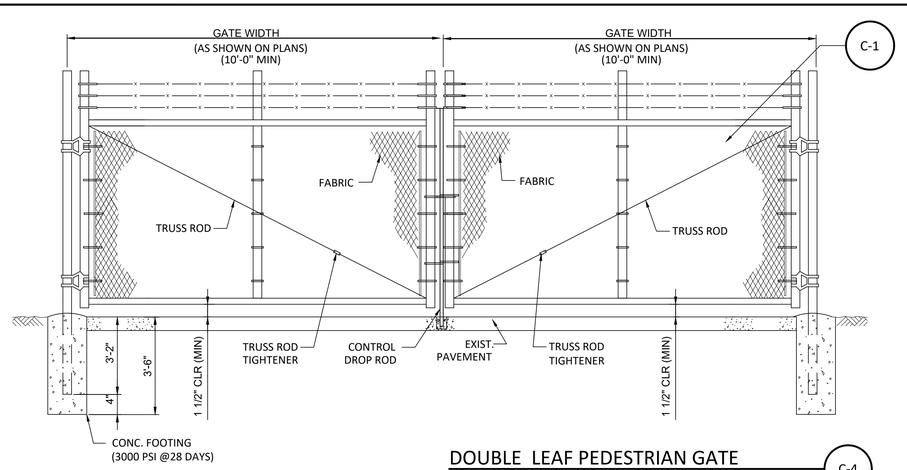
NOTES:
1. SEE SPECS FOR FENCE MATERIAL, COATINGS, AND INSTALLATION REQUIREMENTS.
2. GATE TO BE INSTALLED WITH KEEPER TO SECURE IN OPEN POSITION.
3. GATES LESS THAN 8'-0" IN WIDTH SHALL BE SINGLE LEAF.

SINGLE LEAF PEDESTRIAN GATE — C-2

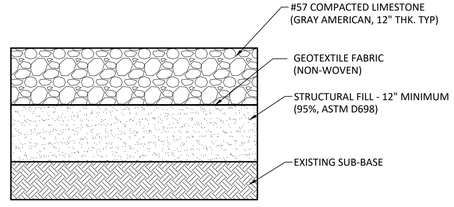


ROLLING GATE — C-3

A GC-1 SECTION



DOUBLE LEAF PEDESTRIAN GATE — C-4



TYPICAL LIMESTONE SURFACING DETAIL — C-5

CADD FILE NAME: 14066-GC-01.dwg

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SCALE: (22x34) NONE	SCALE: (11x17) NONE	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

CIVIL DETAILS - I

REVISIONS

NO.	DATE:	APP'D

STAMP: JAMES F. POWELL, JR. LICENSE No. 31063 PROFESSIONAL ENGINEER STATE OF LOUISIANA CIVIL ENGINEERING

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Planning, Engineering, and Landscape Architecture
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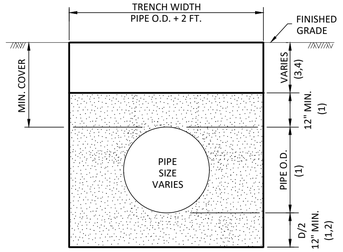
SHEET NO.
GC-1

Plot Date: Tuesday, August 3, 2021 5:09:18 PM
User: Gwen Ladner
File:N:\2014\14066 - West St. Tammany WWTP Expansion\Drawings\Civil\14066-GC-01.dwg

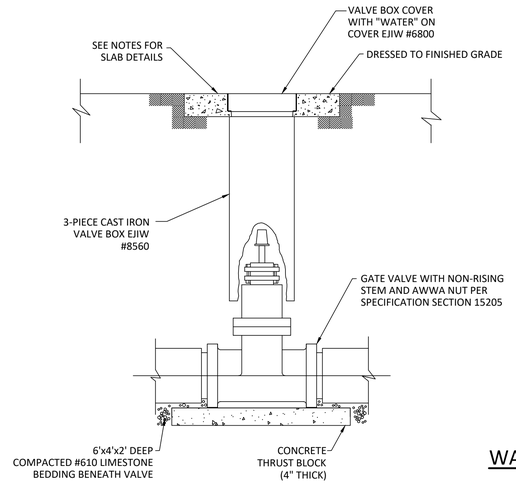


MIN. COVER	PIPE SIZE (IN.)
3 FT.	LESS THAN 12
4 FT.	12 AND GREATER

NOTES:

1. COMPACTED GRANULAR MATERIAL MIN. DENSITY 95% STANDARD PROCTOR (ASTM D698) 6" MAX. LAYERS.
2. PROVIDE BELL HOLES AT EACH JOINT.
3. SELECT EXCAVATED MATERIAL FREE OF STUMPS, DEBRIS AND VOIDS FOR NON-PAVED AREA.
4. COMPACTED GRANULAR MATERIAL WITHIN THE STREETS RIGHT-OF-WAY MIN. DENSITY 95% STANDARD PROCTOR (ASTM D698) 6" MAX. LAYERS.
5. WHERE GROUND WATER OR UNSTABLE TRENCH BOTTOM EXISTS, TRENCH BOTTOM SHALL BE STABILIZED (ASTM D2321) TO PROVIDE A WORKING PLATFORM.
6. TRENCH DETAIL SHOWN SHALL BE MINIMUM REQUIREMENTS TO SAFEGUARD THE INTEGRITY OF THE UTILITY LINE INSTALLATION AT REQUIRED DEPTHS. THE CONTRACTOR SHALL PROVIDE SUFFICIENT SHEETING AND BRACING TO PROVIDE SAFE WORKING CONDITIONS FOR HIS WORKERS.

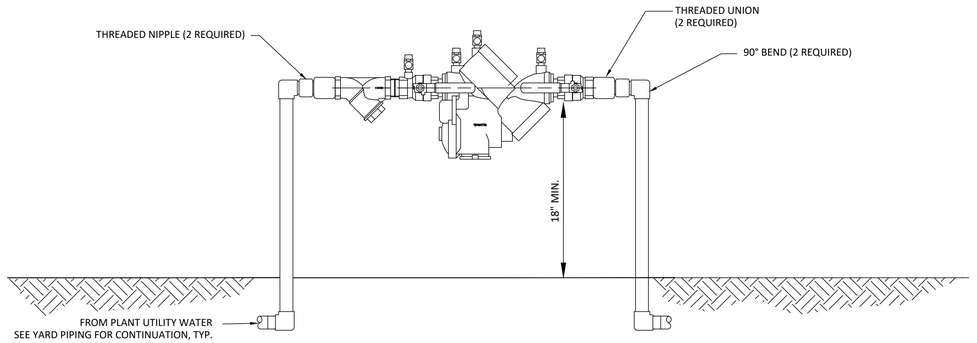
STANDARD PIPE TRENCH — C-6



NOTES:

1. FOR NON-PAVEMENT AREAS, SLAB SHALL BE 2'x2'x4" CONCRETE.
2. FOR TRAFFIC AREAS, SLAB SHALL BE 2'x2' WITH THICKNESS TO MATCH PAVEMENT (8" MIN.)
3. IN CONCRETE PAVEMENT, USE EXPANSION JOINT ON ALL SIDES OF VALVE BOX SLAB.
4. FOR VALVE CLUSTERS, SLAB SHALL BE SIZE INDICATED ON SITE PLAN.

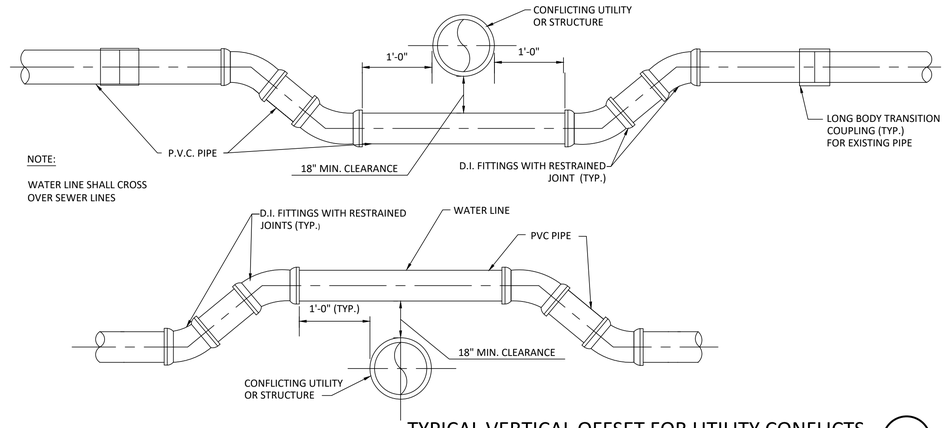
WATER VALVE AND VALVE BOX DETAIL — C-7



NOTES:

1. SUPPORT PIPING AS REQUIRED, PER SPECIFICATION SECTION 15006.
2. BACKFLOW PREVENTER SHALL BE INSULATED TO PROTECT AGAINST FREEZING.

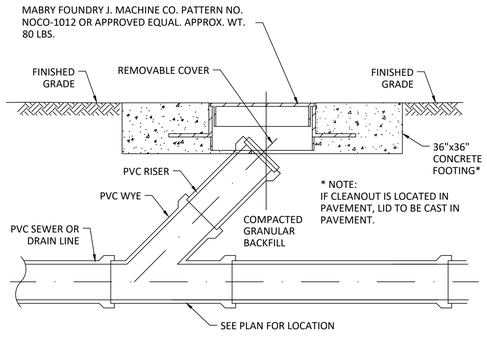
BACK-FLOW PREVENTER DETAIL — C-8



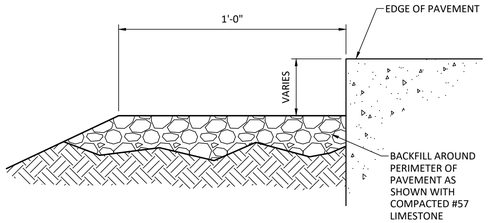
NOTE:

WATER LINE SHALL CROSS OVER SEWER LINES

TYPICAL VERTICAL OFFSET FOR UTILITY CONFLICTS — C-9



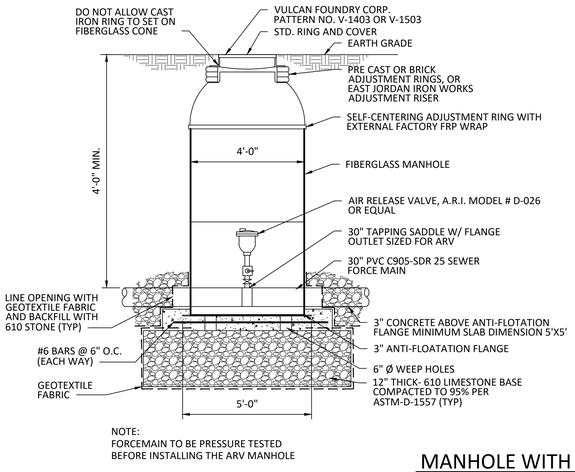
TYPICAL CLEANOUT DETAIL — C-10



NOTE:

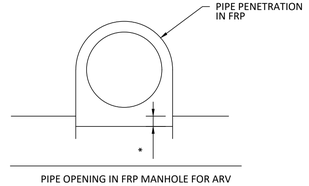
TYPICAL DETAIL TO BE USED WHERE NO GRADES ARE INDICATED ADJACENT TO PAVEMENT.

BACKFILL AROUND PAVEMENT — C-11

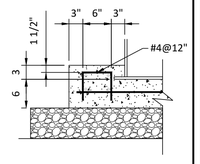


NOTE:
FORCEMAIN TO BE PRESSURE TESTED BEFORE INSTALLING THE ARV MANHOLE

MANHOLE WITH AIR RELEASE VALVE — C-12



WALL DETAIL



ANTI-FLOATATION JOINT

CADD FILE NAME: 14066-GC-02.dwg

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SCALE: (22x34) NONE	SCALE: (11x17) NONE	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

CIVIL DETAILS - II

REVISIONS

NO.	DATE:	APP'D

STAMP: STATE OF LOUISIANA — JAMES E. POWELL, JR. — License No. 31063 — PROFESSIONAL ENGINEER — ENGINEERING — 07-30-21

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Planning, Engineering, and Landscape Architecture
838 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

SHEET NO.

GC-2

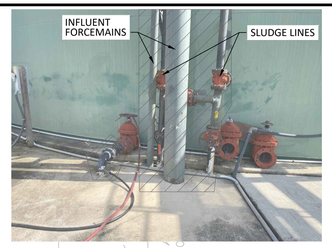


PHOTO 1

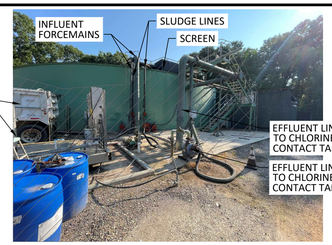


PHOTO 2

0 10 20 40

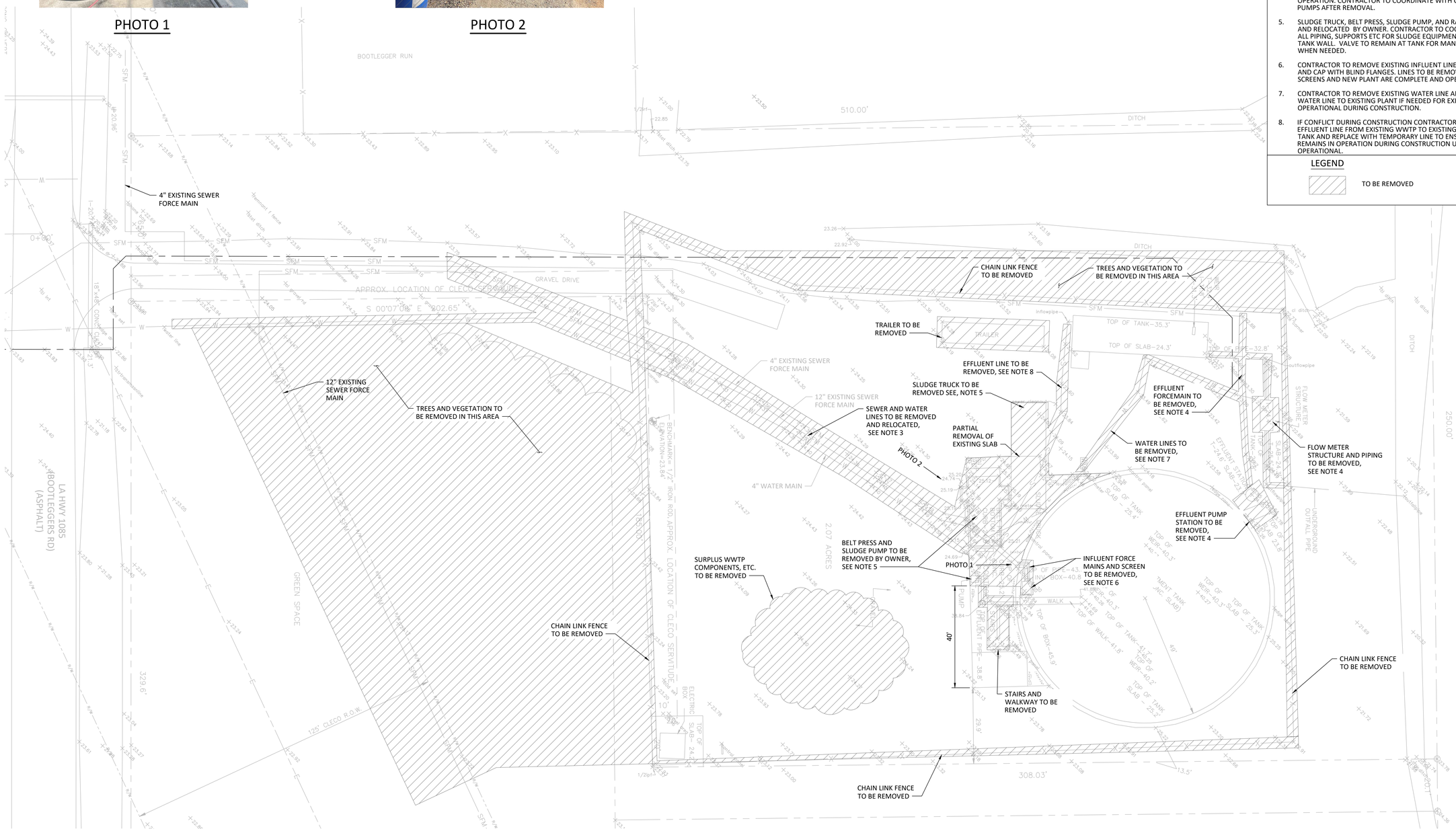
SCALE IN FEET

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR DEMOLITION AND DISPOSAL OF REQUIRED DEMOLITION ITEMS PER THE SPECIFICATIONS AND DEMOLITION PLAN. CONTRACTOR RESPONSIBLE TO COORDINATE DEMOLITION SEQUENCE AS TO KEEP EXISTING PLANT IN OPERATION DURING CONSTRUCTION OF NEW PLANT.
2. LOCATION OF UNDERGROUND UTILITIES SHOWN ON DRAWINGS WERE OBTAINED FROM AVAILABLE RECORDS AND TOPOGRAPHIC SURVEY. THE CONTRACTOR SHALL VERIFY ALL LOCATIONS AND ELEVATIONS.
3. CONTRACTOR TO RELOCATE WATER AND SEWER FORCE MAINS WHILE KEEPING EXISTING PLANT IN SERVICE DURING CONSTRUCTION OF NEW PLANT.
4. EXISTING EFFLUENT PUMP STATION, FORCE MAIN AND FLOW METER TO BE REMOVED ONLY AFTER NEW PUMP STATION AND FORCE MAIN IS IN OPERATION. CONTRACTOR TO COORDINATE WITH OWNER WHERE TO STORE PUMPS AFTER REMOVAL.
5. SLUDGE TRUCK, BELT PRESS, SLUDGE PUMP, AND RAS PUMP TO BE REMOVED AND RELOCATED BY OWNER. CONTRACTOR TO COORDINATE WITH OWNER. ALL PIPING, SUPPORTS ETC FOR SLUDGE EQUIPMENT TO BE REMOVED TO TANK WALL. VALVE TO REMAIN AT TANK FOR MANUAL SLUDGE REMOVAL WHEN NEEDED.
6. CONTRACTOR TO REMOVE EXISTING INFLUENT LINE TO EXISTING SCREEN AND CAP WITH BLIND FLANGES. LINES TO BE REMOVED ONLY AFTER THE NEW SCREENS AND NEW PLANT ARE COMPLETE AND OPERATIONAL.
7. CONTRACTOR TO REMOVE EXISTING WATER LINE AND INSTALL TEMPORARY WATER LINE TO EXISTING PLANT IF NEEDED FOR EXISTING PLANT TO REMAIN OPERATIONAL DURING CONSTRUCTION.
8. IF CONFLICT DURING CONSTRUCTION CONTRACTOR CAN REMOVE EXISTING EFFLUENT LINE FROM EXISTING WWTP TO EXISTING CHLORINE CONTACT TANK AND REPLACE WITH TEMPORARY LINE TO ENSURE EXISTING PLANT REMAINS IN OPERATION DURING CONSTRUCTION UNTIL NEW PLANT IS OPERATIONAL.

LEGEND

TO BE REMOVED



SITE DEMOLITION PLAN

1"-20'-0"

CADD FILE NAME: 14066-PL-DEMO.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 1"=20'-0"	SCALE: (11x17) 1"=40'-0"	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

SITE DEMOLITION PLAN

REVISIONS	NO.	DATE:	APP'D

STAMP: STATE OF LOUISIANA — JAMES E. POWELL, JR. — License No. 31063 — PROFESSIONAL ENGINEER — ENGINEERING — 07-30-2021

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Planning . Engineering . and Landscape Architecture
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SHEET NO.

DC-1

Plot Date: Tuesday, August 3, 2021 5:09:40 PM

User: Gwen Ladner

File:N:\2014\14066 - West St. Tammany WWTP Expansion\Drawings\Civil\14066-PL-DEMO.dwg

Plot Date: Tuesday, August 3, 2021 5:09:55 PM

User: Gwen Ladner

File:N:\2014\14066 - West St. Tammany WWTP Expansion\Drawings\Civil\14066-PL-ExSite.dwg

NOTES:

1. LOCATION OF UNDERGROUND UTILITIES SHOWN ON DRAWINGS WERE OBTAINED FROM SURVEY FILE FROM KELLY McHUGH DATED 7-26-16. THE CONTRACTOR SHALL VERIFY ALL LOCATIONS AND ELEVATIONS.

0 10 20 40

SCALE IN FEET

PLAN

1"-20'-0"

CADD FILE NAME: 14066-PL-ExSite.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 1"=20'-0"	SCALE: (11x17) 1"=40'-0"	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251

ST. TAMMANY PARISH BID NO. 21-21-2

EXISTING SITE PLAN

NO.	DATE:	REVISIONS	APPD

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SHEET NO.

C-1

0 10 20 40
SCALE IN FEET

4" EXISTING SEWER FORCE MAIN
N 717250.94, E 3641326.99
NO CUT BUFFER
50' BUFFER
N 717639.52, E 3641326.20
APPROX. LOCATION OF CLECO SERVITUDE
R25.00'
C-3 GC-1 ROLLING GATE
PEDESTRIAN GATE C-2 GC-1
N 717303.18, E 3641349.32
N 717251.06, E 3641359.77
12" EXISTING SEWER FORCE MAIN
INFLUENT SCREENS, SEE SHEET 1M-1
N 717285.20, E 3641387.68
400,000 GALLON EQUALIZATION TANK, SEE SHEET 1M-2
N 717336.34, E 3641407.33
PACKAGE TREATMENT UNIT (750,000 GPD), SEE SHEET 2M-1
N 717462.20, E 3641406.48
AGGREGATE SURFACING
N 717525.45, E 3641358.38
15'X10' VALVE SLAB
N 717535.45, E 3641373.38
MODIFIED CHLORINE CONTACT TANK, SEE SHEET 3M-1
N 717620.93, E 3641384.74
EFFLUENT PUMP STATION, SEE SHEET 4M-1
N 717605.60, E 3641401.07
FENCE C-1 GC-1
FENCE W/PRIVACY SCREEN ON LA HWY 1085 SIDE ONLY C-1 GC-1
TRANSFER PUMP STATION, SEE SHEET 1M-4
N 717350.58, E 3641455.99
EQUALIZATION TANK BLOWER STATION, SEE SHEET 1M-3
N 717327.34, E 3641456.52
N 717345.33, E 3641468.53
N 717379.37, E 3641457.85
SPLITTER BOX, SEE SHEET 2M-3
NEW EDGE OF SLAB
STAIRS, SEE SHEET 2S-2
EXISTING TREATMENT UNIT (500,000 GPD)
CONSTRUCTION LAYDOWN AREA
PARKING AREA
205.50'
N 717493.96, E 3641477.12
EXISTING BLOWER BUILDING
AGGREGATE SURFACING
PACKAGE TREATMENT UNIT BLOWER STATION, SEE SHEET 2M-4
N 717513.96, E 3641514.11
12' DOUBLE GATE C-4 GC-1
EXISTING CLECO TRANSFORMER
EXISTING MAIN ELECTRICAL GEAR
EXISTING ELECTRICAL DUCT BANK
10'
20'
N 717330.78, E 3641529.73
N 717643.73, E 3641526.27
20' LAND GAP
35.00'
125' CLECO R.O.W.
LA HWY 1085 (BOOTLEGGERS RD) (ASPHALT)
NORTHPOINTE INDUSTRIAL PARK LOT 1
NORTHPOINTE INDUSTRIAL PARK LOT 2

OVERALL SITE PLAN
1"-20'-0"

CADD FILE NAME: 14066-PL-SITE.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 1"=20'-0"	SCALE: (11x17) 1"=40'-0"	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

OVERALL SITE PLAN

REVISIONS

NO.	DATE:	APPD

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SHEET NO.
C-2

4" EXISTING SEWER FORCE MAIN

C-1 GC-1 FENCE

0 5 10 20
SCALE IN FEET

12" EFM (19)

4" SFM (11)

TIE INTO EXISTING SEWER FORCEMAIN WITH 12" 90° DI MJ BEND

BORE UNDER ELECTRICAL CONDUITS, SEE NOTE 2

TIE INTO EXISTING 4" SEWER FORCEMAIN WITH 4" 90° DI MJ BEND

4"X4"X2" DI MJ TEE (TYP)

C-3 GC-1 ROLLING GATE

APPROX. LOCATION OF CLECO SERVITUDE

SAMPLE TAP PER TAMMANY UTILITIES STANDARDS

4" UW (11)

4"X2" DI MJ TEE

12" SFM (11)

4" UW (11)

2" UW (11)

BACKFLOW PREVENTER C-8 GC-2

TIE INTO EXISTING WATER LINE WITH 4"DI MJ BEND

4" EXISTING WATER LINE

HORIZONTAL DIRECTIONAL DRILL

16'-0" MIN

MANHOLE W/ AIR RELEASE VALVE C-12 GC-2

12" EFM (31)
SEE SHEET C-6 FOR CONTINUATION

INFLUENT SCREENS, SEE SHEET 1M-1

SEE SHEET 1M-1 FOR CONTINUATION

C-2 GC-1 PEDESTRIAN GATE

12" EXISTING SEWER FORCE MAIN

2" UW (11)
SEE SHEET 1M-2 FOR CONTINUATION

FENCE W/PRIVACY SCREEN ON LA HWY 1085 SIDE ONLY C-1 GC-1

400,000 GALLON EQUALIZATION TANK, SEE SHEET 1M-2

AGGREGATE SURFACING

BENCHMARK= 1/2" IRON ROD, ELEVATION= 23.84

MATCH LINE SEE SHEET C-4

CONSTRUCTION LAYDOWN AREA

PARKING AREA

GREEN SPACE

TRANSFER PUMP STATION, SEE SHEET 1M-4

EQUALIZATION TANK BLOWER STATION, SEE SHEET 1M-3

12" 90° DI MJ BEND

12" PI (11)

BORE UNDER ELECTRICAL CONDUITS, SEE NOTE 2

APPROX. LOCATION OF CLECO SERVITUDE

125' CLECO R.O.W.

185.00'

326.6'

10'

FLOOD ZONE "A+"

FLOOD ZONE "C"

LA HWY 1085
(BOOTLEGGERS RD)
(ASPHALT)

18"x65" CONC. CULVERT

18"x48" CONC. CULVERT

GRAVEL DRIVE

NOTES:

1. THIS DRAWING IS BASED UPON A LAND TITLE SURVEY BY KELLY J McHUGH & ASSOC, INC. , DATED 06/08/2016
2. THE CONTRACTOR SHALL VERIFY ALL LOCATIONS AND ELEVATIONS OF EXISTING UTILITIES BY POTHOLE AS NECESSARY.
3. CONTRACTOR SHALL FIELD LOCATE CONDUITS BY HAND PRIOR TO MECHANICAL EXCAVATION.

CADD FILE NAME:
14066-PL-YP.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 1"=10'-0"	SCALE: (11x17) 1"=20'-0"	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

YARD PIPING PLAN - I

REVISIONS										
NO.										
DATE:										
APPD										

STAMP:
STATE OF LOUISIANA
JAMES E. POWELL, JR.
LICENSE NO. 31063
PROFESSIONAL ENGINEER
CIVIL ENGINEERING
NOT VALID WITHOUT SIGNATURE

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SHEET NO.
C-3

Plot Date: Tuesday, August 3, 2021 5:10:31 PM

User: Gwen Ladner

File:N:\2014\14066 - West St. Tammany WWTP Expansion\Drawings\Civil\14066-PL-YP.dwg

MATCHLINE SEE SHEET C-3

12" EFM (19)

AGGREGATE SURFACING

4" UW (11)

2" UW (11)
SEE SHEET 2M-1 FOR CONTINUATION

14" 90° DI BEND

14-GV-402

14" SE (11)

10'x15', 4" SLAB

C-8
GC-2

14" SE (11)

14-GV-401

BURIED VALVE (TYP) 14"x12" DI MJ TEE

14" DI MJ TEE

PLUG FOR FUTURE PROCESS

12-GV-402

12-GV-401

12" SE (11)

PACKAGE TREATMENT UNIT (750,000 GPD), SEE SHEET 2M-1

12" 45° BEND

4" 45° BEND

12" 45° BEND

12" EFM (19)

MODIFIED CHLORINE CONTACT TANK, SEE SHEET 3M-1

TOP OF TANK–35.3'

TOP OF SLAB–24.3'

2" UW (11)

TOP OF PIPE–41.8'

2" UW (11)
SEE SHEET 3M-1 FOR CONTINUATION

12" FE (11)

2" UW (11)
SEE SHEET 4M-1 FOR CONTINUATION

12" 45° BEND

EFFLUENT PUMP STATION, SEE SHEET 4M-1

FENCE C-1 GC-1

NEW EDGE OF SLAB

SPLITTER BOX, SEE SHEET 2M-3

STAIRS, SEE SHEET 2S-2

TOP OF PIPE–43.3'

INV. BOX–40.8'

WALK

TOP OF BOX–45.9'

TOP OF WALK–41.8'

TOP OF TANK–41.7'

EXISTING TREATMENT UNIT (500,000 GPD)

TREATMENT TANK (ON CONC. SLAB)

TOP OF WEIR–40.3'

TOP OF WEIR–40.2'

TOP OF TANK SLAB – 25.3'

TOP OF TANK SLAB – 25.4'

12" A (15)

8" A (15)

SEE SHEET 2M-3 FOR DETAILS ON CONNECTION TO EXISTING PLANT EFFLUENT

12" 45° DI MJ BEND

12" PI (11)

AGGREGATE SURFACING

EXISTING BLOWER BUILDING

PACKAGE TREATMENT UNIT BLOWER STATION, SEE SHEET 2M-4

EXISTING CLECO TRANSFORMER

EXISTING MAIN ELECTRICAL GEAR

TOP OF SLAB– 24.2'

ELECTRIC

DITCH

outflowpipe

inflowpipe

NOTES:

1. THIS DRAWING IS BASED UPON A LAND TITLE SURVEY BY KELLY J McHUGH & ASSOC, INC. , DATED 06/08/2016
2. THE CONTRACTOR SHALL VERIFY ALL LOCATIONS AND ELEVATIONS OF EXISTING UTILITIES BY POTHOLE AS NECESSARY.
3. CONTRACTOR SHALL FIELD LOCATE CONDUITS BY HAND PRIOR TO MECHANICAL EXCAVATION.

0 5 10 20
SCALE IN FEET

CADD FILE NAME: 14066-PL-YP.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 1"=10'-0"	SCALE: (11x17) 1"=20'-0"	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

YARD PIPING PLAN - II

NO.	DATE:	REVISIONS	APPD

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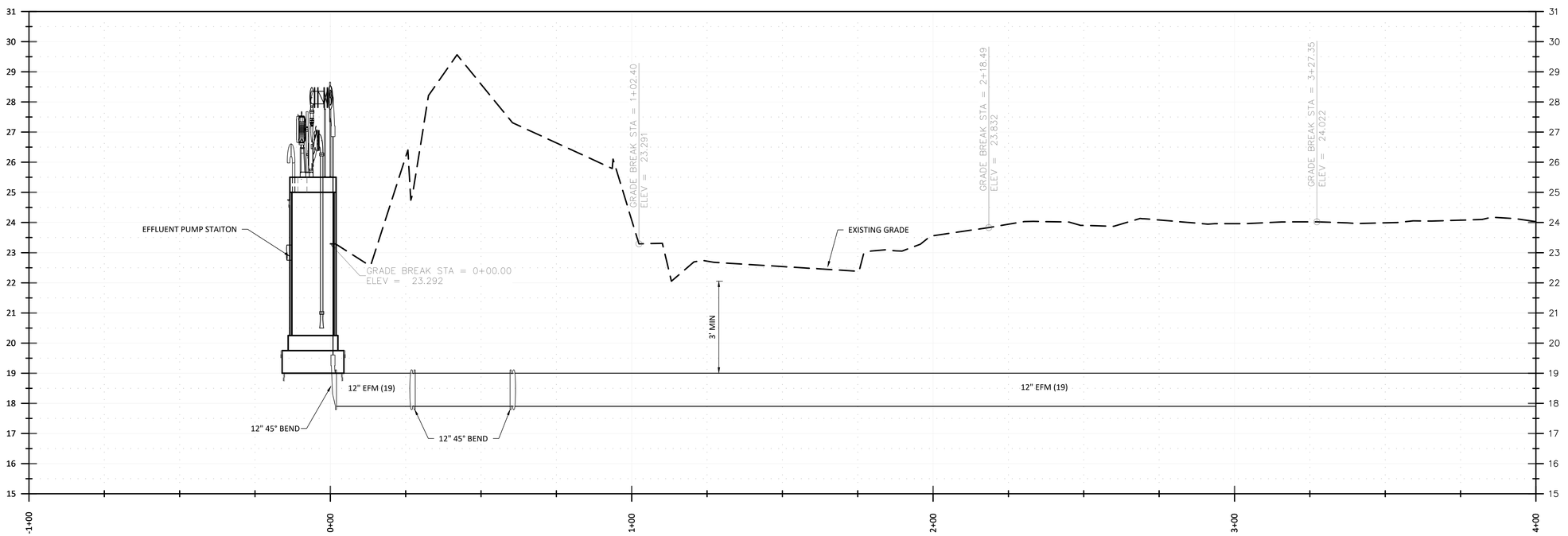
SHEET NO.

C-4



0 20' 40'

CADD FILE NAME: 14066-PP1.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 1"=20'-0"	SCALE: (11x17) 1"=40'-0"	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EFFLUENT FORCE MAIN STA. 0+00 - STA. 4+00

NO.	DATE:	REVISIONS	APPD

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SHEET NO.
C-5

CADD FILE NAME:
14066-PP1.dwg

SCALE: (22x34)	DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
1"=20'-0"	KMD	GAL	JEP	14066
SCALE: (11x17)				DATE:
1"=40'-0"				JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EFFLUENT FORCE MAIN STA. 4+00 - STA. 9+00

REVISIONS

NO.	DATE:	APP'D

STAMP:

STATE OF LOUISIANA
JAMES E. POWELL, JR.
LICENSE NO. 31063
PROFESSIONAL ENGINEER
CIVIL ENGINEERING

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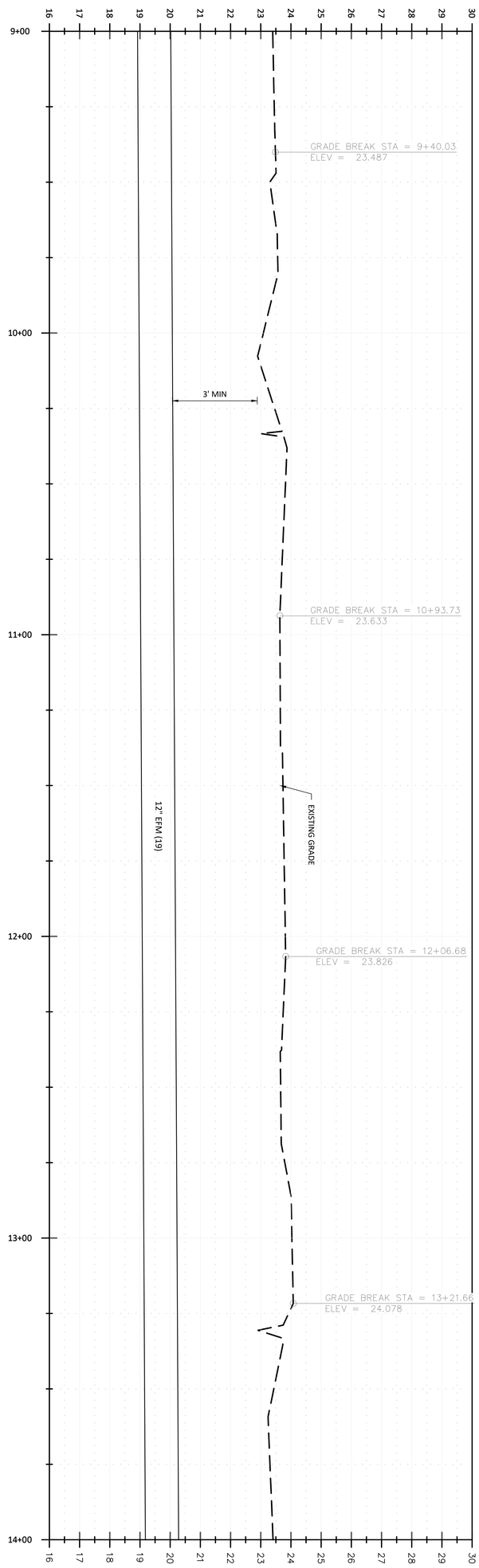
SHEET NO.

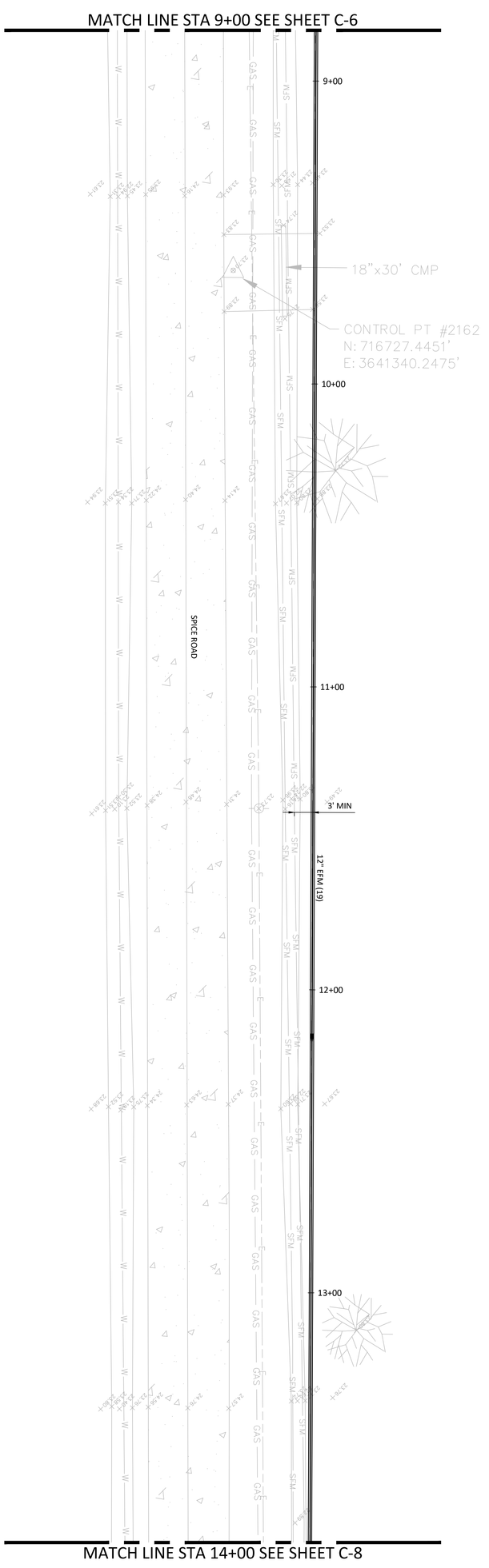
C-6

Plot Date: Tuesday, August 3, 2021 6:48:30 PM

User: Gwen Ladner

File:N:\2014\14066 - West St. Tammany WWTP Expansion\Drawings\Civil\14066-PP1.dwg





0 20' 40'

SHEET NO. C-7

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STAMP: JOSEPH E. PENNINGTON, JR. 36966 REGISTERED PROFESSIONAL ENGINEER STATE OF LOUISIANA ENGINEERING

REVISIONS			
NO.	DATE:		APP'D

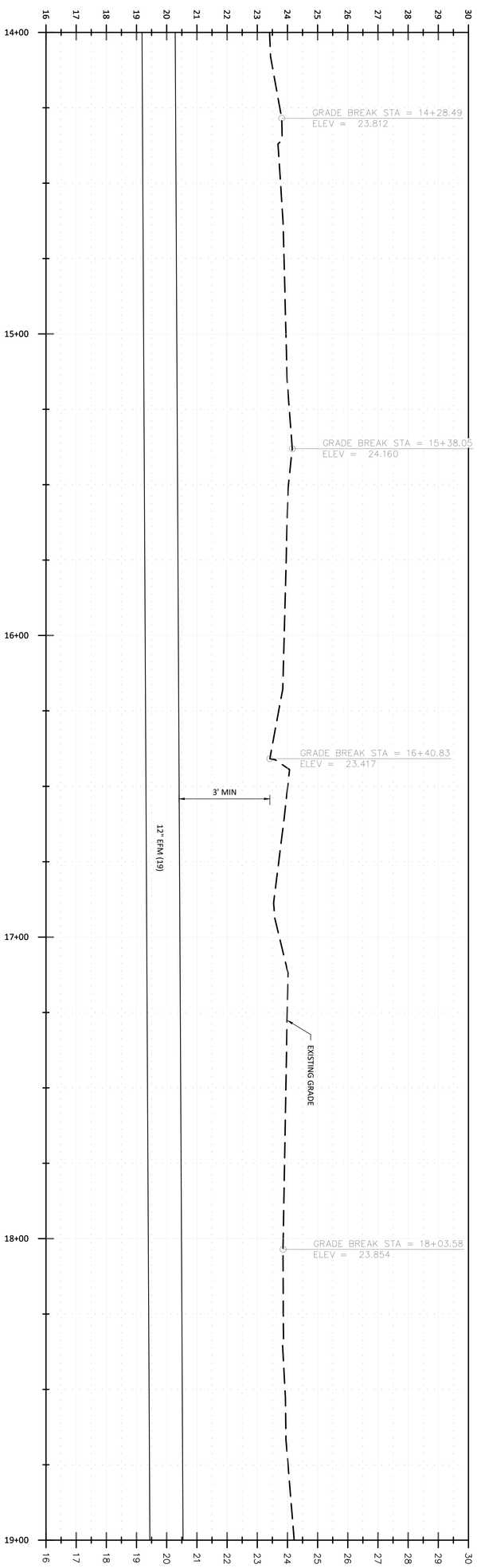
WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA

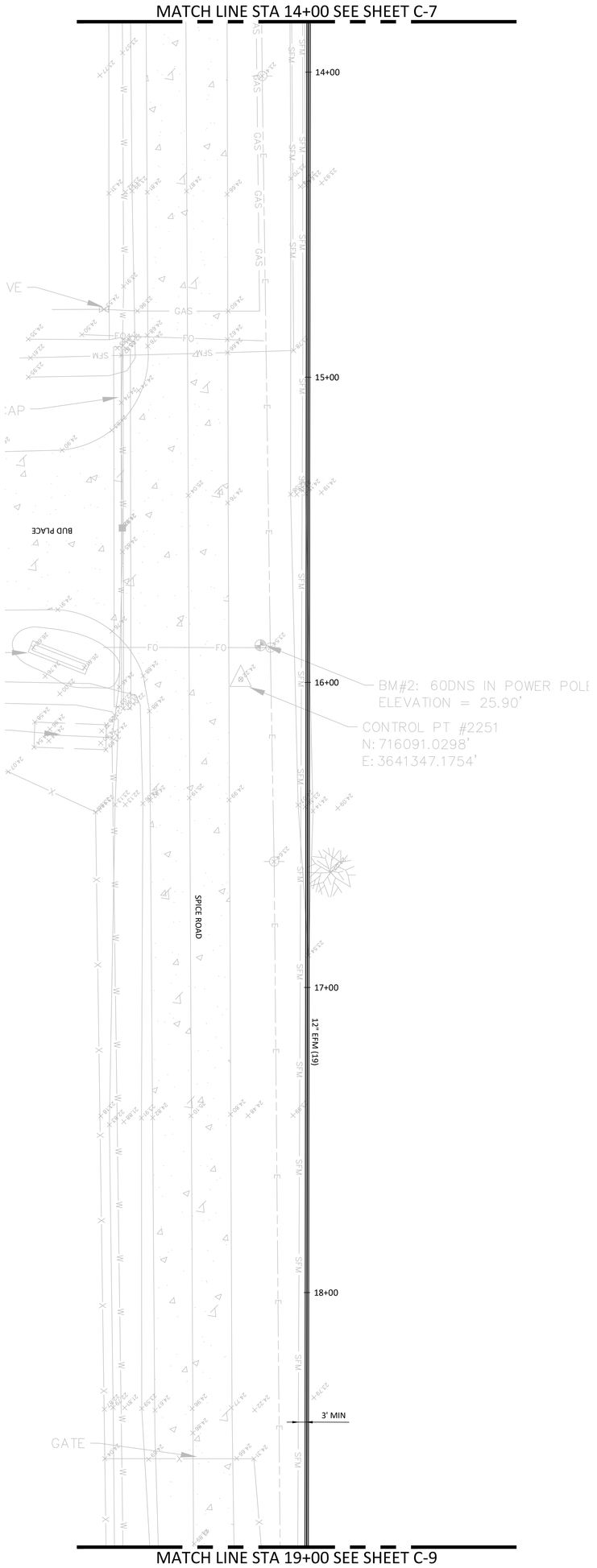
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EFFLUENT FORCEMAIN STA. 9+00 - STA. 14+00

SCALE: (22x34) 1"=20'-0"	DESIGNED BY: KMD
SCALE: (11x17) 1"=40'-0"	DRAWN BY: GAL
	CHECKED BY: JEP
DATE: JULY 30, 2021	JOB NO. 14066

CADD FILE NAME: 14066-PP1.dwg





0 20' 40'

C-8 SHEET NO.

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REVISIONS			
NO.	DATE:		APP'D

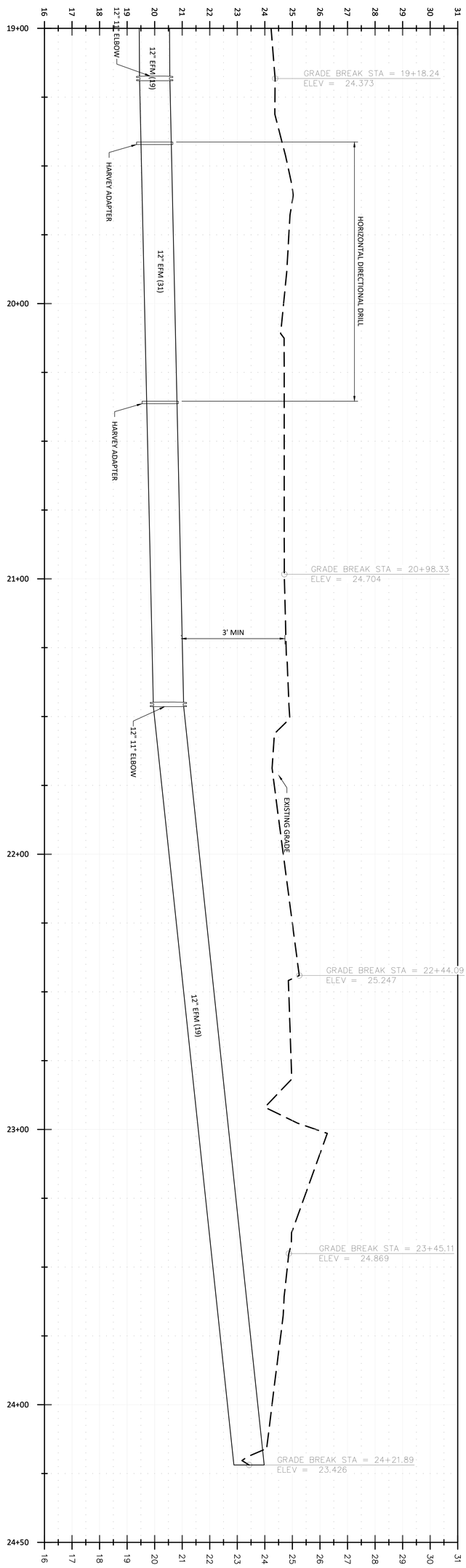
WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA

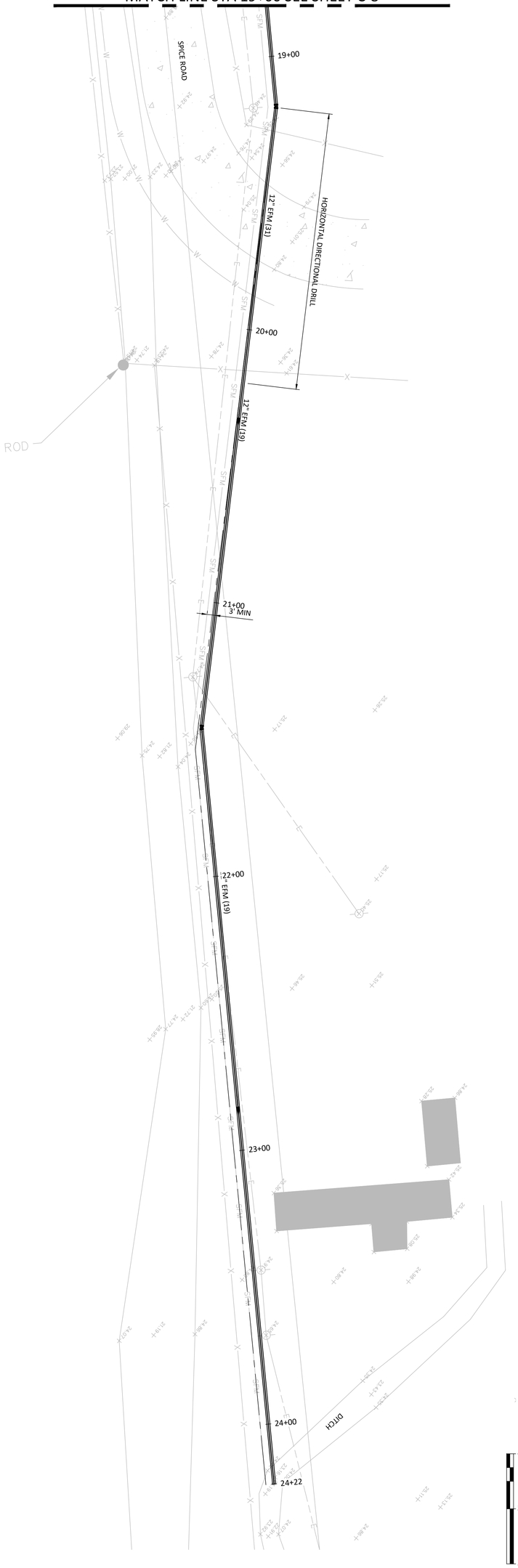
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EFFLUENT FORCEMAIN STA. 14+00 - STA. 19+00

SCALE: (22x34) 1"=20'-0"	DESIGNED BY: KMD
SCALE: (11x17) 1"=40'-0"	DRAWN BY: GAL
	CHECKED BY: JEP
DATE: JULY 30, 2021	JOB NO. 14066

CADD FILE NAME: 14066-PP1.dwg





SHEET NO. C-9

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STAMP:

REVISIONS			
NO.	DATE:		APP'D

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EFFLUENT FORCEMAIN STA. 19+00 - STA.END

SCALE: (22x34) 1"=20'-0"	DESIGNED BY: KMD
SCALE: (11x17) 1"=40'-0"	DRAWN BY: GAL
	CHECKED BY: JEP
DATE: JULY 30, 2021	JOB NO. 14066

CADD FILE NAME: 14066-PP1.dwg

0 10 20 40
SCALE IN FEET

LEGEND
- REQ'D LIMESTONE
- FLOW ARROW
- 22.80 FINISHED GRADE
- 22.24 EXISTING GRADES
- M.E. MATCH EXISTING GRADE
- CROWN / RIDGE
- LIMITS OF CONSTRUCTION

4" EXISTING SEWER FORCE MAIN
NO CUT BUFFER
50' BUFFER
R25.00'
APPROX. LOCATION OF ICG GAS SERVITUDE
12" EXISTING SEWER FORCE MAIN
INFLUENT SCREENS, SEE SHEET 1M-1
T.O.S. ELEV. 25.5'
400,000 GALLON EQUALIZATION TANK, SEE SHEET 1M-2
T.O.S. ELEV. 25.5'
TRANSFER PUMP STATION, SEE SHEET 1M-4
PACKAGE TREATMENT UNIT (750,000 GPD), SEE SHEET 2M-1
T.O.S. ELEV. 25.5'
T.O.S. ELEV. 25.5'
15'X10' VALVE SLAB
MODIFIED CHLORINE CONTACT TANK, SEE SHEET 3M-1
EFFLUENT PUMP STATION, SEE SHEET 4M-1
T.O.S. ELEV. 25.5'
EQUALIZATION TANK BLOWER STATION, SEE SHEET 1M-3
T.O.S. ELEV. 25.5'
T.O.S. ELEV. 25.5'
PARKING AREA
CONSTRUCTION LAYDOWN AREA
SPLITTER BOX, SEE SHEET 2M-3
NEW EDGE OF SLAB
STAIRS, SEE SHEET 2S-2
EXISTING TREATMENT UNIT (500,000 GPD)
T.O.S. ELEV. 25.0'
EXISTING BLOWER BUILDING
PACKAGE TREATMENT UNIT BLOWER STATION, SEE SHEET 2M-4
T.O.S. ELEV. 25.5'
EXISTING CLECO TRANSFORMER
EXISTING MAIN ELECTRICAL GEAR
EXISTING ELECTRICAL DUCT BANK
20' LAND GAP
35.00'
125' CLECO R.O.W.
LA HWY 1085 (BOOTLEGGERS RD) (ASPHALT)
NORTHPOINTE INDUSTRIAL PARK LOT 1
NORTHPOINTE INDUSTRIAL PARK LOT 2

23.80 23.60 22.80 23.50 24.20 24.80 24.10 25.00 25.00 25.00 25.90 24.80 23.60 23.10 22.90 22.20

OVERALL SITE PLAN
1"-20'-0"

CADD FILE NAME:
14066-PL-grading.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
KMD	GAL	JEP	14066

SCALE: (22x34)	SCALE: (11x17)	DATE:
1"=20'-0"	1"=40'-0"	JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

SITE GRADING PLAN

NO.	DATE:	REVISIONS	APP'D

STAMP: STATE OF LOUISIANA — JAMES E. POWELL, JR. — License No. 31063 — PROFESSIONAL ENGINEER — CIVIL ENGINEERING

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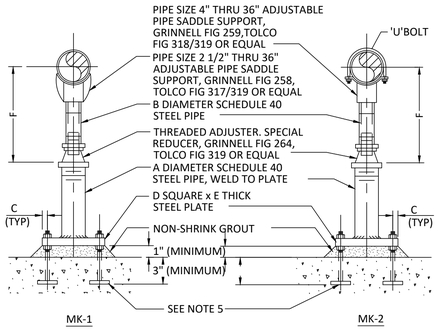
SHEET NO.
C-10



DIMENSIONS IN INCHES							
NOMINAL PIPE SIZE	A	B	C	D	E	F (APPROX) (MINIMUM)	F (APPROX) (MAXIMUM)
2 1/2	2	1 1/2	1	6	3/8	7	11 1/2
3	2	1 1/2	1	6	3/8	7 5/16	11 13/16
3 1/2	2	1 1/2	1	6	3/8	7 9/16	12 1/16
4	3	* 2 1/2 / 3	1 1/8	7 1/2	1/2	10 1/4	14 3/4
6	3	* 2 1/2 / 3	1 1/8	7 1/2	1/2	11 9/16	16 1/16
8	3	* 2 1/2 / 3	1 1/8	7 1/2	1/2	13 9/16	18 1/16
10	3	* 2 1/2 / 3	1 1/8	7 1/2	1/2	14 5/8	19 1/8
12	3	* 2 1/2 / 3	1 1/8	7 1/2	1/2	15 5/8	20 1/8
14	4	3	1 1/4	9	5/8	18 7/8	23 3/8
16	4	3	1 1/4	9	5/8	19 7/8	24 3/8
18	6	4	1 1/2	11	3/4	22 1/4	26 3/4
20	6	4	1 1/2	11	3/4	23 1/4	27 3/4
24	6	4	1 1/2	11	3/4	26 1/2	31
30	6	4	1 1/2	11	3/4	29 5/8	34 1/8
32	6	4	1 1/2	11	3/4	30 5/8	35 1/8
36	6	4	1 1/2	11	3/4	32 5/8	37 1/8

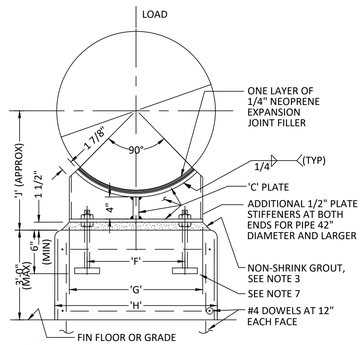
* SEE MANUFACTURER

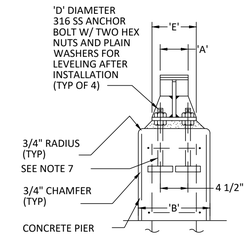
NOTES:

1. FOR ADDITIONAL REQUIREMENTS SEE SPEC SECTION 'PIPE SUPPORT'.
2. GALVANIZE ALL PARTS AFTER FABRICATION.
3. WHERE PIPE SUPPORT OCCURS ON GRADE REFER TO STRUCTURAL DRAWINGS FOR DETAILS.
4. THIS PIPE SUPPORT IS LIMITED TO PIPE FROM 2 1/2" DIAMETER TO 36" DIAMETER INCLUSIVE.
5. ANCHOR BOLT OR CONCRETE ANCHOR WITH TWO NUTS AND ONE LOCKWASHER. PROVIDE BAR 4 x 1/2" x 4" WELDED TO BOLT (TYP OF 4) SEE SPECIFICATIONS.

ADJUSTABLE PIPE SUPPORT WITH OR WITHOUT 'U' BOLT
(FOR PIPE 36" DIAMETER AND SMALLER)

M-1





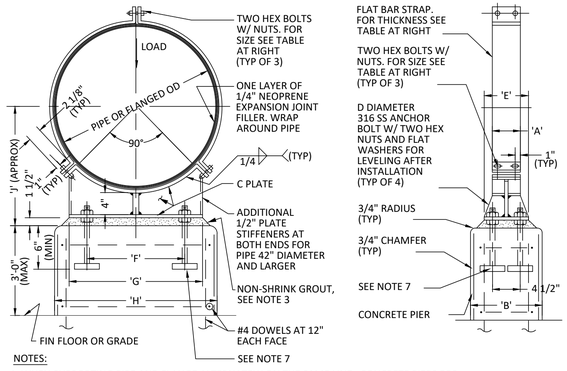
DIMENSIONS IN INCHES															
NOMINAL PIPE SIZE						SUPPORTING									
						PIPE				FLANGE					
	A	B	C	D	E	F	G	H	J	F	G	H	J		
6	4	12	3/8	5/8	6	4 1/2	6	12	10	6 1/2	9	16	13		
8	4	12	3/8	5/8	6	5	8	13	11	7 1/2	9	16	14		
10	4	12	3/8	5/8	6	6	9	15	12	9	13	18	15		
12	4	12	3/8	5/8	6	7	11	17	13	10	15	20	16		
14	4	12	3/8	5/8	6	8	12	17	14	11	16	21	17		
16	4	12	3/8	5/8	6	9	13	19	15	12	18	24	18		
18	4	12	3/8	5/8	6	10	14	20	16	13	19	24	19		
20	5	12	3/8	5/8	6	10	15	21	17	15	21	26	21		
22	5	12	3/8	5/8	6	12	18	24	18	16	23	28	22		
24	5	12	3/8	5/8	6	13	19	24	19	16	24	30	23		
26	5	12	3/8	3/4	6	14	21	27	20	18	26	32	24		
30	5	12	3/8	3/4	6	16	23	28	22	20	29	34	26		
34	5	15	3/8	3/4	6	18	26	32	24	22	33	39	29		
36	6	15	3/8	3/4	6	19	27	32	25	24	34	40	30		
42	6	18	1/2	1	8	21	31	36	28	27	39	45	33		
48	6	18	1/2	1	8	24	36	42	31	30	44	50	37		
54	6	18	1/2	1	8	28	40	46	34	34	50	56	40		
60	6	18	1/2	1 1/8	8	32	45	52	37	36	54	60	44		
66	6	18	1/2	1 1/8	8	33	49	56	40	40	59	66	47		
72	6	18	1/2	1 1/8	8	36	53	60	43	44	63	70	50		

NOTES:

1. WHEN SUPPORTING PIPE AND FLANGE ALTERNATELY ON THE SAME LINE, CONCRETE PIERS FOR PIPE SUPPORTS SHALL ALL HAVE THE SAME DIMENSION 'H' FOR FLANGE SUPPORT.
2. PIPE SUPPORTS SHALL BE LOCATED IN PLAN AT POINTS MARKED THUS: (X)
3. WHERE DIFFERENTIAL SETTLEMENT IS LIKELY TO OCCUR, OMIT GROUT AS DIRECTED BY THE ENGINEER.
4. GALVANIZE ALL PARTS AFTER FABRICATION.
5. WHERE DIRECTED BY THE STRUCTURAL ENGINEER, BOTTOM OF PIERS SHALL EXTEND BELOW BOTTOM OF SLAB.
6. WHERE PIPE SUPPORT OCCURS ON GRADE REFER TO STRUCTURAL DRAWINGS FOR DETAILS.
7. ANCHOR BOLT OR CONCRETE ANCHOR WITH TWO NUTS AND ONE LOCKWASHER. PROVIDE BAR 4x1/2x4" WELDED TO BOLT. (TYP OF 4) SEE SPECIFICATIONS.

PIPE SUPPORT
(FOR PIPE 72" DIAMETER AND SMALLER)

M-2



DIMENSIONS IN INCHES															
NOMINAL PIPE SIZE						STRAP		SUPPORTING							
						BOLT SIZE	FLAT BAR	PIPE				FLANGE			
	A	B	C	D	E			F	G	H	J	F	G	H	J
6	4	12	3/8	5/8	6	1/2	1/4	4 1/2	6	12	10	6 1/2	11	16	13
8	4	12	3/8	5/8	6	1/2	1/4	5	8	13	11	7 1/2	13	18	14
10	4	12	3/8	5/8	6	1/2	1/4	6	9	15	12	9	15	20	15
12	4	12	3/8	5/8	6	1/2	1/4	7	11	17	13	10	17	22	16
14	4	12	3/8	5/8	6	1/2	1/4	8	12	17	14	11	18	23	17
16	4	12	3/8	5/8	6	1/2	1/4	9	13	19	15	12	20	26	18
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22	5	12	3/8	5/8	6	5/8	3/8	12	18	24	18	16	25	30	22
24	5	12	3/8	5/8	6	5/8	3/8	13	19	24	19	16	26	32	23
26	5	12	3/8	3/4	6	5/8	3/8	14	21	27	20	18	28	34	24
30	5	12	3/8	3/4	6	5/8	3/8	16	23	28	22	20	31	36	26
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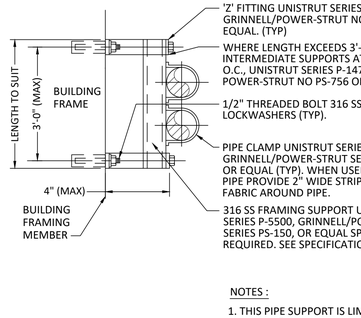
42	6	18	3/8	1	8	3/4	3/8	21	31	36	28	27	41	47	33
48	6	18	3/8	1	8	3/4	3/8	24	36	42	31	30	46	52	37
54	6	18	3/8	1	8	3/4	3/8	28	40	46	34	34	50	56	40
60	6	18	3/8	1 1/8	8	3/4	3/8	32	45	52	37	36	56	62	44
66	6	18	1/2	1 1/8	8	3/4	3/8	33	49	56	40	40	61	68	47
72	6	18	1/2	1 1/8	8	3/4	3/8	36	53	60	43	44	65	72	50

NOTES:

1. WHEN SUPPORTING PIPE AND FLANGE ALTERNATELY ON THE SAME LINE, CONCRETE PIERS FOR PIPE SUPPORTS SHALL ALL HAVE THE SAME DIMENSION 'H' FOR FLANGE SUPPORT.
2. PIPE SUPPORTS SHALL BE LOCATED IN PLAN AT POINTS MARKED THUS: (X).
3. WHERE DIFFERENTIAL SETTLEMENT IS LIKELY TO OCCUR, OMIT GROUT AS DIRECTED BY THE ENGINEER.
4. GALVANIZE ALL PARTS AFTER FABRICATION.
5. WHERE DIRECTED BY THE STRUCTURAL ENGINEER, BOTTOM OF PIERS SHALL EXTEND BELOW BOTTOM OF SLAB.
6. WHERE PIPE SUPPORT OCCURS ON GRADE REFER TO STRUCTURAL DRAWINGS FOR DETAILS.
7. ANCHOR BOLT OR CONCRETE ANCHOR WITH TWO NUTS AND ONE LOCKWASHER. PROVIDE BAR 4x1/2x4" WELDED TO BOLT. (TYP OF 4) SEE SPECIFICATIONS.

PIPE SUPPORT WITH STRAP
(FOR PIPE 72" DIAMETER AND SMALLER)

M-3

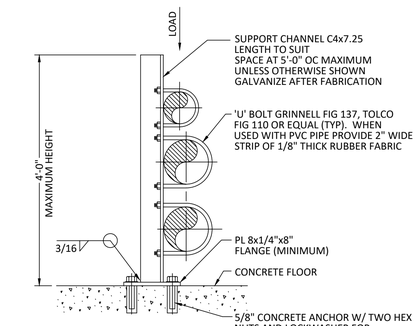


NOTES :

1. THIS PIPE SUPPORT IS LIMITED FOR PIPES UP TO 6" DIAMETER, INCLUSIVE
2. FOR ADDITIONAL REQUIREMENTS SEE SPECIFICATION SECTION 15006.
3. PIPE SUPPORTS LOCATED IN CHEMICAL STORAGE OR CHEMICAL FEED AREAS, ALL MATERIALS SHALL BE TYPE 316 SS.

EXTENDED PIPE SUPPORT

M-4

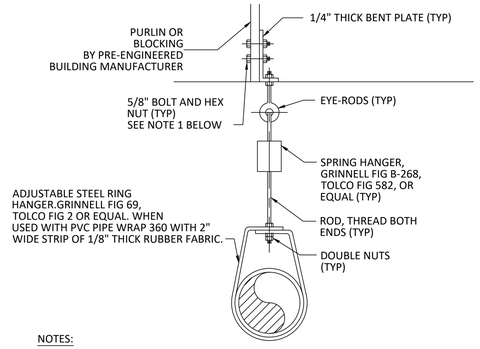


NOTES:

1. FOR ADDITIONAL REQUIREMENTS SEE SPECIFICATION SECTION 'PIPE SUPPORTS'.
2. THIS PIPE SUPPORT IS LIMITED TO PIPES 1/2" THRU 12" DIAMETER.

UPRIGHT PIPE SUPPORT
(FOR PIPE 12" DIAMETER AND SMALLER)

M-5

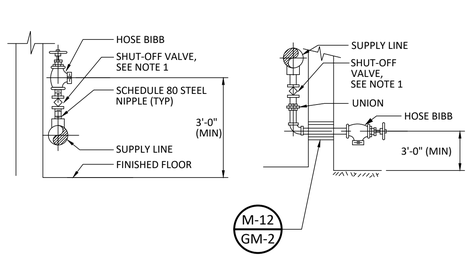


NOTES:

1. EXPANSION TYPE BOLTS ARE NOT ALLOWED.
2. GALVANIZE ALL PARTS AFTER FABRICATION.
3. FOR SPACING AND ADDITIONAL REQUIREMENTS SEE SPECIFICATION SECTION 15006 "PIPE SUPPORTS".

PIPE HANGER FROM STEEL PURLINS

M-6

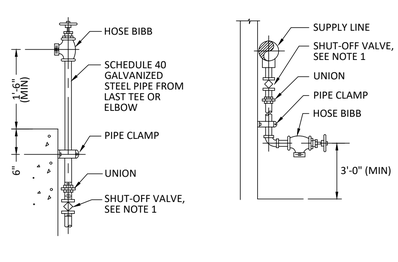


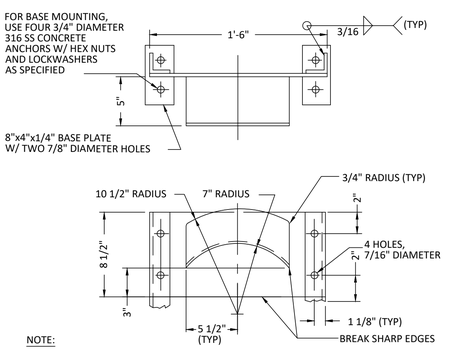
NOTES:

1. ALL HOSE BIBBS SHALL BE CONTROLLED BY INDIVIDUAL SHUT-OFF VALVES (BALL VALVES) EXCEPT WHERE INDIVIDUALLY CONTROLLED BRANCH MAIN SERVES HOSE VALVES ONLY.
2. FOR SIZE AND LOCATION SEE DRAWINGS.
3. PROVIDE WARNING FOR NON-POTABLE WATER.
4. FOR INSTALLATION IN PRE-ENGINEERED BUILDINGS, SUPPORT PIPE AS SHOW IN DETAIL M-5, OR SUPPORT DIRECTLY TO BUILDING FRAMING.

HOSE BIBBS

M-7





NOTE:

1. WHERE HOSE RACK IS FREE-STANDING, PROVIDE TWO STEEL ANGLES 2x2x1/4 W/BASE PLATES.
2. ALL WELDED CONSTRUCTION. 8 GAUGE STEEL SHEET SHOP HOT DIP GALVANIZED AFTER FABRICATION. SHOP PRIMED AND FINISHED COATED IN THE FIELD.

HOSE RACK

M-8

CADD FILE NAME: 14066-GM1.dwg

DESIGNED BY: KMD
DRAWN BY: GAL
CHECKED BY: JEP
JOB NO. 14066
SCALE: (22x34) 1/4"-1'-0"
SCALE: (11x17)
DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PROCESS MECHANICAL DETAILS - I

REVISIONS

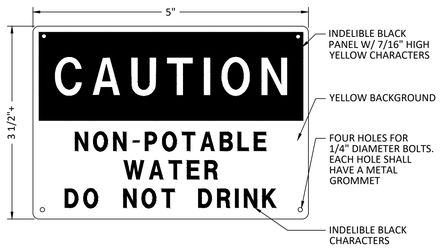
NO.	DATE:	APPD

STAMP: JAMES E. POWELL, JR. License No. 31063 PROFESSIONAL ENGINEER STATE OF LOUISIANA

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

SHEET NO.
GM-1

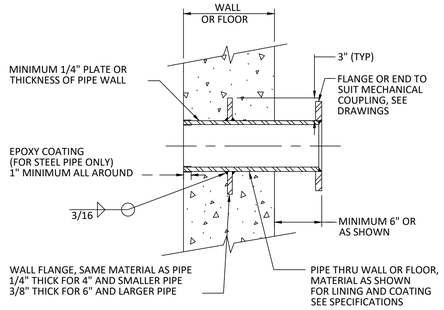
Plot Date: Tuesday, August 3, 2021 5:11:54 PM
User: Gwen Ladner
File:N:\2014\14066 - West St. Tammany WWTP Expansion\Drawings\Mechanical\14066-GM1.dwg



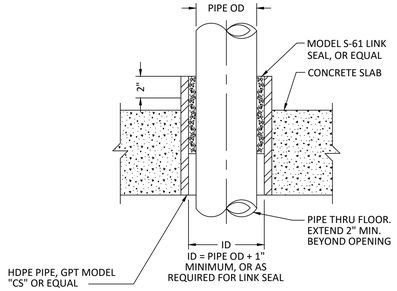
NOTES:

1. MATERIAL TO BE SEMI-RIGID BUTYRATE OR EQUAL.
2. COLORS AND LETTER SIZE TO BE PER OSHA STANDARDS FOR CAUTION SIGNS.
3. PROVIDE THIS SIGN AT ALL HOSE BIBB LOCATIONS WHERE WATER IS NON-POTABLE.

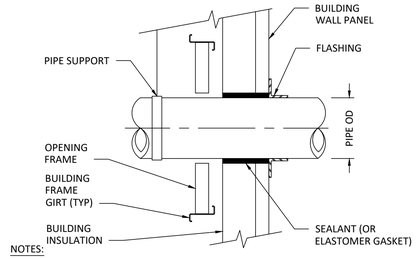
WARNING SIGN FOR NON-POTABLE WATER — M-9



FABRICATED PIPE THIMBLE — M-10



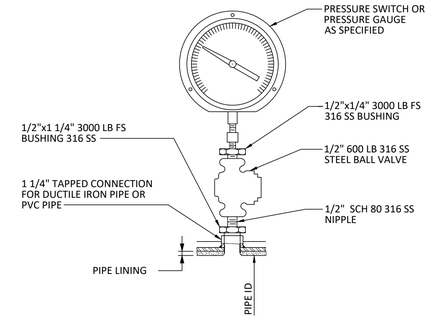
FLOOR PIPE SLEEVE — M-11



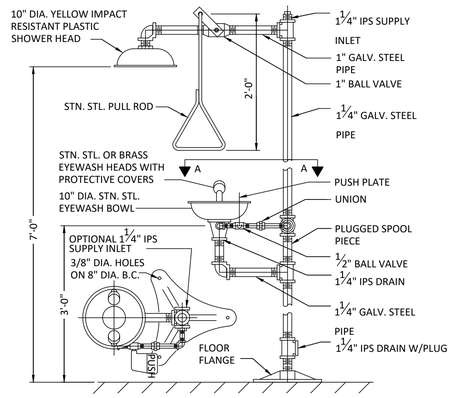
NOTES:

1. SEE STRUCTURAL DRAWINGS FOR DETAILS ON FRAMING AND BUILDING.
2. PIPE OPENING SHALL BE SMOOTH, NEAT, MINIMUM SIZED, AND WATER TIGHT.
3. FLASHING SHALL BE CUSTOM FABRICATED TO FIT OPENING AND SHALL MATCH WALL PANEL.
4. SEALANT SHALL BE PER SPECIFICATION SECTION 07920.
5. PIPE 3" AND SMALLER DO NOT REQUIRE OPENING FRAME.

PIPE OPENING IN PRE-ENGINEERED BUILDING WALL — M-12

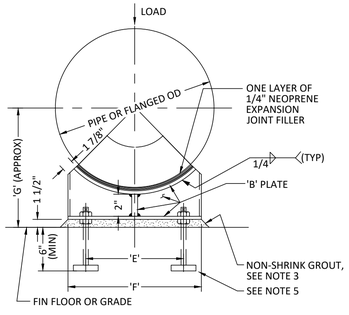


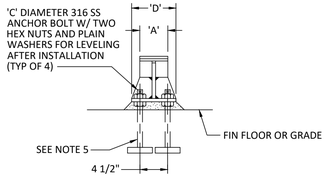
PRESSURE GAUGE OR SWITCH — M-14



EMERGENCY SHOWER — M-15

NOTE: PAINT PIPE, FITTINGS AND FLOOR FLANGE SAFETY YELLOW AFTER FABRICATION.



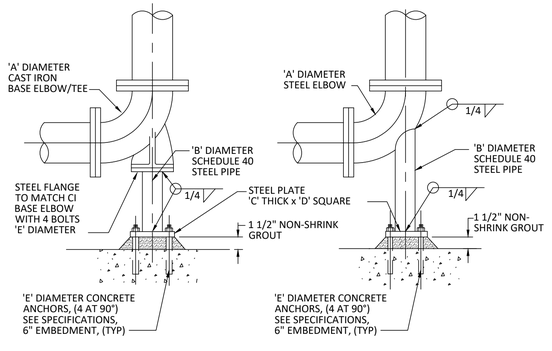


DIMENSIONS IN INCHES										
NOMINAL PIPE SIZE					SUPPORTING					
					PIPE			FLANGE		
	A	B	C	D	E	F	G	E	F	G
8	4	3/8	5/8	6	5	8	11	7 1/2	9	16
12	4	3/8	5/8	6	7	11	12	10	15	20

NOTES:

1. WHEN SUPPORTING PIPE AND FLANGE ALTERNATELY ON THE SAME LINE, CONCRETE PIERS FOR PIPE SUPPORTS SHALL ALL HAVE THE SAME DIMENSION 'G' FOR FLANGE SUPPORT.
2. PIPE SUPPORTS SHALL BE LOCATED IN PLAN AT POINTS MARKED THUS: (X)
3. WHERE DIFFERENTIAL SETTLEMENT IS LIKELY TO OCCUR, OMIT GROUT AS DIRECTED BY THE ENGINEER.
4. HOT DIP GALVANIZE ALL PARTS AFTER FABRICATION.
5. ANCHOR BOLT OR CONCRETE ANCHOR WITH TWO NUTS AND ONE LOCKWASHER. PROVIDE BAR 4x1/2x4" WELDED TO BOLT. (TYP OF 4) SEE SPECIFICATIONS.

PIPE SUPPORT — M-16



DUCTILE IRON ELBOW/TEE — STEEL ELBOW

NOTE:

FOR ADDITONAL REQUIREMENTS SEE SPECIFICATION SECTION 'PIPE SUPPORTS'.

DIMENSIONS IN INCHES				
ELBOW/TEE 'A' DIAMETER	'B' DIAMETER	`C' THICK	`D' SQUARE	`E' DIAMETER
4	2	3/8	6	5/8
6	2 1/2	3/8	7	5/8
8	4	1/2	9	5/8
10	4	1/2	9	5/8
12	6	1/2	11	3/4
14	6	1/2	11	3/4
16	6	1/2	11	3/4
18	8	1/2	13 1/2	3/4
20	8	1/2	13 1/2	3/4
24	8	1/2	13 1/2	3/4
30	10	3/4	16	7/8
36	12	3/4	19	7/8
42	16	3/4	23 1/2	1
48	18	3/4	25	1 1/8

ELBOW SUPPORT — M-17

(FOR PIPE 48" DIAMETER AND SMALLER)

CADD FILE NAME: 14066-GM2.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
KMD	GAL	JEP	14066
SCALE: (22x34) 1/4"=1'-0"	SCALE: (11x17)	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PROCESS MECHANICAL DETAILS - II

REVISIONS	NO.	DATE:	APP'D

STAMP: STATE OF LOUISIANA — JAMES E. POWELL, JR. — License No. 31063 — PROFESSIONAL ENGINEER — 7/30/2021

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

SHEET NO.
GM-2

VALVE SCHEDULE

TAG NUMBER	TYPE	SPECIFICATION SECTION	FUNCTION	OPERATOR	
4-GV-100	WEDGE GATE AWWA C509	15206	PLANT ISOLATION	MANUAL	
6-GV-101	WEDGE GATE AWWA C509	15206	EQUALIZATION TANK DRAIN	MANUAL	
6-GV-201	WEDGE GATE AWWA C509	15206	AERATION TANK DRAIN	MANUAL	
6-GV-202	WEDGE GATE AWWA C509	15206	CLARIFIER DRAIN	MANUAL	
6-GV-203	WEDGE GATE AWWA C509	15206	DIGESTER DRAIN	MANUAL	
8-BFV-101	BUTTERFLY	15202	EQUALIZATION TANK BLOWER 1 ISOLATION	MANUAL	
8-BFV-102	BUTTERFLY	15202	EQUALIZATION TANK BLOWER 2 ISOLATION	MANUAL	
8-BFV-201	BUTTERFLY	15202	AERATION BLOWER 1 ISOLATION	MANUAL	
8-BFV-202	BUTTERFLY	15202	AERATION BLOWER 2 ISOLATION	MANUAL	
8-BFV-203	BUTTERFLY	15202	AERATION BLOWER 3 ISOLATION	MANUAL	
8-BFV-204	BUTTERFLY	15202	DIGESTER BLOWER 1 ISOLATION	MANUAL	
8-BFV-205	BUTTERFLY	15202	DIGESTER BLOWER 2 ISOLATION	MANUAL	
8-BFV-206	BUTTERFLY	15202	DIGESTER HEADER ISOLATION	MANUAL	*
8-BFV-207	BUTTERFLY	15202	DIGESTER HEADER ISOLATION	MANUAL	*
8-CV-101	WAFER CHECK	11501	EQUALIZATION TANK BLOWER 1	-	*
8-CV-102	WAFER CHECK	11501	EQUALIZATION TANK BLOWER 2	-	*
8-CV-103	SWING CHECK AWWA C508	15203	TRANSFER PUMP 1	-	
8-CV-104	SWING CHECK AWWA C508	15203	TRANSFER PUMP 2	-	
8-CV-105	SWING CHECK AWWA C508	15203	TRANSFER PUMP 3	-	
8-CV-201	WAFER CHECK	11501	AERATION BLOWER 1	-	*
8-CV-202	WAFER CHECK	11501	AERATION BLOWER 2	-	*
8-CV-203	WAFER CHECK	11501	AERATION BLOWER 3	-	*
8-CV-204	WAFER CHECK	11501	DIGESTER BLOWER 1	-	*
8-CV-205	WAFER CHECK	11501	DIGESTER BLOWER 2	-	*
8-GV-101	WEDGE GATE AWWA C509	15206	TRANSFER PUMP 1 SUCTION ISOLATION	MANUAL	
8-GV-102	WEDGE GATE AWWA C509	15206	TRANSFER PUMP 2 SUCTION ISOLATION	MANUAL	
8-GV-103	WEDGE GATE AWWA C509	15206	TRANSFER PUMP 3 SUCTION ISOLATION	MANUAL	
8-GV-104	WEDGE GATE AWWA C509	15206	TRANSFER PUMP 1 DISCHARGE ISOLATION	MANUAL	
8-GV-105	WEDGE GATE AWWA C509	15206	TRANSFER PUMP 2 DISCHARGE ISOLATION	MANUAL	
8-GV-106	WEDGE GATE AWWA C509	15206	TRANSFER PUMP 3 DISCHARGE ISOLATION	MANUAL	
10-CV-501	SWING CHECK AWWA C508	15203	EFFLUENT PUMP 1	-	
10-CV-502	SWING CHECK AWWA C508	15203	EFFLUENT PUMP 2	-	
10-GV-501	WEDGE GATE AWWA C509	15206	EFFLUENT PUMP 1 ISOLATION	MANUAL	
10-GV-502	WEDGE GATE AWWA C509	15206	EFFLUENT PUMP 2 ISOLATION	MANUAL	
12-GV-100	WEDGE GATE AWWA C509	15206	PLANT ISOLATION	MANUAL	
12-GV-101	WEDGE GATE AWWA C509	15206	SCREEN 1 INLET	MANUAL	
12-GV-102	WEDGE GATE AWWA C509	15206	SCREEN 2 INLET	MANUAL	
12-GV-401	WEDGE GATE AWWA C509	15206	YARD PIPING	MANUAL	
12-GV-402	WEDGE GATE AWWA C509	15206	YARD PIPING	MANUAL	
14-GV-401	WEDGE GATE AWWA C509	15206	YARD PIPING	MANUAL	
14-GV-402	WEDGE GATE AWWA C509	15206	YARD PIPING	MANUAL	
16-GV-101	WEDGE GATE AWWA C509	15206	SCREEN 1 OUTLET	MANUAL	
16-GV-102	WEDGE GATE AWWA C509	15206	SCREEN 2 OUTLET	MANUAL	

NOTES:
1. VALVES TO BE PROVIDED BY PACKAGE TREATMENT PLANT SUPPLIER DENOTED BY *.
2. VALVES SMALLER THAN 6" NOT SHOWN IN SCHEDULE.

INSTRUMENT SCHEDULE

TAG NUMBER	SIZE	FUNCTION	SPECIFICATION SECTION	NOTES
FIT-101	12"	TRANSFER FLOW	17100	PIPE MOUNTED
FIT-501	12"	EFFLUENT FLOW	17100	PIPE MOUNTED
FR-501	-	EFFLUENT FLOW RECORDING	17100	PANEL MOUNTED
LIT-101	-	EQUALIZATION TANK LEVEL	17100	TANK MOUNTED
LIT-501	-	EFFLUENT WET WELL LEVEL	17100	TANK MOUNTED
PI-101	-	TRANSFER PUMP 1 PRESSURE	15183	PIPE MOUNTED
PI-102	-	TRANSFER PUMP 2 PRESSURE	15183	PIPE MOUNTED
PI-103	-	TRANSFER PUMP 3 PRESSURE	15183	PIPE MOUNTED
PI-501	-	EFFLUENT PUMP 1 PRESSURE	15183	PIPE MOUNTED
PI-502	-	EFFLUENT PUMP 2 PRESSURE	15183	PIPE MOUNTED

EQUIPMENT SCHEDULE

NAME	TAG NUMBER	SPECIFICATION SECTION	
INFLUENT SCREEN 1	01-E1	11333	
INFLUENT SCREEN 2	01-E2	11333	
EQUALIZATION TANK	01-T1	11400	
EQUALIZATION TANK BLOWER 1	01-E3	11501	*
EQUALIZATION TANK BLOWER 2	01-E4	11501	*
TRANSFER PUMP 1	01-P1	11139	
TRANSFER PUMP 2	01-P2	11139	
TRANSFER PUMP 3	01-P3	11139	
PACKAGE TREATMENT UNIT	02-T-1	11390	
CLARIFIER DRIVE	02-E1	11390	*
AERATION BLOWER 1	02-E2	11501	*
AERATION BLOWER 2	02-E3	11501	*
AERATION BLOWER 3	02-E4	11501	*
DIGESTION BLOWER 1	02-E5	11501	*
DIGESTION BLOWER 2	02-E6	11501	*
EFFLUENT PUMP 1	04-P1	11151	
EFFLUENT PUMP 2	04-P2	11151	

NOTES:
EQUIPMENT MARKED * TO BE SUPPLIED BY PACKAGE TREATMENT PLANT SUPPLIER. SEE SECTION 11390.

CADD FILE NAME: 14066-GM3-SCHEDULE.dwg

DESIGNED BY: KMD | DRAWN BY: GAL | CHECKED BY: JEP | JOB NO. 14066
SCALE: (22x34) - | SCALE: (11x17) - | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EQUIPMENT, VALVE & INSTRUMENT SCHEDULES

REVISIONS

NO.	DATE:	APP'D

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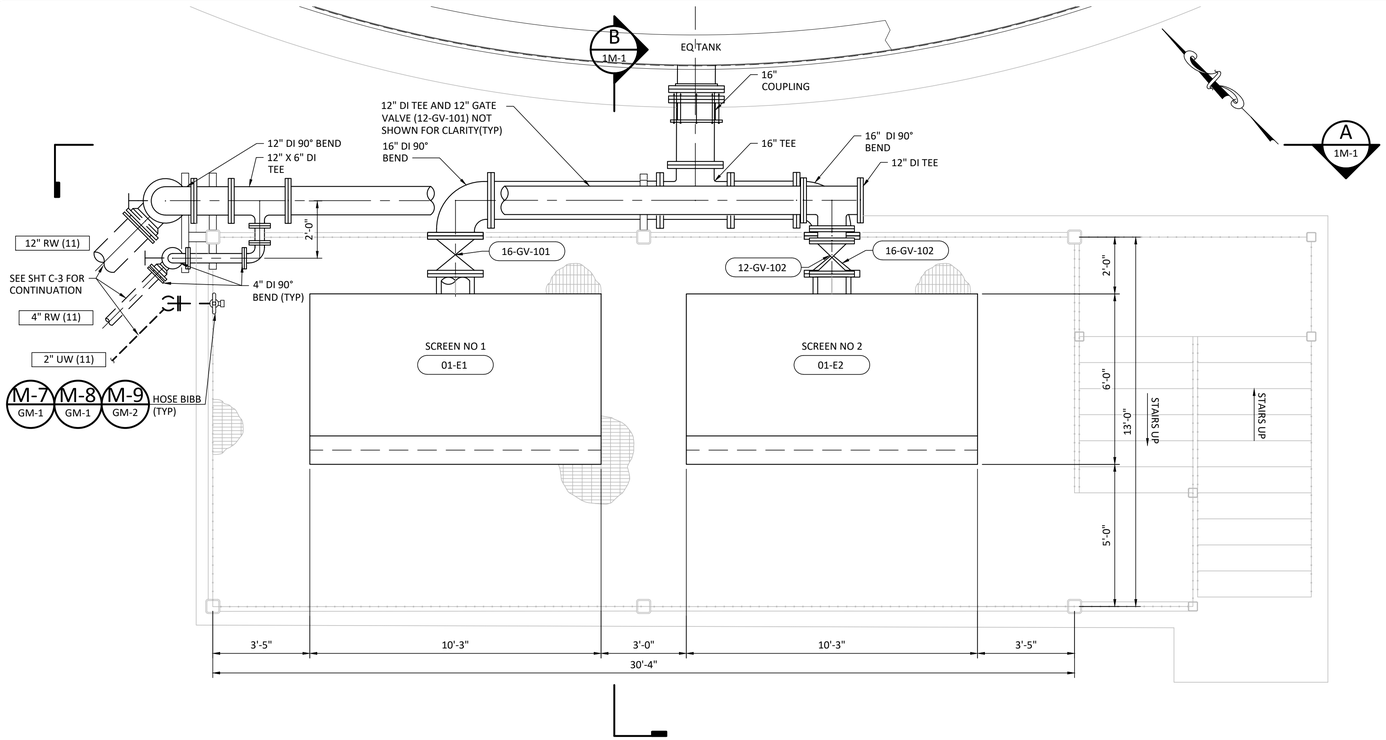
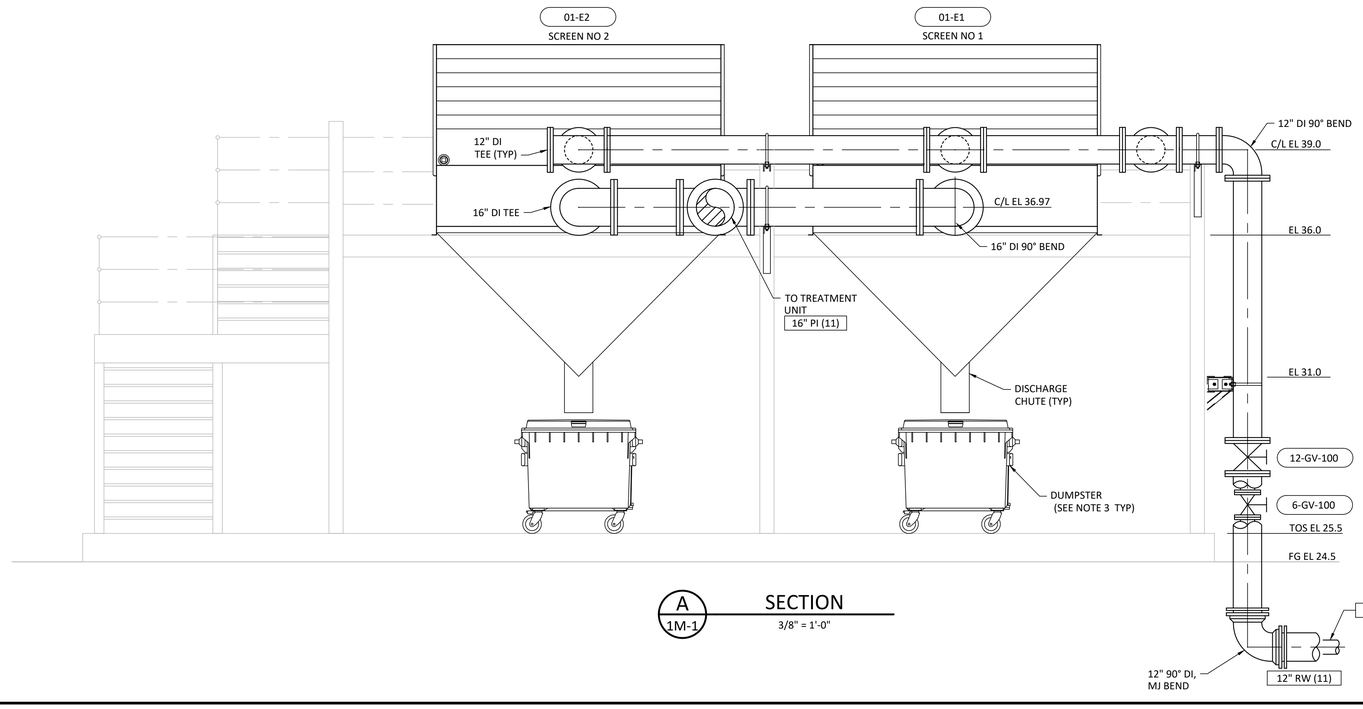
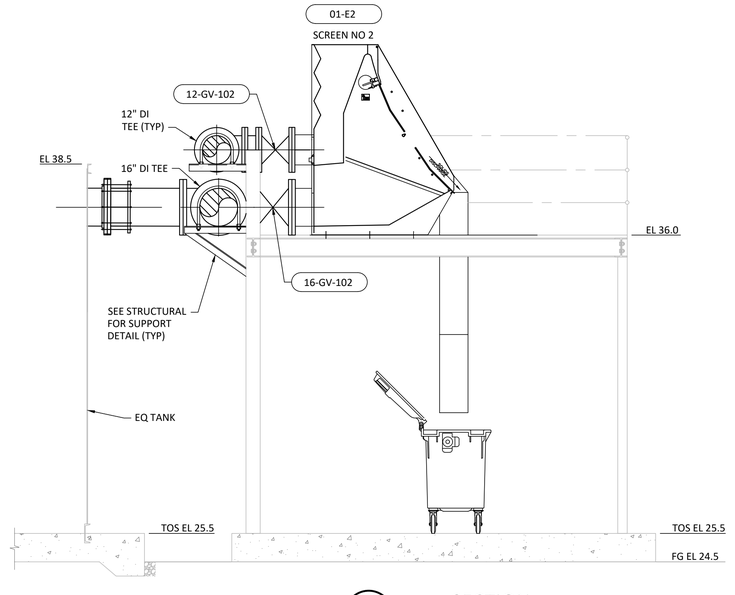
SHEET NO.
GM-3



PLAN
3/8" = 1'-0"



A 1M-1 SECTION
3/8" = 1'-0"



B 1M-1 SECTION
3/8" = 1'-0"

GENERAL SHEET NOTES

1. DISCHARGE CHUTES TO BE SUPPLIED BY SCREEN MANUFACTURER.
2. SEE SHEET GM-3 FOR EQUIPMENT AND VALVE SCHEDULES.
3. DUMPSTER TO BE PROVIDED BY OWNER.

CADD FILE NAME: 14066-1M1-SCRN.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 3/8"=1'-0"	SCALE: (11x17) -		DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

INFLUENT SCREENS - PLAN AND SECTIONS

REVISIONS

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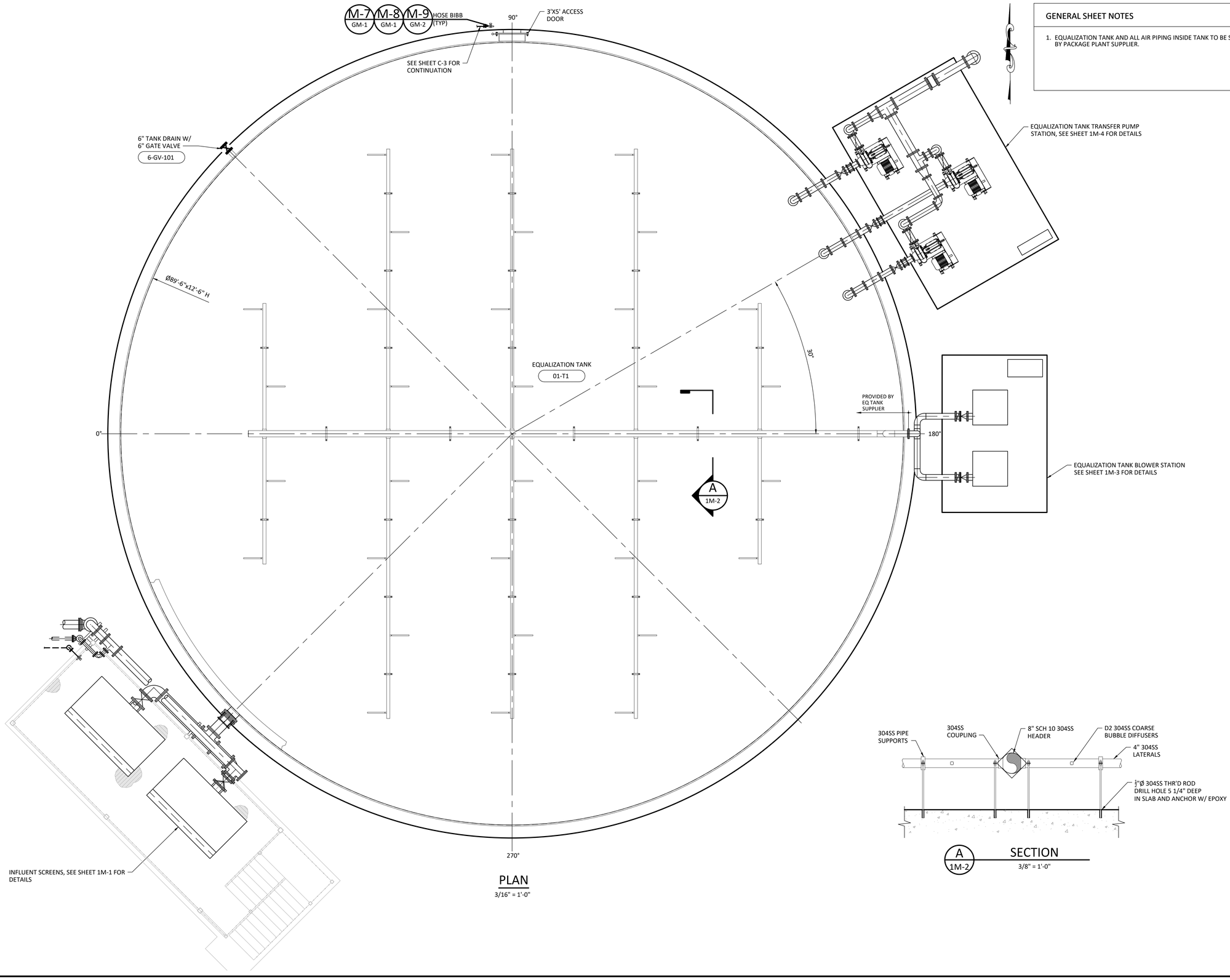
SHEET NO.
1M-1



PLAN
3/16" = 1'-0"

A / 1M-2 SECTION
3/8" = 1'-0"

GENERAL SHEET NOTES

1. EQUALIZATION TANK AND ALL AIR PIPING INSIDE TANK TO BE SUPPLIED BY PACKAGE PLANT SUPPLIER.

CADD FILE NAME: 14066-1M2-EQTK.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
KMD	GAL	JEP	14066

SCALE: (22x34) 3/16"=1'-0" | SCALE: (11x17) - | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EQUALIZATION TANK - PLAN

NO.	DATE:	REVISIONS	APPD

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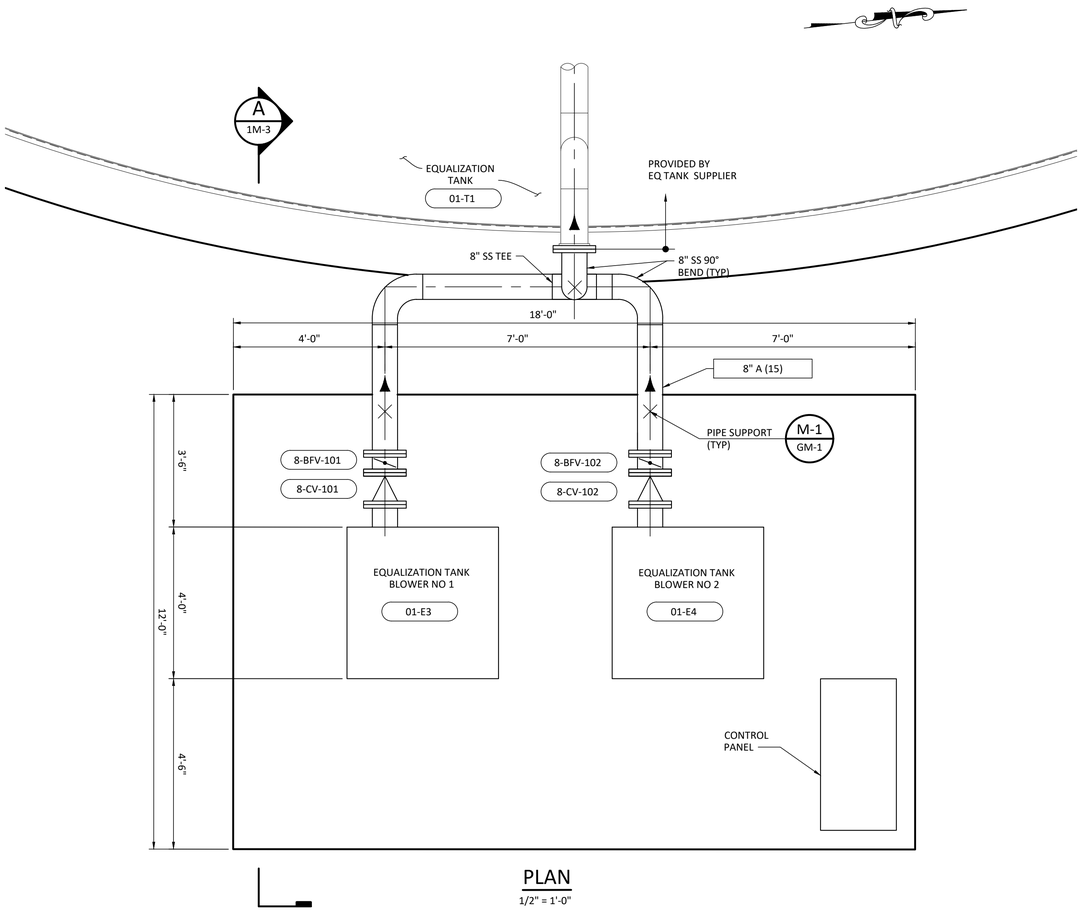
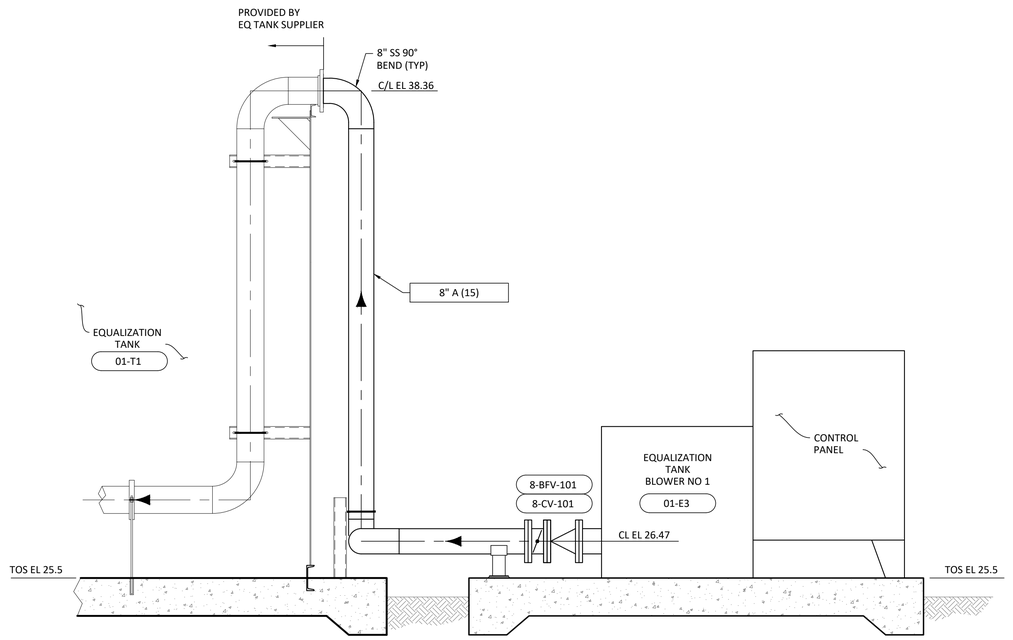
SHEET NO.
1M-2

GENERAL SHEET NOTES

1. EQUALIZATION TANK BLOWERS AND CHECK VALVES SUPPLIED BY EQUALIZATION TANK SUPPLIER.
2. SEE SHEET GM-3 FOR EQUIPMENT AND VALVE SCHEDULES.



PLAN
1/2" = 1'-0"



A 1M-3 SECTION
1/2" = 1'-0"

CADD FILE NAME: 14066-1M3-EQTK-BLWR.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
KMD	GAL	JEP	14066

SCALE: (22x34) 1/2"=1'-0" | SCALE: (11x17) - | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EQ. TANK BLOWER STATION-PLAN AND SECTIONS

REVISIONS

NO.	DATE:	APP'D

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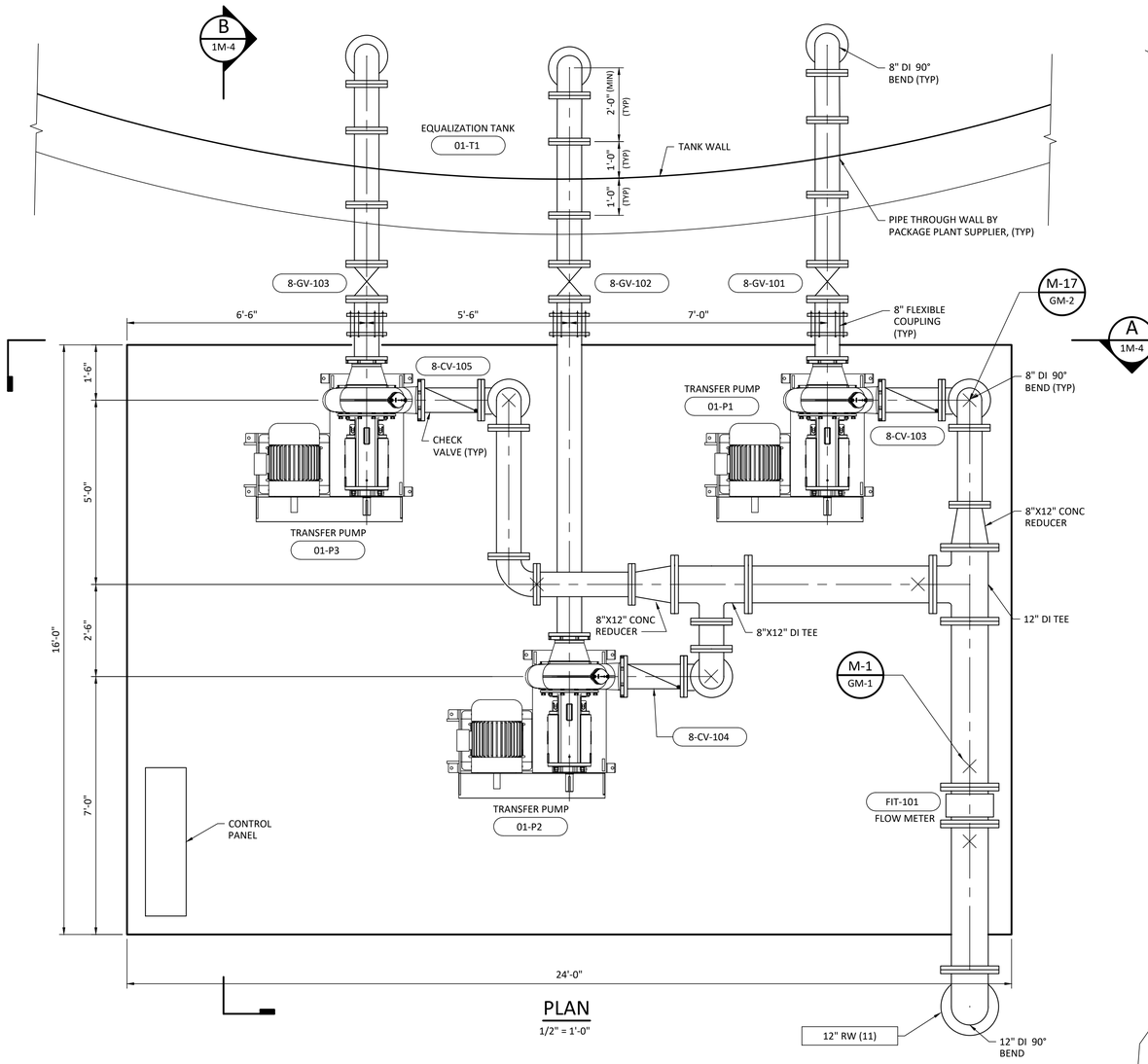
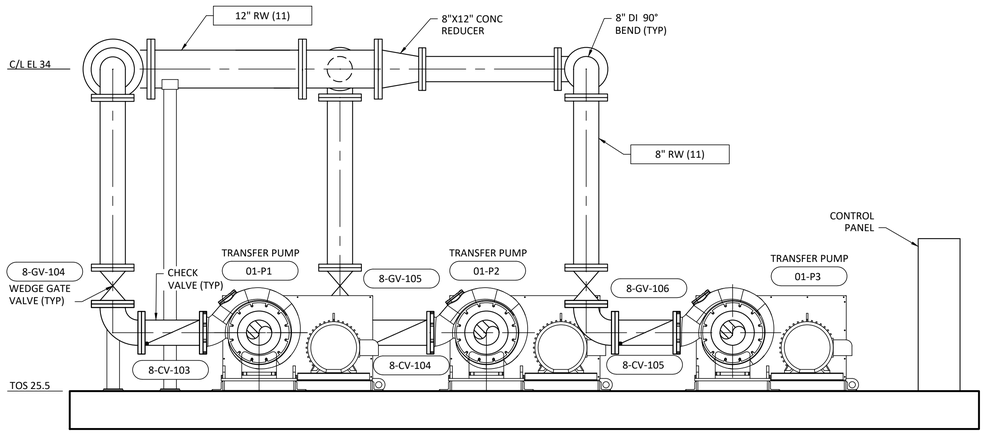
SHEET NO.
1M-3

GENERAL SHEET NOTES

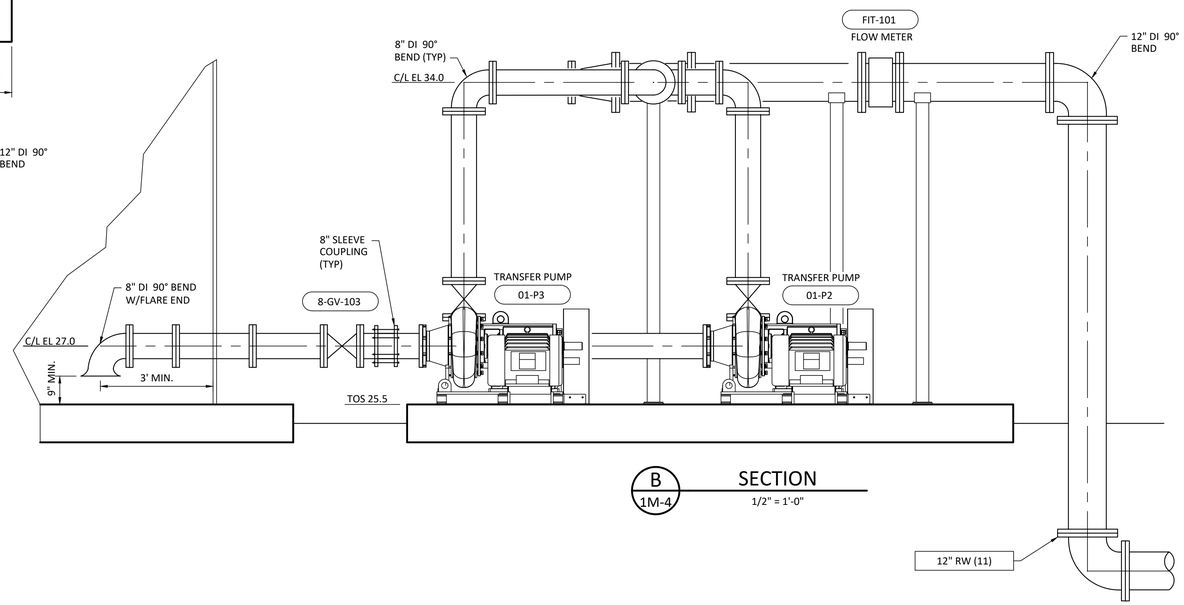
1. SEE SHEET GM-3 FOR EQUIPMENT AND VALVE SCHEDULE.



PLAN
1/2" = 1'-0"



A 1M-4 SECTION
1/2" = 1'-0"



B 1M-4 SECTION
1/2" = 1'-0"

CADD FILE NAME: 14066-1M4-TFPS.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 1/2"=1'-0"	SCALE: (11x17) -		DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

TRANSFER PUMP STATION

REVISIONS

NO.	DATE:	APPD

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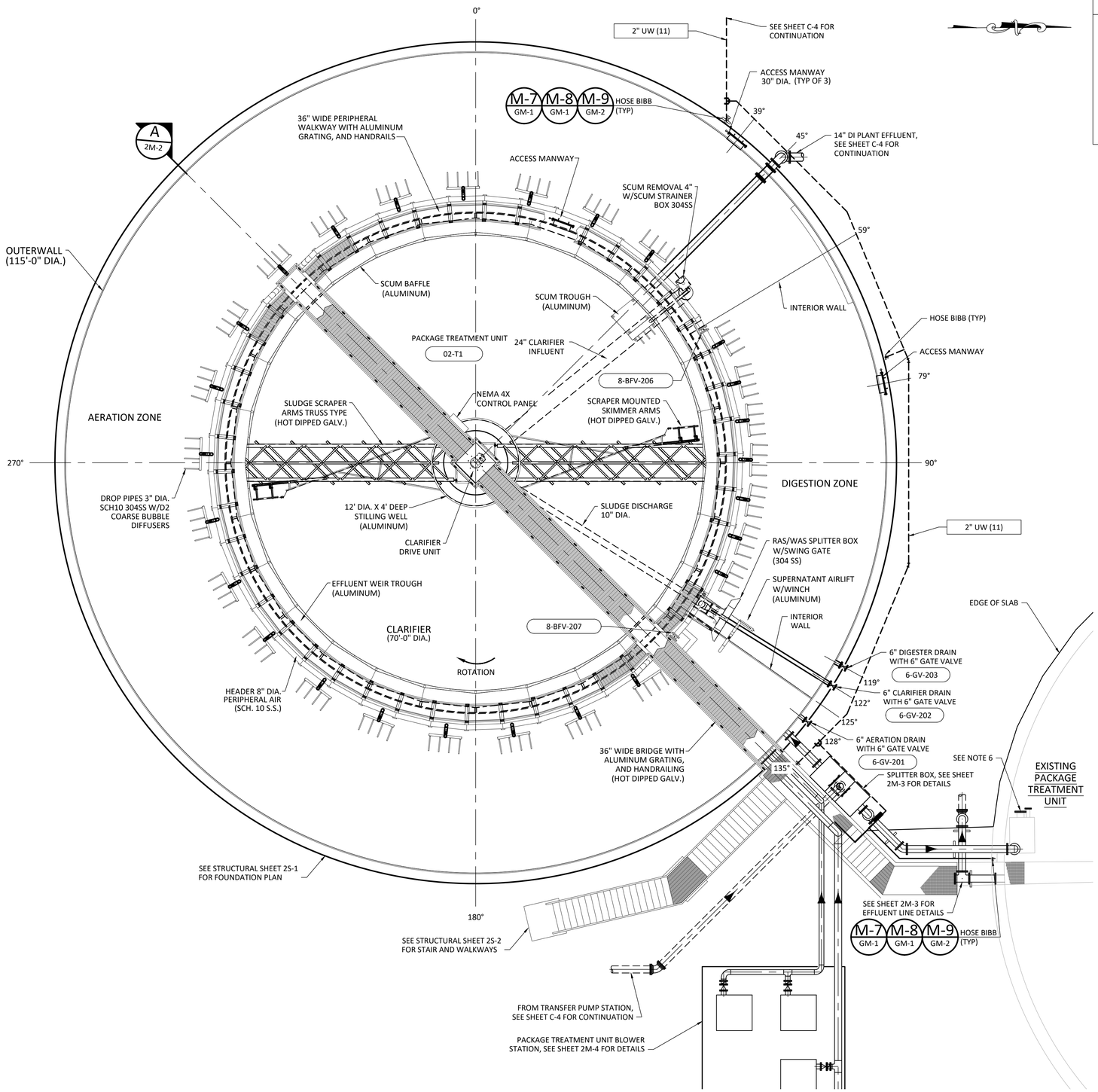
SHEET NO.
1M-4



PLAN

1/8" = 1'-0"

GENERAL SHEET NOTES

1. ORIENTATION OF TANK WALL PENETRATIONS TO BE FIELD VERIFIED BY CONTRACTOR PRIOR TO SUBMITTAL.
2. ALL EQUIPMENT INSIDE TANK TO BE SUPPLIED BY PACKAGE TREATMENT PLANT SUPPLIER. SEE SECTION 11390.
3. SEE SHEET GM-3 FOR EQUIPMENT AND VALVE SCHEDULES.
4. SEE SHEET 2M-3 FOR SPLITTER BOX AND WALKWAY DETAILS.
5. SEE SHEET 2S-1 FOR FOUNDATION DETAILS.
6. EXISTING 12" AND 4" SEWER FORCE MAINS TO EXISTING PLANT TO BE CAPPED AT SCREEN AFTER COMPLETION OF NEW PLANT.

CADD FILE NAME: 14066-2M1-WWTP.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 1/8"=1'-0"	SCALE: (11x17) -		DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PACKAGE TREATMENT UNIT - PLAN

REVISIONS	NO.	DATE:	APP'D

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SHEET NO.

2M-1

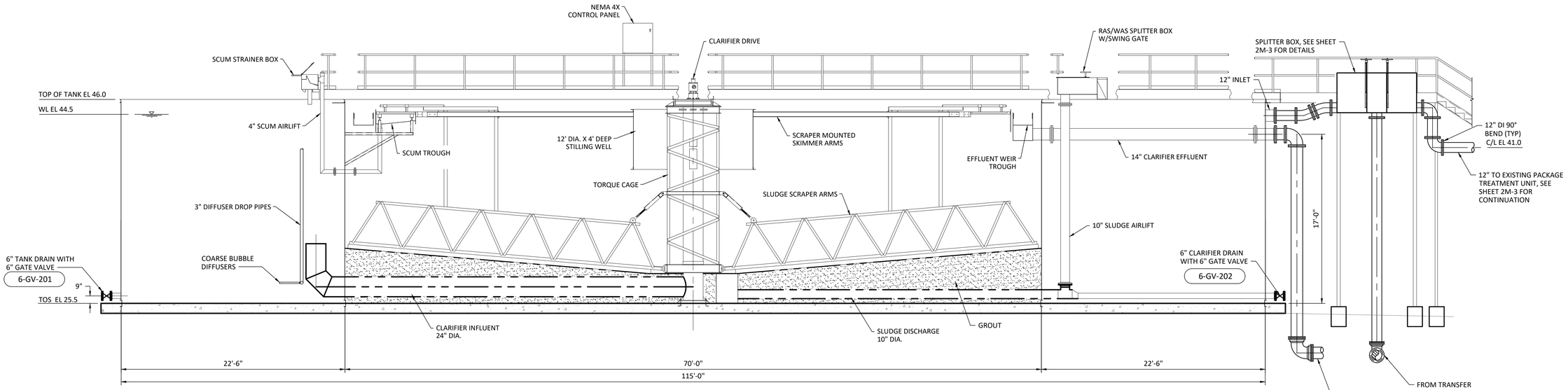
Plot Date: Tuesday, August 3, 2021 5:13:13 PM

User: Gwen Ladner

File:N:\2014\14066 - West St. Tammany WWTP Expansion\Drawings\Mechanical\14066-2M1-WWTP.dwg

GENERAL SHEET NOTES

1. SEE PLAN FOR NOZZLE ORIENTATION, SOME OBJECTS ROTATED OR NOT SHOWN FOR CLARITY.
2. ALL EQUIPMENT INSIDE TANK TO BE SUPPLIED BY PACKAGE TREATMENT PLANT SUPPLIER. SEE SECTION 11222.
3. SEE SHEET GM-3 FOR EQUIPMENT AND VALVE SCHEDULES.
4. SEE SHEET 2S-1 FOR FOUNDATION DETAILS.



A / 2M-1 SECTION

3/16" = 1'-0"

CADD FILE NAME: 14066-2M2-WWTP-SECT.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) -	SCALE: (11x17) -		DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PACKAGE TREATMENT UNIT - SECTION

NO.	DATE:	APP'D

REVISIONS

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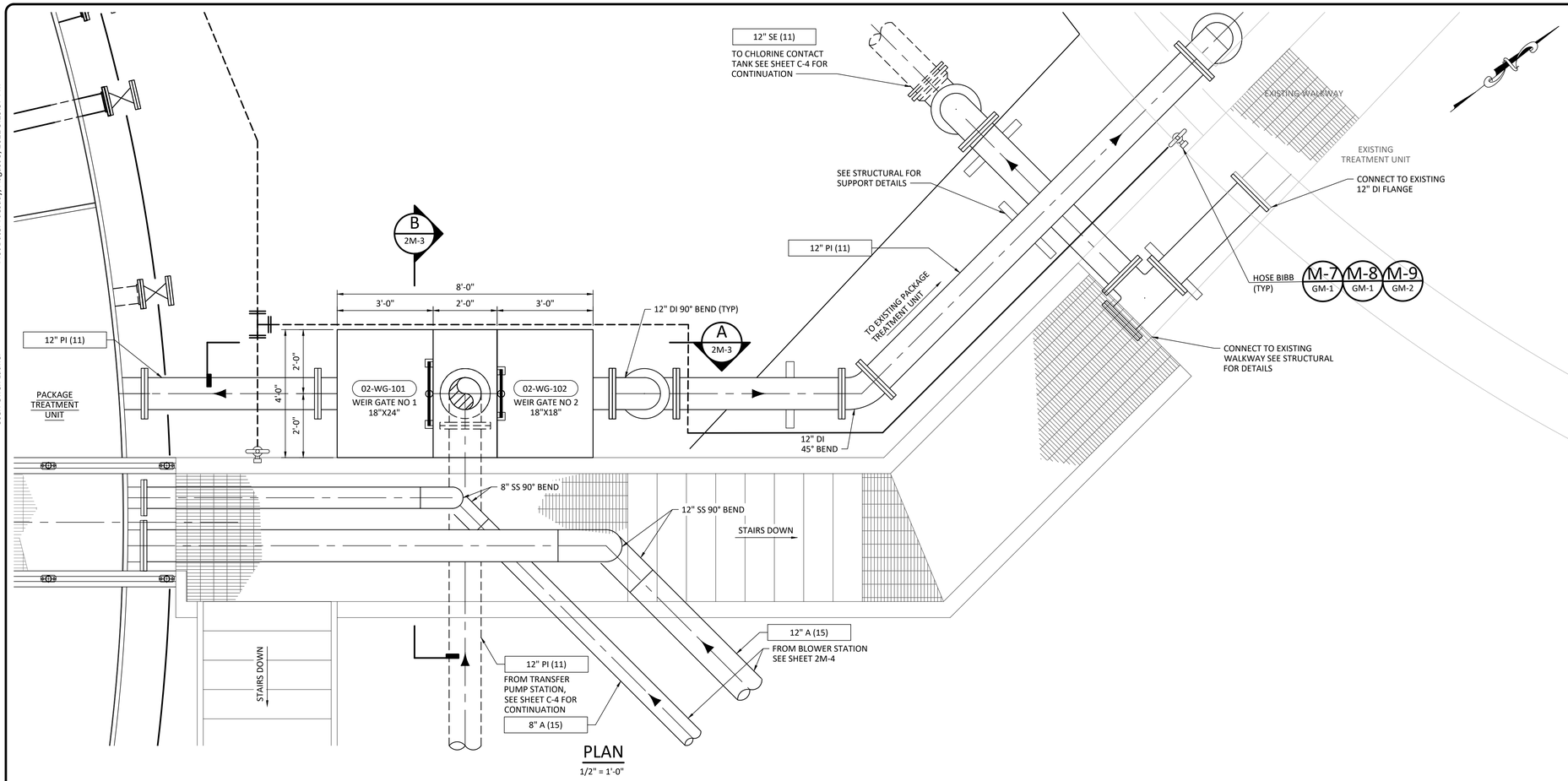
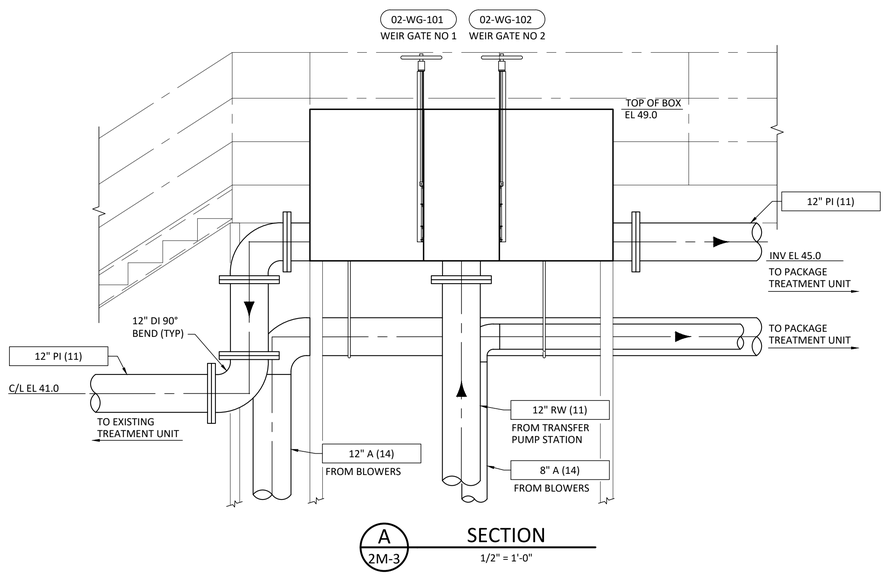
SHEET NO.

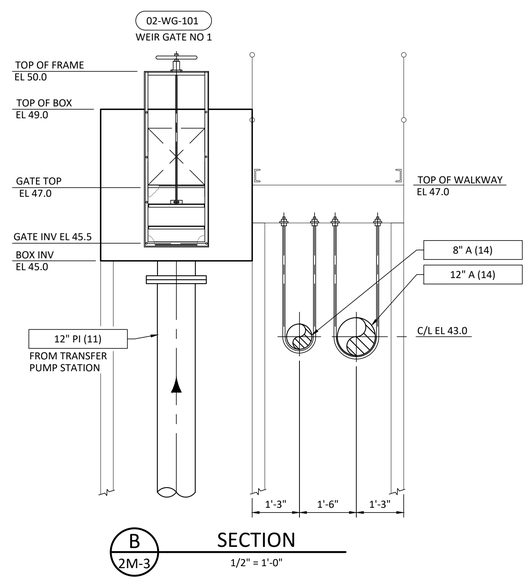
2M-2



PLAN
1/2" = 1'-0"



A 2M-3 **SECTION**
1/2" = 1'-0"



B 2M-3 **SECTION**
1/2" = 1'-0"

GENERAL SHEET NOTES

1. CONTRACTOR SHALL FIELD VERIFY ELEVATION AND LOCATION OF EXISTING WALKWAY AND TIE IN PIPING.
2. SEE SHEET 2S-2 FOR WALKWAY AND STAIRS.
3. SEE SECTION 15254 FOR WEIR GATE SCHEDULE AND REQUIREMENTS.

CADD FILE NAME: 14066-2M3-SPBX.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 1/2"=1'-0"	SCALE: (11x17) -		DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PACKAGE TREATMENT UNIT - SPLITTER BOX

REVISIONS	NO.	DATE:	APP'D

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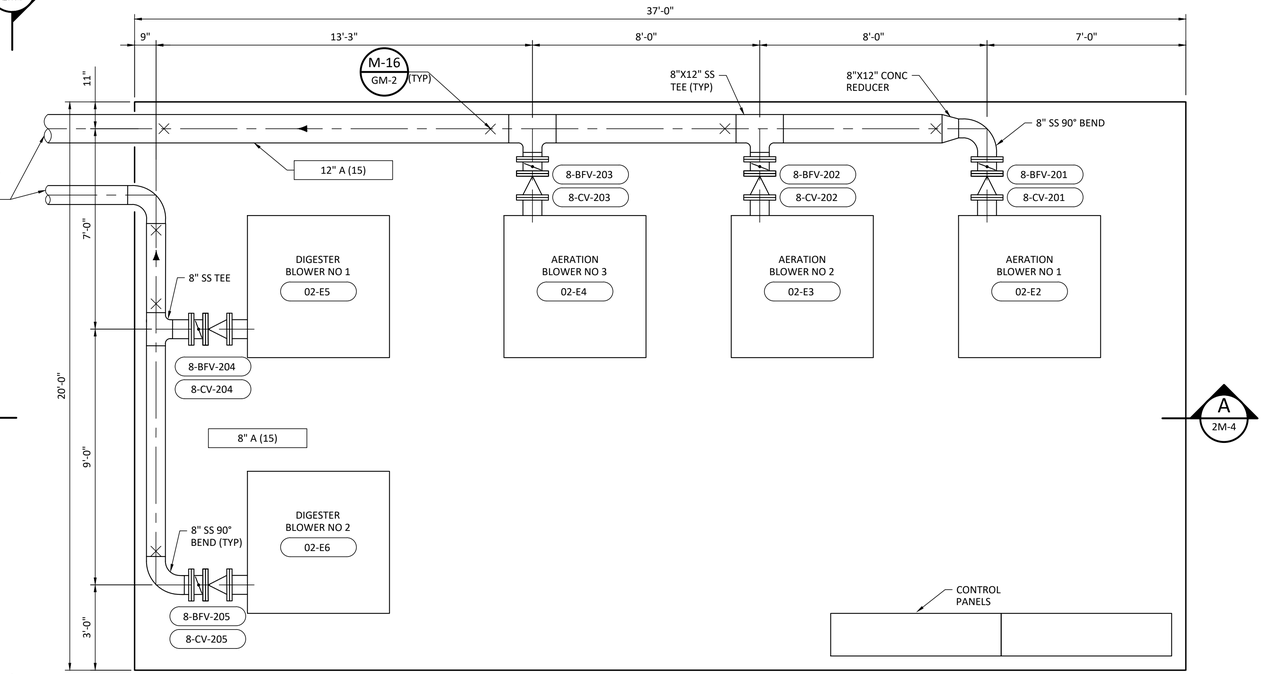
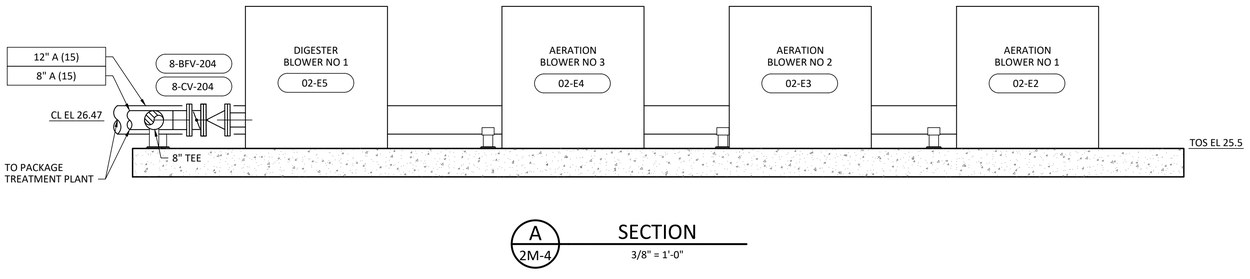
SHEET NO.
2M-3

Plot Date: Tuesday, August 3, 2021 5:13:37 PM
User: Gwen Ladner
File:N:\2014\14066 - West St. Tammany WWTP Expansion\Drawings\Mechanical\14066-2M3-SPBX.dwg



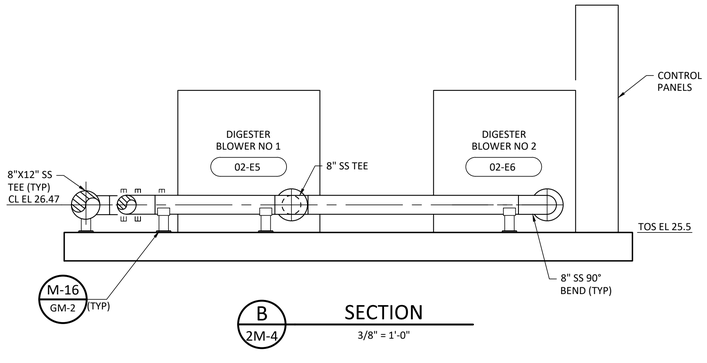
PLAN

3/8" = 1'-0"



A 2M-4 SECTION

3/8" = 1'-0"



B 2M-4 SECTION

3/8" = 1'-0"

GENERAL SHEET NOTES

1. BLOWERS AND CHECK VALVES SUPPLIED BY PACKAGE PLANT SUPPLIER.
2. SEE SHEET GM-3 FOR EQUIPMENT AND VALVE SCHEDULES.

CADD FILE NAME: 14066-2M4-BLWR.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 3/8"=1'-0"	SCALE: (11x17) -	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PTU -BLOWER STATION - PLAN AND SECTIONS

NO.	DATE:	REVISIONS	APP'D

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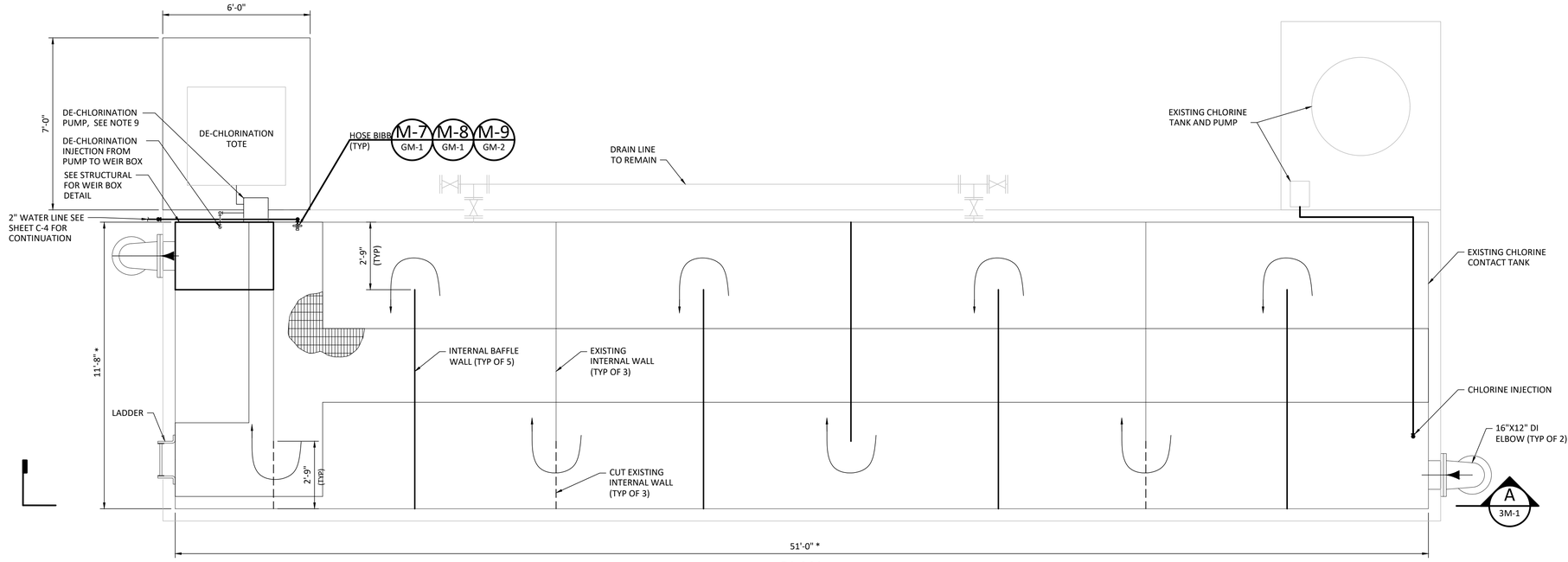
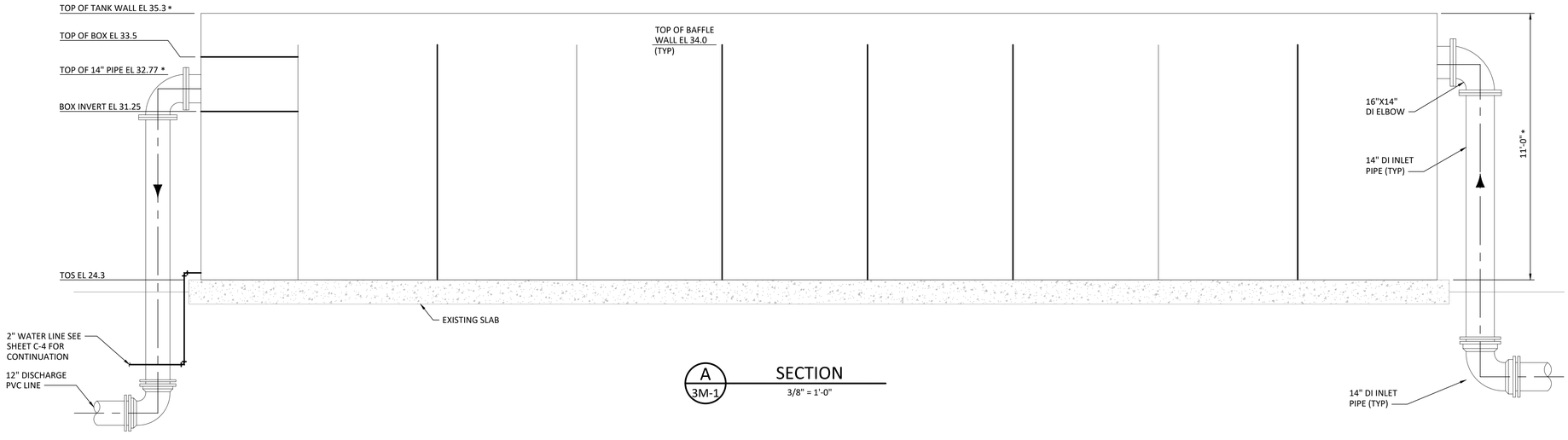
SHEET NO.

2M-4



PLAN

3/8" = 1'-0"



A
3M-1

SECTION

3/8" = 1'-0"

NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS OF EXISTING TANK DENOTED WITH *, INCLUDING INTERIOR WALLS, PRIOR TO SUBMITTAL.
2. CONTRACTOR TO PROVIDE TEMPORARY CHLORINE CONTACT TANK FOR DURATION OF PLANT MODIFICATIONS, MINIMUM OF 17,000 GALLONS.
3. CONTRACTOR TO COORDINATE STARTUP OF TEMPORARY TANK WITH PLANT OPERATOR PRIOR TO INSTALLATION.
4. REMOVE ALL EXISTING WALKWAYS, HANDRAIL, GRATING, AND ALL INTERNAL ITEMS OTHER THAN WALLS, INCLUDING WEIRS, LAUNDERS, AND PIPING NOT SHOWN ON THIS DRAWING FOR CLARITY.
5. PROVIDE NEW LADDER, WALKWAY, HANDRAILS AND GRATING. SEE SHEETS 3S-1 AND 3S-2 FOR DETAILS.
6. CONTRACTOR TO VERIFY EXISTING PIPING SIZES.
7. SEE SHEET 3S-1 AND 3S-2 FOR DETAILS OF NEW BAFFLE WALLS AND EFFLUENT WEIR BOX.
8. CONTRACTOR TO REINSTALL CHLORINE AND DE-CHLORINATION INJECTION LINES.
9. DE-CHLORINATION PUMP SHALL BE ENCLOSED IN PUMP ENCLOSURE AND MOUNTED TO THE SIDE OF THE CHLORINE CONTACT TANK.

CADD FILE NAME: 14066-3M1-CCT.dwg

DESIGNED BY: KMD	DRAWN BY: GAL	CHECKED BY: JEP	JOB NO. 14066
SCALE: (22x34) 3/8"=1'-0"	SCALE: (11x17) -		DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

CHLORINE CONTACT TANK MODIFICATIONS

REVISIONS	NO.	DATE:	APP'D

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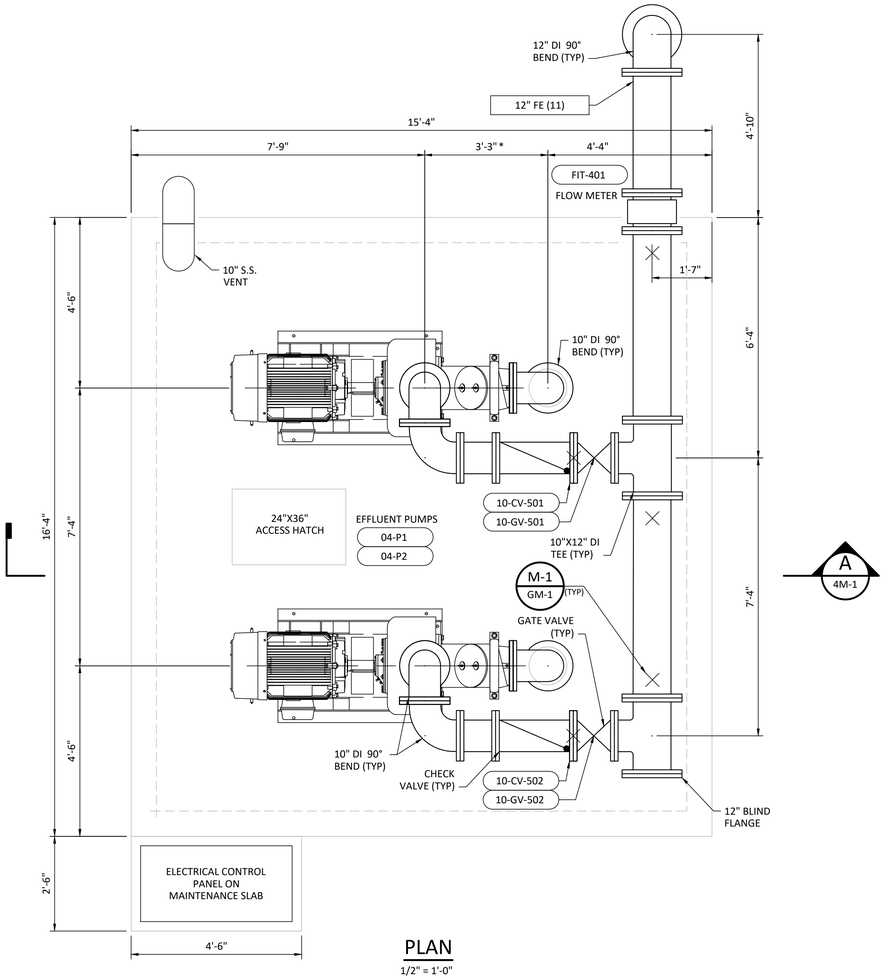
SHEET NO.

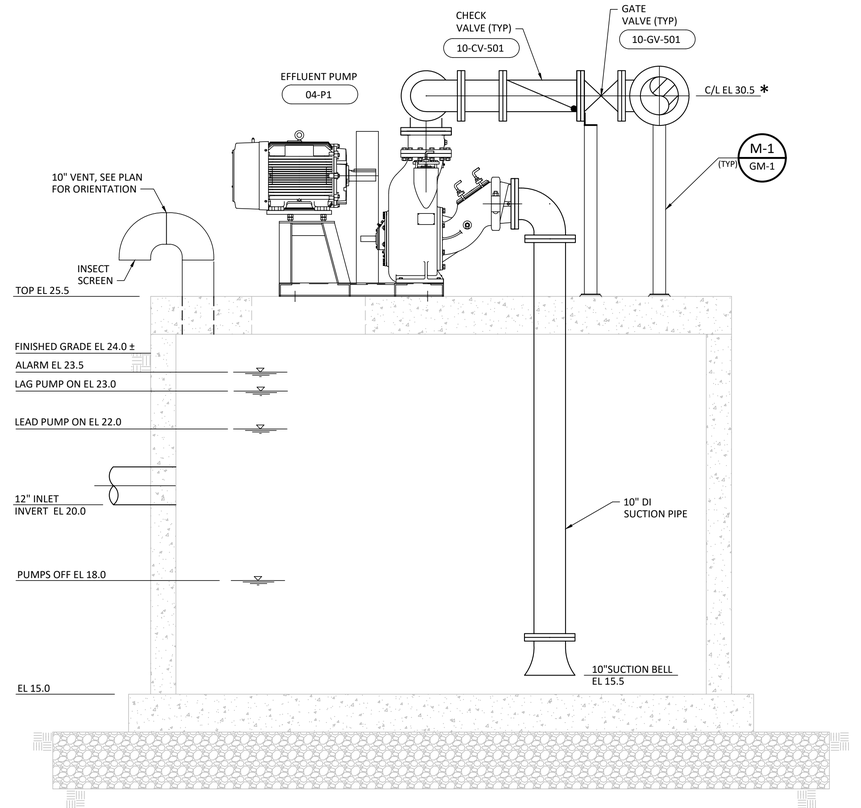
3M-1

GENERAL SHEET NOTES

1. SEE SHEET 4S-1 FOR PRECAST STRUCTURE AND FOUNDATION DETAILS.
2. CONTRACTOR SHALL VERIFY DIMENSIONS INDICATED AS "*" WITH EQUIPMENT SUPPLIER BEFORE EQUIPMENT SUBMITTAL.



PLAN
1/2" = 1'-0"



A
4M-1
SECTION
1/2" = 1'-0"

CADD FILE NAME: 14066-4M1-EFPS.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
KMD	GAL	JEP	14066
SCALE: (22x34) 1/2"=1'-0"	SCALE: (11x17) -		DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EFFLUENT PUMP STATION - PLAN AND SECTION

REVISIONS			
NO.	DATE:		APPD

STAMP:
STATE OF LOUISIANA
JAMES E. POWELL, JR.
License No. 31063
PROFESSIONAL ENGINEER
CIVIL ENGINEERING
7/30/2021

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

SHEET NO.
4M-1

STRUCTURAL- GENERAL NOTES

A. GENERAL

1. THESE NOTES SUPPLEMENT THE SPECIFICATIONS, WHICH SHALL BE REFERRED TO FOR ADDITIONAL REQUIREMENTS.
2. DO NOT SCALE CONTRACT DRAWINGS FOR THE PURPOSE OF ESTABLISHING DIMENSIONS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FINAL DIMENSIONS AND FIT-UP OF THE STRUCTURE, INCLUDING VERIFYING ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE COMMENCING WORK OR FABRICATING MATERIALS.
4. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING ANY WORK. ANY INTERFERENCE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
5. COORDINATE WITH THE MECHANICAL, PLUMBING, ELECTRICAL, AND CIVIL DRAWINGS AND VERIFY THE EXACT LOCATION OF ALL CHASES, INSERTS, OPENINGS, SLEEVES, FINISHES, DEPRESSIONS, SLOPES, PADS, AND OTHER PROJECT REQUIREMENTS, BEFORE COMMENCING ANY WORK. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, PLACEMENT, MAINTENANCE, ETC. OF ANY AND ALL SHORING, BRACING, TIE BACKS, ETC. NEEDED TO SUPPORT ANY PART OF THE NEW OR EXISTING CONSTRUCTION DURING THE ENTIRE CONSTRUCTION PROCESS TO ENSURE THE SAFETY AND INTEGRITY OF THE STRUCTURE UNTIL THE NECESSARY PERMANENT ELEMENTS ARE IN PLACE.

B. GOVERNING BUILDING CODE AND REFERENCES:

1. INTERNATIONAL BUILDING CODE 2015.
   A. STRUCTURAL MEMBERS ARE DESIGNED USING LOAD COMBINATIONS IN ACCORDANCE WITH THE ADOPTED BUILDING CODE.
2. MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES, ASCE 7-16.

C. DESIGN CRITERIA AND LIVE LOADS

1. SEISMIC DESIGN DATA

A.	RISK CATEGORY	II
B.	SEISMIC IMPORTANCE FACTOR, Ie	1
C.	MAPPED SPECTRAL RESPONSE ACCELERATIONS:	
	I. SHORT PERIOD, SS	0.103g
	II. ONE SECOND PERIOD, S1.	0.057g
D.	SITE CLASS	D
E.	SPECTRAL RESPONSE COEFFICIENTS:	
	I. SHORT PERIOD, SDS	0.109
	II. ONE SECOND PERIOD, SD1	0.091
F.	SEISMIC DESIGN CATEGORY	B
G.	BASIC SEISMIC-FORCE-RESISTING SYSTEM(S)	STEEL ORDINARY CONCENTRICALLY BRACE FRAME
H.	RESPONSE MODIFICATION FACTOR(S), R	3.25
I.	ANALYSIS PROCEDURE USED	EQUIVALENT LATERAL FORCE

2. WIND DESIGN DATA

A.	ULTIMATE DESIGN WIND SPEED , Vult (3 SEC GUST)	130 MPH
B.	NOMINAL DESIGN WIND SPEED ,Vasd	101 MPH
C.	RISK CATEGORY	II
D.	WIND EXPOSURE	B

3. LIVE LOADS

A.	STAIRS	100 PSF
B.	BRIDGE	100 PSF

D. SUBMITTALS

1. DEFERRED SUBMITTALS: THE FOLLOWING ITEMS ARE ENGINEERED BY OTHERS. ENGINEERING AND DOCUMENTATION OF THESE ITEMS ARE TO BE PROVIDED BY OTHERS FOR REVIEW BY THE ENGINEER.
   A. PRE-ENGINEERED METAL STAIRS AND ALUMINUM RAILINGS.
2. FURNISH ONE PRINT OF SHOP AND ERECTION DRAWINGS TO ENGINEER FOR REVIEW PRIOR TO FABRICATION. SUBMIT IN A TIMELY MANNER TO PERMIT 10 WORKING DAYS FOR REVIEW BY ENGINEER.
3. FURNISH TWO SETS OF CONCRETE, GROUT AND MORTAR MIX DESIGNS INCLUDING STRENGTH TEST DATA AND MANUFACTURER'S LITERATURE ON ADMIXTURES FOR REVIEW BY ENGINEER NO LATER THAN 2 WEEKS PRIOR TO ON-SITE USE OF THESE MATERIALS.
4. GENERAL AND SUB-CONTRACTOR NOTES:
   A. THE GENERAL CONTRACTOR SHALL REVIEW ALL SUBMITTALS PRIOR TO SUBMITTAL FOR REVIEW BY THE ENGINEER IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
   B. THE STRUCTURAL DRAWINGS SHALL NOT BE USED AS BACKGROUNDS FOR SHOP OR ERECTION DRAWINGS. DRAWINGS PREPARED IN THIS MANNER AND SUBMITTED FOR REVIEW TO THE ENGINEER WILL BE RETURNED REJECTED AND CONSIDERED AS NOT BEING IN CONFORMANCE WITH THE PROJECT SPECIFICATIONS.

E. FOUNDATIONS

1. THE SUBGRADE INFORMATION AND FOUNDATION DESIGN ARE BASED UPON A GEOTECHNICAL REPORT, NO. G15-108, PREPARED BY STRATUM ENGINEERING, LLC , DATED JANUARY 19, 2016. REFERENCE THIS REPORT FOR ADDITIONAL INFORMATION AND REQUIREMENTS. THE SOIL REPORT IS APPENDED TO THE SPECIFICATION.
2. PREPARE SITE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL REPORT. STRIP EXISTING GRADE OF ALL TOPSOIL, VEGETATION, AND OTHER UNDESIRABLE MATERIALS.
3. ALL SLABS, BEAMS, AND FOOTINGS NOT PILE-SUPPORTED SHALL BE SUPPORTED ON EXISTING UNDISTURBED SOIL OR ON NON-EXPANSIVE TYPE FILL COMPACTED TO 95% OF MAXIMUM STANDARD PROCTOR DENSITY. DESIGN SOIL PRESSURE = 2500 LBS. PER SQ. FT. AS ESTABLISHED BY THE GEOTECHNICAL INVESTIGATION PERFORMED BY STRATUM ENGINEERING, LLC AND DATED JANUARY 19, 2016.
4. ALL ELEVATIONS ARE BASED ON THE TOPOGRAPHIC SURVEY DRAWING BY KELLY McHUGH & ASSOCIATES, INC., DATED JULY 26, 2016.

F. CAST-IN-PLACE CONCRETE (NON-PRESTRESSED)

1. STRUCTURAL CONCRETE HAS BEEN DESIGNED IN ACCORDANCE WITH THE "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE", ACI 318-08.
2. WORK SHALL CONFORM TO ALL REQUIREMENTS OF ACI 301-LATEST EDITION, "SPECIFICATIONS FOR STRUCTURAL CONCRETE", PUBLISHED BY THE AMERICAN CONCRETE INSTITUTE, FARMINGTON HILLS, MICHIGAN, EXCEPT AS MODIFIED BY THE REQUIREMENTS OF THESE CONTRACT DOCUMENTS.
3. TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS SHALL CONFORM TO ALL REQUIREMENTS OF ACI 117-LATEST EDITION, "SPECIFICATIONS FOR TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS", PUBLISHED BY THE AMERICAN CONCRETE INSTITUTE, FARMINGTON HILLS, MICHIGAN, EXCEPT AS MODIFIED BY THE REQUIREMENTS OF THESE CONTRACT DOCUMENTS.
4. WORK SHALL CONFORM TO ALL REQUIREMENTS OF ACI 305.1-LATEST EDITION, "SPECIFICATIONS FOR HOT WEATHER CONCRETING", PUBLISHED BY THE AMERICAN CONCRETE INSTITUTE, FARMINGTON HILLS, MICHIGAN, EXCEPT AS MODIFIED BY THE REQUIREMENTS OF THESE CONTRACT DOCUMENTS.
5. ALL CONCRETE SHALL BE NORMAL WEIGHT CONCRETE, UNIT WEIGHT APPROXIMATELY 145 PCF, UNLESS OTHERWISE NOTED.CLEARLY IDENTIFY INTENDED USE FOR EACH MIX DESIGN SUBMITTED FOR APPROVAL.
6. CONCRETE SHALL CONFORM TO THE FOLLOWING:

	W/C RATIO
A. FOUNDATION, SLABS 4,000 PSI @ 28 DAYS (NORMAL WEIGHT)	0.45

7. ALL CONCRETE IN CONTACT WITH SOILS SHALL USE TYPE I-II CEMENT.
8. ALL CONCRETE SHALL BE NORMAL WEIGHT (APPROXIMATELY 145 LBS. PER CUBIC FT.).
9. MIXING WATER SHALL BE POTABLE. THE USE OF WASH WATER AS A PORTION OF THE MIXING WATER SHALL NOT BE PERMITTED.
10. CLEAN ALL CONSTRUCTION JOINTS THOROUGHLY AND PURPOSELY ROUGHEN THE SURFACE TO 1/4" AMPLITUDE USING A ROTARY HAMMER PRIOR TO PLACING ADJACENT CONCRETE.
11. SLABS AND GRADE BEAMS SHALL NOT HAVE JOINTS IN A HORIZONTAL PLANE. ALL CONSTRUCTION JOINTS SHALL BE AS DETAILED OR AS APPROVED BY THE ENGINEER.
12. PLACEMENT OF SLEEVES OR OPENINGS THROUGH GRADE BEAMS IS NOT PERMITTED UNLESS INDICATED ON STRUCTURAL DRAWINGS OR APPROVED, IN WRITING, BY ENGINEER.
13. CAREFULLY COORDINATE THE PLACEMENT OF ALL CAST-IN-PLACE EMBEDS AND ANCHOR RODS. ANCHOR RODS SHALL BE SET WITH A TEMPLATE. ALL EMBED ITEMS SHALL BE SECURELY ATTACHED TO FORM WORK OR REINFORCING.

G. REINFORCING STEEL

1. ALL REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ASTM A615, GRADE 60.
2. CONCRETE CLEAR COVER OVER REINFORCING AND PLACING TOLERANCES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318-LATEST EDITION.
3. PROVIDE CLASS "B" REINFORCING SPLICES. PROVIDE STANDARD 90 DEGREE HOOKS IN ACCORDANCE WITH ACI 318 LATEST EDITION, UNLESS NOTED OTHERWISE. STAGGER SPLICES UNLESS SPECIFICALLY NOTED.
4. DETAIL BARS IN ACCORDANCE WITH "ACI DETAILING MANUAL", PUBLICATION SP-66, AND "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE," ACI 318, LATEST EDITIONS. PROVIDE DETAILS INDICATING REINFORCING CONTINUITY AT CONSTRUCTION JOINTS.
5. REINFORCING BARS SHALL BE FREE OF ALL DELETERIOUS COATINGS WHEN CONCRETE IS PLACED AND THE LENGTH, SIZE, AND LOCATION SHALL BE AS SHOWN ON THE PROJECT PLANS.
6. WHERE REQUIRED, PROVIDE DOWELS MATCHING SIZE AND SPACING OF MAIN REINFORCEMENT.
7. PROVIDE A 90 DEGREE HOOK ON ALL TOP AND SIDE REINFORCING BARS IN ALL BEAMS AT DISCONTINUOUS ENDS.
8. PROVIDE ACCESSORIES NECESSARY TO PROPERLY SUPPORT REINFORCING AT POSITIONS SHOWN ON PLANS AND DETAILS. REINFORCING SHALL BE CHAIRED WITH 3000 PSI CONCRETE BRICKETTES SPACED TO ADEQUATELY SUPPORT THE REINFORCING BUT NO GREATER THAN 3'-0" O.C. EACH WAY.
9. PROVIDE STIRRUPS WITH 2-#4 TOP SUPPORT BARS FOR LENGTH OF STIRRUP SPACING WHERE TOP BARS NOT OTHERWISE PROVIDED.
10. ALL WELDING TO REINFORCING WILL CONFORM TO THE AWS STRUCTURAL WELDING CODE-REINFORCING STEEL, D1.4-2005.
11. DO NOT RE-BEND ANY BARS.
12. INSTALL CORNER BARS IN THE OUTSIDE FACE OF EDGE BEAMS AT EVERY CORNER ONCE TOP AND BOTTOM. BAR SHALL BE THE SAME SIZE AS THE LARGEST BEAM BAR.
13. WELDED WIRE FABRIC (WWF) SHALL BE IN ACCORDANCE WITH ASTM A-185. WIRE SHALL CONFORM TO ASTM A82. LAP ALL FABRIC ONE WIRE SPACING PLUS 2 INCHES.

H. STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL HAS BEEN DESIGNED IN ACCORDANCE WITH THE AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS.
2. UNLESS NOTED OTHERWISE ALL W STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A992 OR ASTM A572 GRADE 50. C AND S STRUCTURAL STEEL SHAPES, RODS, PLATES, AND ANGLES SHALL BE IN ACCORDANCE WITH ASTM A36.
3. TUBE SECTIONS SHALL BE ASTM A-500 GRADE B (46 KSI YIELD).
4. PIPE SECTIONS SHALL BE ASTM A53 TYPE S, GRADE B (35 KSI YIELD).
5. SPLICES IN STRUCTURAL STEEL NOT SHOWN ON THE STRUCTURAL DRAWINGS WILL NOT BE ACCEPTED WITHOUT SPECIFIC APPROVAL OF THE STRUCTURAL ENGINEER.
6. UNLESS NOTED OTHERWISE ALL CONNECTION BOLTS IN SINGLE PLATE CONNECTIONS SHALL BE 1" DIAMETER ASTM A325N (SEE SCHEDULE) AND ALL OTHER CONNECTION BOLTS SHALL BE 3/4" DIAMETER ASTM A325N.
7. UNLESS NOTED OTHERWISE ALL ANCHOR BOLTS SHALL BE 3/4" DIAMETER ASTM A307. ALL ANCHOR BOLTS SHALL BE HEADED AT THE UNTHREADED END.
8. UNLESS NOTED OTHERWISE EVERY WELD SHALL DEVELOP THE FULL STRENGTH OF THE LESSER OF THE MEMBERS IT JOINS. ALL BUTT, GROOVE, OR BEVEL WELDS SHALL BE COMPLETE, FULL PENETRATION.
9. WHERE POSSIBLE, ALL BOLT HOLES IN STRUCTURAL STEEL SHALL BE DRILLED OR PUNCHED IN THE SHOP. ANY HOLES REQUIRED TO BE MADE AT THE PROJECT SITE SHALL BE MECHANICALLY DRILLED OR PUNCHED. NO BURNING OF HOLES SHALL BE ALLOWED.
10. UNLESS SHOWN OTHERWISE ALL CAP AND BASE PLATES SHALL BE WELDED TO THE COLUMNS CONTINUOUSLY ALL AROUND WITH A 1/4" FILLET WELD.

REQUIRED VERIFICATION AND INSPECTION OF CONCRETE CONSTRUCTION (REFER TO 2012 INTERNATIONAL BUILDING CODE -- TABLE 1705.3)

VERIFICATION AND INSPECTION	CONTINUOUS INSPECTION	PERIODIC INSPECTION	REFERENCED STANDARD	IBC REFERENCES
INSPECTION OF REINFORCING STEEL, INCLUDING PLACEMENT		PERIODIC	ACI 318: 3.5, 7.1-7.7	IBC 1910.4
INSPECTION OF REINFORCING STEEL WELDING	NA	NA	AWS D1.4 ACI 318: 3.5.2	
INSPECTION OF ANCHORS CAST IN CONCRETE WHERE ALLOWABLE LOADS HAVE BEEN INCREASED OR WHERE STRENGTH DESIGN IS USED.		PERIODIC	ACI 318 3.8.6, 8.1.3, 21.1.8	IBC 1908.5, 1909.1
INSPECTION OF ANCHORS POST INSTALLED IN HARDENED CONCRETE MEMBER		PERIODIC	ACI 318: 3.8.6, 8.1.3, 21.1.8	IBC 1909.1
VERIFYING USE OF REQUIRED DESIGN MIX		PERIODIC	ACI 318: CH.4, 5.2-5.4	IBC 1904.2, 1910.2, 1910.3
AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, DETERMINE TEMPERATURE OF CONCRETE.	CONTINUOUS		ASTM C 172, ASTM C31, ACI 318: 5.6, 5.8	IBC 1910.10
INSPECTION OF CONCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	CONTINUOUS		ACI 318: 5.9, 5.10	IBC 1910.6, 1910.7, 1910.8
INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES		PERIODIC	ACI 318: 5.11-5.13	IBC 1910.9
INSPECT FORMWORK FOR SHAPE, LOCATION, AND DIMENSIONS FOR THE CONCRETE MEMBER BEING FORMED.		PERIODIC	ACI 318:6.1.1 REFERENCED STANDARD	

THE INFORMATION FOUND ON THIS PAGE IS PROVIDED AS SUPPLEMENTAL INFORMATION TO FACILITATE ANY IBC CODE REVIEW. SEE SPECIFICATION FOR ALL DIRECTIONS GIVEN TO THE CONTRACTOR FOR ITS IMPLEMENTATION.

CADD FILE NAME: GS-1.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
AOC	AOC	TPD	14066
SCALE: (22x34) -	SCALE: (11x17)	DATE:	JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

STRUCTURAL- GENERAL NOTES

REVISIONS	NO.	DATE:	APP'D

STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
PROFESSIONAL ENGINEER
STAMP

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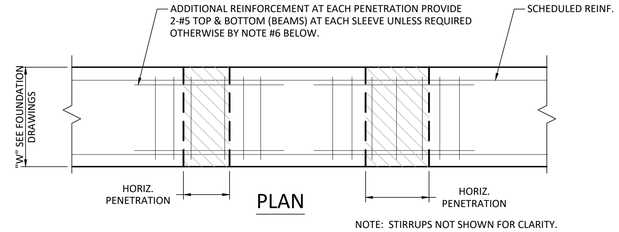
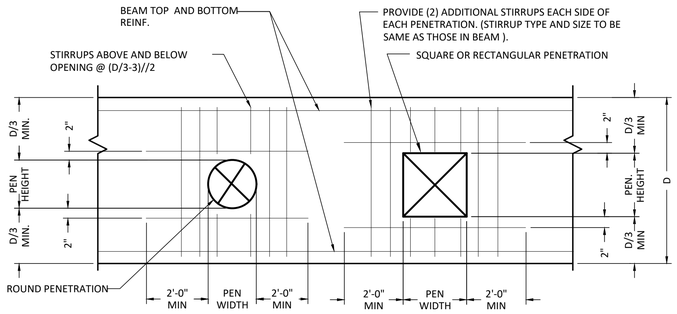
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

SHEET NO.
GS-1



PLAN

NOTE: STIRRUPS NOT SHOWN FOR CLARITY.

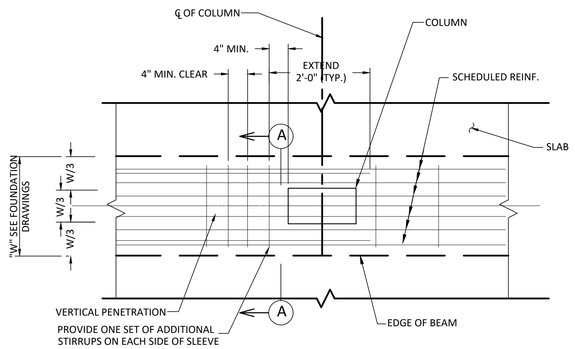


SIDE ELEVATION
HORIZONTAL PENETRATIONS IN GRADE BEAMS

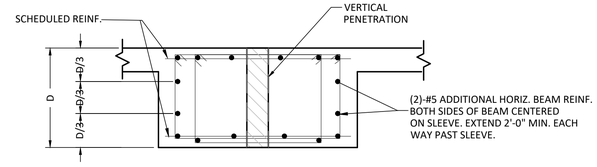
N.T.S

NOTES:

1. GENERAL CONTRACTOR TO COORDINATE LOCATION, SIZE AND ELEVATION AND INCLUDE IN HIS CONTRACT PRICE ALL REQUIRED HORIZONTAL PENETRATIONS THROUGH CONCRETE BEAMS AND JOISTS, WHETHER SHOWN ON STRUCTURAL DRAWINGS OR NOT.
2. WHERE BEAM PENETRATIONS ARE REQUIRED, BUT ARE NOT SPECIFICALLY DETAILED ON STRUCTURAL DRAWINGS, SUBMIT DRAWINGS SHOWINGS DIMENSIONS AND LOCATIONS OF ALL REQUIRED PENETRATIONS, FOR REVIEW AND APPROVAL.
3. "D" DENOTES THE DEPTH OF BEAM, OR SLABS WITH A "D" EQUAL OR GREATER THAN 12".
4. CLEAR SPACING BETWEEN PENETRATIONS, SHALL BE 24" MINIMUM UNLESS DESIGNED OTHERWISE BY THE ENGINEER.
6. FOR LOCATIONS AND/OR SIZES OF PENETRATIONS NOT CONFORMING TO THE ABOVE CRITERIA AND NOT OTHERWISE DETAILED ON THE STRUCTURAL DRAWINGS. CONTRACTOR SHALL COORDINATE THE REQUIRED ADDITIONAL REINFORCEMENT WITH THE ENGINEER ON THE SHOP DRAWINGS.



PLAN

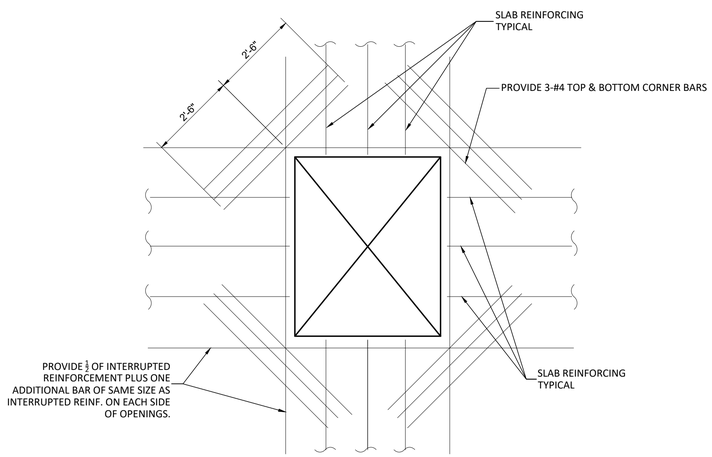


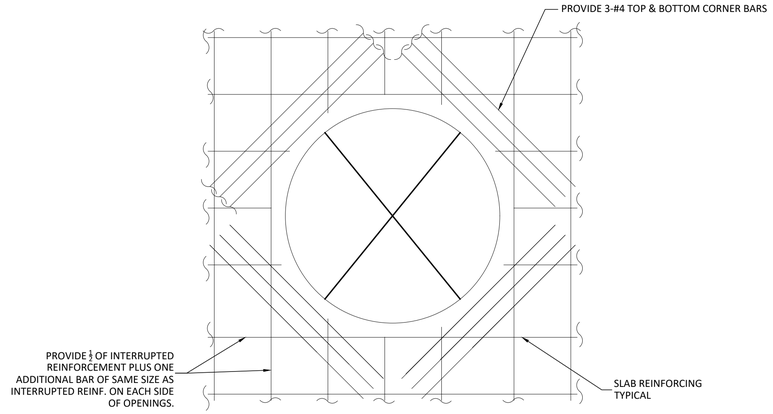
SECTION - A
VERTICAL PENETRATIONS IN GRADE BEAM/SLABS

N.T.S

NOTES:

1. REQUIRED BEAM SLEEVES ARE TO BE COORDINATED BY CONTRACTOR. REQUIRED SLEEVES MAY OR MAY NOT BE SHOWN ON THE STRUCTURAL DRAWINGS. CONTRACTOR SHALL SUBMIT PLAN SHOWING LAYOUT OF ALL SLEEVES WITH FORM WORK SHOP DRAWING SUBMITTAL.
2. SLEEVES SHALL BE LOCATED ON THE BEAM CENTERLINE OR AT LEAST WITHIN THE MIDDLE THIRD OF THE SCHEDULED BEAM WIDTH.
3. CONTINUOUS BEAM REINFORCING MAY BE SLIGHTLY DISPLACED (3"MAX.) OR ADJACENT BARS BUNDLED (2 BARS BUNDLES MAX.) TO FACILITATE SLEEVE INSTALLATION, DO NOT CUT, OFFSET, OR BEND REINFORCING.
4. SLEEVES OCCURRING ON OPPOSITE SIDES OF A COLUMN MUST BE IN LINE.
5. THE OUTSIDE DIAMETER OF A SLEEVE MAY NOT EXCEED 15% OF THE SCHEDULE WIDTH OF THE BEAM THROUGH WHICH IT MUST PASS.
6. THE CONTRACTOR SHALL CONTACT THE ENGINEER OF RECORD FOR DIRECTIONS WHEN A SLEEVE SIZE OR LOCATION DOES NOT MEET THE CONDITIONS ESTABLISHED ABOVE.





LARGE PENETRATIONS INTO SLABS

N.T.S

CADD FILE NAME: GS-1.dwg

DESIGNED BY: AOC	DRAWN BY: AOC	CHECKED BY: TPD	JOB NO. 14066
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STRUCTURAL- GENERAL DETAILS

REVISIONS

NO.	DATE:	APP'D

STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
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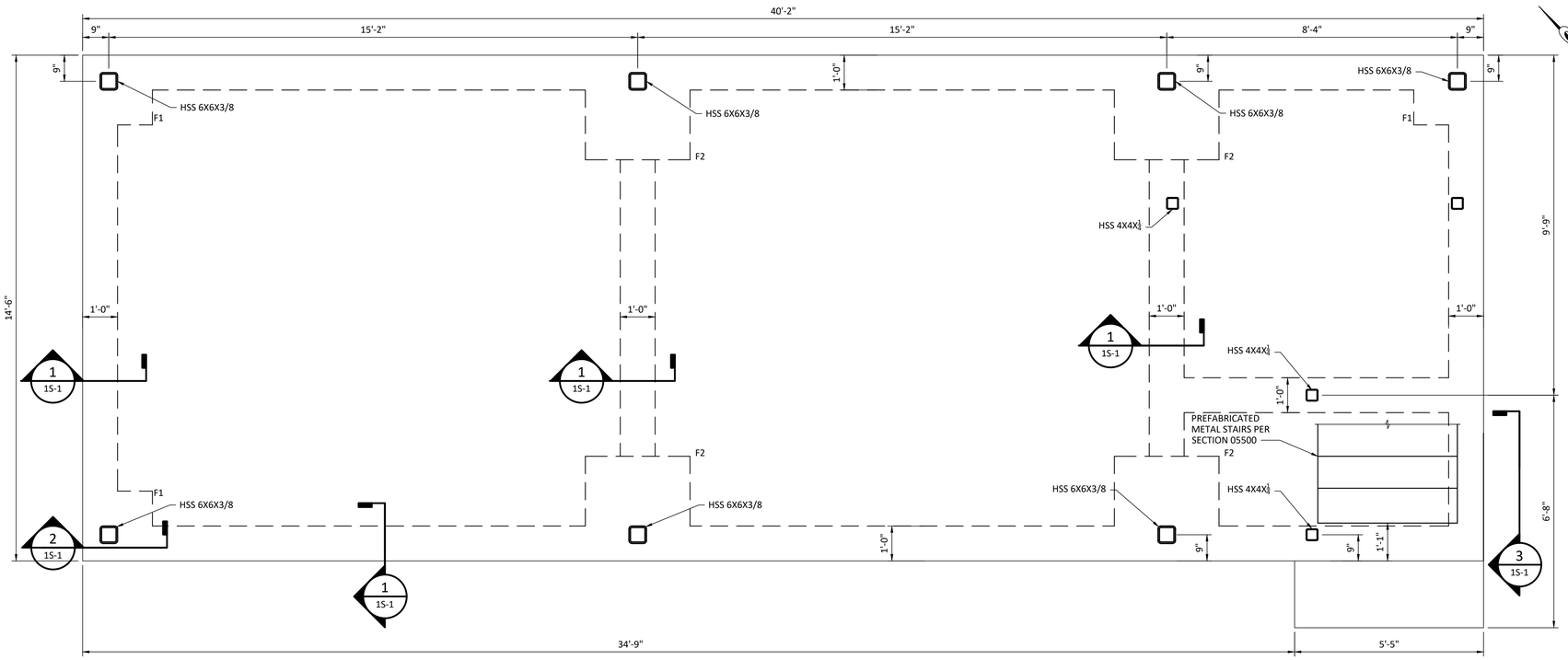
GS-2



INFLUENT SCREENS FOUNDATION PLAN

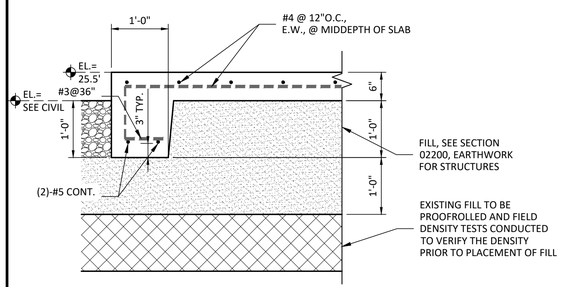
1/2" = 1'-0"

GENERAL SHEET NOTES

1. ALL STEEL INCLUDING BOLTS, PLATES, RODS, CONNECTIONS SHALL BE HOT DIPPED GALVANIZED.
2. CONTRACTOR SHALL COORDINATE EXACT LOCATION AND SIZE OF INFLUENT SCREENS WITH STRUCTURAL STEEL SUPPLIER BEFORE COMMENCING ANY WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ANY ADJUSTMENTS TO THESE DIMENSIONS TO ENSURE INFLUENT SCREENS ARE LOCATED AND INSTALLED PROPERLY.
3. ——x——x——x——x——x—— ALUMINUM RAILING PER SECTION 05521
4. SEE EXACT LOCATION OF INFLUENT SCREEN'S CONCRETE SLAB ON SHEET C-2.

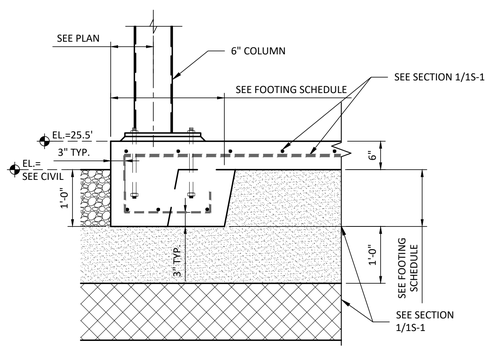
FOOTING SCHEDULE

MARK	SIZE	REINFORCEMENT
F1	2'-0"X2'-0"X1'-0"	(4)-#5 EACH DIRECTION BOTTOM ONLY
F2	3'-0"X3'-0"X1'-0"	(5)-#5 EACH DIRECTION BOTTOM ONLY



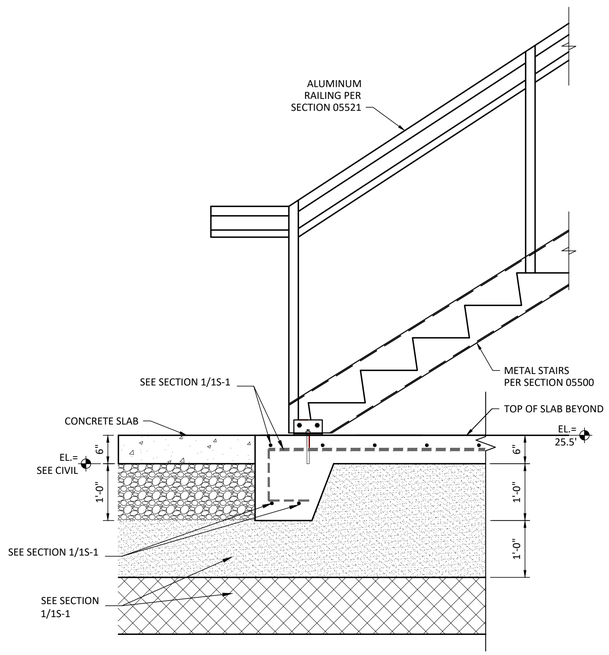
1 / 1S-1 SECTION

3/4" = 1'-0"



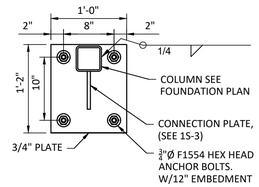
2 / 1S-1 SECTION

3/4" = 1'-0"



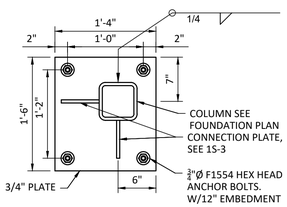
3 / 1S-1 SECTION

3/4" = 1'-0"



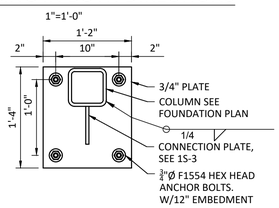
TYPICAL BASE PLATE DETAIL FOR HSS 4X4

1"=1'-0"



CORNER BASE PLATE DETAIL FOR HSS 6X6 @ X- BRACING IN BOTH DIRECTIONS

1"=1'-0"



TYPICAL BASE PLATE DETAIL FOR HSS 6X6

1"=1'-0"

CADD FILE NAME:

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
DAM	AOC	TPD	14066

SCALE: (22x34) -

SCALE: (11x17) -

DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

INFLUENT SCREENS PLATFORM - FOUNDATION

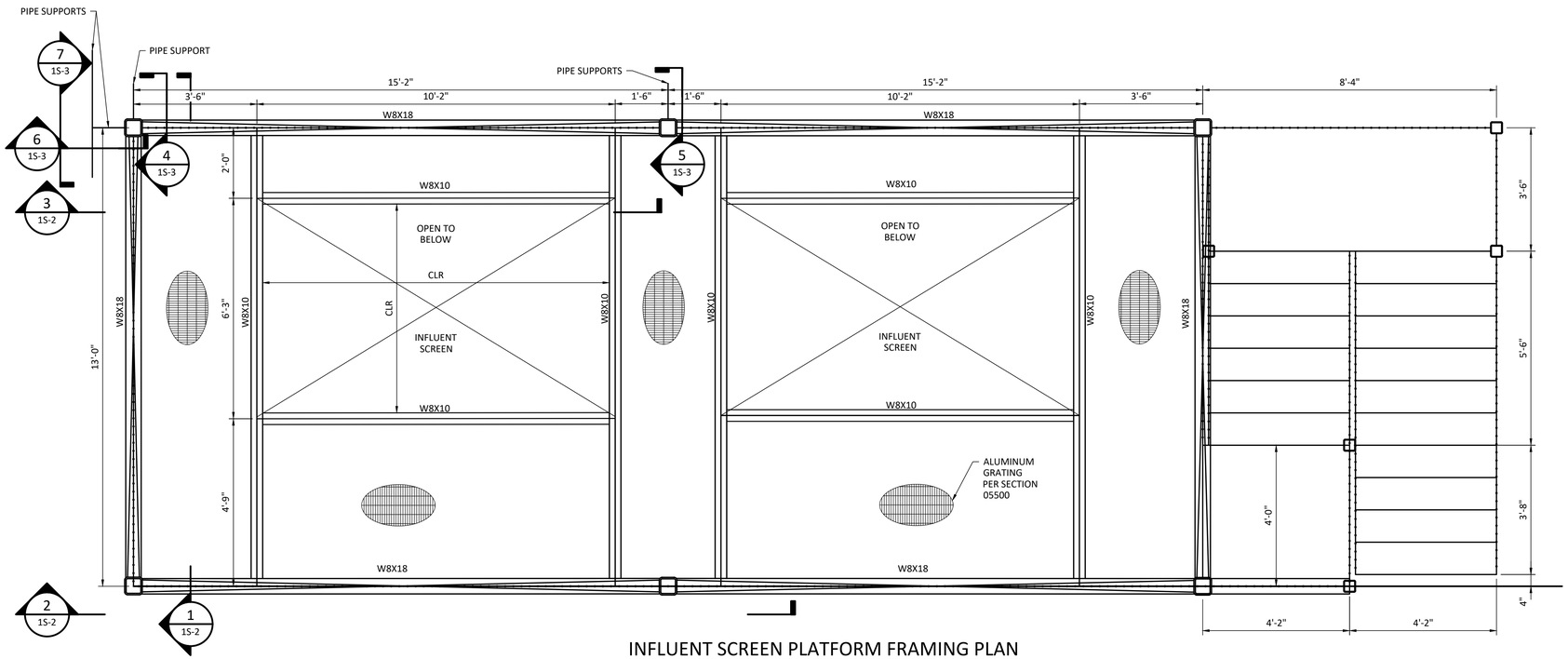
NO.	DATE:	REVISIONS	APP'D

STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
PROFESSIONAL ENGINEER
STAMP

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

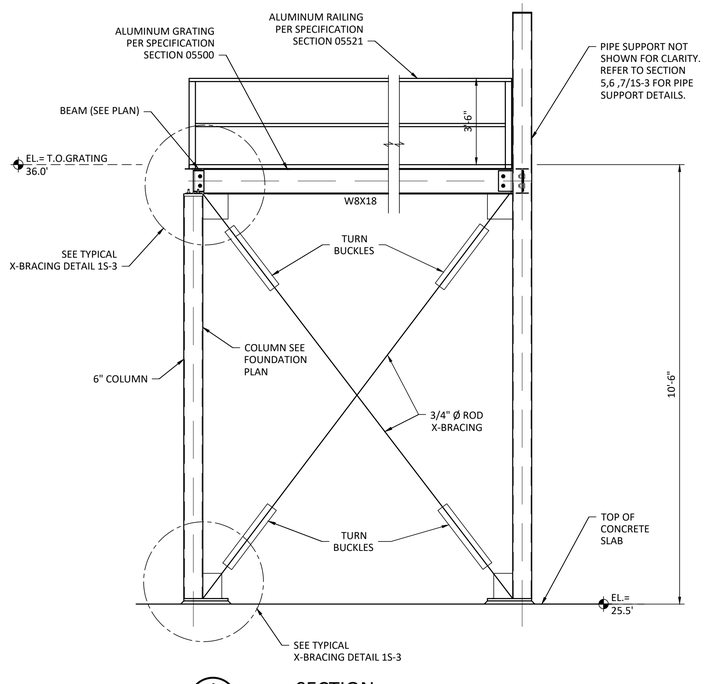
SHEET NO.

1S-1



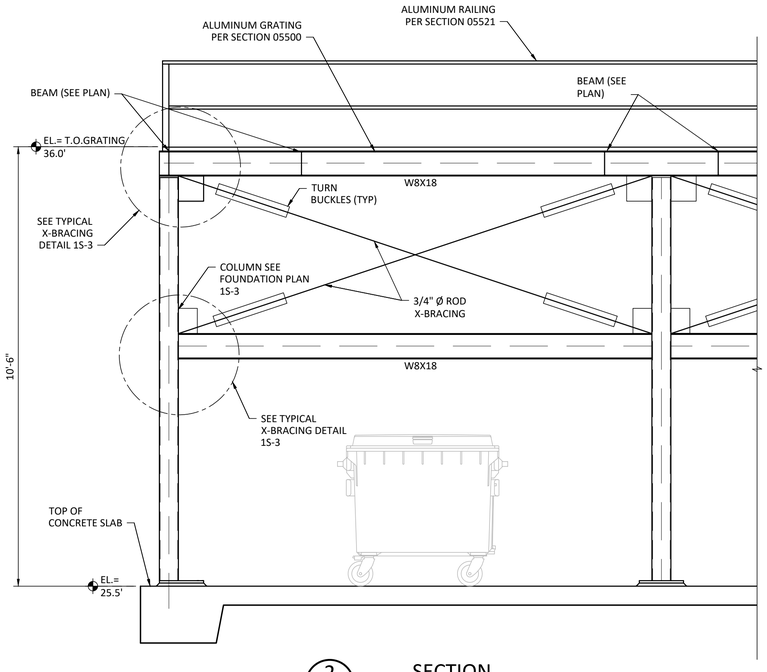
INFLUENT SCREEN PLATFORM FRAMING PLAN

1/2" = 1'-0"



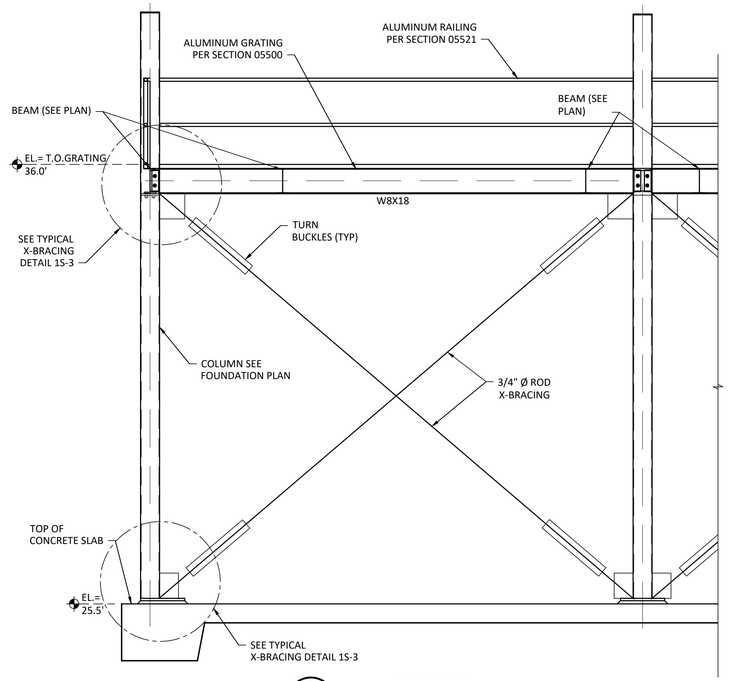
1 1S-2 SECTION

1/2"=1'-0"



2 1S-2 SECTION

1/2"=1'-0"



3 1S-2 SECTION

1/2"=1'-0"

GENERAL SHEET NOTES

1. INFLUENT SCREEN ATTACHMENT TO STRUCTURE PER INFLUENT SCREEN SUPPLIER.

CADD FILE NAME:

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
DAM	AOC	TPD	14066

SCALE: (22x34) -

SCALE: (11x17) -

DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

INFLUENT SCREENS PLATFORM - FRAMING

REVISIONS

NO.	DATE:	APP'D

STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
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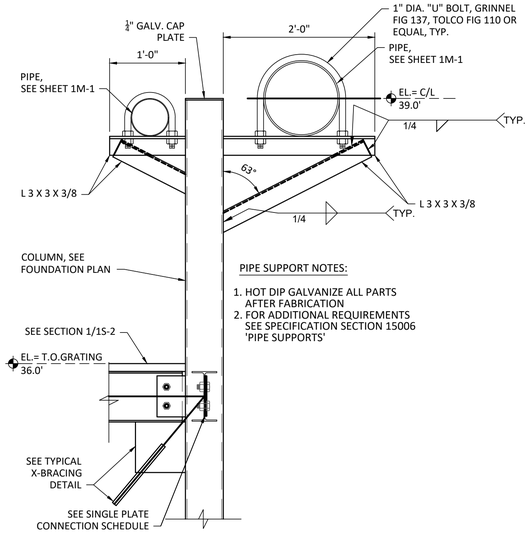
SHEET NO.

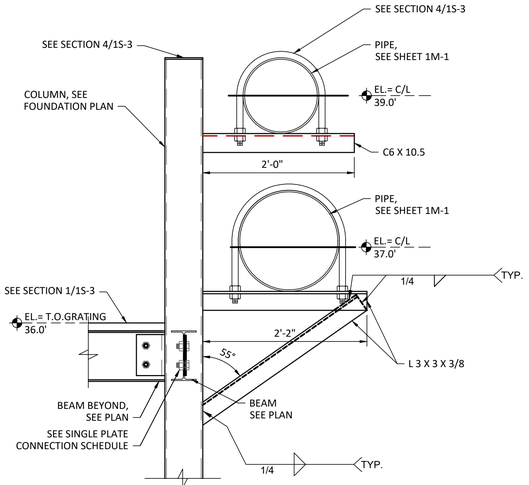
1S-2



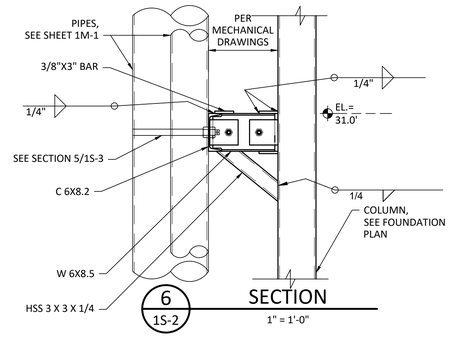
PIPE SUPPORT NOTES:

1. HOT DIP GALVANIZE ALL PARTS AFTER FABRICATION
2. FOR ADDITIONAL REQUIREMENTS SEE SPECIFICATION SECTION 15006 'PIPE SUPPORTS'

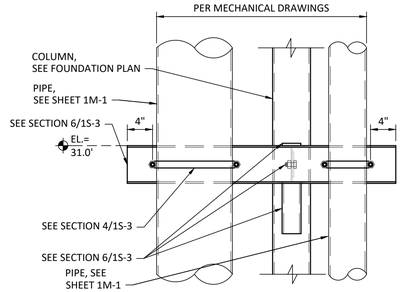
4 / 1S-2 SECTION
1" = 1'-0"



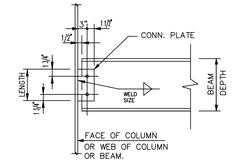
5 / 1S-2 SECTION
1" = 1'-0"



6 / 1S-2 SECTION
1" = 1'-0"

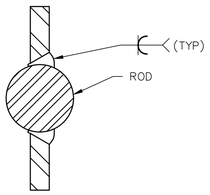


7 / 1S-2 SECTION
1" = 1'-0"



BEAM SIZE	7/8"ø A325N BOLTS	CONN. PLATE		WELD SIZE (E 70XX)
	NO.	LENGTH	THICK.	
W6	1	4"	1/4"	3/16"
W8	2	6 1/2"	1/4"	3/16"
W10	2	6 1/2"	1/4"	3/16"

SINGLE PLATE CONNECTIONS



TYPICAL ROD TO PLATE DETAIL
N.T.S

CAP PLATE
1"=1'-0"

TYPICAL X-BRACING DETAIL
3/4"=1'-0"

GENERAL SHEET NOTES

1. INFLUENT SCREEN ATTACHMENT TO STRUCTURE PER INFLUENT SCREEN SUPPLIER.

CADD FILE NAME:

DESIGNED BY: DAM | DRAWN BY: AOC | CHECKED BY: TPD | JOB NO. 14066
SCALE: (22x34) - | SCALE: (11x17) - | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

INFLUENT SCREENS PLATFORM - DETAILS

REVISIONS

NO.	DATE:	APPD

STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
PROFESSIONAL ENGINEER
STAMP

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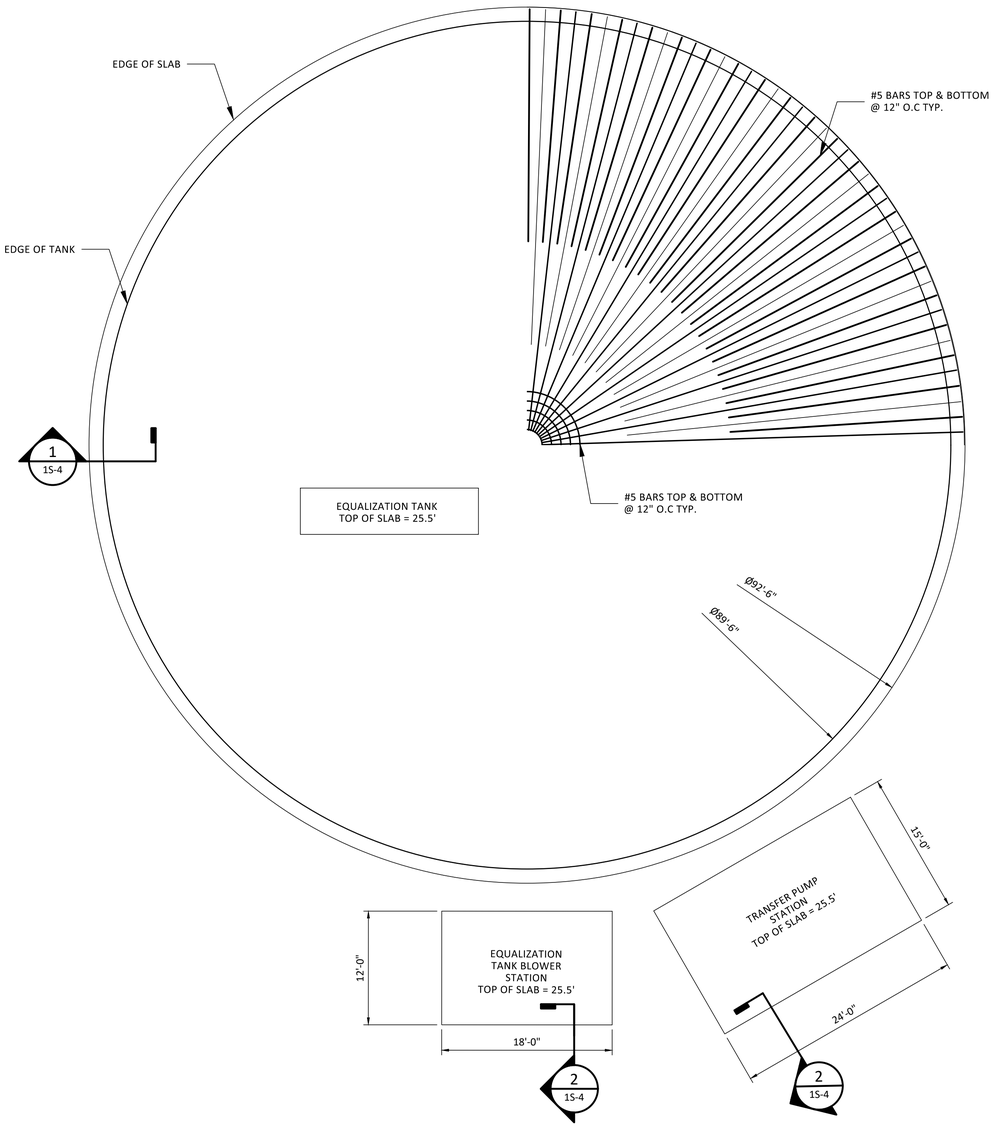
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

SHEET NO.
1S-3

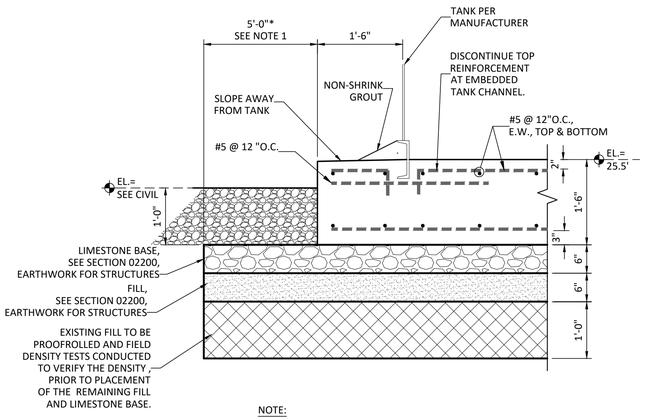
GENERAL SHEET NOTES

1. TANK STAGE LOADING PER TANK MANUFACTURER'S RECOMMENDATIONS
2. SEE EXACT LOCATION OF EQUALIZATION TANK BLOWER STATION AND TRANSFER PUMP STATION'S CONCRETE SLAB ON SHEET C-2.
3. FOUNDATION TO INCLUDE XYPEX SEE SPECIFICATION 03300.



EQUALIZATION TANK, EQUALIZATION TANK BLOWER STATION AND TRANSFER PUMP STATION FOUNDATION PLAN

1/8" = 1'-0"

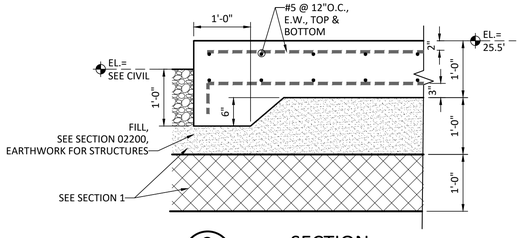


NOTE:

1. * LIMESTONE SHALL EXTEND AT LEAST 3 FT BEYOND THE EDGE OF THE SLAB IN AREAS WITH SITE CONSTRAINTS. IN ALL OTHER AREAS, IT SHALL EXTEND 5 FT.

1 / 1S-4 SECTION

3/4" = 1'-0"



2 / 1S-4 SECTION

3/4" = 1'-0"

CADD FILE NAME: 1S-4.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
AOC	DAM	TPD	14066
SCALE: (22x34) -	SCALE: (11x17) -	DATE:	JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EQUALIZATION TANK – FOUNDATION

REVISIONS

NO.	DATE:	APP'D

STAMP: STATE OF LOUISIANA — JAMES E. POWELL, JR. — License No. 31083 — PROFESSIONAL ENGINEER — CIVIL ENGINEERING

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Planning, Engineering, and Landscape Architecture
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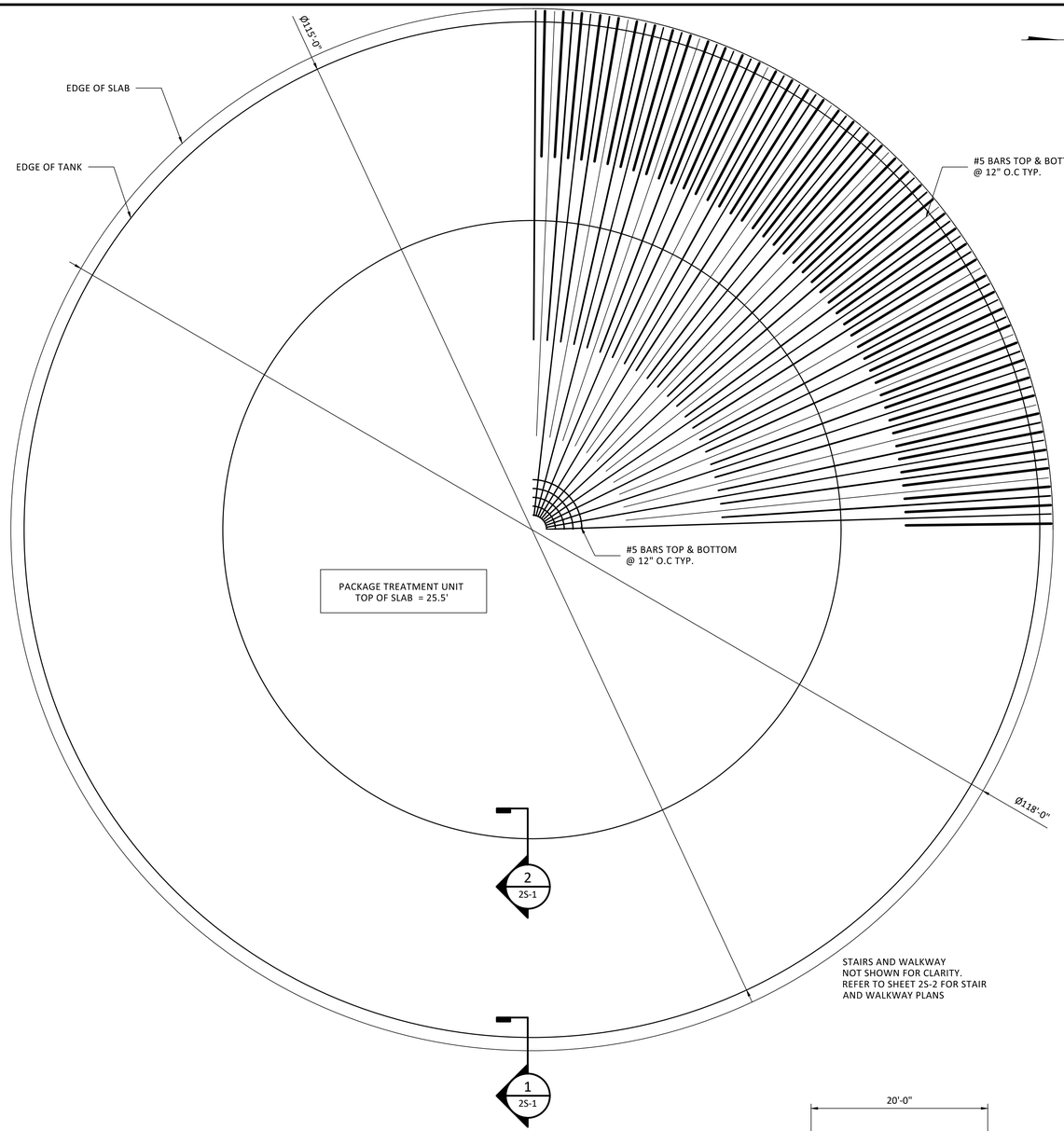
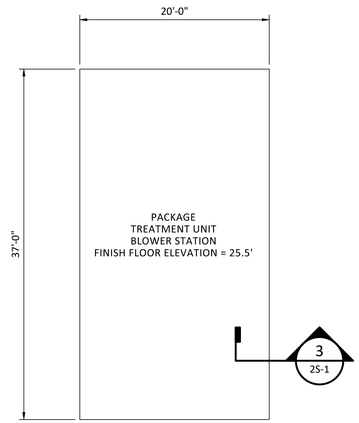
SHEET NO.

1S-4



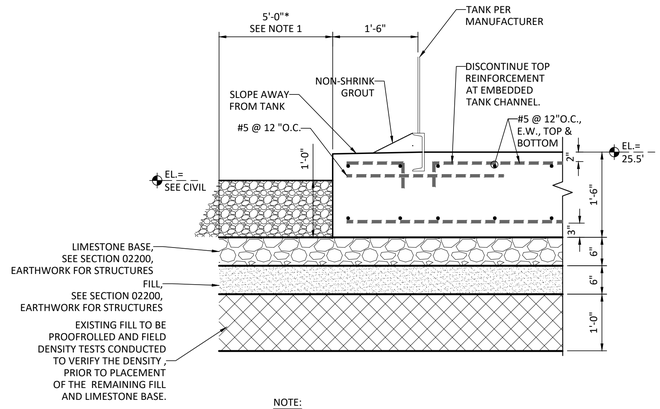
PACKAGE TREATMENT UNIT AND
PACKAGE TREATMENT UNIT BLOWER STATION FOUNDATION PLAN

1/8" = 1'-0"



GENERAL SHEET NOTES

1. TANK STAGE LOADING PER TANK MANUFACTURER'S RECOMMENDATIONS.
2. SEE EXACT LOCATION OF PACKAGE TREATMENT UNIT BLOWER STATION'S CONCRETE SLAB ON SHEET C-2.
3. FOUNDATION TO INCLUDE XYPEX SEE SPECIFICATION 03300.

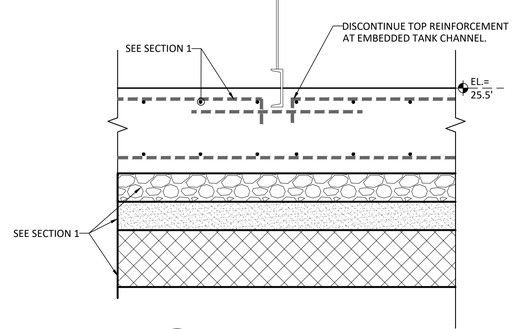


NOTE:

1. * LIMESTONE SHALL EXTEND AT LEAST 3 FT BEYOND THE EDGE OF THE SLAB IN AREAS WITH SITE CONSTRAINTS.
   IN ALL OTHER AREAS, IT SHALL EXTEND 5 FT.

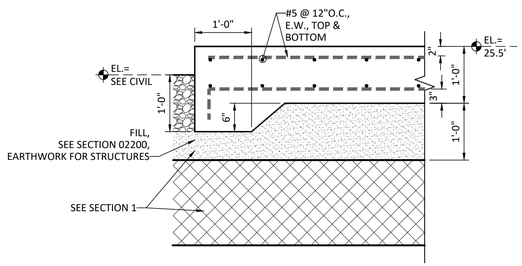
1 / 2S-1 SECTION

3/4" = 1'-0"



2 / 2S-1 SECTION

3/4" = 1'-0"



3 / 2S-1 SECTION

3/4" = 1'-0"

CADD FILE NAME: 2S-1, 2-S2,2-S3,2-S4.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
AOC	DAM	TPD	14066
SCALE: (22x34) -	SCALE: (11x17) -	DATE:	JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PACKAGE TREATMENT UNIT- FOUNDATION PLAN

REVISIONS			
NO.	DATE:		APP'D

STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
PROFESSIONAL ENGINEER
STAMP

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Planning, Engineering, and Landscape Architecture
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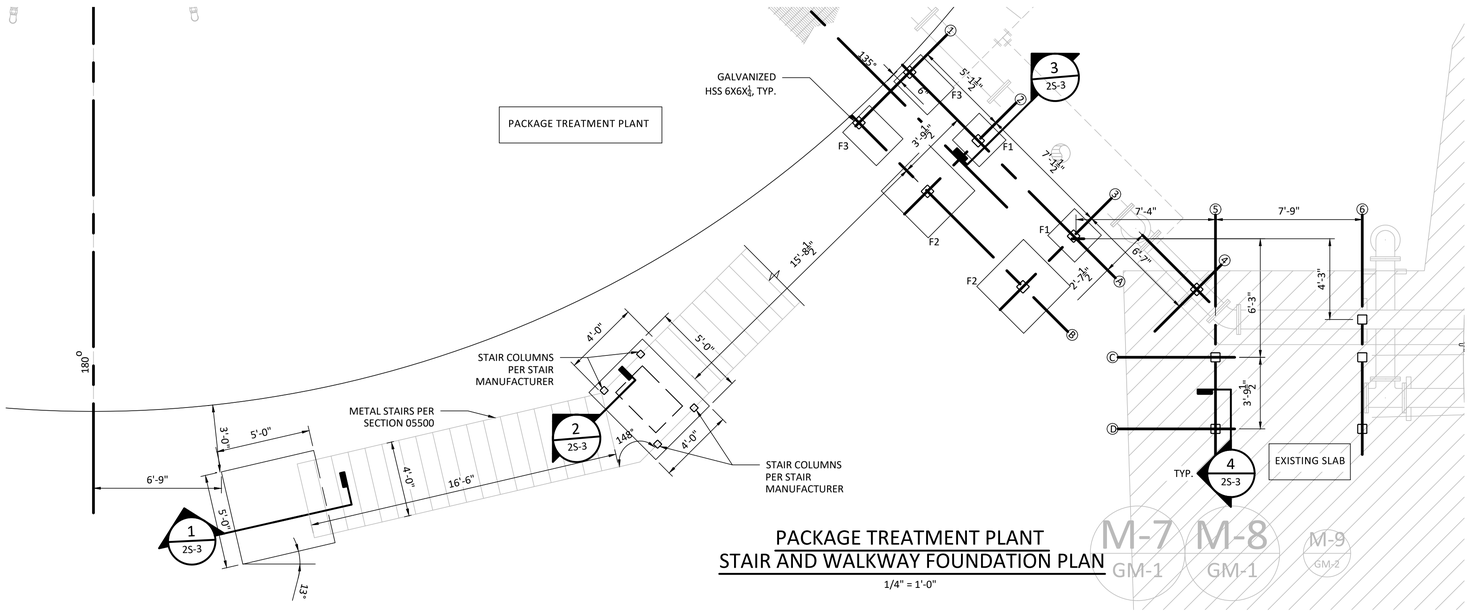
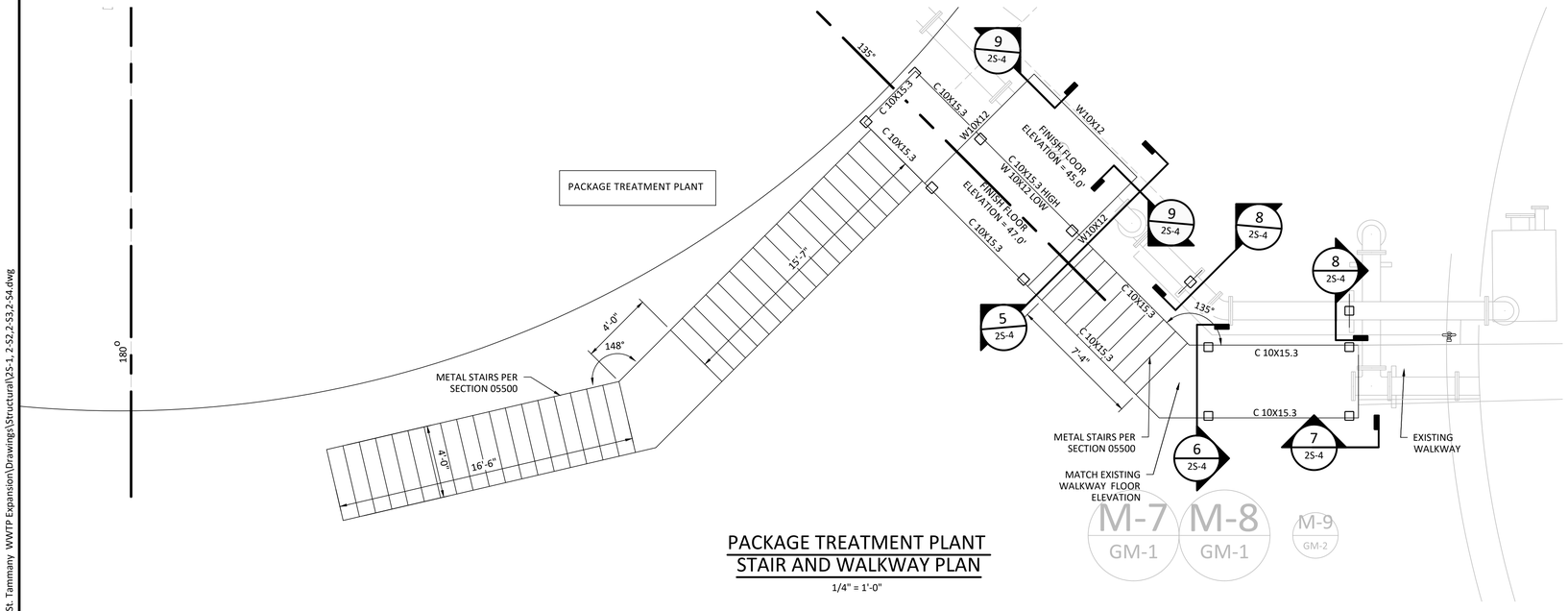
SHEET NO.

2S-1



PACKAGE TREATMENT PLANT
STAIR AND WALKWAY FOUNDATION PLAN

1/4" = 1'-0"



PACKAGE TREATMENT PLANT
STAIR AND WALKWAY PLAN

1/4" = 1'-0"

FOOTING SCHEDULE		
MARK	SIZE	REINFORCEMENT
F1	2'-6"X2'-6"X1'-6"	(4)-#5 EACH DIRECTION BOTTOM ONLY.
F2	3'-6"X3'-6"X1'-6"	(5)-#5 EACH DIRECTION BOTTOM ONLY.
F3	2'-6"X2'-0"X1'-6"	(4)-#5 SHORT DIRECTION (3)-# 5 LONG DIRECTION BOTTOM ONLY.

CADD FILE NAME: 2S-1, 2-S2,2-S3,2-S4.dwg

DESIGNED BY: AOC | DRAWN BY: DAM | CHECKED BY: TPD | JOB NO. 14066

SCALE: (22x34) - | SCALE: (11x17) - | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PACKAGE TREATMENT UNIT-STAIR/WALKWAY PLAN

REVISIONS

NO.	DATE:	APP'D

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THOMAS DYER
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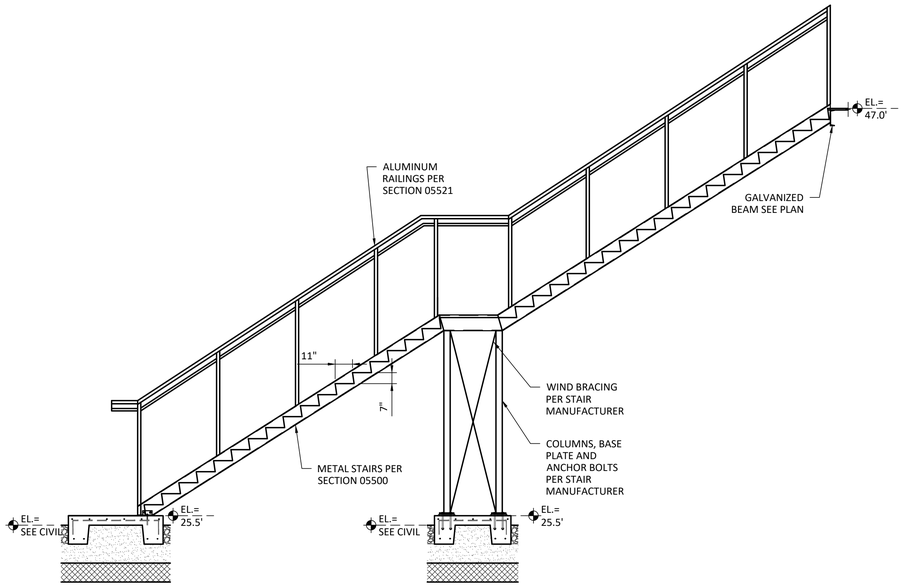
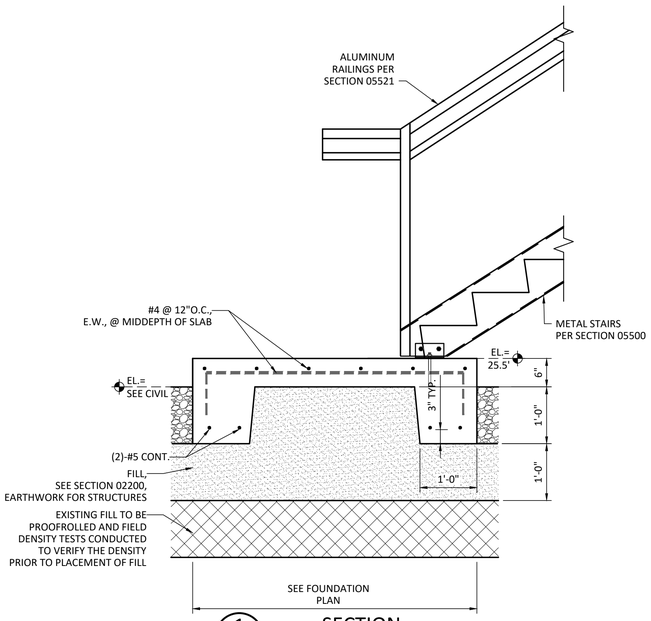
SHEET NO.
2S-2



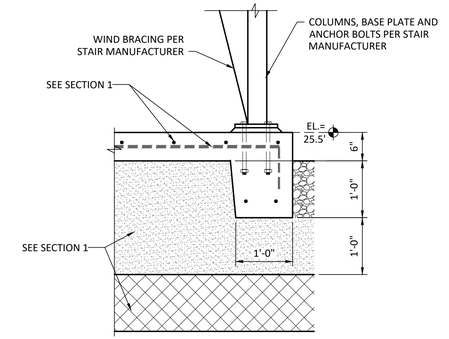
STAIR ELEVATION

1/4" = 1'-0"



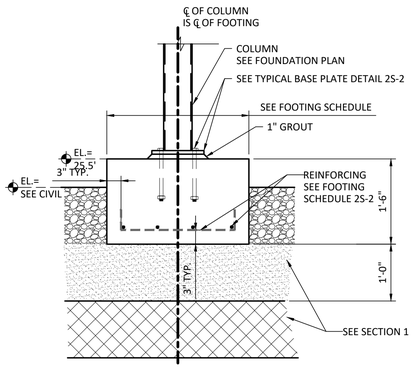
1 / 2S-3 SECTION

3/4" = 1'-0"



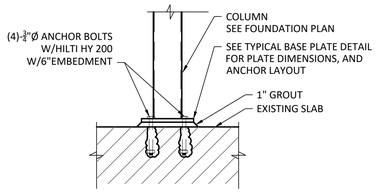
2 / 2S-3 SECTION

3/4" = 1'-0"



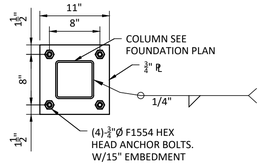
3 / 2S-3 SECTION

3/4" = 1'-0"



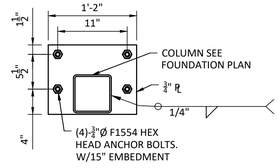
4 / 2S-3 SECTION

3/4" = 1'-0"



TYPICAL BASE PLATE DETAIL

1"=1'-0"



EDGE BASE PLATE DETAIL

1"=1'-0"

CADD FILE NAME: 2S-1, 2-S2,2-S3,2-S4.dwg

DESIGNED BY: AOC	DRAWN BY: DAM	CHECKED BY: TPD	JOB NO. 14066
SCALE: (22x34) -	SCALE: (11x17) -	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PACKAGE TREATMENT UNIT - STAIR DETAILS

REVISIONS

NO.	DATE:	APP'D

STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
PROFESSIONAL ENGINEER
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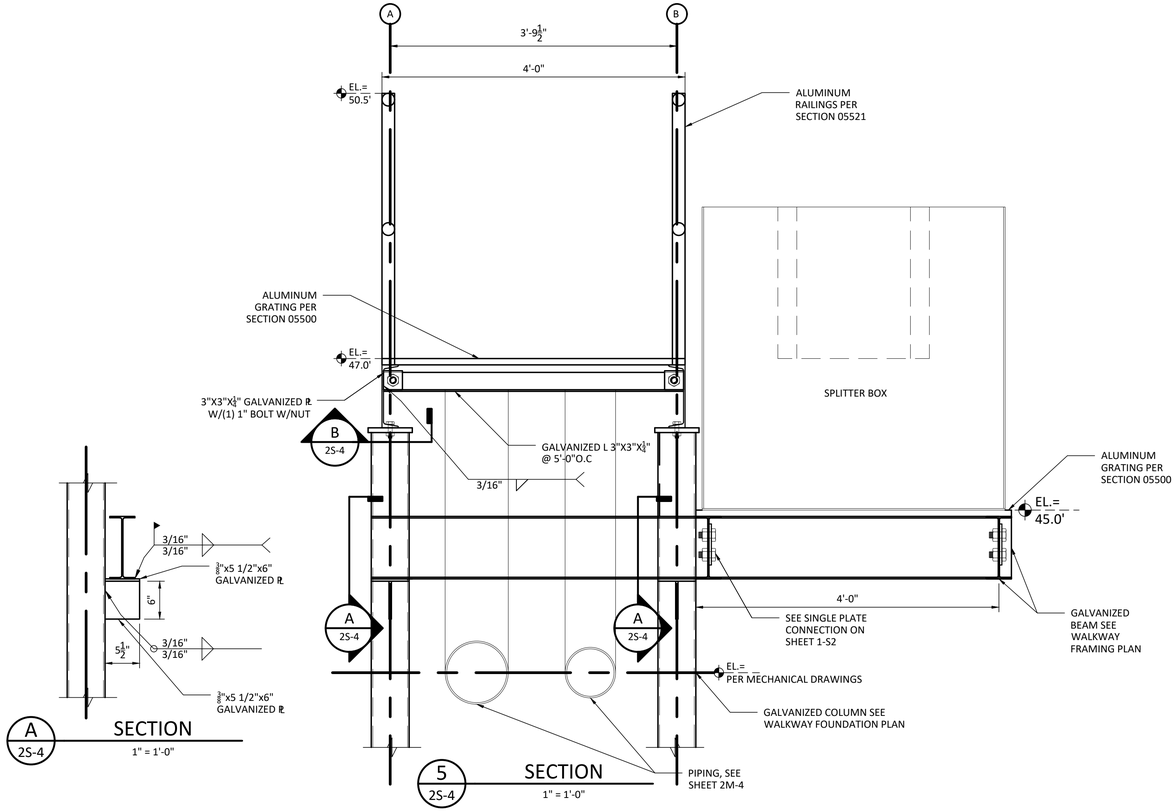
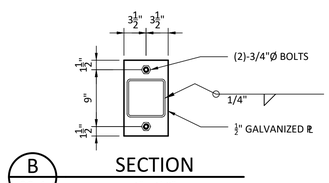
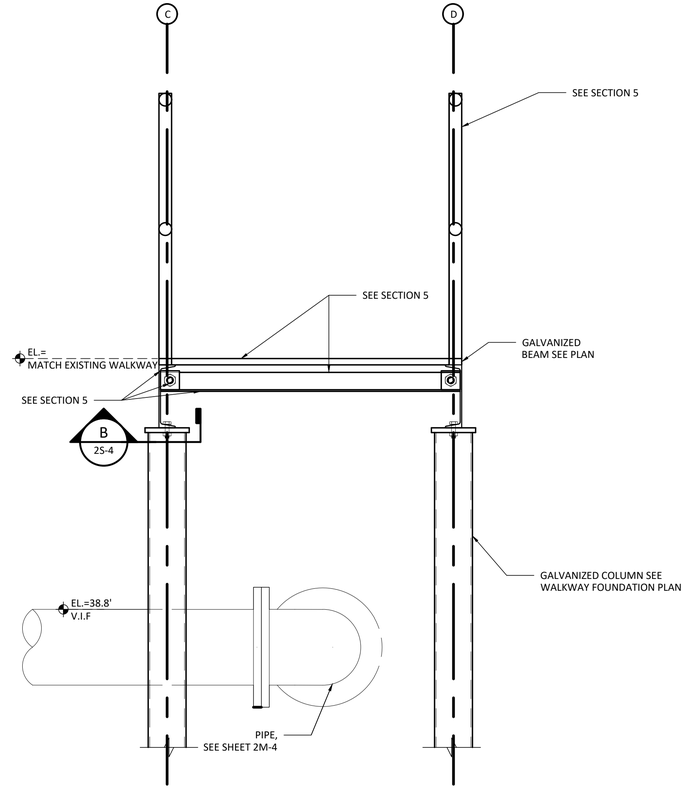
Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

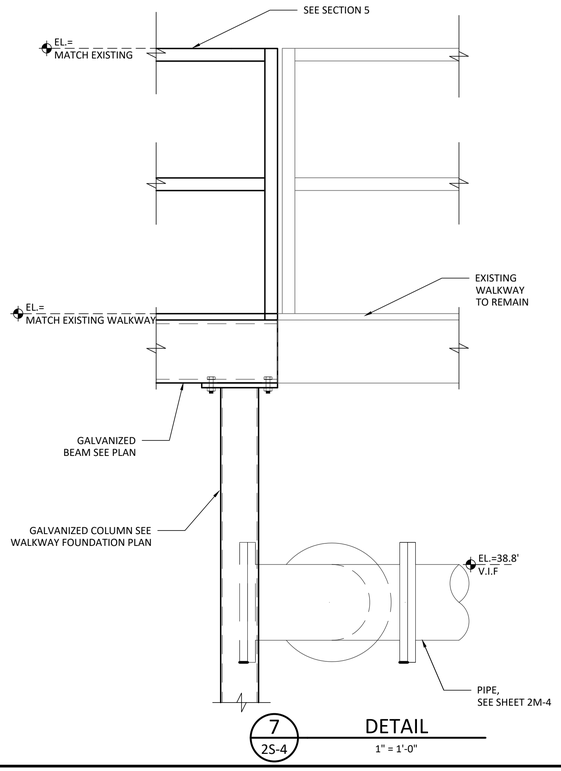
SHEET NO.

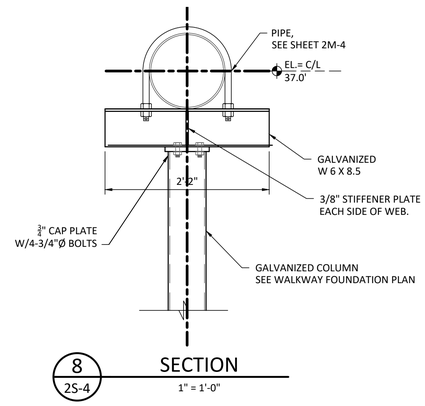
2S-3

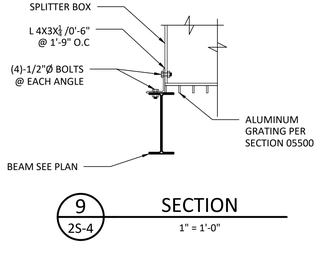


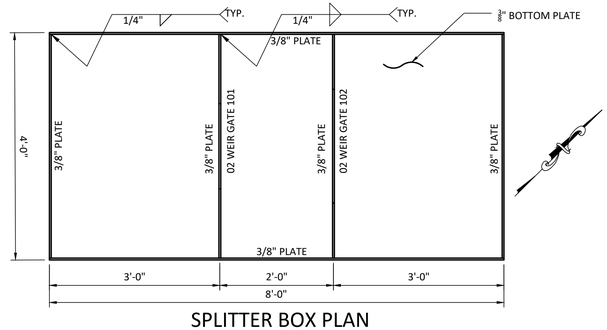


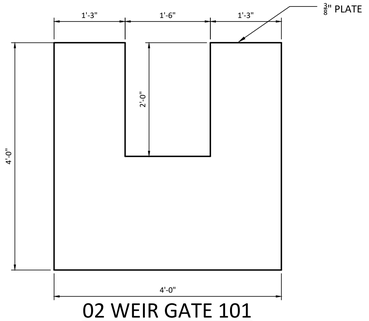


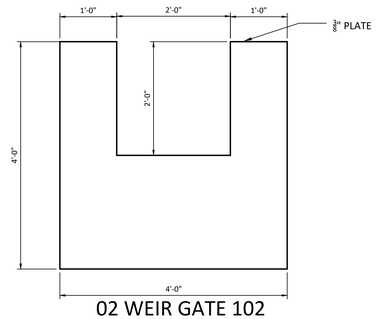












CADD FILE NAME: 2S-1, 2-S2,2-S3,2-S4.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
AOC	DAM	TPD	14066
SCALE: (22x34) -	SCALE: (11x17) -	DATE: JULY 30, 2021	

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PACKAGE TREATMENT UNIT - DETAILS

REVISIONS

NO.	DATE:	APP'D

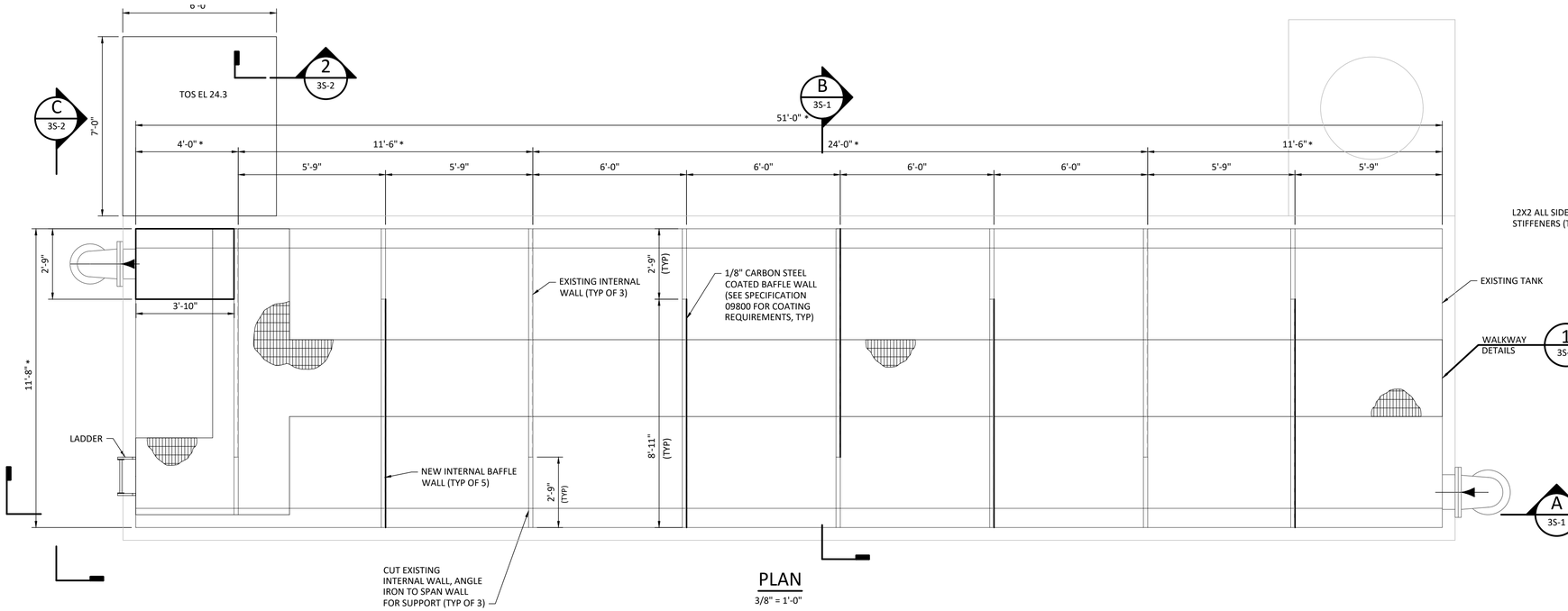
STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
PROFESSIONAL ENGINEER
STAMP

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.3377

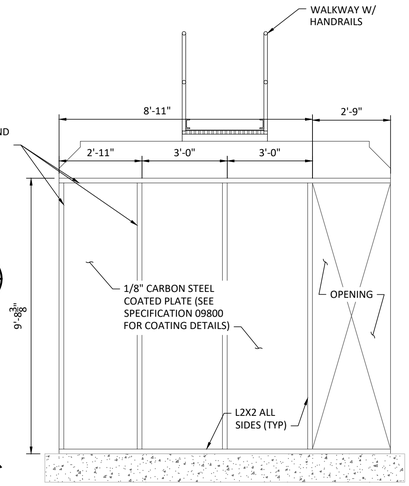
SHEET NO.
2S-4

GENERAL SHEET NOTES

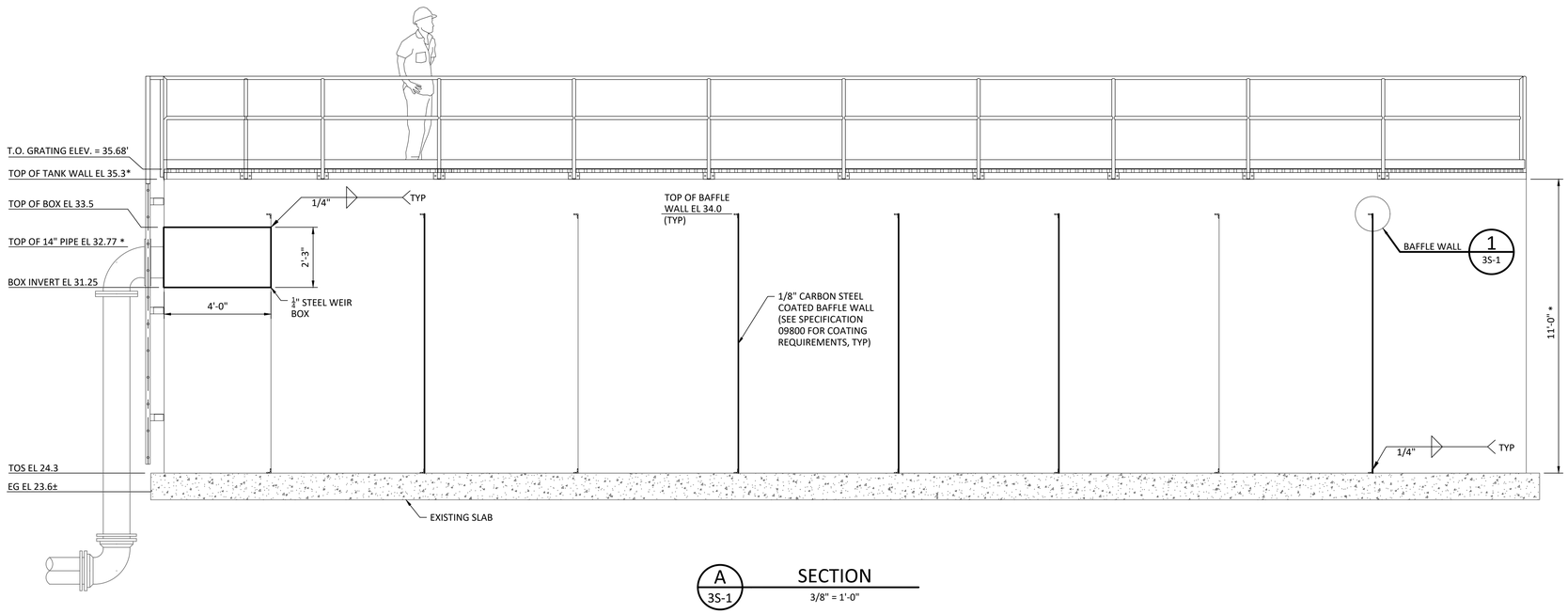
1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS OF EXISTING TANK DENOTED WITH *, INCLUDING INTERIOR WALLS, PRIOR TO SUBMITTAL.
2. REMOVE ALL EXISTING WALKWAYS, HANDRAIL, GRATING, AND ALL INTERNAL ITEMS OTHER THAN WALLS, INCLUDING WEIRS, LAUNDERS, AND PIPING NOT SHOWN ON THIS DRAWING FOR CLARITY.
3. CONTRACTOR TO INSTALL WALKWAYS, HANDRAILS, AND GRATING IN KIND. INFLUENT WEIR BOX TO BE REPLACED WITH IN KIND.
4. TANK, BAFFLE WALLS AND WEIRS TO BE COATED SEE SPECIFICATION 9800 FOR DETAILS.



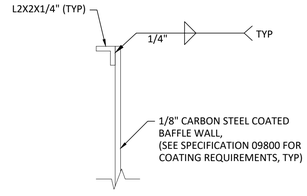
PLAN
3/8" = 1'-0"



B
3S-1
SECTION
3/8" = 1'-0"



A
3S-1
SECTION
3/8" = 1'-0"



1
3S-1
DETAIL
NTS

CADD FILE NAME: 3S-1.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
DAM	GAL	TPD	14066

SCALE: (22x34) 3/8"=1'-0" | SCALE: (11x17) - | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

CHLORINE CONTACT TANK MODIFICATIONS

REVISIONS	NO.	DATE:	APPD

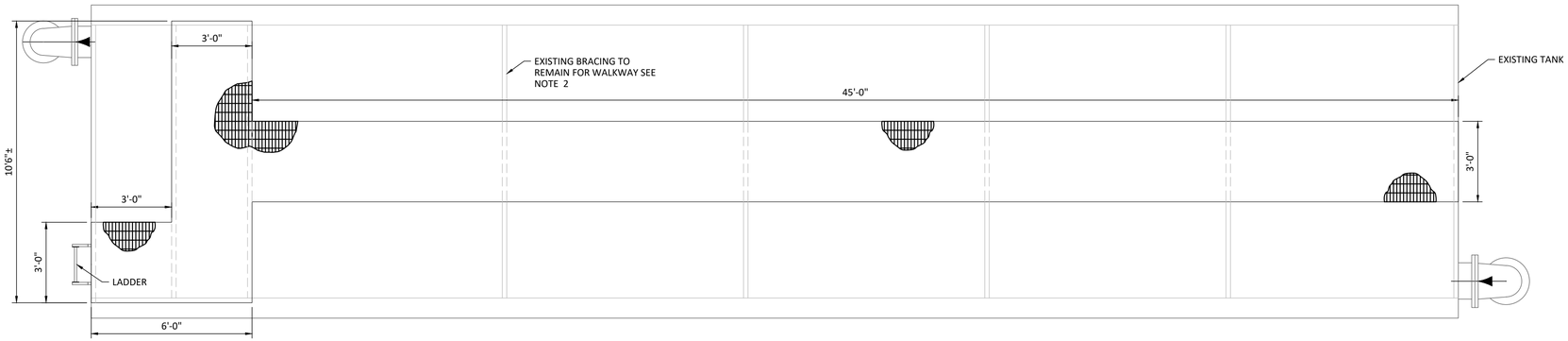
STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
PROFESSIONAL ENGINEER
STAMP

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

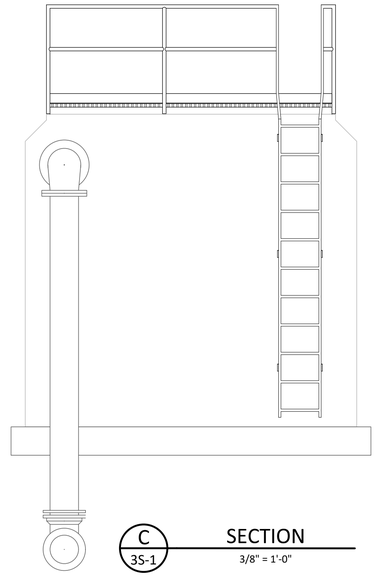
SHEET NO.
3S-1

GENERAL SHEET NOTES

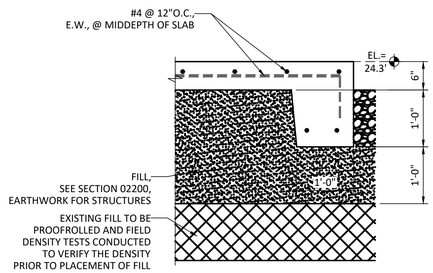
1. REMOVE ALL EXISTING WALKWAYS, HANDRAIL, GRATING, AND ALL INTERNAL ITEMS OTHER THAN WALLS, INCLUDING WEIRS, LAUNDERS, AND PIPING NOT SHOWN ON THIS DRAWING FOR CLARITY.
2. CONTRACTOR TO INSTALL NEW WALKWAYS, HANDRAILS, AND GRATING WITH LIKE KIND. CONTRACTOR TO VERIFY CONDITION OF WALKWAY SUPPORTS AND REPLACE IF NEEDED.



1 / 3S-1 DETAIL
3/8" = 1'-0"



C / 3S-1 SECTION
3/8" = 1'-0"



2 / 3S-1 SECTION
3/4" = 1'-0"

CADD FILE NAME: 3S-1.dwg

SCALE: (22x34)	SCALE: (11x17)	DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
3/8"=1'-0"	-	DAM	GAL	TPD	14066

DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

CHLORINE CONTACT TANK DETAILS

REVISIONS	NO.	DATE:	APP'D

STATE OF LOUISIANA
THOMAS DYER
License No. 36743
7/30/21
PROFESSIONAL ENGINEER
STAMP

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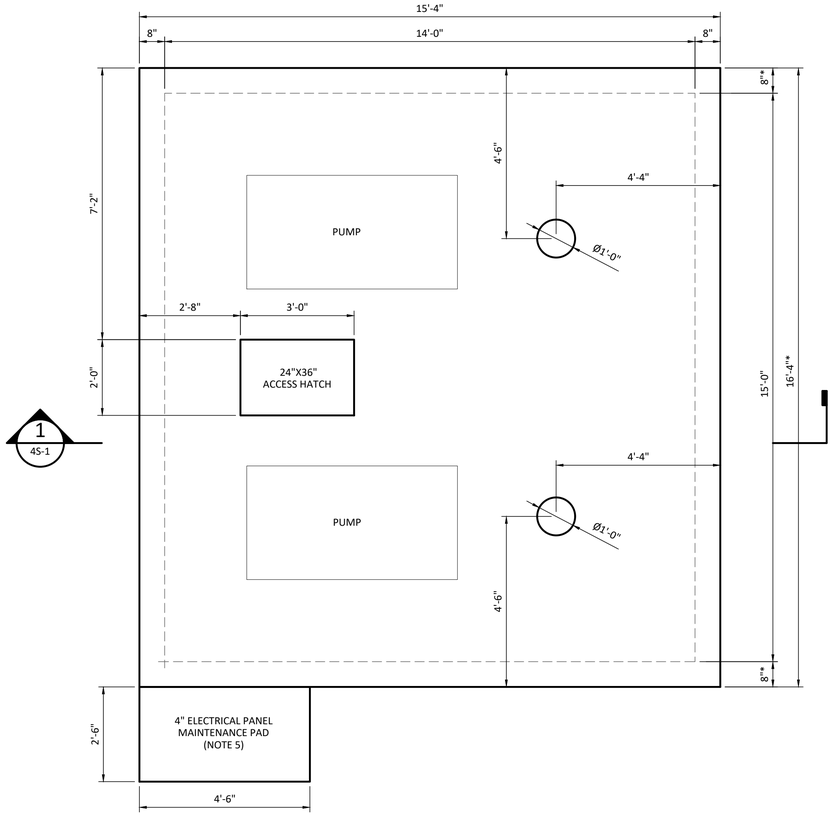
SHEET NO.
3S-2

GENERAL SHEET NOTES

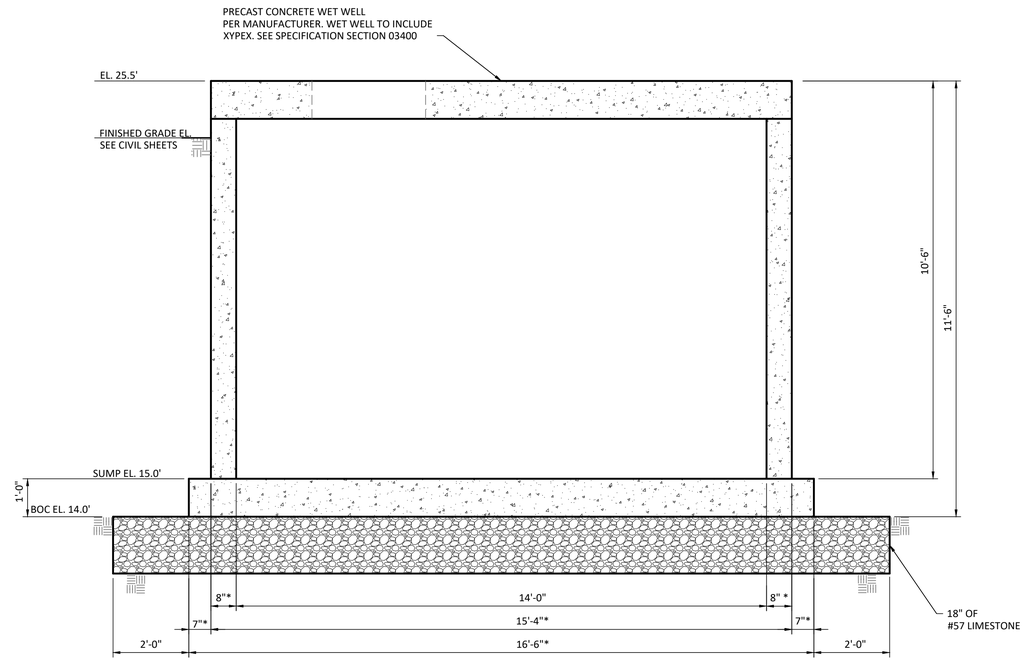
1. DEWATERING OF THE EXCAVATION AREA MAY BE NECESSARY TO ALLOW PROPER INSTALLATION OF THE WET WELL. SEE SPECIFICATION SECTION 02140-DEWATERING.
2. BRACED EXCAVATIONS MAY BE NECESSARY TO MAINTAIN A SAFE ACCESS TO THE WET WELL AREA. SEE SPECIFICATION SECTION 02160 - SHEETING, SHORING AND BRACING.
3. * CONTRACTOR SHALL VERIFY DIMENSION WITH PRECAST CONCRETE WET WELL SUPPLIER.
4. VERIFY ALL OPENINGS AND PENETRATIONS WITH MECHANICAL SHEET 4M-1.
5. SEE ELECTRICAL DRAWINGS FOR PANEL SIZE, CONTRACTOR TO SIZE MAINTENANCE SLAB ACCORDINGLY.



1 / 4S-1

EFFLUENT PUMP STATION TOP VIEW

1/2" = 1'-0"



1 / 4S-1

SECTION

1/2" = 1'-0"

CADD FILE NAME: 4S-1.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
DAM	AOC/GAL	TPD	14066

SCALE: (22x34)	SCALE: (11x17)	DATE:
-	-	JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

EFFLUENT PUMP STATION- PLAN AND SECTION

REVISIONS

NO.	DATE:	APP'D

STAMP: STATE OF LOUISIANA — JAMES E. POWELL, JR. — LICENSE NO. 37063 — PROFESSIONAL ENGINEER — CIVIL ENGINEERING

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.3377

SHEET NO.

4S-1

DEVICE LEGEND

SYMBOL	DESCRIPTION
VFD	VARIABLE FREQUENCY DRIVE CONTROLLER
(5)	5 HP MOTOR
TS-1	TOGGLE SWITCH #1
MS	MANUAL MOTOR STARTER
RTU	REMOTE TERMINAL UNIT
PS	PHASE SELECTOR SWITCH
VM	VOLTMETER
KW	KW METER
NIC	NOT IN THIS CONTRACT
	LOCAL CONTROL PANEL INDICATES HINGE LOCATION
100A 3P	MOLDED CASE CIRCUIT BREAKER- 100 AMP, 3 POLE
100	RUN # 100
FS-1	FLOAT SWITCH # 1
OR 30A	DISCONNECT SWITCH - 30 AMP
(J) OR J	JUNCTION BOX
WP	WEATHERPROOF
GFI	GROUND FAULT CURRENT INTERRUPTER
	DUPLEX RECEPTACLE 7'=7'EL., UC=UNDER COUNTER, MW=MICROWAVE
	SPECIAL PURPOSE RECEPTACLE
3	WALL SWITCH - # INDICATES 3 WAY
A	LIGHT FIXTURE TYPE A
G	LIGHT FIXTURE TYPE G

TERMINAL LEGEND

SYMBOL	DESCRIPTION
●	INTERNAL
⌀	FIELD CONNECTION
⊘	EXTERNAL TERMINALS

CONTROL PANEL LEGEND

SYMBOL	DESCRIPTION	GENERAL LOCATION
MDP	MAIN DISTRIBUTION PANEL	SERVICE ENTRANCE
EQBCP	EQ BLOWERS CONTROL PANEL	EQUALIZATION TANK
ABCP	AERATION BLOWERS CONTROL PANEL	PACKAGE PLANT
DBCP	DIGESTION BLOWERS CONTROL PANEL	PACKAGE PLANT
TPCP	TRANSFER PUMPS CONTROL PANEL	EQUALIZATION TANK
EPCP	EFFLUENT PUMPS CONTROL PANEL	EFFLUENT PUMP STATION
SCP	SCRAPER CONTROL PANEL	PACKAGE PLANT

ELECTRICAL CONTRACTOR TO INSTALL ALL CONTROL PANELS

CADD FILE NAME:
E-1 Legend - 21001.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
JWE	JWE	JWE	14066

SCALE: (22x34) NO SCALE
SCALE: (11x17)
DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

LEGEND

NO.	DATE:	REVISIONS	APPD

STATE OF LOUISIANA
JAMES W. ELLIS II
License No. 31603
Professional Engineer
in
ELECTRICAL ENGINEERING

7-26-21

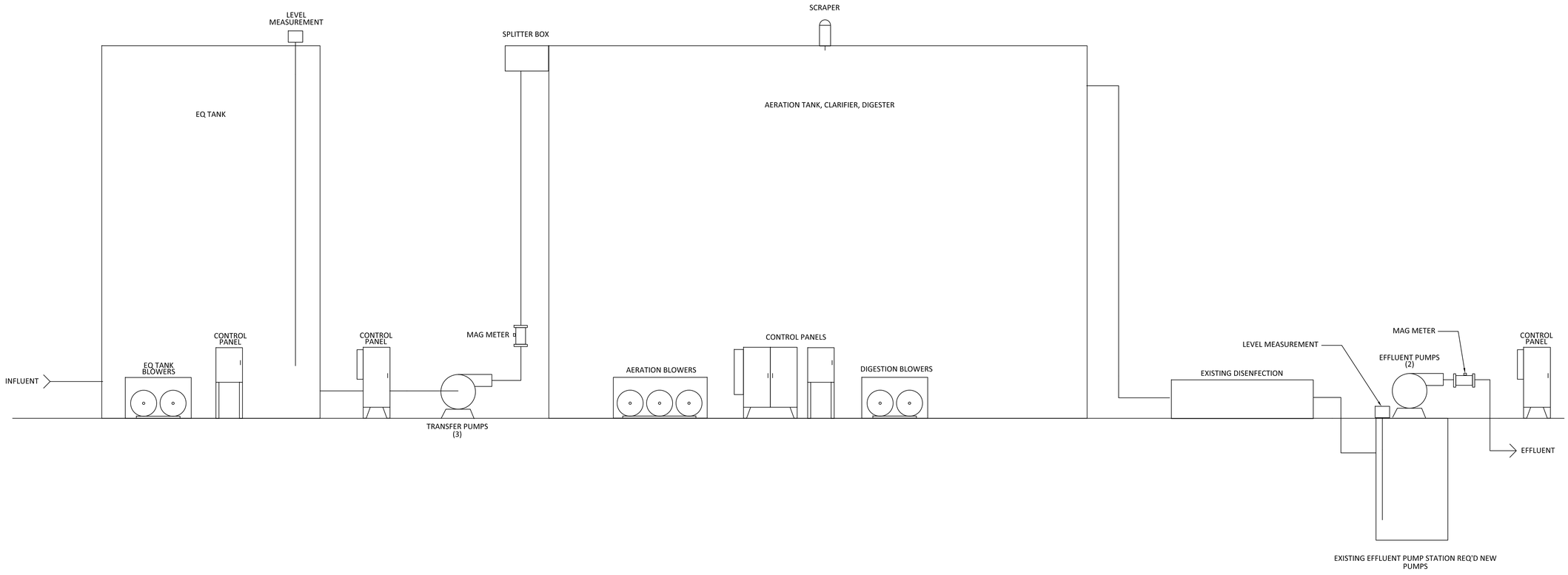
Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.5977

SHEET NO.
E-1

ELLIS
ENGINEERING, L.L.C.
525 BREWSTER RD.
MADISONVILLE, LA 70447
(504) 415-7670
PROJECT No. 21001
JAMES W. ELLIS II, P.E., LOUISIANA LICENSE # 31603

GENERAL NOTES THIS SHEET

A. THIS DIAGRAM IS FOR INFORMATION ONLY. THERE IS NO ELECTRICAL WORK SHOWN ON THIS SHEET. SEE OTHER DIVISIONS AND DRAWINGS FOR DETAILS.



CADD FILE NAME:
E-2 Process Flow Diagram - 21001.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
JWE	JWE	JWE	14066

SCALE: (22x34) NO SCALE
SCALE: (11x17)
DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

PROCESS FLOW DIAGRAM

REVISIONS	NO.	DATE:	APP'D

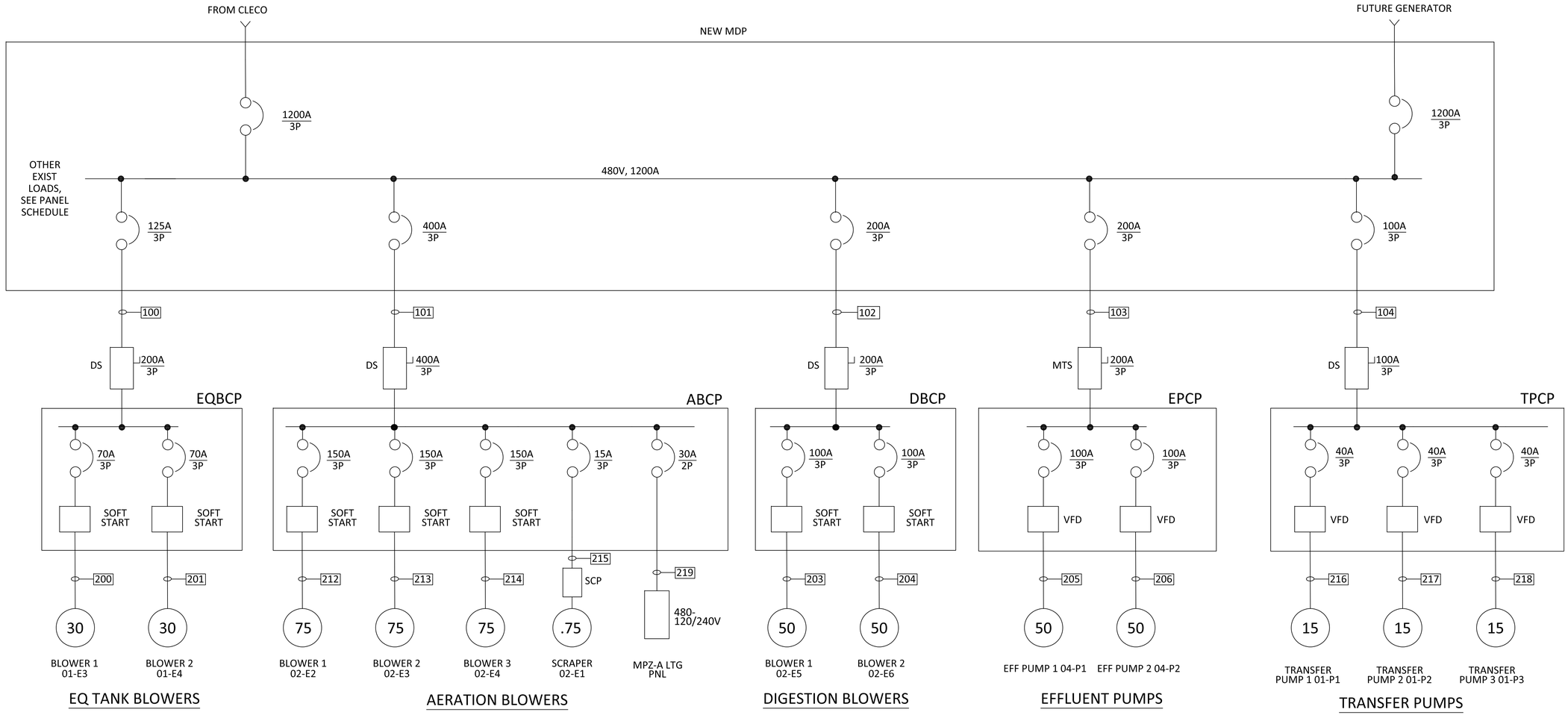
STATE OF LOUISIANA
JAMES W. ELLIS II
License No. 31603
Professional Engineer
in
ELECTRICAL ENGINEERING

7-26-21

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.3377

SHEET NO.
E-2

ELLIS
ENGINEERING, L.L.C.
525 BREWSTER RD.
MADISONVILLE, LA 70447
(504) 415-7670
PROJECT No. 21001
JAMES W. ELLIS II, P.E., LOUISIANA LICENSE # 31603



GENERAL NOTES THIS SHEET

A. SEE SHEET E–6 FOR PANEL SCHEDULE. EXISTING LOADS AND DETAILS ARE NOT SHOWN ON THIS SHEET.

B. ALL CONDUIT ABOVE GRADE SHALL BE SCHEDULE 40 ALUMINUM. PACK AND SEAL ANY CONDUITS THAT ENTER OR LEAVE A CLASSIFIED AREA, THAT REQUIRE A CONDUIT SEAL, INCLUDING CONTROL CONDUIT, IN ACCORDANCE WITH NFPA 70, ART 501.15.

CADD FILE NAME:
E-3 One Line Diagram - 21001.dwg

DESIGNED BY: JWE
DRAWN BY: JWE
CHECKED BY: JWE
JOB NO. 14066
SCALE: (22x34) NO SCALE
SCALE: (11x17)
DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

ONE LINE DIAGRAM

REVISIONS

NO.	DATE:	APP'D

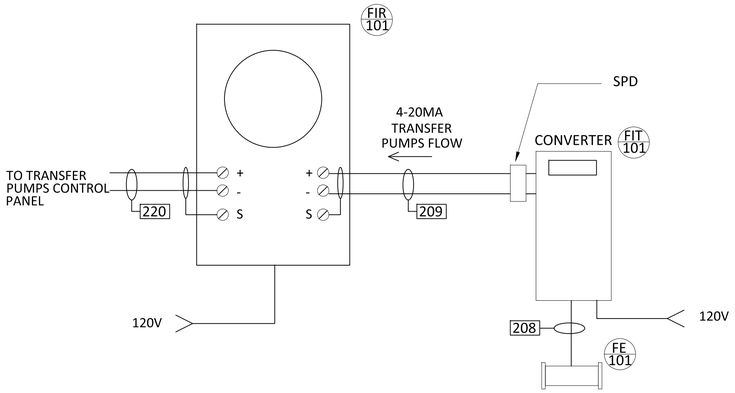
STATE OF LOUISIANA
JAMES W. ELLIS II
License No. 31603
Professional Engineer
In
ELECTRICAL ENGINEERING

7-26-21

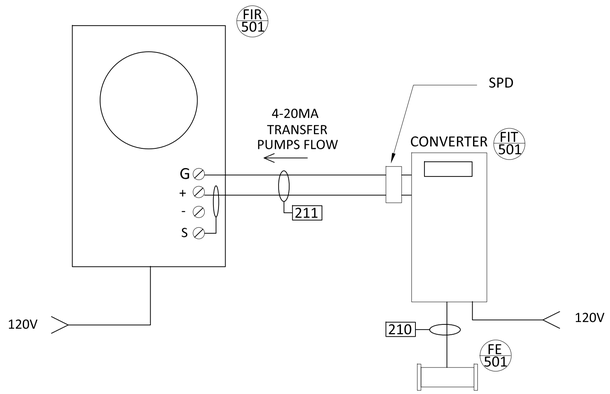
Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.9377

SHEET NO.
E-3

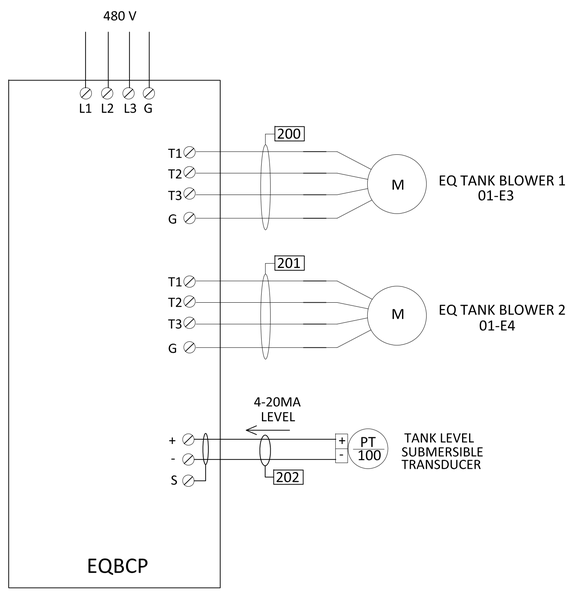
ELLIS
ENGINEERING, L.L.C.
525 BREWSTER RD.
MADISONVILLE, LA 70447
(504) 415–7670
PROJECT No. 21001
JAMES W. ELLIS II, P.E., LOUISIANA LICENSE # 31603



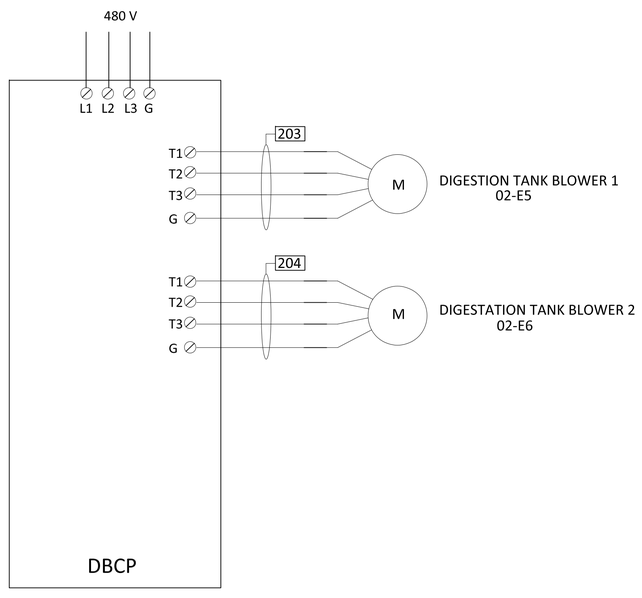
TRANSFER PUMPS
MAGNETIC FLOW METER



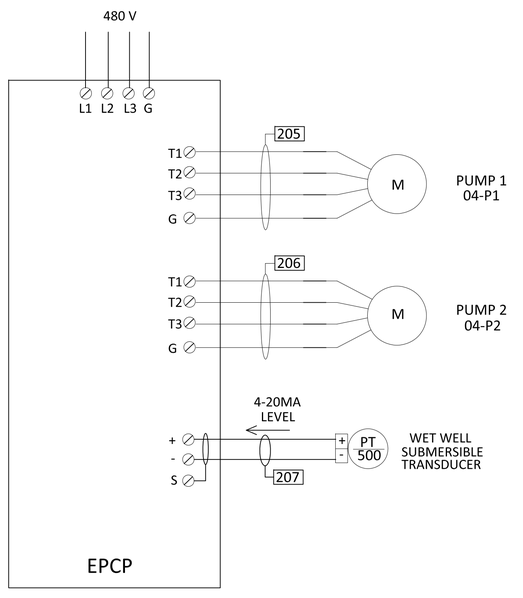
PLANT EFFLUENT
MAGNETIC FLOW METER



EQ BLOWERS
CONTROL PANEL



DIGESTION BLOWERS
CONTROL PANEL



EFFLUENT PUMPS
CONTROL PANEL

GENERAL NOTES THIS SHEET

A. CONTROL WIRING SHOWN ARE MINIMUM REQUIREMENTS. PROVIDE CONTROL CABLING AS REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM. COORDINATE WITH PROVIDER.

B. ALL CONDUIT ABOVE GRADE SHALL BE SCHEDULE 40 ALUMINUM. PACK AND SEAL ANY CONDUITS THAT ENTER OR LEAVE A CLASSIFIED AREA, THAT REQUIRE A CONDUIT SEAL, INCLUDING CONTROL CONDUIT, IN ACCORDANCE WITH NFPA 70, ART 501.15.

CADD FILE NAME:
E-4 Interconnection 1 - 21001.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
JWE	JWE	JWE	14066
SCALE: (22x34) NO SCALE	SCALE: (11x17)		DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

INTERCONNECTION DIAGRAMS 1

NO.	DATE:	REVISIONS	APP'D

STATE OF LOUISIANA
JAMES W. ELLIS II
License No. 31603
Professional Engineer
in
ELECTRICAL ENGINEERING

7-26-21

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.3377

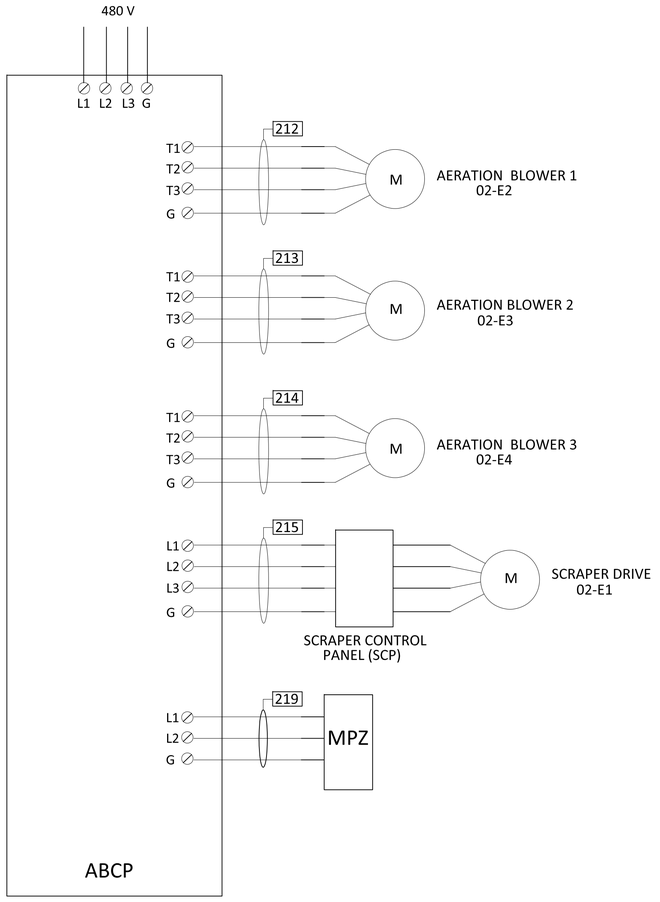
SHEET NO.
E-4

ELLIS
ENGINEERING, L.L.C.
525 BREWSTER RD.
MADISONVILLE, LA 70447
(504) 415-7670
PROJECT No. 21001
JAMES W. ELLIS II, P.E., LOUISIANA LICENSE # 31603

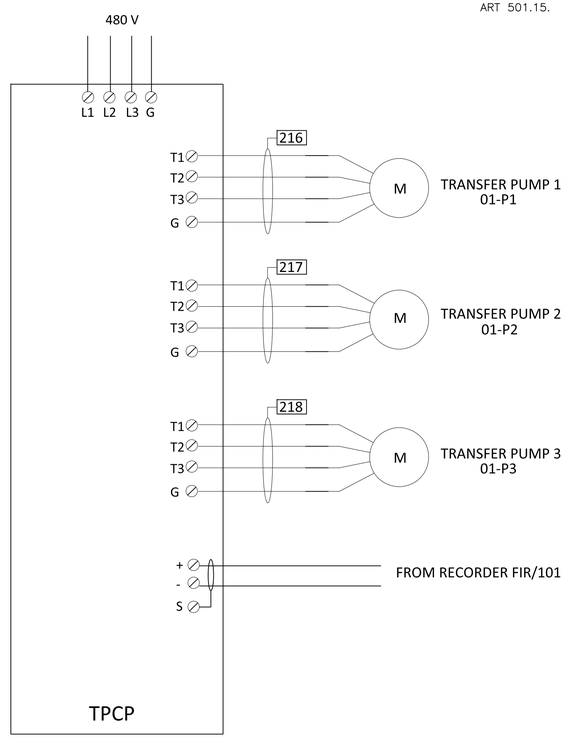
GENERAL NOTES THIS SHEET

A. CONTROL WIRING SHOWN ARE MINIMUM REQUIREMENTS. PROVIDE CONTROL CABLING AS REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM. COORDINATE WITH PROVIDER.

B. ALL CONDUIT ABOVE GRADE SHALL BE SCHEDULE 40 ALUMINUM. PACK AND SEAL ANY CONDUITS THAT ENTER OR LEAVE A CLASSIFIED AREA, THAT REQUIRE A CONDUIT SEAL, INCLUDING CONTROL CONDUIT, IN ACCORDANCE WITH NFPA 70, ART 501.15.



AERATION BLOWERS
CONTROL PANEL



TRANSFER PUMPS
CONTROL PANEL

CADD FILE NAME:
E-5 Interconnection 2 - 21001.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
JWE	JWE	JWE	14066

SCALE: (22x34) NO SCALE
SCALE: (11x17)
DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

INTERCONNECTION DIAGRAMS 2

NO.	DATE:	REVISIONS	APP'D

STATE OF LOUISIANA
JAMES W. ELLIS II
License No. 31603
Professional Engineer
in
ELECTRICAL ENGINEERING

7-26-21

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
638 Village Lane N. • Mandeville, LA 70471 • 985.727.5377

SHEET NO.
E-5

ELLIS
ENGINEERING, L.L.C.
525 BREWSTER RD.
MADISONVILLE, LA 70447
(504) 415-7670
PROJECT No. 21001
JAMES W. ELLIS II, P.E., LOUISIANA LICENSE # 31603

PANEL MPZ–A

LOCATION: AT TRANSFER PUMPS
10 KVA, 480–120/240V, 1P, 3W
W/ PRIMARY AND SECONDARY BREAKERS
SURFACE MOUNTING NEMA 3R ENCL.
RATING 10,000 AMPS SYMMETRICAL

(6)

	CKT. NO.	AMPS POLES	WIRE SIZE	CONDUIT SIZE	MAIN SERVICING	KVA
	1	20–1	3#12	3/4"	TREATMENT PLANT LIGHTS	1
	2	20–1	3#12	3/4"	TREATMENT PLANT RECEPTACLES	1
*	3	20–1	3#8	3/4"	EFF PUMP STATION RECEPTACLE	1
*	4	20–1	3#8	3/4"	TRANSFER PUMP STATION RECEPTACLE	1
	5	20–1	3#12	3/4"	MPZ RECEPTACLES	1
	6	–				
	7	–				
	8					
	9					
	10					
					TOTAL KVA DEMAND @ .8 DF	4
					TOTAL AMP DEMAND	18

* WIRE SIZED BASED ON VOLTAGE DROP. PROVIDE #12 PIGTAILS AT RECPT.

WIRE AND CONDUIT SCHEDULE

RUN #	FROM	TO	CONDUIT	WIRE	REMARKS
100	MAIN DISTRIBUTION PANEL	EQBCP	1 1/2"	3#1, 1#6	
101	MAIN DISTRIBUTION PANEL	ABCP	4"	3#600 KCMIL, 1#3	
102	MAIN DISTRIBUTION PANEL	DBCP	2"	3#3/0, 1#4	
103	MAIN DISTRIBUTION PANEL	EPCP	2"	3#3/0, 1#4	
104	MAIN DISTRIBUTION PANEL	TPCP	1 1/2"	3#1, 1#6	
200	EQBCP	EQ TANK BLOWER 1	1"	3#4, 1#8	
201	EQBCP	EQ TANK BLOWER 2	1"	3#4, 1#8	
202	EQBCP	PT/100	3/4"	FACTORY CABLE	
203	DBCP	DIGESTION BLOWER 1	1-1/4"	3#3, 1#8	
204	DBCP	DIGESTION BLOWER 2	1-1/4"	3#3, 1#8	
205	EPCP	EFFLUENT PUMP 1	1-1/4"	3#3, 1#8	
206	EPCP	EFFLUENT PUMP 2	1-1/4"	3#3, 1#8	
207	EPCP	PT/500	3/4"	FACTORY CABLE	
208	FE/101	FIT/101	3/4"	FACTORY CABLE	
209	FIT/101	FIR/101	3/4"	2/C#16 SHLD	
210	FE/501	FIT/501	3/4"	FACTORY CABLE	
211	FIT/501	FIR/501	3/4"	2/C#16 SHLD	
212	ABCP	AERATION BLOWER 1	2"	3# 1/0, 1#4	
213	ABCP	AERATION BLOWER 2	2"	3# 1/0, 1#4	
214	ABCP	AERATION BLOWER 3	2"	3# 1/0, 1#4	
215	ABCP	SCRAPER DRIVE	3/4"	3#12, 1#12	
216	TPCP	TRANSFER PUMP 1	3/4"	3#8, 1#10	
217	TPCP	TRANSFER PUMP 2	3/4"	3#8, 1#10	
218	TPCP	TRANSFER PUMP 3	3/4"	3#8, 1#10	
219	ABCP	MPZ	3/4"	3#8, 1#8	
220	TPCP	FIR/101	3/4"	2/C#16 SHLD	

GENERAL NOTES THIS SHEET

A. ALL CONDUIT SHALL BE 3/4" MIN AND CONTAIN A #12 GRD MIN. ALL POWER WIRING SHALL BE MIN #12 AWG.

B. CONTROL WIRES SHOWN SHALL BE CONSIDERED A MINIMUM STANDARD. PROVIDE ALL CONTROL WIRING FOR A COMPLETE AND OPERATIONAL SYSTEM, IN ACCORDANCE WITH THE SUPPLIER'S RECOMMENDATION.

C. ALL CONDUIT ABOVE GRADE SHALL BE SCHEDULE 40 ALUMINUM. PACK AND SEAL ANY CONDUITS THAT ENTER OR LEAVE A CLASSIFIED AREA, THAT REQUIRE A CONDUIT SEAL, INCLUDING CONTROL CONDUIT, IN ACCORDANCE WITH NFPA 70, ART 501.15.

D. MOUNT EQUIPMENT ON GALVANIZED STEEL POLES AND STAINLESS STEEL C CHANNEL FRAMING. ALL FASTENERS SHALL BE STAINLESS STEEL.

E. ALL ELECTRICAL AND CONTROL PANELS AND ALL JUNCTION BOXES SHALL BE NEMA 4X AND HINGED.

F. PROVIDE A PROPERLY SIZED NEUTRAL WIRE FOR ANY CONTROL PANEL THAT REQUIRES 277V.

PANEL BOARD: MDP
VOLTAGE: 480/277
PHASE: 3
WIRE: 4
BUS AMPS: 1200

ENCLOSURE: NEMA 3R
MOUNTING: FREE STANDING
LOCATION: SEE PLANS
MAIN O.C. DEVICE: MB–1200
A.I.C.: 20K

OPTIONS: PROVIDE A COMPLETE ARC FLASH HAZARD AND COORDINATION STUDY FOR THIS PANEL AND LABEL AND ADJUST IT ACCORDINGLY.

(2)

CKT. NO.	DESCRIPTION	CONN LOAD (KVA)	DEMAND LOAD (KVA)	O. C. DEVICE POLES	O. C. DEVICE AMP TRIP
1	EXISTING TREATMENT PLANT			3	200
2	EQBCP			3	125
3	ABCP			3	400
4	DBCP			3	200
5	EPCP			3	200
6	TPCP			3	100
7	SPARE			3	200
8	SPARE			3	400
9	SPACE			3	400
9	MANUAL GENERATOR TRANSFER			3	1200

DESIGN KVA: XXX
DESIGN FLA: XXXX
DEMAND KVA: –
DEMAND FLA: –

SPECIFIC NOTES THIS SHEET

(1) CLECO METER. COORDINATE METER SOCKET OR C.T. TYPE METERING WITH CLECO. IF A METER SOCKET IS USED, PROVIDE A 1200A, 3P, NEMA 3R, DISCONNECT SWITCH, AHEAD OF METER, IN ACCORDANCE WITH CLECO STANDARDS.

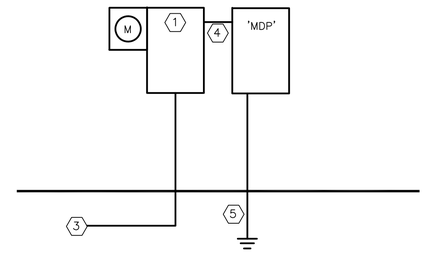
(2) PANEL SHALL HAVE A 1200A, ELECTRONIC TRIP MAIN BREAKER THAT IS KIRK KEY INTERLOCKED WITH THE 1200A MANUAL TRANSFER GENERATOR BREAKER SHOWN. UPON LOSS OF NORMAL POWER, THE KEY CAN BE USED TO LOCK OUT THE MAIN BREAKER AND TURN ON THE GENERATOR BREAKER TO SUPPLY GENERATOR POWER. GENERATOR IS NOT PART OF THIS PROJECT. REFERENCE SQUARE D DRAWING# 0Q–2310052–63060655–01

(3) 4–600 KCMIL IN EACH OF 3 – 4" C TO CLECO TRANSFORMER. COORDINATE INSTALLATION WITH CLECO AND INSTALL PER CLECO STANDARDS.

(4) 4–600 KCMIL AND 1# 4/0 GRD IN EACH OF 3 – 4" C.

(5) #4/0 GRD TO 3/4"X10' COPPER BONDED DRIVEN GROUND ROD. ROUTE #4/0 GRD TO NEUTRAL BUS IN MDP. CONNECT TO GROUND BUS WITH #4/0 OR MFG PROVIDED EQUIVALENT. GROUND IN ACCORDANCE WITH NFPA 70.

(6) MINI POWER ZONE PANEL WITH TRANSFORMER AS MANUFACTURED BY SQUARE D.



FEEDER DIAGRAM

CADD FILE NAME: E-6 Schedules - 21001.dwg

DESIGNED BY: JWE | DRAWN BY: JWE | CHECKED BY: JWE | JOB NO. 14066
SCALE: (22x34) NO SCALE | SCALE: (11x17) | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION
COVINGTON, LOUISIANA
ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

SCHEDULES

REVISIONS

NO.	DATE:	APPD

STATE OF LOUISIANA
JAMES W. ELLIS II
License No. 31603
Professional Engineer
in
ELECTRICAL ENGINEERING

7-26-21

Kyle Associates, LLC
Planning, Engineering, and Landscape Architecture
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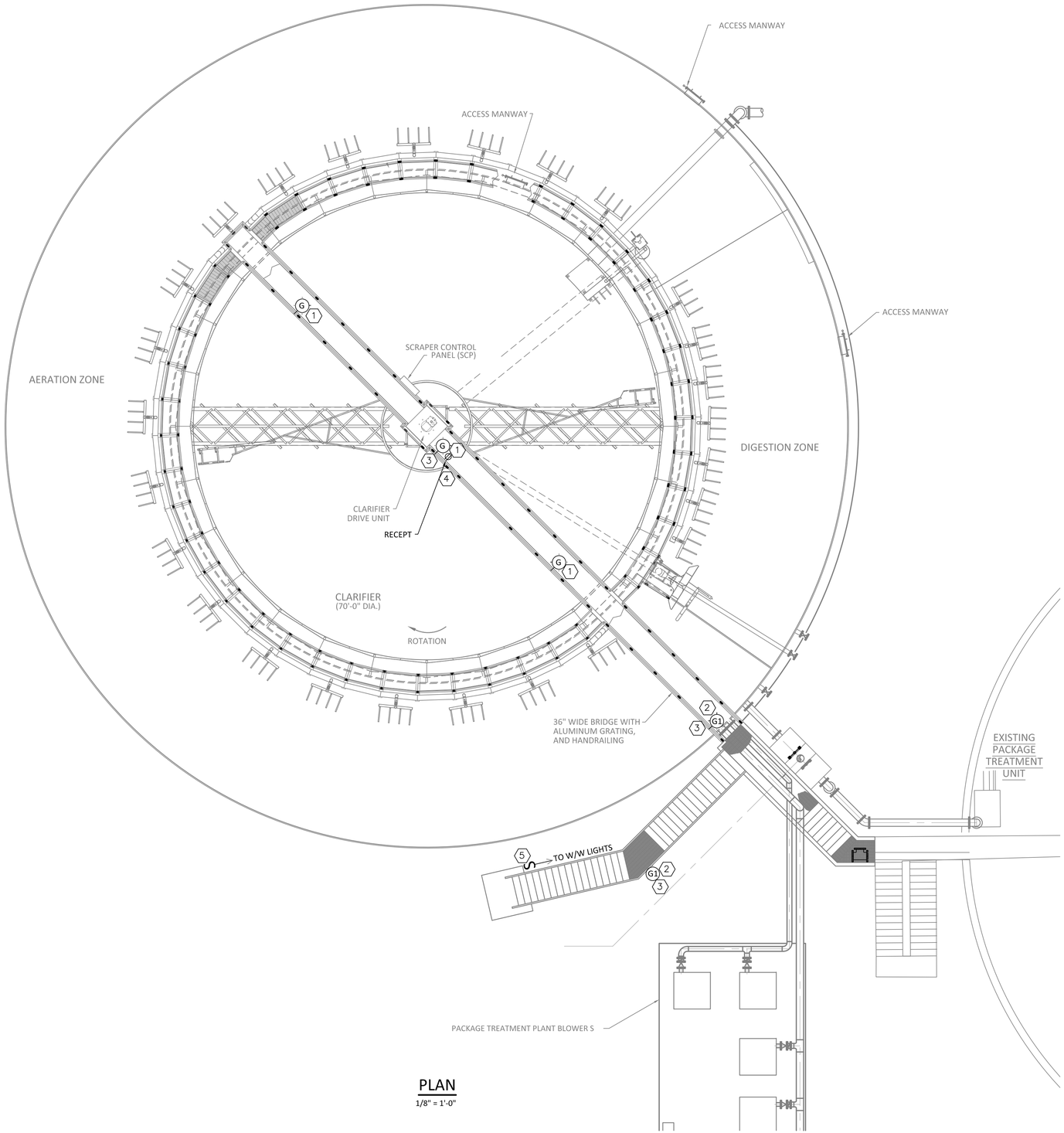
SHEET NO.
E-6

ELLIS
ENGINEERING, L.L.C.
525 BREWSTER RD.
MADISONVILLE, LA 70447
(504) 415–7670
PROJECT No. 21001
JAMES W. ELLIS II, P.E., LOUISIANA LICENSE # 31603



PLAN
1/8" = 1'-0"

8/29/16

GENERAL NOTES THIS SHEET

A. ALL CONDUIT SHALL BE 3/4" MIN AND CONTAIN A #12 GRD MIN. ALL POWER WIRING SHALL BE MIN #12 AWG.
B. ORIENT ND TYPE DISTRIBUTION FOR LIGHT FIXTURES ALONG WALKWAY.
C. PROVIDE UNSWITCHED 120V TO FIXTURES WITH EMERGENCY BALLASTS.
C. INSTALL CONDUIT ALONG WALKWAY SUPPORTS, NOT HAND RAILS.
C. INSTALL ELECTRICAL DEVICES 18" MINIMUM ABOVE TANK WALL ELEVATION.

SPECIFIC NOTES THIS SHEET

1. PROVIDE TYPE G FIXTURE WITH ND TYPE DISTRIBUTION THIS LOCATION. PROVIDE ALL MOUNTING HARDWARE REQUIRED. SEE SPECIFICATIONS AND DETAILS. HOME RUN 3#10, 1#10G TO MPZ–A.
2. PROVIDE TYPE G FIXTURE WITH WD TYPE DISTRIBUTION THIS LOCATION. PROVIDE ALL MOUNTING HARDWARE REQUIRED. SEE SPECIFICATIONS AND DETAILS. HOME RUN 3#10, 1#10G TO MPZ–A.
3. PROVIDE HOLOPHANE BSL310HAZB BATTERY PACK FOR THIS FIXTURE.
4. PROVIDE WEATHER PROOF, GFCI, DUPLEX, RECEPTACLE, WITH IN USE COVER. HOME RUN TO PANEL MPZ–A.
5. LOCATE SWITCH FOR LIGHTS ABOVE AT BOTTOM OF STAIR. DO NOT ATTACH TO TOP HANDRAIL.

LIGHT FIXTURE TYPE G AND G1, STANCHION MOUNT

74W, LED, 120 VOLT, PRISMATIC GLASS FOR LONG, NARROW DISTRIBUTION ALONG WALKWAYS, AND SYMMETRICAL DISTRIBUTION AT OTHER AREAS.
.PROVIDE STANCHION MOUNT ADAPTER FOR STANCHION MOUNTED UNITS

TYPE G – HOLOPHANE PXLH–10000LM–ND–120–40K–80–XX–WG.
TYPE G1 – HOLOPHANE PXLH–10000LM–WD–120–40K–80–XX–WG

CADD FILE NAME:
E-7 WWTP - 21001.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
JWE	JWE	JWE	14066

SCALE: (22x34) 1/8"=1'-0" | SCALE: (11x17) - | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

ST. TAMMANY PARISH PROJECT NO. TU17000251
ST. TAMMANY PARISH BID NO. 21-21-2

TREATMENT PLANT ELECTRICAL

NO.	DATE:	REVISIONS	APP'D

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SHEET NO.
E-7

ELLIS
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525 BREWSTER RD.
MADISONVILLE, LA 70447
(504) 415–7670
PROJECT No. 21001
JAMES W. ELLIS II, P.E., LOUISIANA LICENSE # 31603

SPECIFIC NOTES THIS SHEET

1. EXISTING MDP TO BE REMOVED AND REPLACED AS SHOWN.
2. APPROXIMATE LOCATON OF NEW PANEL MDP WITH GENERATOR INPUT,KIRK KEY INTERLOCKED, BREAKER. PROVIDE A 4" CONCRETE HOUSEKEEPING PAD BELOW PANEL AND EXTENDING 3.5' IN FRONT OF PANEL.
3. THE EXISTING FEEDER FOR THE EXISTING TREATMENT PLANT, (200A, 3P), SHALL BE EXTENDED TO NEW PANEL MDP WITH 3#3/0 AWG AND 1#4 G. IN 2" C. SEE GENERAL NOTES THIS SHEET FOR ALLOWABLE DOWN TIME.
4. PROVIDE WEATHER PROOF, GFCI, DUPLEX, RECEPTACLE, WITH IN USE COVER. HOME RUN TO ASSOCIATED BREAKER IN PANEL MPZ-A.
5. CLECO TRANSFORMER TO BE UPGRADED TO ACCOMMODATE NEW ELECTRICAL LOAD. COORDINATE WITH CLECO.

GENERAL NOTES THIS SHEET

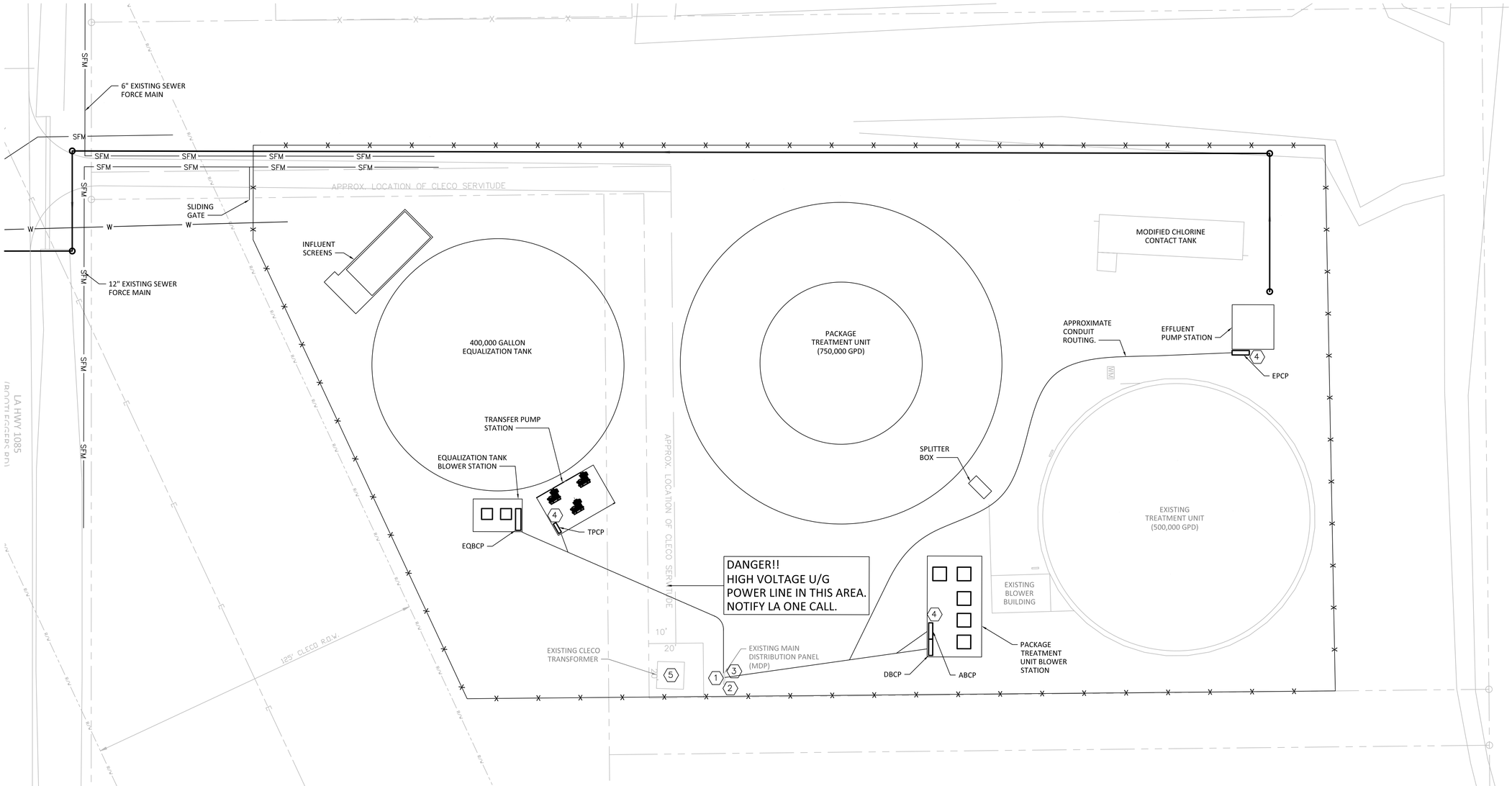
A. ALL CONDUIT SHALL BE 3/4" MIN AND CONTAIN A #12 GRD MIN. ALL POWER WIRING SHALL BE MIN #12 AWG.

B. PROVIDE TEMPORARY POWER AS NECESSARY TO OPERATE EXISTING EQUIPMENT DURING CONSTRUCTION. DOWNTIME SHALL NOT EXCEED 2 HOURS CONTINUOUSLY. IF NECESSARY, PROVIDE A PROPERLY SIZED GENERATOR TO OPERATE THE EXISTING 200A, 3P, 480V, FEEDER FOR THE EXISTING EQUIPMENT. ENSURE THAT GENERATOR CAN START THE EXISTING MOTORS.

C. PRIOR TO START OF PROJECT, CONTACT LOUISIANA ONE CALL AND COORDINATE WITH OWNER TO LOCATE UNDERGROUND UTILITIES. ANY BROKEN MARKED UTILITIES OR ELECTRICAL LINES SHALL BE IMMEDIATELY FIXED BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.

D. PROVIDE PULL BOXES AS NECESSARY. SEE SPECIFICATIONS.

E. FEEDERS SHALL BE BURIED MINIMUM 3' BELOW GRADE. PROVIDE METALLIC MARKER TAPE 12" ABOVE CONDUITS.



0 10 20 40
SCALE IN FEET

ELECTRICAL SITE PLAN

1"-20'-0"

8/29/16

CADD FILE NAME: E-8 Site - 21001.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
JWE	JWE	JWE	14066

SCALE: (22x34) 1"=20'-0" | SCALE: (11x17) 1"=40'-0" | DATE: JULY 30, 2021

WEST ST. TAMMANY WWTP EXPANSION

COVINGTON, LOUISIANA

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ELECTRICAL SITE PLAN

NO.	DATE:	REVISIONS	APP'D

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SHEET NO.

E-8

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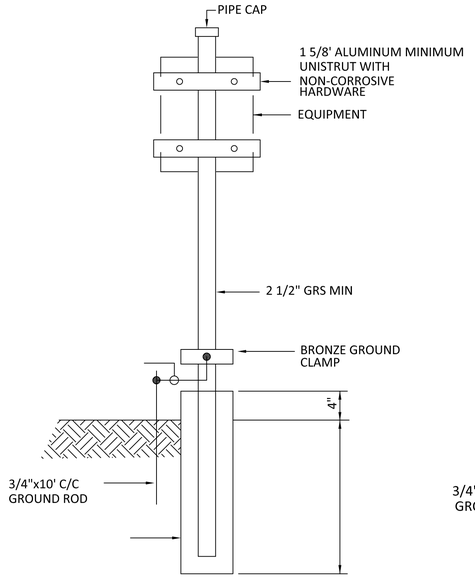
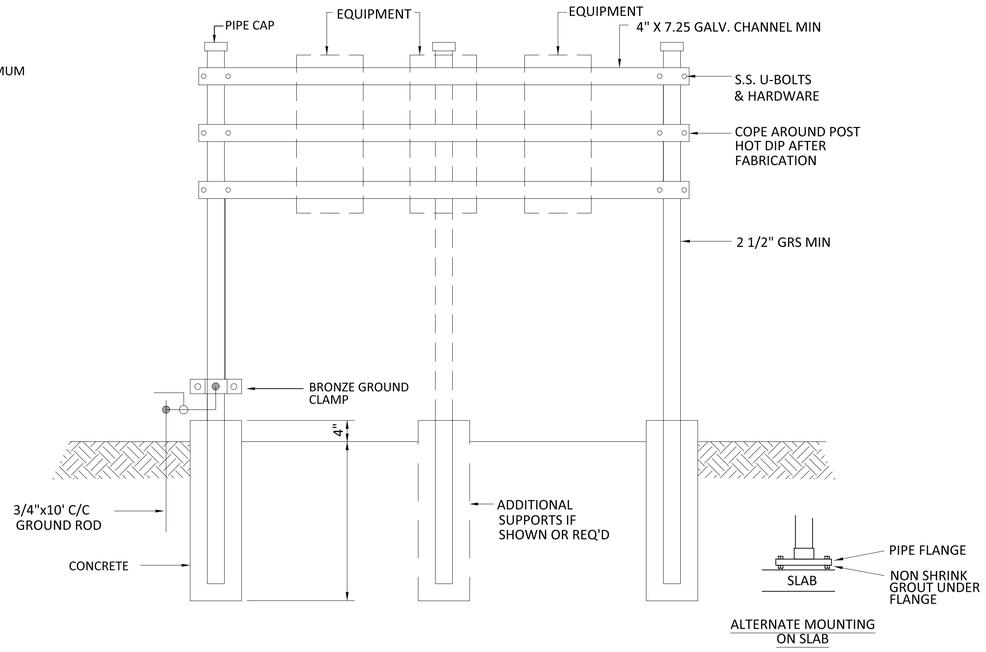
(504) 415-7670
PROJECT No. 21001
JAMES W. ELLIS II, P.E., LOUISIANA LICENSE # 31603

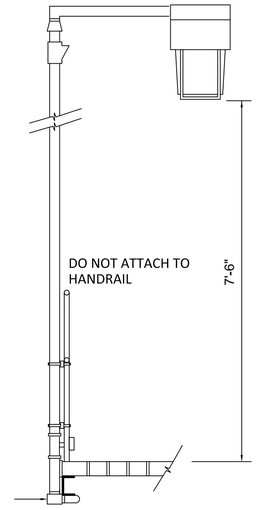


ELECTRICAL & INSTRUMENT EQUIPMENT
MOUNTING - SMALL PANELS

NTS



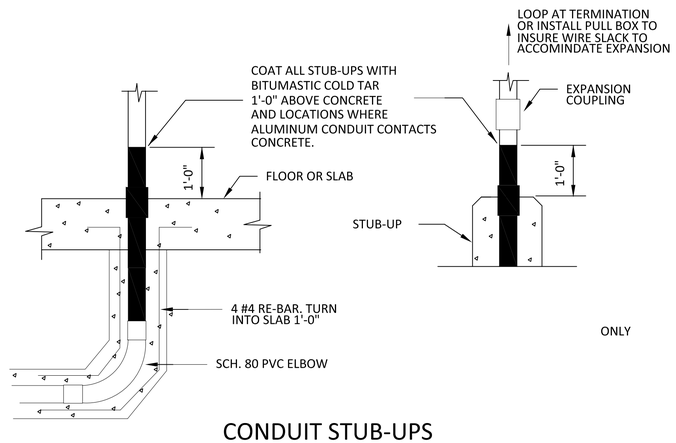
ELECTRICAL & INSTRUMENT EQUIPMENT
MOUNTING - LARGE OR MULTIPLE PANELS



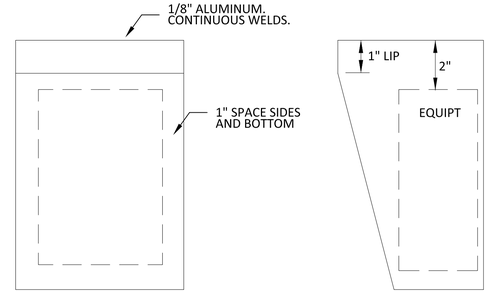
LIGHT FIXTURE DETAIL

GENERAL NOTES THIS SHEET

A. LIGHT FIXTURE SUPPORT SHALL MEET LOCAL WIND REQUIREMENTS.



CONDUIT STUB-UPS



ALUMINUM SUNSHIELD

FOR ALL OUTDOOR EQUIPMENT
WITH DISPLAYS

CADD FILE NAME:
E-9 Details - 21001.dwg

DESIGNED BY:	DRAWN BY:	CHECKED BY:	JOB NO.
JWE	JWE	JWE	14066

SCALE: (22x34) NO SCALE
SCALE: (11x17)
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ST. TAMMANY PARISH PROJECT NO. TU17000251
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DETAILS

REVISIONS

NO.	DATE:	APP'D

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SHEET NO.
E-9

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